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TOPAZ2D Heat Transfer Code Users Manual and Thermal Property Data Base

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"Forty-two!" yelled Loonquawl. "Is that all you've got to show for seven and a half million years' work?"

"I checked it very thoroughly," said the computer, "and that quite definitely is the answer. I think the problem, to be quite honest with you, is that you've never actually known what the question is."

The Hitchhiker's Guide to the Galaxy
Douglas Adams

1 *Introduction*

TOPAZ2D is a two dimensional implicit finite element computer code for heat transfer analysis. This user's manual provides information on the structure of a TOPAZ2D input file. Also included is a material thermal property data base. This manual is supplemented with The TOPAZ2D Theoretical Manual [1] and The TOPAZ2D Verification Manual [2]. TOPAZ2D has been implemented on the CRAY, SUN, and VAX computers.

TOPAZ2D can be used to solve for the steady state or transient temperature field on two dimensional planar or axisymmetric geometries. Material properties may be temperature dependent and either isotropic or orthotropic. A variety of time and temperature dependent boundary conditions can be specified including temperature, flux, convection, and radiation. Time or temperature dependent internal heat generation can be defined locally by element or globally by material. TOPAZ2D can solve problems of diffuse and specular band radiation in an enclosure coupled with conduction in the material surrounding the enclosure. Additional features include thermally controlled reactive chemical mixtures, thermal contact resistance across an interface, bulk fluid flow, phase change, and energy balances. Thermal stresses can be calculated using the solid mechanics code NIKE2D [3] which reads the temperature state data calculated by TOPAZ2D. A three dimensional version of the code, TOPAZ3D [4], is available.

The material thermal property data base, Chapter 4, included in this manual was originally published in 1969 by Art Edwards [5] for use with his TRUMP [6] finite difference heat transfer code. The format of the data base has been altered to be compatible with TOPAZ2D. Bob Bailey is responsible for adding the high explosive thermal property data.

2 *Execution and Input*

2.1 Terminal Execution Line

TOPAZ2D is a public file on all CRAY machines at LLNL. The terminal execution line for TOPAZ2D is

topaz2d i=inf o=otf g=ptf v=vff d=dpf r=rtf t=tpf

where

- inf=text input file containing control information, material properties, node point coordinates, element connectivity, and boundary condition specifications.
- otf=text output file containing for selected time steps the temperature and heat flux at each node point, and energy balances. The default root name is "tprint".
- ptf=binary output plot file containing geometry, temperature, and flux information to be graphically displayed using the post processor ORION [7]. The default root name is "t2plot".
- vff=binary input file containing view factors calculated using the code FACET [8] or exchange factors calculated using the code MONTE2D [9]. The default name is "fabs".
- dpf=binary output file containing information necessary to restart TOPAZ2D. This is a dump file with the default root name "t2dump".
- rtf=binary input file containing information necessary to restart TOPAZ2D. This is a dump file from a previous run.
- tpf=text input file that can be used to define node initial temperatures. This is the "newfile" created from a previous steady state run.

File name dropouts are permitted, for example

topaz2d i=inf g=tpf

A help package containing file assignment descriptions, a chronological list of bug fixes and modifications, and undocumented features can be accessed by typing

topaz2d help

2.2 Interactive Controls

Several interactive controls are available to the user when executing TOPAZ2D. The controls allow the user to query the status of the code execution or to terminate execution. The interrupt commands and their resulting system response are described in the following list.

- sw1. a dump file is written and TOPAZ2D terminates
- sw2. TOPAZ2D responds with time, cycle number, and solution convergence information
- sw3. TOPAZ2D responds with time, cycle number, and solution convergence information until sw3. is retyped
- sw4. a dump file is written and TOPAZ2D continues execution
- sw5. not used
- sw6. requests input of up to 5 node numbers whose temperature along with time will be printed for succeeding time steps until sw6. is retyped

On workstations (e.g., SUN, IRIS), first type control-c for a system interrupt and then type the above commands for the desired action.

2.3 Input File

The interactive pre-processor MAZE [10] is recommended to generate an input file. The following notes are referenced by number in the data cards that follow.

1. Time dependent, temperature dependent, and constant functional relations are indicated by positive, negative, and zero curve numbers, respectively. The constant value will be the curve multiplier.
2. By convention, heat flow is positive in the direction of the surface outward normal vector. Surface definition is in accordance with the right hand rule. The outward normal vector points to the right as one progresses from node n_1 to n_2 .

3. The curve multiplier on a boundary segment is allowed to vary in a linear fashion by specifying separate values at each end of the segment.

Comment Lines - A line with the symbol * or \$ in column 1 will be treated as a comment line. Comment lines can appear anywhere in the input file.

2.3.1 Control Card 1

<i>column</i>	<i>format</i>	<i>quantity</i>
1-72	A72	title

2.3.2 Control Card 2

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	number of materials (nummat)
6-10	I5	number of node points (numnp)
11-15	I5	number of elements (numel)
16-20	I5	type of geometry (1=axisymmetric; 2=plane)
21-25	I5	bandwidth minimization eq.0: no minimization (default) eq.1: minimization eq.2: nodal destination vector read from input file
26-30	I5	number of function curves used to describe thermal loadings or boundary conditions (ncurv)
31-35	I5	number of data pairs required to define the curve with the most data points (npmax)
36-40	I5	number of slide lines (nsl)
41-45	I5	total number of slave nodes (nslvt)
46-50	I5	total number of master nodes (nmsrt)

2.3.3 Control Card 3

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	number of elements with internal heat generation (nhgen)
6-10	I5	number of nodes at which nonzero initial temperatures are specified (nit)
11-15	I5	number of nodes at which temperature boundary conditions are specified (ntbc)
16-20	I5	number of flux boundary condition segments (nfbc)
21-25	I5	number of convection boundary condition segments (ncbc)
26-30	I5	number of radiation boundary condition segments (nrbc)
31-35	I5	number of enclosure radiation segments (nebc)
36-40	I5	number of radiation bands (nband)
41-45	I5	number of emissivity vs. wavelength curves (necurv)
46-50	I5	radiation calculation type (irtype) (positive values indicate that the view factor or exchange factor matrix will be read from file vfl, negative values indicate that they will be read from this file) eq.1: view factors eq.2: exchange factors eq.3: black body exchange factors
51-55	I5	number of special internal boundary elements (nibc)
56-60	I5	number of bulk nodes (nbn)
61-65	I5	number of bulk node segments (nbns)
66-70	I5	number of chemical reacting elements (nre)

2.3.4 Control Card 4

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	analysis type (itran) eq.0: steady state eq.1: transient with consistent mass matrix eq.2: transient with lumped mass matrix

define the following variables for a transient analysis

6-10	I5	time step codes (lstep) eq.0: fixed time step eq.1: variable time step
11-15	I5	number of time steps between printed data output (default 1)
16-20	I5	number of time steps between plotted data output (default 1)
21-25	I5	number of time steps between dump file generation (default - at end of run)
26-30	E10.0	time integration parameter eq. 0.5 - Crank Nicolson (default) eq. 1.0 - fully implicit

2.3.5 Control Card 5

If steady state solution, leave this card blank.

fixed time step (istep=0)

<i>column</i>	<i>format</i>	<i>quantity</i>
1-10	E10.0	initial problem time
11-20	E10.0	final problem time
21-30	E10.0	time step size

variable time step (istep=1)

<i>column</i>	<i>format</i>	<i>quantity</i>
1-10	E10.0	initial problem time
11-20	E10.0	final problem time
21-30	E10.0	initial time step size
31-40	E10.0	minimum time step size (default set to 1% of the smallest time constant (dtmin))
41-50	E10.0	maximum time step (default 100*dtmin)
51-60	E10.0	maximum temperature change in each time step above which the time step will be decreased
61-70	E10.0	time step control parameter $0. < p < 1.$ (default 0.5)

2.3.6 Control Card 6

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	type of problem eq.0: linear eq.1: nonlinear problem - material properties evaluated at gauss point temperature eq.2: nonlinear problem - material properties evaluated at element average temperature

define the following variables for a nonlinear analysis

<i>column</i>	<i>format</i>	<i>quantity</i>
6-10	I5	maximum number of reformations per time step (default 10)
11-15	I5	maximum number of equilibrium iterations per reformation (default 1)
16-25	E10.0	convergence tolerance (default 0.001)
26-35	E10.0	divergence control parameter
		steady state $0.3 \leq p \leq 1.0$ (default 1.0)
		transient $0.0 < p \leq 1.0$ (default 0.5)

2.3.7 Material Property Data

Repeat the following set of cards for 'nummat' (from Control Card 2) materials. Each material must have a control card plus a number of property specification cards. The number of property specification cards required is dependent on the material type. A total of 'nummat' (from control card 1) sets must be defined. The material numbers must be in numerical sequence beginning with the number 1.

If a temperature dependent material model is used and the solution temperature is outside the range of the defined property data, the appropriate extreme value of the data will be used for the property. The property data is not extrapolated. A warning message is printed to the terminal if an out of range condition is encountered.

control card

column	format	quantity
1-10	A10	material identification name
11-15	I5	material identification number
16-20	I5	material type eq.1: isotropic eq.2: orthotropic eq.3: isotropic, temperature dependent eq.4: orthotropic, temperature dependent eq.5: isotropic, temperature dependent from thermal property data base eq.6: power law eq.7: high temperature cut off material
21-30	E10.0	density
31-40	E10.0	transition temperature
41-50	E10.0	latent heat of transition
51-60	I10	thermal generation rate curve number (note 1)
61-70	E10.0	thermal generation rate multiplier
70-80	E10.0	material angle ψ_g in degrees for an orthotropic material

material type 1 - isotropic - define 1 card

<i>card</i>	<i>column</i>	<i>format</i>	<i>quantity</i>
1	1-10	E10.0	heat capacity
	11-20	E10.0	thermal conductivity

material type 2 - orthotropic - define 1 card

<i>card</i>	<i>column</i>	<i>format</i>	<i>quantity</i>
1	1-10	E10.0	heat capacity
	11-20	E10.0	thermal conductivity k_1
	21-30	E10.0	thermal conductivity k_2

material type 3 - isotropic, temperature dependent - define 3 cards

<i>card</i>	<i>column</i>	<i>format</i>	<i>quantity</i>
1	1-80	8E10.0	temperature: $T_1, T_2, \dots, T_8$
2	1-80	8E10.0	heat capacity: $c_1, c_2, \dots, c_8$
3	1-80	8E10.0	thermal conductivity: $k_1, k_2, \dots, k_8$

material type 4 - orthotropic, temperature dependent - define 4 cards

<i>card</i>	<i>column</i>	<i>format</i>	<i>quantity</i>
1	1-80	8E10.0	temperature: $T_1, T_2, \dots, T_8$
2	1-80	8E10.0	heat capacity: $c_1, c_2, \dots, c_8$
3	1-80	8E10.0	thermal conductivity: $k_{11}, k_{12}, \dots, k_{18}$
4	1-80	8E10.0	thermal conductivity: $k_{21}, k_{22}, \dots, k_{28}$

material type 5 - isotropic, temperature dependent from material property data base

The material property data base is presented in Chapter 4. Card 1 must be included. The number of additional cards required is dependent on the number of property vs. temperature data pairs for heat capacity and thermal conductivity. A maximum of 24 data pairs (contained on 6 cards) can be defined for each of these properties. See Chapter 4 for more details. The use of this material can be very cpu time intensive because 2 table lookups are required - one for heat capacity and the second for thermal conductivity.

<i>card</i>	<i>column</i>	<i>format</i>	<i>quantity</i>
1	1-5	I5	number of heat capacity data points, n_c
	6-10	I5	number of thermal conductivity data points, n_k
	11-20	E10.0	heat capacity
	21-30	E10.0	thermal conductivity

if $n_c > 1$, then include heat capacity vs. temperature data

2, ..., m 1-80 8E10.0 $T_1, c_1, T_2, c_2, \dots, T_n, c_n$ $2 \leq n_c \leq 24$

if $n_k > 1$, then include thermal conductivity vs. temperature data

m+1, ... 1-80 8E10.0 $T_1, k_1, T_2, k_2, \dots, T_n, k_n$ $2 \leq n_k \leq 24$

material type 6 - power law - define 2 cards

The heat capacity and thermal conductivity are represented by a cubic polynomial.

- heat capacity $c = c_0 + c_1 T + c_2 T^2 + c_3 T^3$
- thermal conductivity $k = k_0 + k_1 T + k_2 T^2 + k_3 T^3$

The use of this material model is desirable for nonlinear problems because the polynomials are evaluated by in-line code (i.e., no table lookups are required).

<i>card</i>	<i>column</i>	<i>format</i>	<i>quantity</i>
1	1-40	4E10.0	heat capacity coefficients: c_0, c_1, c_2, c_3
2	1-40	4E10.0	thermal conductivity coefficients: k_0, k_1, k_2, k_3

material type 7 - high temperature cutoff - define 4 cards

This material is isotropic, temperature dependent with a temperature cutoff above which the material assumes a constant value of thermal conductivity. This allows simulation of materials that are transparent or opaque to heat flow above the cutoff temperature. Suggested values for the thermal conductivity are:

- for a thermally transparent material $k = k_0 \times 10^2$
- for a thermally opaque material $k = k_0 \times 10^{-2}$

where k_0 is a nominal value for the thermal conductivity of the material.

<i>card</i>	<i>column</i>	<i>format</i>	<i>quantity</i>
1	1-80	8E10.0	temperature: $T_1, T_2, \dots, T_8$
2	1-80	8E10.0	heat capacity: $c_1, c_2, \dots, c_8$
3	1-80	8E10.0	thermal conductivity: $k_1, k_2, \dots, k_8$
4	1-10	E10.0	temperature cutoff
	11-20	E10.0	thermal conductivity after cutoff

2.3.8 Node Point Data

Define 'numnp' (from Control Card 2) node points.

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	node point number, n_i
6-10	5x	skip
11-20	E10.0	x or r coordinate
21-30	E10.0	y or z coordinate
31-40	E10.0	temperature initial condition
41-45	I5	generation increment, k

Node point cards do not need to be in order. However, the highest node point number must terminate the node data. When node data is missing, node numbers are generated according to the sequence

$$n_i, n_i+k, n_i+2k, \dots, n_j$$

where n_i and n_j are the node numbers defined on two consecutive cards, and k is taken from the first card. Linear interpolation is used to obtain the coordinate of the generated nodes and the node temperatures.

2.3.9 Element Data

Define 'numel' (from Control Card 2) elements.

column	format	quantity
1-5	I5	element number
6-10	I5	node n_1
11-15	I5	node n_2
16-20	I5	node n_3
21-25	I5	node n_4
26-30	I5	material number
31-35	I5	number of elements to be generated following this one
36-40	I5	element node point generation increment, k

Element cards are assumed to be in element number sequence. The highest element number must terminate the data. Omitted data is automatically generated by incrementing the elements by 1 and the node points by $n_{i+1} = n_i + k$. Element node numbers, n_i , can begin at any apex of the element and must be numbered counterclockwise around the element. The convention for numbering node points is shown below.

2.3.10 Slide Line Data

Define a control card for each slide line. A total of 'nsl' (from Control Card 2) control cards are required. Following the control cards, include 'nsl' sets of slide line definition cards.

control card

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	number of slave nodes in slide line (nsn)
6-10	I5	number of master nodes in slide line (nmn)

Repeat the following set of cards for each slide line $1 \leq n \leq nsl$. Each set should include a total of $1+nsn+nmn$ cards.

<i>card</i>	<i>column</i>	<i>format</i>	<i>quantity</i>
1	1-10	E10.0	thermal contact resistance (must be > 0)
include nsn slave definition cards for slide line n			
2,...,nsn+1	1-5	I5	slave number
	6-10	I5	node point number
include nmn master surface definition cards for slide line n			
nsn+2,.....	1-5	I5	master number
	6-10	I5	node point number

2.3.11 Thermal Generation Rate Data

Define 'nhgen' (from Control Card 3) thermal generation element cards. Volumetric thermal generation rate data may be entered in 2 places: on the material property data cards and in this section by element number. If thermal generation is specified in both locations, the effect is additive.

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	element number
6-10	5X	skip
11-15	I5	number of elements to be generated following this one
16-20	I5	element number generation increment
21-25	I5	thermal generation rate curve number (see note 1)
26-35	E10.0	thermal generation rate multiplier

2.3.12 Temperature Initial Condition Data

Define 'nit' (from Control Card 3) node point temperature initial condition cards. Node point temperature initial condition data can be specified in 3 locations. The precedence from highest to lowest order is: from this section, from file "tic", from node point data cards (i.e., data from this section will overwrite all other data). This section is needed only if nit>0.

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	node number
6-10	5X	skip
11-15	I5	number of nodes to generate following this one
16-20	I5	node number generation increment
21-30	E10.0	initial temperature

2.3.13 Temperature Boundary Condition Data

Define 'ntbc' (from Control Card 3) node point temperature boundary condition cards.

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	node number
6-10	5X	skip
11-15	I5	number of nodes to generate following this one
16-20	I5	node number generation increment
21-25	I5	temperature boundary condition curve number (note 1)
26-35	E10.0	temperature boundary condition curve multiplier

2.3.14 Flux Boundary Condition Data

Define 'nfbce' (from Control Card 3) flux boundary condition segment cards.

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	node n_1 (note 2)
6-10	I5	node n_2
11-15	I5	number of segments to generate following this one
16-20	I5	node number generation increment, k
21-25	I5	flux curve number (note 1)
26-35	E10.0	flux curve multiplier at node n_1 (note 3)
36-45	E10.0	flux curve multiplier at node n_2

Omitted data is automatically generated by incrementing the segment number by 1 and the node points by $n_{i+1} = n_i + k$.

CAUTION: Remember that flux is a vector. **Flux into the body is a negative quantity** because its direction is opposite to that of the surface outward normal vector.

2.3.15 Convection Boundary Condition Data

Define 'nebc' (from Control Card 3) convection boundary condition segment cards.

column	format	quantity
1-5	I5	node n_1 (note 2)
6-10	I5	node n_2
11-15	I5	number of segments to generate following this one
16-20	I5	node number generation increment, k
21-25	I5	heat transfer coefficient, h_c , curve number (note 1)
26-35	E10.0	h_c curve multiplier
36-45	E10.0	free convection exponent
46-50	I5	T_∞ curve number (note 1)
51-60	E10.0	T_∞ curve multiplier at node n_1 (note 3)
61-70	E10.0	T_∞ curve multiplier at node n_2

Omitted data is automatically generated by incrementing the segment number by 1 and the node points by $n_{i+1} = n_i + k$.

The general form of the convection boundary condition is $q = h_c (T - T_\infty)^a (T - T_\infty)$, where ' h_c ' is the convection heat transfer coefficient and ' a ' is the free convection exponent.

TABLE 1 Values of h & a for Air Flow [13]

Geometry	flow	h_c [W/m ² K]	a
horizontal plates			
upper surface heated or lower surface cooled	turbulent	1.52	0.33
	laminar	$1.32 / L^{0.25}$	0.25
upper surface cooled or lower surface heated	laminar	$0.59 / L^{0.25}$	0.25
horizontal cylinders			
	turbulent	1.24	0.33
	laminar	$1.32 / D^{0.25}$	0.25
vertical plates and cylinders			
	turbulent	1.31	0.33
	laminar	$1.42 / L^{0.025}$	0.25

2.3.16 Radiation Boundary Condition Data

Define 'nrbc' (from Control card 3) radiation boundary condition segment cards.

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	node n_1 (note 2)
6-10	I5	node n_2
11-15	I5	number of segments to generate following this one
16-20	I5	node number generation increment, k
21-25	I5	heat transfer coefficient, h_r , curve number (note 1)
26-35	E10.0	h_r curve multiplier
36-40	I5	T_∞ curve number (note 1)
41-50	E10.0	T_∞ curve multiplier at node n_1 (note 3)
51-60	E10.0	T_∞ curve multiplier at node n_2

Omitted data is automatically generated by incrementing the segment number by 1 and the node points by $n_{i+1} = n_i + k$.

The heat transfer coefficient for radiation is defined as $h_r = \sigma \epsilon F$, where σ is the Stefan Boltzmann constant (see Chapter 5 for values), ϵ is the surface emissivity, and F is the view factor between the surface and the environment (usually $F=1$).

2.3.17 Enclosure Radiation Data

The enclosure radiation data consists of 1 control card, 'nebc' surface segment definition cards, 1 wavelength breakpoint card, and 'necurv' emissivity cards ('nebc' and 'necurv' are defined on Control Card 3). These cards are then followed by the view factor matrix or exchange factor matrix if 'irtype' is negative on Control Card 3.

control card

<i>column</i>	<i>format</i>	<i>quantity</i>
1	A1	K for Kelvin, or R for Rankine temperature units
2-10	E9.0	Stefan Boltzmann constant (see Chapter 5 for values)
define the following variables if nband>1		
11-20	E10.0	radiosity convergence tolerance (default .0E-04)
21-25	I5	maximum number of radiosity iterations (default 100)

define 'nebc' surface segment cards

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	segment number
6-10	I5	node n_1 (note 2)
11-15	I5	node n_2
16-30	15X	skip
31-35	I5	number of segments to be generated following this one
36-40	I5	node point generation increment
41-45	I5	eq.0: segment is part of a conduction element eq.1: segment is not part of a conduction element
46-50	I5	emissivity curve number
51-60	E10.0	if the emissivity curve number is 0, then the emissivity is set to 1. and the segment temperature should be entered here.

wavelength breakpoint card

<i>column</i>	<i>format</i>	<i>quantity</i>
1-80	8E10.0	wavelength breakpoints $\lambda_1, \lambda_2, \dots, \lambda_8$

define 'necurv' emissivity vs wavelength cards

<i>column</i>	<i>format</i>	<i>quantity</i>
1-80	8E10.0	emissivity $\epsilon_1, \epsilon_2, \dots, \epsilon_8$

view factor and exchange factor matrix definition if irtype<0.

If 'irtype' is negative on Control card 3, then the viewfactor (irtype=-1) or exchange factor (irtype=-2 or -3) matrix should be included next. The matrix should be entered by rows in 8E10.0 format until 'necb' factors have been entered for that row. The first factor for the next row should begin a new card.

The view factor matrix is symmetric. Its structure is.

$$\begin{bmatrix} A_1 F_{11} & A_1 F_{12} & \circ & A_1 F_{1N} \\ A_2 F_{21} & A_2 F_{22} & \circ & A_2 F_{2N} \\ \circ & \circ & \circ & \circ \\ A_N F_{N1} & A_N F_{N2} & \circ & A_N F_{NN} \end{bmatrix}$$

The exchange factor matrix is not symmetric. Note also that it is entered as F^T

$$\begin{bmatrix} F_{11} & F_{21} & \circ & F_{N1} \\ F_{12} & F_{22} & \circ & F_{N2} \\ \circ & \circ & \circ & \circ \\ F_{1N} & F_{2N} & \circ & F_{NN} \end{bmatrix}$$

2.3.18 Internal Boundary Elements

Define 'nibc' (from Control Card 3) internal boundary elements.

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	surface A, node n_1
6-10	I5	surface A, node n_2
11-15	I5	surface B, node n_3
16-20	I5	surface B, node n_4
21-25	I5	number of internal elements to be generated following this one
26-30	I5	node number generation increment for nodes on surface A
31-35	I5	node number generation increment for nodes on surface B
36-40	I5	thermal conductance, f , curve number (note 1)
41-50	E10.0	f curve multiplier
51-60	E10.0	exponent a
61-70	E10.0	exponent b

Internal boundary elements allow thermal coupling between two surfaces (e.g., across a gap between 2 parts) according to the formula

$$q = f(\theta, t) (\theta_A^a - \theta_B^a)^b$$

Four nodes are required to define an internal boundary element. These nodes should be numbered as shown in the following figure. No two node numbers may be the same. However, nodes n_1 and n_4 , and nodes n_2 and n_3 can have the same coordinates.

2.3.19 Bulk Node Data

Bulk node data consists of 'nbn' (from Control Card 3) sets of the following cards.

control card

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	bulk node number
6-10	I5	bulk node material number
11-15	I5	number of boundary segments associated with this bulk node (nbseg)
16-25	E10.0	bulk node volume

include 'nbseg' segment definition cards for this bulk node

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	node n_1 (note 2)
6-10	I5	node n_2
11-15	I5	number of segments to be generated following this one
16-20	I5	node point generation increment
21-25	I5	thermal conductance, f, curve number
26-35	E10.0	f curve multiplier
36-45	E10.0	exponent a
46-55	E10.0	exponent b

The heat flow between a bulk node, B, and an adjoining surface, S, is given by $q = f(\theta, t) (\theta_s^a - \theta_b^a)^b$.

2.3.20 Chemical Reaction Data

Define 4 control cards that specify the reaction kinetics (see Chapter 5 for values) followed by 'nre' (from Control Card 3) element definition cards.

control cards

<i>card</i>	<i>column</i>	<i>format</i>	<i>quantity</i>
1	1-10	E10.0	gas constant (see Chapter 5 for values)
	11-20	E10.0	density
2	1-30	3E10.0	heat of decomposition Q_1, Q_2, Q_3
3	1-30	3E10.0	log collision frequency $\ln Z_1, \ln Z_2, \ln Z_3$
4	1-30	3E10.0	activation energy E_1, E_2, E_3

define 'nre' element cards

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	element number
6-10	5X	skip
11-15	I5	number of elements to be generated following this one
16-20	I5	element number generation increment
21-30	E10.0	starting concentration of species a
31-40	E10.0	starting concentration of species b
41-50	E10.0	starting concentration of species c

2.3.21 Function Curve Data

Each function curve definition consists of a control card followed by (x,y) data pairs. The x values, which are either time or temperature, must be in ascending order.

Values of a function at intermediate values are obtained by linear interpolation. Values outside the range of a curve results in a warning message and continuation of the problem using the last value in the curve.

control card

<i>column</i>	<i>format</i>	<i>quantity</i>
1-10	A10	curve identification
11-15	I5	curve number (+ = time function; - = temperature function)
15-20	I5	number of data pairs in this curve (np)

define 'np' data pair cards

<i>column</i>	<i>format</i>	<i>quantity</i>
1-10	E10.0	time or temperature
11-20	E10.0	function value

2.3.22 Transient Problem Continuation Cards

This data is used when it is desired to have discrete time breakpoints during a transient run, such as for pulse type heat sources. The time breakpoints will be reached exactly by modifying the time step. There is no limit on the number of time continuation cards.

<i>column</i>	<i>format</i>	<i>quantity</i>
1-10	E10.0	new starting time step
11-20	E10.0	new ending time

3 *Restart Input File*

A restart input file is generally not needed to restart TOPAZ2D. It may be used, however, to reset the following parameters:

- number of additional time steps
- time step control parameters
- output printing and plotting interval
- integration control parameters
- nonlinear iteration control parameters
- function curves
- material properties

An entry of 0 or blank will cause no change in the specified parameter from the previous run unless otherwise noted. All changes made when restarting will be reflected in the next dump file.

The terminal execution line for restarting TOPAZ2D with a restart input file is

topaz2d i=inf r=rtf

where

- inf=text input file containing information according to this chapter.
- rtf=binary input file containing information necessary to restart TOPAZ2D. This is a dump file from a previous run.

3.1 Restart Control Card

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	transient solution parameter change flag (ltran) eq.0: no change eq.1: changed as specified below
6-10	I5	nonlinear solution parameter change flag (nonlin) eq.0: no change eq.1: changed as specified below
11-15	I5	number of materials to be redefined (numat)
16-20	I5	number of loading curves to be redefined (numcur)

3.2 Transient Solution Change Cards

Omit these cards if $i_{tran} = 0$.

<i>card</i>	<i>column</i>	<i>format</i>	<i>quantity</i>
1	1-5	I5	time step code (lstep) eq.0: fixed time step eq.1: variable time step
	6-10	I5	number of time steps between printed data output
	11-15	I5	number of time steps between plotted data output
	16-20	I5	number of time steps between dump file generation
	21-30	E10.0	time integration parameter

Restart Input File

fixed time step (lstep=0)

<i>card</i>	<i>column</i>	<i>format</i>	<i>quantity</i>
2	11-20	E10.0	final problem time
	21-30	E10.0	time step size

variable time step (lstep=1)

<i>card</i>	<i>column</i>	<i>format</i>	<i>quantity</i>
2	11-20	E10.0	final problem time
	21-30	E10.0	time step size
	31-40	E10.0	minimum time step
	41-50	E10.0	maximum time step
	51-60	E10.0	maximum temperature change in each time step above which the time step will be decreased
	61-70	E10.0	time step control parameter $0. < p < 1.$

3.3 Nonlinear Solution Control Card

Omit this card if $\text{nonlin} = 0$.

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	type of problem eq.1: material properties evaluated at gauss point temperature eq.2: material properties evaluated at element average temperature
6-10	I5	maximum number of reformations per time step (default 10)
11-15	I5	maximum number of equilibrium iterations per reformation
16-25	E10.0	convergence tolerance (default 0.001)
26-35	E10.0	divergence control parameter $0.0 < p \leq 1.0$

3.4 Material Property Change Cards

Omit these cards if $\text{numat} = 0$; otherwise, enter data for numat materials as in section 2.3.7. The number of materials redefined (numat) can not exceed the number of materials specified in the original input

3.5 Function Curve Change Cards

Omit these cards if $\text{numcur} = 0$; otherwise, define numcur card sets. Each function curve definition consists of a control card followed by (x,y) data pairs. The x values, which are either time or temperature, must be in ascending order.

control card

<i>column</i>	<i>format</i>	<i>quantity</i>
1-10	A10	curve identification
11-15	I5	curve number (+ = time function; - = temperature function)
15-20	I5	number of data pairs in this curve (np)

define 'np' data pair cards

<i>column</i>	<i>format</i>	<i>quantity</i>
1-10	E10.0	time or temperature
11-20	E10.0	function value

4 Examples

This chapter contains several examples. The only intent of these examples is to provide reference information on creating TOPAZ2D input files. The spacial discretization (i.e., mesh) and time step used may not be the best for solving the problems accurately. The TOPAZ2D Verification Manual [2] should be consulted for a more rigorous verification of the analysis options available in TOPAZ2D against published analytical solutions.

4.1 Composite Cylinder with Thermal Contact Resistance

Carslaw and Jaeger [11] (section 7.2.IV) provide the following analytical equation for steady temperature, radial heat flow in the composite hollow cylinder of three regions (r_1, r_2) , (r_2, r_3) , (r_3, r_4) of thermal conductivities k_1, k_2, k_3 and contact resistances R_2, R_3 over the surfaces at r_2, r_3 .

$$\theta_1 - \theta_4 = \frac{q_1 A_1}{2\pi l} \left(\sum_{a=1}^3 \frac{\ln \left(\frac{r_{a+1}}{r_a} \right)}{k_a} + \sum_{a=2}^3 \frac{R_a}{r_a} \right) \quad (\text{EQ 1})$$

The boundary conditions are

$$q_1 = 10 \text{ Btu/hr ft}^2 \quad l = 1 \text{ ft} \quad \theta_4 = 0 \text{ F}$$

with

$$\begin{array}{lll} r_1 = 1.0 \text{ ft} & k_1 = 3 \text{ Btu/hr ft F} & \\ r_2 = 2.0 & k_2 = 2 & R_2 = 1 \text{ hr ft}^2 \text{ F/Btu} \\ r_3 = 2.5 & k_3 = 1 & R_3 = 1 \\ r_4 = 3.0 & & \end{array}$$

The following table shows the analytical and numerical results. The finite element mesh and TOPAZ2D input listing follow.

TABLE 2 Interface Temperatures [F] for Composite Cylinder with Thermal Contact Resistance

node	analytical	TOPAZ2D
1	14.2494	14.2406
5	11.9389	11.9365
6	6.9389	6.9365
8	5.8232	5.8220
9	1.8232	1.8220
11	0.	0.

FIGURE 1: Schematic of the finite element mesh with interface node numbers displayed.

Following is the TOPAZ2D input file for example 1.

example 1 - composite cylinder with thermal contact resistance

```
3 22 8 1 1 0 0 2 4 4
```

```
2 1
```

```
0
```

```
0. 0. 0.
```

```
0
```

\$ material data

```
matl1 1 1
```

```
3.
```

```
matl2 2 1
```

```
2.
```

```
matl3 3 1
```

```
1.
```

\$ node data

```
1 1.0 0. 1
```

```
5 2.0 0.
```

```
6 2.0 0. 1
```

```
8 2.5 0.
```

```
9 2.5 0. 1
```

```
11 3.0 0.
```

```
12 1.0 1. 1
```

```
16 2.0 1.
```

```
17 2.0 1. 1
```

```
19 2.5 1.
```

```
20 2.5 1. 1
```

```
22 3.0 1.
```

\$ element data

```
1 1 2 13 12 1 3 1
```

```
5 6 7 18 17 2 1 1
```

```
7 9 10 21 20 3 1 1
```

\$ slide line data

```
2 2
```

```
2 2
```

```
1. slide line 1
```

```
1 5
```

```
2 16
```

```
1 6
```

```
2 17
```

```
1. slide line 2
```

```
1 8
```

```
2 19
```

```
1 9
```

```
2 20
```

\$ temperature bc data

```
11 1 11 0 0.
```

\$ flux bc data

```
12 1 0 -10. -10.
```

4.2 Slab with Nonlinear Material Properties

Stewart and Wessling [12] analytically solved the following problem to be used for comparison in validating heat transfer computer codes. They found that several of the computer codes investigated did not correctly handle strong material nonlinearities.

The problem consists of a homogeneous, isotropic slab of finite thickness, L , heated on the front face by a constant and uniform heat flux, q , and insulated on the rear face.

The appropriate form of the heat conduction equation is

$$\frac{\partial}{\partial x} \left(k \frac{\partial T}{\partial x} \right) = \rho c \frac{\partial T}{\partial t} \quad (\text{EQ 2})$$

subject to the initial and boundary conditions

$$\begin{aligned} T(x, 0) &= T_0 \\ \frac{\partial T}{\partial x}(0, t) &= -\frac{q}{k} \\ \frac{\partial T}{\partial x}(L, t) &= 0 \end{aligned} \quad (\text{EQ 3})$$

This problem can be solved analytically for the special case $k=k(T)$, $c=c(T)$, and $\rho=\rho(T)$ such that $k/\rho c=\alpha=\text{constant}$. The solution is

$$\frac{\beta T_0 \theta^2}{2} + \theta = \frac{qL}{k_0 T_0} \left[\frac{X^2}{2} - X + \frac{1}{3} + Fo - \frac{2}{\pi^2} \sum_{n=1}^{\infty} \frac{1}{n^2} \cos(n\pi X) \exp(-n^2 \pi^2 Fo) \right] \quad (\text{EQ 4})$$

where

$$\begin{aligned} \theta &= \frac{T - T_0}{T_0} \\ X &= \frac{x}{L} \\ Fo &= \frac{\alpha t}{L^2} \end{aligned} \quad (\text{EQ 5})$$

A hypothetical material was chosen with properties

$$\rho = 500 \text{ lb/ft}^3$$

$$k(T) = k_0 [1 + \beta(T - T_0)] = 1.00 [1. + 0.005 (T - 530.)] \text{ Btu/hr ft R}$$

$$c(T) = c_0 [1 + \beta(T - T_0)] = 0.05 [1. + 0.005 (T - 530.)] \text{ Btu/lb R}$$

Other chosen parameters were

$$q = 2.52 \times 10^6 \text{ Btu/hr ft}^2$$

$$L = 0.03133 \text{ ft}$$

$$T_0 = 530 \text{ R}$$

$$\beta = 0.005 \text{ 1/R}$$

$$k_0 = 1. \text{ Btu/hr ft R}$$

$$c_0 = 0.05 \text{ Btu/lb R}$$

The following table shows the analytical and numerical results.

TABLE 3 **Temperature at $x=0$**

time [hr]	analytical	TOPAZ2D
1.0E-06	847.19	846.63
1.0E-05	1201.41	1201.00

Examples

Following is the TOPAZ2D input file. The graded finite element mesh consisted of 40 elements - the first 10 of width 0.0001 ft, the next 10 of width 0.0005 ft, and the final 20 elements of width 0.0012665 ft.

example 2 - slab with nonlinear material properties

```
1 82 40 2 1
1
1 0 10 10
0. 100.e-08 1.e-08
1 1.e-06
$ material data
mat11 1 3 500.
530. 3000.
.05 .6675
1. 13.35
$ node data
1 0. 0. 530. 1
11 .001 0. 530. 1
21 .006 0. 530. 1
41 .03133 0. 530.
42 0. .004 530. 1
52 .001 .004 530. 1
62 .006 .004 530. 1
82 .03133 .004 530.
$ element data
1 1 2 43 42 1 39 1
$ flux bc data
42 1 0 -2.52e+06 -2.52e+06
```

5 *Thermal Property Data*

5.1 Introduction

Thermal property data for over 1000 materials have been compiled. The compilation includes:

- a numbered list of data sources, primarily those containing extensive data tabulations and bibliographies
- a numerical classification system used as a guide in assigning a permanent identification number to each material included in the system
- a system of quality indicators used to show the general reliability or accuracy of data included in the compilation
- an alphabetical index of materials that includes the identification number assigned to each material, an alphanumeric designator for auxiliary identification, a list of data sources by number, and a quality indicator for each type of data given for the material
- a list of thermal property data arranged in order of the material identification numbers and in the format used for input data in TOPAZ2D.

This data compilation is by no means complete or comprehensive. Please report errors in the data immediately so that the data base can be corrected. Also, new materials will be added to the data base by notifying the authors.

5.2 Data Sources

The sources for the data included in the compilation and several other general sources are listed below. The numbers of the first column are used in the alphabetical material index to cross-reference the sources. Asterisks indicate the data sources actually used for this compilation. The source used most extensively for the compilation is that edited by Touloukian (No. 20).

The thermal properties were estimated for a large number of materials for which no reliable data could be found. These estimates have been included whenever the estimates appeared to be as accurate as available data for similar materials.

1	*	perry j h	chemical engineers handbook 4th ed	1963
2	*	mcadams w h	heat transmission 3rd ed	1954
3	*		liquid metals handbook 2nd ed	1952
4	*	marks l s	mechanical engineers handbook 5th ed	1951
5	*	fleming p	private collection of plastics data	1968
6	*		materials engr matl selector issue	1967

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7	pfeifer h	private collection of materials data	1968
8	* james e	properties of chemical explosives ucrl 14592	1965
9		asre data book	
10		airplane air conditioning engr data	1952
11		international critical tables	1926
12	johnson a i	thermal conductivity chart for gases	1954
13	hilsenrath j	tables of thermal properties of gases nbs 564	1955
14	* tipton c r jr	the reactor handbook 2nd ed vol 1	1960
15	kuong j f	thermal properties of liquids	1963
16		the reactor handbook vol 3 engineering	1963
17		english transl of handbuch der physic	1962
18	hoyt s l	metal data	1952
19	avduyevskiy v s	fundls of heat transfer in av and rkt engr	1962
20	* touloukian y s	thermophysical prop of high temp solid matls	1967
21		prelim rept on the prop of li be mg al nbs6297	1959
22		th prop of seld light element cpds nbs7437	1962
23	kowalczyk l s	thermal cond and its varn with t and p	1955
24	johnson v j	a compdm of prop of matl at low temp nbs	1960
25		janaf thermochemical tables	
26	kelley k k	entropies oe elements and inorg cpds bm592	1961
27	* weast r c	handbook of chemistry and physics 47th ed	1966
28	* jester m	private collection of liquid metal properties	1968
29	* wicks c e	thermodyn prop of 65 elements bu mines 605	1963
30	* peters r l	materials data nomographs	1965
31	* thompson b	energy content vs temp for d-pu a-pu and u	
32	* kelley k k	enthalpy plots dwg k38745 bu mines 584	1960
33	* kelley k k	bu mines 371	1939
34	* laber d	bmi final rept on sanl tasks 309/032a 401/027	1967
35	*	y-12 data sheets	
36	* schauer d	weapons matl data book	
37	* schorsch r h	engineering properties of selected ratls	1966
38	*	modern plastics encyclopedia	1968
39	*	handbook of molded and extr rubber goodyear	
40	*	machine design reference issue plastics	1964
41	*	metals handbook 8th ed	1961
42	* stull d r	thermodynamic properties of the elements acs	1956
43	* hampel c a	rare metals handbook 2nd ed	1961
44	* moyer j	private collection of thermal data	1968
45	* hodge a w	prop of high temp ti alloys dmic memo 230	1968
46	* carslaw h jaeger j	conduction of heat in solids 2nd ed oxford	1959
47	* smithells c j	metals reference book 4th ed vol 3	1967
48	* lynch j f ruderer	engr prop of sel ceram matls bmi am cer soc	1966
49	*	prop of kennametal hard carbide alloys	1963
50	*	prop handbook carboloy etc ge met prod	1958
51	* clark s p jr	handbook of physical constants geol soc amer	1966
52	* stephens d r maimo	the thermal cond of rock salt ucrl 6894-ii	1964

53	*	seddon b j	phys prop of pu ceramic cpds	trg1601	1968
54	*	storms e k	the refractory carbides		1967
55	*	johnson g cornell r	thermal diffusivity mech eng note	end78-014	1978

5.3 Material Classification System

The material classification system shown below was used to assign identification numbers to the materials included in the compilation. The classification of many materials was arbitrary. The range of numbers in each category of materials is sufficient to include most materials of interest and importance. Many unused numbers remain within each category for materials which may eventually be included in the compilation.

- 1000 elements
 - 1001-1499 solids, liquids
 - 1501-1599 gases
 - 1601-1999 not used
- 2000 alloys
 - 2001-2099 aluminum alloys
 - 2101-2399 copper alloys
 - 2401-2499 magnesium alloys
 - 2501-2599 nickel alloys
 - 2601-2699 cobalt alloys
 - 2701-2799 titanium alloys
 - 2801-2999 not used
- 3000 alloys (continued)
 - 3001-3099 iron alloys
 - 3101-3299 steels
 - 3301-3499 super alloys (cr-ni-fe)
 - 3501-3599 beryllium alloys
 - 3601-3649 lead, tin, and indium alloys
 - 3651-3679 molybdenum alloys
 - 3681-3699 niobium (columbium) alloys
 - 3701-3749 plutonium alloys
 - 3751-3779 silver alloys
 - 3781-3799 tantalum alloys
 - 3801-3829 tungsten alloys
 - 3831-3859 uranium alloys
 - 3861-3879 zinc alloys
 - 3881-3899 zirconium alloys
 - 3901-3999 miscellaneous alloys
- 4000 inorganic compounds
 - 4001-4199 oxides (single)
 - 4201-4299 oxides (mixed)
 - 4301-4399 silicates
 - 4401-4499 nitrides
 - 4501-4599 carbides
 - 4601-4699 borides
 - 4701-4739 beryllides
 - 4741-4759 sulfides

	4761-4769	phosphides
	4771-4799	silicides
	4801-4899	halides
	4901-4949	intermetallics, metalloids
	4951-4999	miscellaneous compounds
5000		inorganic mixtures
	5001-5199	glasses
	5201-5299	ceramics, bricks
	5301-5399	not used
	5401-5499	cermets
	5501-5799	gas mixtures
	5801-5999	not used
6000		inorganic composites
	6001-6099	rocks, minerals, sands, soils
	6101-6999	not used
7000		organic compounds and mixtures
	7001-7499	polymers (including foams)
	7501-7599	high explosives (including mock h. e.)
	7601-7699	not used
8000		organic composites and natural materials
	8001-8499	miscellaneous
	8501-8599	woods
	8601-8999	not used
9000		miscellaneous
	9001-9099	idealized materials
	9101-9999	not used

5.4 Material Properties Quality Code

The data for each material were chosen as the best values for those cases in which conflicting or inaccurate data were found in the literature. The numerical quality indicators are necessarily crude and general, but may be interpreted approximately as follows.

Quality type 0 (or blank) - Data was good or no statement was made in data source regarding its accuracy. No conflicting data was found in any other data sources. Most data in this category is probably accurate to within 1-2 percent for density, 5-10 percent for heat capacity, and 10-20 percent for thermal conductivity.

Quality type 1 - Good data, but heat capacity or thermal conductivity was reported only for a limited temperature range. The temperature range was extended by extrapolation and the resulting values are probably as accurate as reported values.

Quality type 2 - Either the accuracy of the data was poor or values reported by different sources disagreed. The best values were used whenever a judgment could be made, or average values were used with consideration given to data for similar materials.

Quality type 3 - No data could be found in the literature. Estimates were made based on theoretical or empirical grounds, or on data for similar materials. These estimates were included whenever they appeared to be about as accurate as reported data for similar materials.

Quality type 4 - No data could be found in the literature and no accurate estimate could be made. The data is considered to be a rough estimate, based, in most cases, on data for similar materials.

Quality type 5 - No data could be found in the literature and no accurate estimate could be made. A minimum requirement for inclusion is the availability of at least estimated values of density, heat capacity, and thermal conductivity.

5.5 Material Index

Following is an alphabetical index of materials included in the data base noting the references in which the data was found and the quality of the data. The alphanumeric identifier assigned to each material aid in identifying the material in the data base. In the cases of the elements and most simple compounds, the atomic or molecular formulae are used. In most cases, acronyms or mnemonics are used. The classification number is also included as a further aid in locating the material in the data base. The quality indicators "dckthck" stand for density, constant heat capacity, constant thermal conductivity, temperature of transition (or maximum service temperature), latent heat of transition, table of heat capacity versus temperature, and table of thermal conductivity versus temperature, respectively.

abbr.	no.	material	references	quality dckthck
absr1	7001	abs resin (low k)	6	25555
absr2	7002	abs resin (high k)	6	25555
acdel	7006	acetyl (delrin)	6, 38	2555
acrlp	7011	acrylic (lucite, plexiglass)	6, 20, 38	22555
acrlh	7012	acrylic (high k)	6, 38	22555
ac	1426	actinium	20, 27, 42	340035
air	5501	air	1, 2, 46	0
alkis	7016	alkyd isocyanate foam (density 0.16)	20	2525
ally1	7021	allyl, cast resins (high heat capacity)	6, 38	2200555
ally2	7022	allyl, cast resins (low heat capacity)	6, 38	2200555
kalum	4972	alum ($\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$) (crystal)	1, 27	550
bral1	5212	alumina brick, fused (Al_2O_3 96) (22 p)	1, 20, 47	2330
bral1	5214	alumina brick, high (Al_2O_3 53) (20 p)	47	322335
bral2	5215	alumina brick, high (Al_2O_3 83) (28 p)	47	322335
bral3	5216	alumina brick, high (Al_2O_3 87) (22 p)	20	303330
poral	5281	alumina porcelain, high	20	3005500
al	1001	aluminum	20, 1, 32, 34, 27, 37, 42,	2
al	1001	aluminum	+14, 47, 51	2
alliq	1002	aluminum (liquid)	2, 42, 47, 14, 51	0
ala15	2011	aluminum alloy (al84.0, average trtmt)	1, 6, 14, 20, 37, 41, 47	2022212
ala17	2013	aluminum alloy (al84.0, cast or tempd)	1, 6, 14, 20, 37, 41, 47	2022212
ala14	2010	aluminum alloy (al84.0, wrot or annld)	1, 6, 14, 20, 37, 41, 47	2022212
ala16	2012	aluminum alloy (al90.0, cast or tempd)	1, 6, 14, 20, 37, 41, 47	2022212
ala13	2009	aluminum alloy (al92.0, wrot or annld)	1, 6, 14, 20, 37, 41, 47	2022212
ala14	2010	aluminum alloy (al93.0, average trtmt)	1, 6, 14, 20, 37, 41, 47	2022212
ala15	2011	aluminum alloy (al94.0, cast or tempd)	1, 6, 14, 20, 37, 41, 47	2022212
ala13	2009	aluminum alloy (al96.0, average trtmt)	1, 6, 14, 20, 37, 41, 47	2022212
ala12	2008	aluminum alloy (al96.0, wrot or annld)	1, 6, 14, 20, 37, 41, 47	2022212
ala14	2010	aluminum alloy (al96.5, cast or tempd)	1, 6, 14, 20, 37, 41, 47	2022212
ala12	2008	aluminum alloy (al98.0, average trtmt)	1, 6, 14, 20, 37, 41, 47	2022212

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alal3	2009	aluminum alloy (al98.5, cast or tempd)	1,6,14,20,37,41,47	2022212
alal1	2007	aluminum alloy (al99.0, average trtmt)	1,6,14,20,37,41,47	2022212
alal1	2007	aluminum alloy (al99.0, wrot or annld)	1,6,14,20,37,41,47	2022212
alal2	2008	aluminum alloy (al99.2, cast or tempd)	1,6,14,20,37,41,47	2022212
alal1	2007	aluminum alloy (al99.8, cast or tempd)	1,6,14,20,37,41,47	2022212
a202a	2006	aluminum alloy 2024-5-t4 (annealed)	20,41	300
a707a	2002	aluminum alloy 7075-t6 (annealed)	20,41	300
a7075	2001	aluminum alloy 7075-t6 (as received)	20,41	300
a7079	2004	aluminum alloy 7079	37,41	305
alamg	2003	aluminum alloys (al, mg 2.5-5.0)	1,41	2002
a2024	2005	aluminum alloys 2024-t4 and 24s-24 (ar)	20,41	300
topaz	4301	aluminum fluosilicate (topaz) (a-axis)	27,51	305550
topaz	4302	aluminum fluosilicate (topaz) (c-axis)	27,51	305551
aln	4412	aluminum nitride (aln) (prs axis, 98 d)	20,27,47,48	2500
aloxf	4018	aluminum oxide (al2o3) (foam, d = 0.5)	1,20,27,32,47,48,51	202
aloxl	4019	aluminum oxide (al2o3) (foam, d = 1.9)	1,20,27,32,47,48,51	200
aloxd	4012	aluminum oxide (al2o3) (polyxtal 100 d)	1,20,27,32,47,48,51	200
aloxp	4014	aluminum oxide (al2o3) (polyxtal, 55 d)	1,20,27,32,47,48,51	200
aloxs	4016	aluminum oxide (al2o3) (single xtal)	1,20,27,32,47,48,51	202
alcr1	5412	aluminum oxide + cr (al2o3 23, cr 77)	20,48	302530
alcr2	5413	aluminum oxide + cr (al2o3 70, cr 30)	20,48	302535
andal	4312	aluminum silicate (al2o3.sio2) (ortho)	20,27,47,51	20505
kyan	4314	aluminum silicate (al2o3.sio2) (tricl)	20,27,47,51	500
mull	4316	aluminum silicate (3al2o3.2sio2) (100d)	20,27,47,48,51	500
am	1430	americium	20,27	342555
nh3	4881	ammonia (nh3) (gas)	1,27,47	0
nh3liq	4880	ammonia (nh3) (liquid under pressure)	1,27,47	500
nh4br	4812	ammonium bromide (nh4br) (prsd 8 kb)	27,47	300530
nh4cl	4814	ammonium chloride (nh4cl) (prsd 8 kb)	27,47	10
analc	4329	analcite (na2o.al2o3.4sio2.4h2o) (xtal)	27,51	305555
andal	4312	andalusite (al2o3.sio2) (ortho xtal)	20,27,51	20505
sb	1006	antimony	20,1,32,42,27	0
sbliq	1007	antimony (liquid)	1,47,42,27,20,14	0
sbtec	4913	antimony telluride (sb2te3) (cpr, n dr)	20,27	300555
sbtep	4912	antimony telluride (sb2te3) (polyxtal)	20,27	300555
argas	1501	argon (gas)	27,2,42,41	0
as	1008	arsenic, grey	1,27,41,42	40005
astex	4914	arsenic telluride (as2te3) (v zone mlt)	20	3305555
at	1437	astatine	42	3343335
brtol	7501	baratol h.e. (tnt 26, ba nitrate 76)	8	555
ba	1241	barium	20,27,29,42,43	40005
bab6	4612	barium boride (bab6)	27,48	300555
baf2	4816	barium fluoride (baf2) (single crystal)	20,27,51	300230
ban03	4952	barium nitrate (ba(no3)2) (prsd 8 k8)	1,27	300050
baso4	4954	barium sulfate (baso4) (crystal)	27,51	300550
batis	4213	barium titanate (bao.tio2) (sintered)	20,27,48	500
batit	4212	barium titanate (bao.tio2) (100 d)	20,27,48	500
batim	4214	barium titanate (bao.tio2) (+mn,nb ox)	20,27,48	500

bk	1440	berkelium	27	444555
beryl	4318	beryl (3beo.al2o3.6sio2)	20,27,51	320502
be	1011	beryllium	20,6,1,32,34,27,36,42	22
bebeo	5420	beryllium + beo (be, beo 0.6-1.7)	20	3300
be96a	3501	beryllium alloy (be96.5) (as received)	20	303341
be96h	3502	beryllium alloy (be96.5) (annealed)	20	303341
be98a	3503	beryllium alloy (be98.5) (as received)	20	303341
be98h	3504	beryllium alloy (be98.5) (annealed)	20	303341
be995	3505	beryllium alloy (be99.5)	20	3033413
beryl	4318	beryllium aluminosilicate (beryl)	20,27,51	320502
be2c	4512	beryllium carbide (be2c) (hp or snt)	14,20,28,47	2320022
cuber	2181	beryllium copper (cu bal, be 0.38-0.55)	1	331
cubeh	2182	beryllium copper (cu bal, be1.7-1.9)	1,6,41	2335
be3n2	4414	beryllium nitride (be3n2) (prsd 3.4 kb)	20,47	5
beoxp	4024	beryllium oxide (beo) (76 pc dens)	14,20,27,36,43,44,	0
beoxp	4024	beryllium oxide (beo) (76 pc dens)	+47,48,51	0
beo	4022	beryllium oxide (beo) (96 pc dens)	14,20,27,36,43,44,	0
beo	4022	beryllium oxide (beo) (96 pc dens)	+47,48,51	0
beobe	5414	beryllium oxide + be (beo, be 3-12)	20	5500
beomo	5416	beryllium oxide + be + mo (be 7, mo 7)	20	5501
beosi	5418	beryllium oxide + be + si	20	305530
porbe	5280	beryllium oxide porcelain 4811	20	305530
bspod	4320	beta-spodumene (li2o.al2o3.4sio2) (tet)	20,27,51	305550
bi	1016	bismuth	2,1,27,43,41,42,47	0
biliq	1017	bismuth (liquid)	1,14,27,43,47	0
bitep	4916	bismuth telluride (bi2te3-p) (plane dr)	20,47	220522
bites	4919	bismuth telluride sulfide (bi2te2s)	20	305550
zrb2z	5498	boride z cermet (zrb2 81-87, mosi2 13)	47,48	2000500
zrb2b	5496	borolite 101 cermet (zrb2 93-96, b 4-7)	47,48	505
boron	1266	boron	20,27,30,42,43,48	20205
b4c-d	4514	boron carbide (b4c) (dense)	20,27,48	2002500
b4c-p	4515	boron carbide (b4c) (porous)	20,27,48	2002500
bn	4416	boron nitride (bn) (perp pr axis, 95 d)	20,27,36,47,48	500
bnppa	4418	boron nitride (bn) (prs axis, 94 d)	20,27,36,47,48	500
bnac	4424	boron nitride (bn 80, c 20) (prs axis)	20	5500
bnox2	4420	boron nitride (bn 97, bn2o3 2) (perp p)	20	5500
bnexp	4422	boron nitride (bn 97, bn2o3 2) (prs ax)	20	5500
sib4	4614	boron silicide (b4si)	27,48	300530
braln	2101	brass, aluminum (cu76, zn22, al2)	1	555
brcar	2105	brass, cartridge (cu70, zn30)	1,2,20,41,46	500
brpbl	2111	brass, leaded	6,41	3555
brmum	2116	brass, muntz metal	1,41	5555
brrdc	2121	brass, red, cast (cu85, zn5, pb5, sn3)	1,41	3555
brrdw	2122	brass, red, wrought (cu85, zn15)	1,41	20555
brtin	2126	brass, tin (naval and admiralty)	1,2,41	2555
bryel	2131	brass, yellow (cu65, zn35)	1,6,41	555
bricr	5232	brick, chrome (cr2o3 32)	1,27,41	5530
brcrm	5234	brick, chrome magnesite (see ref 47)	20,47	330

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diata 5246 brick, diatomaceous earth (accr strata)	4	305530
diath 5249 brick, diatomaceous earth (high burn)	4	305530
diatm 5248 brick, diatomaceous earth (molded, frd)	4	305530
diatp 5247 brick, diatomaceous earth (prill strata)	4	305530
diatt 5251 brick, diatomaceous earth (use to 1100)	4	305530
diatl 5250 brick, diatomaceous earth (use to 850c)	4	305530
brief 5256 brick, egyptian fire (sio2 64-71)	20	2323532
bricf 5224 brick, fired carbon	1,20,27,42,47	5505
brifr 5262 brick, forsterite (mgo 58 sio2 38) (20p)	20,47	335
bral1 5212 brick, fused alumina (al2o3 96) (22 p)	1,20,47	2330
brisi 5294 brick, hard fired silica (sio2 94-95)	20	330
bral1 5214 brick, high alumina (al2o3 53) (20 p)	47	322335
bral2 5215 brick, high alumina (al2o3 83) (28 p)	47	322335
bral3 5216 brick, high alumina (al2o3 87) (22 p)	20	303330
brikb 5265 brick, kaolin insulating (d = 0.30)	1,20	5510
brika 5264 brick, kaolin insulating (d = 0.43)	1,20	5510
magnp 5267 brick, magnesite (mgo 87)	1,20,27,47,48	330
magna 5268 brick, magnesite a (mgo 90) (14.5 p)	1,20,27,47,48	330
magnb 5269 brick, magnesite b 93) (22.6 p)	1,20,27,47,48	330
magne 5270 brick, magnesite c 86) (17.8 p)	1,20,27,47,48	330
magns 5266 brick, magnesite spall res (mgo 89)	1,20,27,47,48	335
brimm 5218 brick, masonry, medium	1,2,27,46	2025535
brifm 5259 brick, missouri fireclay	1,47	3300530
brifn 5258 brick, normal fireclay (22 p)	47	535
brisl 5296 brick, siliceous (sio2 89 al2o3 9) (25p)	47	335
brifs 5260 brick, siliceous fireclay (23 p)	47	535
brisk 5298 brick, sillimanite (22 pc porosity)	20	300530
brids 5254 brick, stabilized dolomite (22 p)	1,47	530
vermi 4986 brick, vermiculite	20	305550
brgas 1546 bromine (gas)	27,1,42	0
bronz 2141 bronze (cu75, zn25)	1,2	305555
bral 2146 bronze, aluminum (cu92, al8)	1,6,41	2000555
brar 2151 bronze, architectural	1,41	2300555
brocm 2156 bronze, commercial	1,2,38,41	555
brmn 2161 bronze, manganese	1,41	555
broph 2166 bronze, phospher 10 percent	1,41	5555
bropl 2168 bronze, phospher 1.25 percent	6,41	555
bropm 2167 bronze, phospher 5 percent	6,41	555
brsih 2171 bronze, silicon, high	1,6,41	550
brsil 2172 bronze, silicon, low	1,6,41	555
brsnh 2176 bronze, tin (cast), high leaded	6,41	23555
brsnl 2177 bronze, tin (cast), leaded	6	3555
buacr 7026 butadiene-acrylonitrile rubber + c	20	5555
butyr 7031 butyl rubber	6,39	555
cd 1041 cadmium	2,1,32,42,43,27,41,47	0
cdliq 1042 cadmium (liquid)	2,1,32,42,43,27,41,47	0
caccp 4957 calcite (caco3) (crystal) (c axis)	1,27,51	0
caccs 4958 calcite (caco3) (crystal) (a axis)	1,27,51	0

ca	1306	calcium	27, 1, 42, 43, 41	5
cab6	4616	calcium boride (cab6)	27, 48	300555
cacep	4957	calcium carbonate (caco3) (calcite) (c)	1, 27, 51	0
caces	4958	calcium carbonate (caco3) (calcite) (a)	1, 27, 51	0
cacou	4956	calcium carbonate (caco3) (natural)	1, 27, 51	5
caf2a	4820	calcium fluoride (caf2) (mineral aggr)	1, 20, 27, 47, 51	205
caf2	4818	calcium fluoride (caf2) (single xtal)	1, 20, 27, 47, 51	200
dolom	4960	calcium magnesium carbonate (camgc2o6)	1, 27, 51	20515
cao	4026	calcium oxide (cao) (pressed, 91 dens)	1, 20, 27, 47, 48, 51	200
caopp	4028	calcium oxide (cao) (packed pwd, 50 d)	1, 20, 27, 47, 48	200
gypsm	4962	calcium sulfate dihydrate (caso4.4h2o)	1, 27, 51	555
catit	4216	calcium titanate (cao.tio2)	20, 27, 48, 51	500
cf	1443	californium		4445555
camor	1071	carbon, amorphous (carbon stock)	27, 1	22
cgem1	1061	carbon, diamond gem quality type 1	1, 20, 27	500
cgraf	1066	carbon, graphite (typical k)	1, 2, 20, 27, 32, 42, 51	2000002
bricf	5224	carbon brick, fired	1, 20, 27, 42, 47	5505
co2	4027	carbon dioxide	1, 2, 27	0
cogas	4029	carbon monoxide	1, 27	300030
cela2	7037	cellulose acetate (high k)	6, 38	20555
cela1	7036	cellulose acetate (low k)	6, 38	20555
ceab2	7042	cellulose acetate butyrate (high k)	6, 38	225555
ceab1	7041	cellulose acetate butyrate (low k)	6, 38	225555
cenip	7046	cellulose nitrate (pyroxylin)	6, 38	200555
cepr1	7051	cellulose proprionate (low k)	6, 38	225555
cepr2	7052	cellulose proprionate (high k)	6, 38	225555
cetra	7056	cellulose triacetate	38	5555
ce	1356	cerium	41, 27, 20, 42	26205
ceb6	4626	cerium boride (ceb6) (99.0 pc dense)	48	300555
ceo2	4030	cerium oxide (ceo2) (prsd, sntrd, 86 d)	1, 20, 47	201
ces	4742	cerium sulfide (ces)	20, 48	22505
ce2s3	4744	cerium sulfide (ce2s3)	20, 48	20512
cs	1231	cesium	1, 14, 27, 28, 32, 43, 47	40005
csliq	1232	cesium (liquid)	14, 27, 28, 32, 43, 47	22
chalk	6018	chalk (av prop)	1, 46	25555
clgas	1506	chlorine (gas)	27, 1, 42, 2	0
cralm	4973	chrome alum (cr2(so4)3.k2so4.24h2o)	1, 27	550
bricr	5232	chrome brick (cr2o3 32)	1, 27, 41	5530
brerm	5234	chrome magnesite brick (see ref 47)	20, 47	330
enisa	3312	chrome-nickel-iron superalloys	6	555
cr	1201	chromium	20, 1, 27, 32, 43, 42	0
cheni	5422	chromium carbide + ni (cr(x)c(y), ni)	48	2000555
cuehr	2183	chromium copper (cu bal, cr0.5)	6, 20, 47	2330
crn	4426	chromium nitride (crn) (prsd, 100 pc d)	27, 47, 48	505
cr2n	4428	chromium nitride (cr2n) (prsd, 100 d)	27, 47, 48	200505
crsi2	4772	chromium silicide (crsi2)	20, 27, 48	500
co	1046	cobalt	20, 27, 1, 32, 43, 30, 41,	0
co	1046	cobalt	+42	0

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coerw	2646	cobalt alloy (co64, cr30, w6)	20	330333
cohel	2612	cobalt alloy hc-1049	20	3300
coh21	2614	cobalt alloy hs-21 (as cast)	1,14,20,41	310
coh2a	2615	cobalt alloy hs-21 (aged)	1,14,20,41	310
coh23	2616	cobalt alloy hs-23	14,20	303330
coh25	2618	cobalt alloy hs-25 (1-605) (wrought)	1,14,41	330
coh27	2620	cobalt alloy hs-27 (as cast)	14,20	303330
coh30	2622	cobalt alloy hs-30 (422-19) (as cast)	14,20	333333
coh31	2624	cobalt alloy hs-31 (x-40) (as cast)	1,14,20,41	300330
coh36	2626	cobalt alloy hs-36 (cast)	1,14,20	333
cojq3	2628	cobalt alloy jessop q-32	20	303330
cojl5	2630	cobalt alloy j-1570	20	3333330
cok42	2632	cobalt alloy k-42b	14	3323332
coml1	2636	cobalt alloy multimet (n-155) (low c)	1,14,20,41	330
comtm	2634	cobalt alloy multimet (n-155) (wrought)	1,14,20,41	330
cos59	2638	cobalt alloy s-590 (wrought)	14,41	330
cos81	2640	cobalt alloy s-816 (wrought)	1,14,20,41	330
cov36	2642	cobalt alloy v-36 (wrought)	41	333333
cow52	2644	cobalt alloy wi-52	20	3333330
cow5q	2645	cobalt alloy wi-52 (cr coated sample)	20	3333330
enlox	4219	cobalt nickel oxide (46coo.46nio.8lio)	20,27	3305555
cobox	4034	cobalt oxide (coo)	20,27,47,48	2005
cos	4774	cobalt silicide (cos)	20,48	305555
nblaw	3681	niobium alloy (nb61, ta28, w10, zr0.5)	20	3300
nbwmo	3684	niobium alloy (nb80, w15, mo5)	20	3300
nbtiz	3682	niobium alloy (nb85, ti10, zr5)	20	3300
nbra5	3683	niobium alloy (nb95, ta5)	20	3303330
eme-3	7502	composition b-3 h.c. (rdx 60, tnt 40)	8	555
eme-4	7503	composition c-4 h.c. (rdx 90, binders)	8	5555
concn	5240	concrete, cinder	1,2,20,27,46	25535
conlw	5243	concrete, lightweight	1,2,20,27,46	5530
concs	5241	concrete, stone (1-2-4 mix)	1,2,20,27,46	25535
conl4	5242	concrete, 1-4 dry	1,2,20,27,46	25535
cu	1051	copper	20,1,27,32,34,37,42,	0
cu	1051	copper	147	0
cuwgt	2191	copper, wrought (etp, dhp, te0.5, pb1)	41	3535
cuber	2181	copper alloy (cu bal, be 0.38-0.55)	1	331
cubeh	2182	copper alloy (cu bal, be 1.7-1.9)	1,6,41	2335
cuchr	2183	copper alloy (cu bal, cr0.5)	6,20,47	2330
cupr3	2203	copper alloy (cu70, ni30)	1,6,41	2555
cupr1	2202	copper alloy (cu90, ni10)	1,6,41	2555
cuall	2201	copper alloy (cu99.4, al0.3, zr0.27)	20	3303331
nicon	2506	copper alloy constantan (cu55, ni45)	1,2,14,41,47	331
cuman	2195	copper alloy manganin	2	3305550
cunis	2185	copper alloy nickel silver (ni 10-20)	1,2,6,41,47	2222555
cugzn	2186	copper gilding metal (cu95, zn5)	1,41	555
cuoli	4220	copper lithium oxide (96cuo.4lio)	20,27	3305550
cuo	4036	copper oxide (cuo) (tenorite)	1,20,27,47,51	2002220

cus04	4966	copper sulfate (cus04) (crystal)	27	550
bluev	4967	copper sulfate hydrate (cus04.5h2o)	1,27,51	555
cordr	4322	cordierite (2mgo.2al2o3.5sio2)	20,51	5510
corkg	8514	cork, ground	2,46	5555
corkr	8515	cork, ground, regranulated	2,46	5555
cupr3	2203	cupronickel (cu70, ni30)	1,6,41	2555
cupr1	2202	cupronickel (cu90, ni10)	1,6,41	2555
cm	1446	curium	20,27	4445555
dan35	3901	dandelion 35	34,36	5500
datb	7504	datb h.e. (diamino trinitrobenzene)	8	300555
d-gas	1551	deuterium	27	3305530
d2o	4118	deuterium oxide (d2o) (liquid)	14,27	300
diabg	5020	diabasic glass (artificial)	27,51	3305530
dapon	7061	diallyl phthalate (dapon)	35	2025555
diata	5246	diatomaceous earth brick (accr strata)	4	305530
diath	5249	diatomaceous earth brick (high burn)	4	305530
diatm	5248	diatomaceous earth brick (molded, frd)	4	305530
diatp	5247	diatomaceous earth brick (prll strata)	4	305530
diatt	5251	diatomaceous earth brick (use to 1100c)	4	305530
diatl	5250	diatomaceous earth brick (use to 850c)	4	305530
dolom	4960	dolomite (camg(co3)2) (avg prop)	1,27,51	20555
brids	5254	dolomite brick, stabilized (22 p)	1,47	530
dy	1391	dysprosium	41,27,20,42	35
brief	5256	egyptian fire brick (sio2 64-71)	20	2323532
es	1449	einsteinium		4445555
epcrl	7066	epoxy, der 332 (c), hysol 6000-op (k)	6,20,38	2220505
epgfm	7071	epoxy, glass fiber filled (molded)	20,38	25552
epsfc	7076	epoxy, silica filled, cast	38	2225555
epunc	7081	epoxy, unfilled, cast	38	2025555
epsom	4971	epsomite (mgso4.7h2o) (crystal)	1,27,51	555
er	1401	erbium	41,27,20,42	5
ethce	7086	ethyl cellulose (wide range of c, k)	6,38	225555
ethva	7091	ethyl vinyl acetate	38	25555
eu	1376	europium	20,27,41,43	30005
eub6	4634	europium boride (eub6) (93.0 pc dense)	48	305555
fm	1452	fermium		4445555
fbrfx	8201	fiberfax paper (carborundum co.)	44	5500
brifm	5259	fireclay brick, missouri	1,47	3300530
brifn	5258	fireclay brick, normal (22 p)	47	535
brifs	5260	fireclay brick, siliceous (23 p)	47	535
flint	5022	flint glass	1,27,46	25532
f-gas	1511	fluorine (gas)	27,42	0
fcctf	7101	fluorocarbons, cfe and ctfe	6,38	555
fcfep	7106	fluorocarbons, fep	6,38	555
fetfe	7111	fluorocarbons, tfe (teflon)	1,6,20,38	2500
glasf	5024	foamed glass (d = 0.144)	1	305532
forst	4324	forsterite (2mgo.sio2) (100 pc dense)	1,20,27,51	0
brifr	5262	forsterite brick (mgo 58 sio2 38) (20 p)	20,47	335

Thermal Property Data

fr	1455	francium	42	4343335
sio2	4062	fused silica glass	1,20,27,47,51	2200
sio2	4062	fused quartz glass (sio2)	1,20,27,47,51	2200
gd	1381	gadolinium	41,27,20,42	5
gdb6	4636	gadolinium boride (gdb6) (95.6 pc dens)	48	300555
gd2o3	4038	gadolinium oxide (gd2o3) (monoc) (98 d)	20,47,48	2000505
ga	1311	gallium	27,42,43,1	20005
galiq	1312	gallium (liquid)	1,14,27,43,47	20005
ge-ip	1261	germanium (intrinsic, p-type)	20,27,42,43,1,48	2
ge-n	1262	germanium (n-type)	20,27,42,43,1,48	0
glass	5012	glass (see ref 27, pp e5-e8) (avg prop)	27	2225555
glabc	5014	glass, borosilicate crown	27,51	25502
pyrc6	5018	glass, ceramic, pyroceram 9606	20	5500
pyrc8	5019	glass, ceramic, pyroceram 9608	20	5500
diabg	5020	glass, diabase (artificial)	27,51	3305530
flint	5022	glass, flint	1,27,46	25532
glasf	5024	glass, foamed (d = 0.144)	1	305532
sio2	4062	glass, fused quartz (sio2)	1,20,27,47,51	2200
sio2	4062	glass, fused silica or vitrous silica	1,20,27,47,51	2200
glasl	5026	glass, lead	20	305530
glasw	5028	glass, lime window	20	305530
obsid	5030	glass, obsidian	27,51	305530
pyrex	5016	glass, pyrex	2,20,27,51	500
glaspl	5034	glass, soda plate	20,51	305532
glascl	5032	glass, soda-lime	20,27	3325532
vycor	5036	glass, vycor	20,27	500
au	1056	gold	20,6,1,32,27,42,41,2	0
auliq	1057	gold (liquid)	14,20,27,42,43	40005
grntm	6014	granite (av prop) (see ref 51)	1,2,27,46,51	25555
grnth	6013	granite (high k)	1,2,27,46,51	25555
grntl	6012	granite (low k)	1,2,27,46,51	25555
gypsm	4962	gypsum (caso4.4h2o) (mineral) (high d)	1,27,51	555
gypsa	4964	gypsum (caso4.4h2o) (artificial)	1,27	555
hf	1271	hafnium	20,32,27,42,43,41	0
hfb2	4618	hafnium boride (hfb2)	20,27,48	20502
hfc	4518	hafnium carbide (hfc)	20,27,48,54	22502
hfn	4430	hafnium nitride (hfn) (hp strd 78-92 d)	20,27,48	2020502
hfo2	4040	hafnium oxide (hfo2) (monoc) (94 d)	20,27,48	21
d2o	4118	heavy water (d2o) (liquid)	14,27	300
hegas	1516	helium (gas)	27,1,2,42	0
fe2o3	4042	hematite (fe2o3)	1,27,32,47,48,51	20505
ho	1396	holmium	20,27,41,42,43	30005
h-gas	1521	hydrogen (gas)	27,2,42,1	0
ice	4116	ice (h2o) (solid)	27,46,51	0
in	1211	indium	1,27,43,30,42,41	20005
inliq	1212	indium (liquid)	1,42,43,47	5
soldl	3611	indium alloy (in25, sn37.5, pb37.5)	36	3355
insbp	4920	indium antimonide (insb) (imp 0.16)	20,27	3000000

insbs	4921	indium antimonide (insb) (imp 0.33-1.2)	20,27	3000000
inasp	4922	indium arsenide (inas) (polyx, imp 3.0)	20,27	3000500
inass	4923	indium arsenide (inas) (pure, s-doped)	20,27	3000500
inte	4924	indium telluride (in2te3)	20,27	300550
i-sol	1316	iodine (solid)	27,42,41,1	5
ir	1276	iridium	27,41,20,42,43	20002
fefur	1083	iron (0 to 3000 deg c)	20,1,32,27,42,44,51	0
fecry	1082	iron (-273 to 763 deg c)	20,1,32,27,42,44,51	0
fe	1081	iron (-51 to 1537 deg c)	20,1,32,27,42,44,51	0
ind02	3022	iron, ductile (mg containing)	1	300355
ind03	3023	iron, ductile (mg containing, heat res)	1	300355
ind01	3021	iron, ductile (0.06 mg)	1,6	323333
gci01	3001	iron, grey cast, ferritic (2.3-3.0 c)	1,2,6,20,27,33,46	3300
gci02	3002	iron, grey cast, ferritic (3.2-3.8 c)	1,2,6,20,27,33,46	303330
gci03	3003	iron, grey cast, pearlitic (2.3-3.0 c)	1,2,6,20,27,33,46	303330
gci04	3004	iron, grey cast, pearlitic (3.0-3.2 c)	1,2,6,20,27,33,46	303330
gci05	3005	iron, grey cast, pearlitic (3.4 c)	1,2,6,20,27,33,46	303330
gci06	3006	iron, grey cast, pearlitic (3.7-3.8 c)	1,2,6,20,27,33,46	303330
gci07	3007	iron, grey cast, pearlitic (4.12 c)	1,2,6,20,27,33,46	303330
fe	1081	iron, ingot (fe99.9+)	1,20,27,32,42,44	0
kovar	3031	iron, ni-hard types 1 and 2 (kovar)	1,20	200320
innrd	3035	iron, ni-resist, type d2 (cast)	1	300355
innr3	3033	iron, ni-resist, type 3 (cast)	1	355
innr4	3034	iron, ni-resist, type 4 (cast)	1	355
innir	3032	iron, ni-resist, types 1 and 2 (cast)	1,20	325
innit	3041	iron, ni-tensyliron (cast, heat treat)	1	300355
incfb	3026	iron, nodular cast, ferritic base	1,2,20	303330
incpb	3027	iron, nodular cast, pearlitic base	1,2,20	303330
inmal	3036	iron, malleable (2.5 c)	1,6	5555
inwrt	3037	iron, wrought (various)	1,2,6,27	2330
ninvr	2501	iron alloy invar (fe64, ni36)	6,41,47	20355
fe2o3	4042	iron oxide (fe2o3) (hematite)	1,27,32,47,48,51	20505
fe3o4	4044	iron oxide (feo.fe2o3) (magnetite)	20,27,47,51	2000005
fes2	4746	iron sulfide (fes2) (single crystal)	27,47,51	505
brikb	5265	kaolin brick, insulating (d = 0.30)	1,20	5510
brika	5264	kaolin brick, insulating (d = 0.43)	1,20	5510
kras	1556	krypton (gas)	27,1,42	0
kyan	4314	kyanite (al2o3.sio2) (tricl crystal)	20,27,51	500
la	1351	lanthanum	41,27,1,20,42	5
lab6	4624	lanthanum boride (lab6) (99.5 pc dense)	48	300555
lw	1491	lawrencium		4445555
pb	1091	lead	2,1,32,27,37,42	0
pbliq	1092	lead (liquid)	1,2,14,27,37,42,43,47	2
pb	1091	lead (0.07 ca)	36	0
pbant	3601	lead, antimonial (pb, sb 4-6) (hard)	1,6,41	355
pbsbh	3602	lead, antimonial (pb, sb 8-9)	1,6,41	355
pb	1091	lead, antimonial (pb, sb1)	1,41	0
pb	1091	lead, tellurium	1	0

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sold1	3611	lead alloy (pb37.5, sn37.5, in25)	36	3355
sold2	3612	lead alloy (pb39.2, sn60.8) (solder)	34,41	5
sold4	3613	lead alloy (pb50, sn50) (solder)	1,41	50
sold3	3614	lead alloy (pb60, sn40) (solder)	1,41	55
glas1	5026	lead glass	20	305530
pbo	4046	lead oxide (pbo) (yellow)	1,20,27,32,47	201
pbtep	4927	lead telluride (pbte) (polyxtal)	20,27	300550
pbtes	4926	lead telluride (pbte) (single crystal)	20,27	300550
limst	6016	limestone (dense, dry)	1,2,27,46,51	5555
limsw	6017	limestone (h2o 15.3)	1,2,27,46,51	5555
li	1216	lithium	1,27,28,41,43,42,47	0
liliq	1217	lithium (liquid)	1,27,28,41,42,43,47	202
bspod	4320	lithium aluminum silicate (b-spodumene)	20,27,51	305550
cnlox	4218	lithium cobalt nickel oxide (8-46-46 m)	20,27	3305555
cuoli	4220	lithium copper oxide (4lio.96cuo)	20,27	3305550
lih	4882	lithium hydride (lih) (cast, vac voids)	20	200
lih	4882	lithium hydride (lih) (powder compact)	20	200
lihcg	4884	lithium hydride (lih) (cast, gas voids)	20	200
lif	4822	lithium fluoride (lif) (single crystal)	1,20,27,47,51	20202
lifpb	4824	lithium fluoride (lif 96) (plastic bnd)	1,20,27,47,51	200
mnsel	4928	lithium manganese selenide (97mn.3li.-)	20,27	3305530
nioli	4222	lithium nickel oxide (5lio.95nio)	20,27	3305550
litbr	4968	lithium tetraborate (li2o.2b2o3) (epox)	27	555
lu	1416	lutetium	20,27,41	230025
lx04	7517	lx-04 h.e. (hmx 85, viton a 15)	55	0
lx07	7518	lx-07 h.e. (hmx 90, viton a 10)	55	0
lx09	7519	lx-09 h.e. (hmx 93, dnpa 4.6, fefo 2.4)	55	0
lx10	7520	lx-10 h.e. (hmx 95, viton a 5)	55	0
lx17	7516	lx-17 h.e. (triamino-trinitro-bensene)	55	0
fe3o4	4044	magnetite (feo.fe2o3)	20,27,47,51	2000005
magna	5268	magnesite a brick (mgo 90) (14.5 p)	1,20,27,47,48	330
magnb	5269	magnesite b brick (mgo 93) (22.6 p)	1,20,27,47,48	330
magnp	5267	magnesite brick (mgo 87)	1,20,27,47,48	330
magns	5266	magnesite brick, spall res (mgo 89)	1,20,27,47,48	335
magnc	5270	magnesite c brick (mgo 86) (17.8 p)	1,20,27,47,48	330
mg	1096	magnesium	20,1,32,27,42	0
mgliq	1097	magnesium (liquid)	1,14,20,27,32,43	30005
mg042	2462	magnesium alloy (mg,ag2.5,ce2,zr0.6)	47	333
mg001	2421	magnesium alloy aml00a (casting)	41	33
mg002	2422	magnesium alloy az31(x,s) (wrought)	14,20,47	10
mg003	2423	magnesium alloy az31b(p,s) (wrought)	1,20,41	0
mg004	2424	magnesium alloy az61a(x), azm (wrought)	14,41,47	33
mg005	2425	magnesium alloy az63a(ac,f) (casting)	14,41	33
mg006	2426	magnesium alloy az80a(x,frgd) (wrought)	1,20,37,41	303
mg007	2427	magnesium alloy az81a(t4) (casting)	41	300333
mg008	2428	magnesium alloy az855(x) (wrought)	47	333
mg009	2429	magnesium alloy az91a,b (dc) (casting)	1,14,41,47	31
mg010	2430	magnesium alloy az91c(ac) (casting)	1,41	33

mg011	2431	magnesium alloy az92a(ac)	(casting)	1,14,41	33
mg012	2432	magnesium alloy a3a	(wrought)	41	33333
mg013	2433	magnesium alloy a8(ac or st)	(casting)	47	333
mg014	2434	magnesium alloy bz33a(ac,ah)	(casting)	1	333
mg015	2435	magnesium alloy ek30a, h812	(casting)	20,41	31
mg017	2437	magnesium alloy ek33a, h811	(casting)	20,41	32
mg016	2436	magnesium alloy ek41a(t5,t6)	(casting)	41	333
mg018	2438	magnesium alloy hk31a(h24)	(casting)	1,20,41	0
mg019	2439	magnesium alloy hk31a(o)	(casting)	1,20,41	0
mg020	2440	magnesium alloy hk31a(t6)	(casting)	1,20,41	0
mg021	2441	magnesium alloy hm21a(o,h24)	(wrought)	41	313
mg022	2442	magnesium alloy hm31a	(wrought)	20,41	3
mg023	2443	magnesium alloy hz32a(ac),zt1	(casting)	1,20,41,47	33
mg024	2444	magnesium alloy magnox a12(x)	(wrought)	47	333
mg025	2445	magnesium alloy m1(ac)	(casting)	14,47	333
mg026	2446	magnesium alloy m1(x,s)	(wrought)	14,47	333
mg027	2447	magnesium alloy m1a	(wrought)	41	33
mg028	2448	magnesium alloy pe	(wrought)	41	30033
mg029	2449	magnesium alloy za(ac)	(casting)	47	3333
mg030	2450	magnesium alloy ze10a(o,h24)	(wrought)	41	33
mg031	2451	magnesium alloy ze41a(t5,ht)	(casting)	20,41,47	330
mg032	2452	magnesium alloy zh42	(casting)	41	33
mg033	2453	magnesium alloy zh62a(ac),tz6	(casting)	20,41,47	31
mg034	2454	magnesium alloy zk20a	(wrought)	20,41	3303333
mg035	2455	magnesium alloy zk51a, h807	(casting)	20,41,47	0
mg036	2456	magnesium alloy zk60a,b, zw6	(casting)	1,14,20,41,47	1
mg037	2457	magnesium alloy zre0 (ez30)	(casting)	20	303331
mg038	2458	magnesium alloy zrel(aa)	(casting)	47	333
mg039	2459	magnesium alloy zty(x) (hk11)	(wrought)	20,47	331
mg040	2460	magnesium alloy zw1(x) (zk11)	(wrought)	47	333
mg041	2461	magnesium alloy zw3(x) (zk31)	(wrought)	47	333
mg043	2463	magnesium alloy 1959 (mg,ce4.33)	20	3303335	
mg044	2464	magnesium alloy 1960 (mg,ce6.7)	20	3303330	
mg045	2465	magnesium alloy 1961 (mg,ce11.85)	20	3303330	
mg046	2466	magnesium alloy 1964 (mg,ce5,co2,mn0.8)	20	3303330	
mg047	2467	magnesium alloy 1992 (mg,ce4.45,co3)	20	3303330	
spinx	4224	magnesium aluminate (mgo.al2o3) (xtal)	20,27,47,48,51	500	
spinl	4225	magnesium aluminate (mgo.al2o3) (100 d)	20,27,47,48,51	500	
cordr	4322	magnesium aluminum silicate (cordierit)	20,51	5510	
mgopx	4050	magnesium oxide (mgo) (polyxtal, 100 d)	1,20,27,47,48,51	2000	
mgox	4048	magnesium oxide (mgo) (single crystal)	1,20,27,47,48	0	
forst	4324	magnesium silicate (2mgo.sio2) (100 d)	1,20,27,51	0	
steat	4326	magnesium silicate (mgo.sio2) (commerc)	1,20,27,51	505	
mg2si	4776	magnesium silicide (mg2si)	20,27,48	300530	
mgso4	4970	magnesium sulfate (mgso4) (crystal)	1,27	50	
epsom	4971	magnesium sulfate hydrate (mgso4.7h2o)	1,27,51	555	
pormt	5233	magnesium titanate porcelain	20,48	305530	
mncry	1101	manganese	20,1,32,27,43,42	0	

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mno	4052	manganese oxide (mno) (single xtal)	1,27,48	5
mn3o4	4054	manganese oxide (mn3o4) (87 pc dense)	20,27,48,51	22005
mnse1	4928	manganese selenide (97mnse.3lise)	20,27	3305530
mnsi2	4778	manganese silicide (mnsi2)	20,27,48	300530
mnte4	4930	manganese telluride (95mnte.5mnas)	20	3305530
mnten	4931	manganese telluride (99mnte.nate)	20	3305530
cuman	2195	manganin (cu84, ni4, mn12)	2	3305550
marbl	6021	marble (av prop) (see ref 51)	1,27,51	25555
marbd	6020	marble dielectric (xtal) (caco3 99.99)	1,27,51	5550
melm2	7122	melamine (high dens, high k)	6,38	2022555
melm1	7121	melamine (low dens, low k)	6,38	2022555
melac	7123	melamine, alpha cellulose filled	38	22555
melas	7124	melamine, asbestos filled (mst 95-205)	38	2022555
melaf	7125	melamine, cellulose filled (mst 95-205)	38	22555
mel11	7127	melamine, fabric or flock filled	6,38	555
melqf	7126	melamine, glass fiber filled (mst 205)	6,38	555
md	1461	mendelevium		4445555
hgliq	1207	mercury (liquid)	1,27,28,42,43,47,14	0
hgcl2	4826	mercury chloride (hgcl2) (prsd 8 kb)	1,27,47	10
ch4	4890	methane (ch4) (gas)	1,27	0
memac	7131	methyl methacrylate	1,38	25550
micax	4982	mica (single crystal) (a or b axes)	20,51	305555
micac	4983	mica (single crystal) (c axis)	20,51	305555
micas	4984	mica (single crystal) (synthetic) (98d)	20	305550
micab	4985	mica brick (red or white) (avg prop)	20	305552
micap	4987	mica insulating powder	20	305550
hem01	7514	mock h.e. lm-04-0 h4-048-a294-3	5,8	5530
hem02	7515	mock h.e. lm-04-0 h7-048-a522.1	5,8	5500
hem03	7506	mock h.e. rm-04-bg (lx-04-1 mech mock)	8	5555
hem04	7507	mock h.e. 90010 (pbx-9404 mech mock)	8	5555
mo	1106	molybdenum	20,6,1,32,41,43,42,	0
mo	1106	molybdenum	+47,14	0
moafe	3672	molybdenum alloy (mo bal, fe 0.25)	20	333311
mo70	3673	molybdenum alloy (mo70, w30)	20	3300
moati	3671	molybdenum alloy (mo99.5, ti0.5)	1,6,41	300
mobed	4712	molybdenum beryllide (mobel2)	20,48	500
mo2c	4520	molybdenum carbide (mo2c)	20,27,48	2022502
mo2n	4432	molybdenum nitride (mo2n) (pr srd 100d)	47,48	2000505
mose2	4932	molybdenum selenide (mose2)	20	3303555
mosi2	4780	molybdenum silicide (mosi2)	20,27,48	2500
mote2	4934	molybdenum telluride (mote2)	20	3305555
mulby	3831	mullberry (u90, nb7.5, zr2.5)	34,36,37	0
mull	4316	mullite (3al2o3.2sio2) (100 pc dense)	20,27,48,51	500
nd	1366	neodymium	41,20,42	30225
ndb6	4630	neodymium boride (ndb6) (97.3 pc dense)	48	300555
negas	1526	neon (gas)	27,2,1,42	20000
neopr	7136	neoprene rubber	6,38,39	555
np	1464	neptunium	20,27	2440555

ni	1111	nickel	20,2,1,32,37,41,42,51	2
nial3	2588	nickel alloy (ni35,cr20,fe45)	41	5533
nial2	2586	nickel alloy (ni60,cr16,fe24)	41	5533
nial1	2584	nickel alloy (ni62,cr12,fe26)	2,41	3305533
ni995	2590	nickel alloy (ni99.5) low c, 220, 225	1,14	320
nicka	2503	nickel alloy a (ni99.4) (annealed)	1,14,20	2
nican	2502	nickel alloy calite n	14	333
nich3	2504	nickel alloy chlorimet 3	14	3333
nicon	2506	nickel alloy constantan (ni45, cu55)	1,2,14,41,47	331
nicod	2508	nickel alloy corrosist	14	333
nidae	2592	nickel alloy d and e	1	30
niduh	2512	nickel alloy duranickel (and -r) (hard)	1,14,47	333
nidus	2510	nickel alloy duranickel (and -r) (soft)	1,14,47	333
nid20	2514	nickel alloy durimet 20 (cast)	1	303333
nihsa	2516	nickel alloy hastelloy a (annealed)	1,14,20	20332
nihsb	2518	nickel alloy hastelloy b	1,14,20,41,47	300
nihsc	2520	nickel alloy hastelloy c	1,14,41,47	302
nihsd	2522	nickel alloy hastelloy d	1,14,41,47	333
nihsn	2523	nickel alloy hastelloy n and inor-8	20,41	330
nihsr	2524	nickel alloy hastelloy r-235	1,14,20	300
nihsx	2526	nickel alloy hastelloy x	1,14,20,41	330
nih80	2528	nickel alloy hy mu 80	14	200333
nillg	2530	nickel alloy illium g	1,14,20,41,47	2002333
nillr	2532	nickel alloy illium r	1,14,41,47	2000333
nincl	2534	nickel alloy incoloy	1,14	323
ninc9	2536	nickel alloy incoloy 901	1,20	3310
nincn	2540	nickel alloy inconel (cast)	1,14,20,41,47	302
ninca	2538	nickel alloy inconel (wrought, annld)	1,14,20,41,47	302
nincw	2542	nickel alloy inconel w	1	333
nincx	2544	nickel alloy inconel x and x-750	1,20,41	301
ninc6	2545	nickel alloy inconel 600 (annealed)	1,47	2003330
ninc7	2546	nickel alloy inconel 700	1,14,20,41	330
ninc2	2543	nickel alloy inconel 702 (annealed)	1,20	3320
nin7c	2547	nickel alloy inconel 713c (cast)	1,20	200320
ninvr	2501	nickel alloy invar (hot-rolled or frgd)	6,41,47	20355
cok42	2632	nickel alloy k-42b	14	3323332
nimoc	2551	nickel alloy monel (cast)	1,41	200333
nimou	2549	nickel alloy monel (cold-drawn)	1,14,20,41	333
nimon	2548	nickel alloy monel (hot-rolled)	1,14,41,44,47	0
nimlh	2552	nickel alloy monel, h (as cast)	1,41	220333
nimhu	2555	nickel alloy monel, h (cast, var comp)	1,20,41	220333
nimlk	2554	nickel alloy monel, k (annealed)	1,14,20,41,44	200300
nimkr	2556	nickel alloy monel, kr (annealed)	1,14	200333
nimlr	2558	nickel alloy monel, r (hot-rolled)	1,20,41	200330
nimls	2560	nickel alloy monel, s (cast, all cond)	1,14,20	200330
nimow	2553	nickel alloy monel weldable alloy	1	200333
nim4h	2557	nickel alloy monel 400	47	205533
niml4	2550	nickel alloy monel 403 (hot-rolled)	1	203333

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cont1	2636	nickel alloy multimet (n-155) (low c)	1,14,20,41	330
contm	2634	nickel alloy multimet (n-155) (wrought)	1,14,20,41	330
nim25	2561	nickel alloy m-252 (ge j-1500)	20	3310
nichr	2562	nickel alloy nichrome v (ni80, cr 20)	1,47	23302
nimnd	2564	nickel alloy nimonic ds	47	303333
nim10	2577	nickel alloy nimonic 100	20	3303330
nim15	2575	nickel alloy nimonic 105	47	3330
nim75	2566	nickel alloy nimonic 75	1,14,20	330
nim80	2568	nickel alloy nimonic 80	1,14,20,41,47	330
nim8a	2570	nickel alloy nimonic 80a	1,20,41,47	330
nim90	2572	nickel alloy nimonic 90	1,14,20,41	330
nim95	2573	nickel alloy nimonic 95	20,47	303330
niper	2574	nickel alloy permanickel	1,14	335
niren	2576	nickel alloy rene 41	20,41	303320
niudm	2578	nickel alloy udimet 500 (wrought)	1,20,41	300330
niwsp	2580	nickel alloy waspalloy	1,20,41	300330
ni330	2582	nickel alloy 330 (ni99.55) (annealed)	1	335
enlox	4218	nickel cobalt oxide (46nio.46coo.8lio)	20,27	3305555
nioli	4222	nickel lithium oxide (95nio.5lio)	20,27	3305550
niopl	4060	nickel oxide (nio) (polyxtal, 68-74 d)	20,27,32,47,48,51	0
niopx	4058	nickel oxide (nio) (polyxtal, 88-100 d)	20,27,32,47,48,51	0
nio	4056	nickel oxide (nio) (single xtal)	20,27,32,47,48,51	5
cunis	2185	nickel silver (cu bal, ni 10-20)	1,2,6,41,47	2222555
niznf	4226	nickel zinc ferrite (ni(zn)o.fe2o3)	20	2025502
nb	1246	niobium	20,27,32,43,44,42	0
nbtaw	3681	niobium alloy (nb61, ta28, w10, zr0.5)	20	3300
nbwmo	3684	niobium alloy (nb80, w15, mo5)	20	3300
nbtiz	3682	niobium alloy (nb85, ti10, zr5)	20	3300
nbta5	3683	niobium alloy (nb95, ta5)	20	3303330
nbbed	4714	niobium beryllide (nbbe12) (hp, 93-97d)	20,48	2000500
nbbe8	4716	niobium beryllide (nb2be17)	20,48	300530
nbb2	4620	niobium boride (nbb2) (pressed, sntrd)	20,27,48	2500
nbc	4522	niobium carbide (nbc)	20,27,48,54	20502
nbn	4434	niobium nitride (nbn)	20,47,48	505
nb2n	4436	niobium nitride (nb2n)	20,47,48	300535
nbsi2	4782	niobium silicide (nbsi2)	20,27	300535
nogas	4061	nitric oxide (no) (gas)	1,27	500
nitr	7141	nitrile rubber	6,39	5555
nitrc	7508	nitrocellulose h.e. (12.7 n)	8	305555
n-gas	1531	nitrogen (gas)	27,2,42,1	0
no	1467	nobelium		4445555
nylon	7151	nylon 6, 11, 66, 610 (polycaprolactam)	1,6,38	500
nylqf	7156	nylon, glass filled		202555
obsid	5030	obsidian glass	27,51	305530
orthc	4328	orthoclase (k2o.al2o3.6sio2) (crystal)	27,51	325555
os	1114	osmium	27,20,42,41	0
o-gas	1536	oxygen (gas)	27,42,1,2	0
pd	1236	palladium	20,41,42,27,43	0

e9011	7509	pbx-9011 h.e. (hmx 90, estane 10)	8	555
e9404	7510	pbx-9404-03 h.e. (hmx 94, nc 3, bind 3)	8,44	511
petn	7511	petn h.e.	8	555
phcaf	7172	phenolic, cast, asbestos filler	6,38	2555
phcnf	7171	phenolic, cast, no filler	6,38	222555
phmhd	7177	phenolic, molded (high density, k)	6	22555
phmld	7176	phenolic, molded (low density, k)	6	22555
phrpd	7181	phenolic resin, pressed, types 40, 50	20	305555
pfppf	7161	phenol-formaldehyde + phenol-furfural	20	2225555
phnxy	7191	phenoxy	6,38	2000555
p	1321	phosphorus (white)	27	40005
plasl	4963	plaster, building (molded, dry)	1,27	555
plamt	7201	plastic laminate, various types	6,20	2222555
glasp	5034	plate glass	20,51	305532
pt	1116	platinum	20,1,32,27,41,43,42	0
pu	1121	plutonium	20,31,3,27,43,42,41,	0
pu	1121	plutonium	+36,44	0
pustd	3701	plutonium alloy (delta phase)	20,27,31,44	200
puc	4524	plutonium carbide (puc) (arcm or cast)	20,48,53,54	2025502
pun	4438	plutonium nitride (pun)	27,48,53	300530
pup	4762	plutonium phosphide (pup) (90 pc dense)	53	500
pus	4747	plutonium sulfide	53	550
upuox	4242	plutonium uranium oxide (puo _{2.4} uo ₂) see	53	303530
po	1473	polonium	20,27	20005
pallo	7211	polyallomer	6,38	22555
pcarb	7221	polycarbonate, various fillers	6,38	2022555
pestg	7231	polyester, glass fiber reinforced, tac	20	2555
pethh	7243	polyethylene, high density	6,38	2555
pethl	7241	polyethylene, low density	6,38	2555
pethm	7242	polyethylene, medium density	6,38	2555
pimhf	7251	polyimide, h-film, kapton	6,40	555
memac	7131	polymethyl methacrylate	1,38	25550
pproc	7262	polypropylene, copolymer	6,38	20555
pprop	7263	polypropylene, filled	6	20555
pprom	7261	polypropylene, moplun	6,38	555
pstyf	7271	polystyrene, foamed-in-place, rigid	6	2020555
pstyg	7276	polystyrene, general purpose	6,20,38	2550
pstym	7281	polystyrene, modified	6	22555
pstyp	7286	polystyrene, prefoamed, rigid, dow q103	6,20	2002550
pstyl	7287	polystyrene foam (d = 0.038) (1 atm)	1	20552
pstyv	7289	polystyrene foam (d = 0.046) (vacuum)	1	20552
pstyh	7288	polystyrene foam (d = 0.046) (1 atm)	1	20552
psulf	7291	polysulfone	5,6,38	555
purrf	7302	polyurethane foamed-in-place, rigid	6,20	2320555
puref	7301	polyurethane foam, flexible	6,20,38	2020555
purer	7311	polyurethane rubber 1-100	6,38	20555
pvin	7321	polyvinyl alcohol	6	5555
pvinb	7331	polyvinyl butyral	6,38	555

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pvinc	7341	polyvinyl carbazole	20	5555
pvcac	7356	polyvinyl chloride acytate, flexible	38	2225555
pvcac	7357	polyvinyl chloride acytate, rigid	38	2225555
pvcfl	7351	polyvinyl chloride, flexible	6,38,20	2222555
pvcrd	7352	polyvinyl chloride, rigid	6,38,20	2222555
pvtpx	7371	polyvinyl tpx-r	5,38	5555
pvdcm	7362	polyvinylidene chloride	6,38	22555
pvdcl	7361	polyvinylidene chloride film	6,38	555
pvdck	7366	polyvinylidene fluoride (kynar)	5,38	5555
poral	5281	porcelain, high alumina	20	3005500
porzr	5282	porcelain, high zircon	20	305535
pormt	5283	porcelain, magnesium titanate	20,48	305530
porce	5286	porcelain, ordinary	1,20	3325535
porbe	5280	porcelain 4811 (beo)	20	305530
porc5	5284	porcelain 576	20	325535
k	1226	potassium	1,27,28,42,41,43,51	0
kliq	1227	potassium (liquid)	14,27,28,43,47,51	22
kalum	4972	potassium alum (k2so4.al2(so4)3.24h2o)	1,27	550
orthc	4328	potassium aluminum silicate (orthoclas)	27,51	325555
kbr	4828	potassium bromide (kbr) (prsd 8 kb)	1,27,47	210
kbrx	4830	potassium bromide (kbr) (single xtal)	1,27,47,51	210
kbr50	4833	potassium bromide (kbr 50, kcl 50)	1,27,47,51	3303330
kbr75	4832	potassium bromide (kbr 75, kcl 25)	1,27,47,51	3303330
kbr90	4831	potassium bromide (kbr 90, kcl 10)	1,27,47,51	3303330
kcl	4836	potassium chloride (kcl) (prsd 8 kb)	1,27,47,51	10
kclsy	4837	potassium chloride (kcl) (sylvite xtal)	1,27,47,51	10
kbr50	4833	potassium chloride (kcl 50, kbr 50)	1,27,47,51	3303330
kcl50	4838	potassium chloride (kcl 50, nacl 50)	1,27,47,51	303330
kcl75	4834	potassium chloride (kcl 75, kbr 25)	1,27,47,51	3303330
kcl90	4835	potassium chloride (kcl 90, kbr 10)	1,27,47,51	3303330
kcrom	4233	potassium chromate (k2o.2cro3) (m axis)	1,27	300050
kcrox	4232	potassium chromate (k2o.2cro3) (s axis)	1,27	300050
kf	4840	potassium fluoride (kf) (prsd 8 kb)	1,27,47	10
ki	4842	potassium iodide (ki) (prsd 8 kb)	1,27,47	10
kfecn	4974	potassium ferrocyanide (k4fe(cn)6.3h2o)	1,27	550
kno3	4976	potassium nitrate (kno3) (pr 8000 kb)	1,27	0
pr	1361	praseodymium	41,27,20,42	205
prb6	4628	praseodymium boride (prb6) (95 pc dens)	48	305555
pm	1421	promethium	20,27,42	3332035
pa	1476	protactinium	20,27	30005
pyrex	5016	pyrex glass	2,20,27,51	500
pyrc6	5018	pyroceram 9606 ceramic glass	20	5500
pyrc8	5019	pyroceram 9608 ceramic glass	20	5500
pyrop	4990	pyrophyllite (parallel to bedding)	27,51	2305530
pyron	4991	pyrophyllite (perpend. to bedding)	27,51	2305530
sio2a	4066	quartz crystal, a axis (sio2)	1,2,20,27,37,47,51	2200
sio2c	4064	quartz crystal, c axis (sio2)	1,2,20,27,37,47,51	2200
sanqf	6032	quartz flour, fine (dry)	51	305535

sanqn	6033	quartz flour, fine (h ₂ o 21 pc)	51	305555
sio2	4062	quartz glass, fused (sio ₂)	1,20,27,47,51	2200
sanqp	6039	quartz powder, coarse (h ₂ o 24)	51	305555
sandy	6034	quartz sand (dry) (av prop) (see ref)	51	2325555
sandq	6036	quartz sand (wet) (h ₂ o 4-23) (av prop)	51	2325555
ra	1479	radium	27	2040025
rngas	1561	radon gas	27	40505
rattn	8211	rattan	44	25555
re	1251	rhodium	27,43,41,42	2
rh	1281	rhodium	20,27,43,42,41	0
rocks	6022	rock or stone (average properties)	1,46	3335555
stbrc	7431	rubber, buna, with carbon black	6,20,39	200555
butyr	7031	rubber, butyl	6,39	555
rubbd	7382	rubber, dielectric mix	6,20	550
rubbk	7383	rubber, high k	6,20	550
rubbn	7381	rubber, natural	6	555
rubbf	7386	rubber, natural, foam	6,20	320555
neopr	7136	rubber, neoprene	6,38,39	555
nitr	7141	rubber, nitrile		5555
puer	7311	rubber, polyurethane elastomer 1-100	6,38	20555
rb	1291	rubidium	1,27,28,42,43,47	40024
rbliq	1292	rubidium (liquid)	1,14,27,28,43,47	20022
rbcl	4844	rubidium chloride (rbcl) (prsd 8 kb)	1,27,47	10
rbi	4846	rubidium iodide (rbi) (prsd 8 kb)	1,27,47	10
ru	1301	ruthenium	20,42,1,27	202020
sm	1371	samarium	20,27,41,42,43	30205
smb6	4632	samarium boride (smb6) (96.8 pc dense)	48	300555
sms	4748	samarium sulfide (sms)	20,48	300550
sandy	6034	sand (dry) (d = 1.36 to 1.84) (av prop)	51	2325555
sandn	6038	sand, northway (h ₂ o 4-10) (av prop)	51	2325555
sandq	6036	sand, quartz (wet) (h ₂ o 4-23) (av prop)	2,51	2325555
sandm	6026	sandstone (av prop) (see ref 51)	2,27,46,51	25555
sands	6024	sandstone (high density)	2,27,46,51	25555
sandl	6025	sandstone (low density)	2,27,46,51	25555
aloxd	4012	sapphire (al ₂ o ₃) (polyxtal) (100 pc d)	1,20,27,32,47,48,51	200
aloxs	4016	sapphire (al ₂ o ₃) (single xtal) (av dir)	1,20,27,32,47,48,51	202
sc	1341	scandium	20,27,41,43	30005
se	1326	selenium (grey)	27,43,42,1	20005
shale	6028	shale (av prop) (see ref 51)	51	2225555
brisi	5294	silica brick, hard fired (sio ₂ 94-95)	20	330
sio2	4062	silica glass, fused or vitrous	1,20,27,47,51	2200
brisl	5296	siliceous brick (sio ₂ 89, al ₂ o ₃ 9) (25p)	47	335
si	1256	silicon	20,1,27,41,43,42,48	0
sib4	4614	silicon boride (sib4)	27,48	300530
sical	4539	silicon carbide (sic) (brick al ₂ o ₃ 1.7)	20,27,32,47	2500
siccf	4535	silicon carbide (sic) (carbofrax brick)	20,27,32,47	2500
sicfv	4542	silicon carbide (sic) (foam, in vacuum)	20,32,47	2500
sicfb	4536	silicon carbide (sic) (frit bnd brick)	20,27,32,47	2500

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sickt	4534	silicon carbide (sic) (kt grade)	20,27,32,47,48	2500
siemb	4541	silicon carbide (sic) (nitride bonded)	20,32,47,48	2503
siempa	4543	silicon carbide (sic) (powder, in air)	20,32,47	2500
sieph	4544	silicon carbide (sic) (powder, in he)	20,32,47	2500
sierd	4540	silicon carbide (sic) (refractory d-30)	20,27,32,47	2500
sierp	4538	silicon carbide (sic) (rexal, 65-70d)	1,20,27,32,47	2500
sierx	4537	silicon carbide (sic) (rexal, 80-100d)	20,27,32,47,48	2500
sicx1	4531	silicon carbide (sic) (single xtal)	20,27,32,47	22500
sicx2	4532	silicon carbide (sic) (single xtal)	20,32,47,48	22505
siesb	4533	silicon carbide (sic) (slf bnd, he atm)	20,27,32,47	2500
siesi	5424	silicon carbide + si (sic 76, si 24)	20	3305550
si3n1	4444	silicon nitride (si3n4) (70 pc dense)	20,27,47,48	20502
si3n4	4442	silicon nitride (si3n4) (85 pc dense)	20,27,47,48	20502
sio2f	4068	silicon oxide (sio2) (foam, 1 atm air)	1,20,27,47	2200
sio2	4062	silicon oxide (sio2) (fused quartz)	1,20,27,47,51	2200
sio2a	4066	silicon oxide (sio2) (quartz, a axis)	1,2,20,27,37,47,51	2200
sio2c	4064	silicon oxide (sio2) (quartz, c axis)	1,2,20,27,37,47,51	2200
site	4936	silicon telluride (site)	20	305555
silff	7401	silicone foam, flexible (lrl)	6,20	2022555
silfr	7402	silicone foam, rigid, various	6,20	2022555
silrh	7423	silicone rubber, high k (see ref 5)	5,6,41,44	220555
silrl	7421	silicone rubber, low k (see ref 5)	5,6,41,44	220555
silrm	7422	silicone rubber, medium k (see ref 5)	5,6,41,44	220555
silrl	7424	silicone rubber, rtv 521 and 093-009	5,6,41,44	220555
silmd	7411	silicone, molded, various fillers	6,20,38	2222555
brisk	5298	sillimanite brick (22 pc porosity)	20	300530
aq	1126	silver	20,6,1,27,2,32,42,47,	0
aq	1126	silver	+14,43	0
agliq	1127	silver (liquid)	27,32,42,43	30005
silva	3751	silver alloys, sterling and coin	1	325
snte2	4940	silver antimony telluride (snte 25 pc)	20	3305555
agcl	4848	silver chloride (agcl) (single crystal)	27,47,51	15
ag2se	4942	silver selenide (ag2se)	20,27,47	20502
slate	6030	slate (av prop) (see ref 51)	51	2225555
glasc	5032	soda-lime glass	20,27	3325532
na	1221	sodium	2,1,27,28,41,42,43,51	0
nalq	1222	sodium (liquid)	1,14,27,28,42,43,47,	1
nalq	1222	sodium (liquid)	+51	1
analc	4329	sodium aluminum silicate hydrate (xtal)	27,51	305555
nabr	4850	sodium bromide (nabr) (prsd 8 kb)	1,27,47	10
nacl	4978	sodium chlorate (nacl) (crystal)	1,27,51	505
nacl	4852	sodium chloride (nacl) (clear crystal)	1,27,47,51,52	10
naclr	4854	sodium chloride (nacl) (opaque, impure)	1,27,47,51,52	10
kcl50	4838	sodium chloride (nacl 50, kcl 50)	1,27,47,51	303330
naf	4856	sodium fluoride (naf) (prsd 8 kb)	1,27,47	10
soils	6046	soil (av props) (see refs)	2,46,51	2225555
soil3	6044	soil, clay (wet)	51	2225555
sanqf	6032	soil, fine quartz flour (dry)	51	305535

sanqw 6033	soil, fine quartz flour (h2o 21 pc)	51	305555
soil1 6042	soil, loam (dry) (av prop) (see refs)	2,51	2225555
soil2 6043	soil, loam (h2o 4-27 pc) (av, see refs)	2,51	2225555
soilm 6048	soil, mars surface (see ucrl-50309)		5555
solid 6050	soil, sandy dry	46	5555
soilw 6052	soil, sandy (h2o 8)	46	5555
snowf 8231	snow, fresh	2,27	55
snowp 8232	snow, packed	27,46	55
sold1 3611	solder (pb37.5, sn37.5, in25)	36	3355
sold2 3612	solder (pb39.2, sn60.8)	34,41	5
sold4 3613	solder (pb50, sn50)	1,41	50
sold3 3614	solder (pb60, sn40)	1,41	55
spinx 4224	spinel (mgo.al2o3) (single crystal)	20,27,47,48,51	500
spin1 4225	spinel (mgo.al2o3) (100 pc dense polyx)	20,27,47,48,51	500
h2ogs 4113	steam (h2o) (gas) (satd)	1,2,14,27,46	205550
h2ogl 4112	steam (h2o) (gas) (1 atm)	1,2,14,27,46	200050
steat 4326	steatite (mgo.sio2) (commercial grades)	1,20,27,51	505
stall 3101	steel, alloy and mild (4130, 4340)	6,41,46	3302
stalc 3106	steel, alloy, cast	6	3355
stcar 3116	steel, carbon, type 1020 (0.2 - 0.6 c)	1,20,37	300
stefc 3111	steel, free cutting, eutectoid	2,4,6,20,41	300
sthsp 3121	steel, high speed (m1, m10, m-2, ti)	20	3303355
comt1 2636	steel, multimet (n-155) (low c)	1,14,20,41	330
comtm 2634	steel, multimet (n-155) (wrought)	1,14,20,41	330
stst4 3141	steel, stainless (cr 12-13, ni 0-3)	1,2,4,14,20	300
stst3 3131	steel, stainless (cr 16-26, ni 8-36)	1,2,4,6,20,37	2023333
ssc08 3208	steel, stainless ca15, ca40 (cast)	1	355
ssc09 3209	steel, stainless cb30, cc50 (cast)	1	355
ssc13 3213	steel, stainless ck, ch, hi (cast)	1	355
ssc12 3212	steel, stainless cf (cast)	1	355
ssc04 3204	steel, stainless cn-7m (cast)	1	355
ssc06 3206	steel, stainless ha (cast)	1	355
ssc07 3207	steel, stainless hc, hd (cast)	1	355
ssc11 3211	steel, stainless he (cast)	1	355
ssc05 3205	steel, stainless hf (cast)	1	355
ssc10 3210	steel, stainless hh, hl, hk (cast)	1	355
ssc03 3203	steel, stainless ht (cast)	1	355
ssc02 3202	steel, stainless hu (cast)	1	355
ssc01 3201	steel, stainless hw (cast)	1	355
stst3 3131	steel, stainless series 300	1,2,4,6,20,37	2023333
stst4 3141	steel, stainless series 400	1,2,4,20	300
stph4 3171	steel, stainless 17-4ph	20,14	23302
stph7 3176	steel, stainless 17-7ph	20,14	2003300
st199 3186	steel, stainless 19-9dl	41	2300
stst2 3126	steel, stainless 201 and 202	1	3355
st304 3133	steel, stainless 304	1,4,37	300
st347 3135	steel, stainless 321 and 347	1,2,4,20,37,14	300
sts4a 3146	steel, stainless 430, 430f, and 431	1,2,4,6,20,14	302

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stsb	3151	steel, stainless 446	1,14,20	302
stst5	3161	steel, stainless 501 and 502	2,4	2303330
wcco2	5453	steel, tool, tungsten carbide ca2	20	3300530
wccol	5452	steel, tool, tungsten carbide ca4	20	3300530
stuh	3181	steel, ultra high strength type 300-m	1	355
sr	1296	strontium	20,28,42,27	240024
srso4	4980	strontium sulfate (srso4) (crystal)	1,27,51	550
srtilt	4234	strontium titanate (sro.tio2) (100 d)	20,48	500
srtip	4235	strontium titanate (sro.tio2) (80 d)	20,48	500
stco1	5426	strontium titanate + co (co 10)	20	3300535
stco2	5427	strontium titanate + co (co 20)	20	3300535
stco3	5428	strontium titanate + co (co 30)	20	3300535
stco4	5429	strontium titanate + co (co 40)	20	3300535
stbr	7431	styrene-butadiene rubber + carbon blk	6,20,39	200555
s	1331	sulfur	27,1,42,30,2,41	10001
so2	4071	sulfur dioxide (so2) (gas)	1	5500
talc	4994	talc	20,27,51	5505
ta	1161	tantalum	20,1,27,32,37,43	20002
tanbv	3784	tantalum alloy (ta62, nb30, v7.5)	20	3300
tawhf	3785	tantalum alloy (ta89, w9, hf2)	20	300
talow	3781	tantalum alloy (ta90, w10)	20,36	500
tacuz	3783	tantalum alloy (ta98, cu0.7, zr0.7)	20	3300
tanbl	3782	tantalum alloy (ta99.5, nb0.5)	20	3303330
tasb	4944	tantalum antimonide (tasb)	20	3305552
tabel	4718	tantalum beryllide (tabel2) (hp)	20,48	
tabel	4720	tantalum beryllide (ta2be17)	20,48	500
tab	4642	tantalum boride (tab) (psd, sntr, 85d)	20,27,47,48	500
tab2	4644	tantalum boride (tab2)	20,27,47,48	2020502
tac	4562	tantalum carbide (tac)	20,27,48,54	2020502
wcco5	5456	tantalum carbide + wc cermet k601	49	300530
tan	4446	tantalum nitride (tan)	20,27,48	2220525
ta2n	4448	tantalum nitride (ta2n)	20,27,48	2220522
tasi2	4784	tantalum silicide (tasi2)	20,27	300535
tatb	7516	tatb h.e. (triamino-trinitro-benzene)	55	0
tc	1164	technetium	27,42	40025
teffe	7111	teflon	1,6,20,38	2500
tefr	7112	teflon, reinforced	20	2500
te	1488	tellurium	27,20,42,41,1	20002
tb	1386	terbium	20,27,41,42,43	30205
tbb6	4638	terbium boride (tbb6) (94.3 pc dense)	48	305555
tetrl	7512	tetryl h.e.	8	300555
tl	1336	thallium	41,27,1,42,47	0
tliliq	1337	thallium (liquid)	1,14,27,42,43,47	55
th	1166	thorium	20,32,34,27,37,43,44,	2
th	1166	thorium	+41	2
thb4	4646	thorium boride (thb4)	20,27,48	2002502
thb6	4648	thorium boride (thb6)	20,27,48	2000535
thc	4564	thorium carbide (thc) (80 pc dense)	20,27,48,54	300530

thc2	4565	thorium carbide (thc2) (69 pc dense)	20,27,48,54	300530
tho2	4072	thorium oxide (tho2) (96-100 pc dense)	1,20,27,47,48,51	2002300
tm	1406	thulium	20,27,41,42,43	30005
sn	1171	tin	2,1,27,32,42,41,47	0
snliq	1172	tin (liquid)	1,14,27,32,41,42,43	0
sold1	3611	tin alloy (sn37.5, pb37.5, in25)	36	3355
sold3	3614	tin alloy (sn40, pb60) (solder)	1,41	55
sold4	3613	tin alloy (sn50, pb50) (solder)	1,41	50
sold2	3612	tin alloy (sn60.8, pb39.2) (solder)	34,41	5
sno2	4074	tin oxide (sno2) (93-95 pc dense)	1,20,27,47,48	2300
snte2	4940	tin telluride (snte 25, agsbte2 75)	20	3305555
snte6	4939	tin telluride (snte 60, agsbte2 40)	20	3305555
snte8	4938	tin telluride (snte 80, agsbte2 20)	20	3305555
ti	1176	titanium	20,27,32,37,42,43,41,	20002
ti	1176	titanium	+1	20002
tial1	2712	titanium alloy (ti bal, al2, mn2)	20	3303330
tial3	2716	titanium alloy (ti bal, al4, cu2, zr2)	20	3303330
tial7	2730	titanium alloy (ti bal, al4, cu4, sn2)	20	3303330
tial1	2732	titanium alloy (ti bal, al4, mo3, vl)	20	3233323
tial5	2720	titanium alloy (ti bal, al4, vl, mo0.6)	20	3303330
tial2	2714	titanium alloy (ti bal, al4, v2, mol)	20	3303330
tial4	2718	titanium alloy (ti bal, al4, v3, mol1.5)	20	3303330
tial6	2728	titanium alloy (ti bal, al4, zr3.5)	20	3303330
tial2	2736	titanium alloy (ti bal, al5, sn2.5)	41,45	303330
ti555	2738	titanium alloy (ti bal, al5, sn5, zr5)	45	303330
tial3	2740	titanium alloy (ti bal, al6, v4)	20,37,45	300
tial5	2742	titanium alloy (ti bal, al8, mol, vl)	45	3330
tial4	2746	titanium alloy (ti bal, cr3.4, mo2.1)	20	3303330
tial8	2752	titanium alloy (ti bal, sn4.8, al4.5)	20	3303330
tial9	2754	titanium alloy (ti bal, sn5.5, al2)	20	3303330
tiv14	2768	titanium alloy (ti bal, vl4, cr10, al4)	20	3003300
tiv15	2766	titanium alloy (ti bal, vl5, al2.8)	20	3003300
tial0	2770	titanium alloy (ti bal, zr3, al2)	20	3303330
ti100	2750	titanium alloy cl00m (rc130a) (mn7.9)	20	203320
tih40	2722	titanium alloy hylite 40 cl30am,rc130b	1,20,41	303330
tih50	2724	titanium alloy hylite 50 (imi550)	20,45	303330
tih51	2726	titanium alloy hylite 51 (imi551)	45	303330
tih55	2760	titanium alloy hylite 55 (imi)	20,45	303330
tih60	2758	titanium alloy hylite 60 (imi)	20,45	303330
tih65	2756	titanium alloy hylite 65 (imi)	45	303330
ti679	2764	titanium alloy imi 679 (sn11, zr5, al2)	45	303330
ti680	2762	titanium alloy imi 680 (sn11, mo4, al2)	45	303330
ti140	2748	titanium alloy ti140a (fe2, cr2, mo2)	20	3303330
ti150	2744	titanium alloy ti150a (cr2.7, fe1.4)	20	3003300
ti155	2734	titanium alloy ti155a (al5,fe2,cr1,mol)	1,20	3303330
tibed	4722	titanium beryllide (tibel2) (hp, 95d)	20,48	2500
tib2	4650	titanium boride (tib2) (hp, 95 pc dens)	20,27,47,48	500
tic93	4567	titanium carbide (tic) (93 pc dense)	20,27,47,48,54	22502

Thermal Property Data

tic96	4566	titanium carbide (tic) (96 pc dense)	20,27,47,48,54	22502
ticc2	5431	titanium carbide + co (col8, nbc,tac15)	20	3305535
ticc1	5430	titanium carbide + co (tic 80, co 20)	20	305535
ticc3	5432	titanium carbide + nbc + ni	20	3305535
ticcr	5442	titanium carbide + ni or co (avg prop)	48	2220555
ticc5	5434	titanium carbide cermet k138a	49	305530
ticc6	5435	titanium carbide cermet k151a	49	305530
tic10	5439	titanium carbide cermet k161b	20	3005500
ticc4	5433	titanium carbide cermet k162b	49	305530
ticc7	5436	titanium carbide cermet k163b1	49	305530
ticc8	5437	titanium carbide cermet k164b	49	305530
ticc9	5438	titanium carbide cermet k165	49	305530
tinit	4452	titanium nitride (tin) (hp, 70-90 dens)	20,27,47,48	2020502
tio2a	4084	titanium oxide (tio2) (rutile, a axis)	1,20,27,32,47,48,51	20202
tio2c	4082	titanium oxide (tio2) (rutile, c axis)	1,20,27,32,47,48,51	20202
tio2	4086	titanium oxide (tio2) (rutile, 100 d)	1,20,27,32,47,48,51	200
tnt	7513	tnt h.e. (2,4,6-trinitrotoluene) (cast)	8	555
topaz	4301	topaz (2alfo.sio2) (a-axis)	27,51	305550
topac	4302	topaz (2alfo.sio2) (c-axis)	27,51	305551
tourm	4996	tourmaline	27,51	305550
t-gas	1566	tritium gas		3335533
w	1181	tungsten	20,1,32,34,27,37,42,	0
w	1181	tungsten	+41,43	0
w25re	3801	tungsten alloy (w75, re25)		3303330
wnicu	3802	tungsten alloy (w90, ni6, cu2-4)	20	303330
wb	4652	tungsten boride (wb)	20,27,47,48	2500
wc	4568	tungsten carbide (wc)	20,27,47,48,54	2500
wcc12	5463	tungsten carbide cermet carboloy 883	50	300530
wcc11	5462	tungsten carbide cermet carboloy 905	50	300530
wcc10	5461	tungsten carbide cermet carboloy 999	50	300530
wcco2	5453	tungsten carbide cermet ca2 tool steel	20	3300530
wcco1	5452	tungsten carbide cermet ca4 tool steel	20	3300530
wcco3	5454	tungsten carbide cermet k6 and k96	20,49	300530
wcco5	5456	tungsten carbide cermet k601	49	300530
wcco8	5459	tungsten carbide cermet k701	49	300530
wcco9	5460	tungsten carbide cermet k801 (wc + ni)	49	300530
wcco7	5458	tungsten carbide cermet k92	49	300530
wcco6	5457	tungsten carbide cermet k94 and k1	49	300530
wo3	4092	tungsten oxide (wo3) (polyxtal. porous)	20,27,47,48	20305
wse2	4946	tungsten selenide (wse2)	20,27	3303550
wsic	4786	tungsten silicide (wsic) (hp, 95 dense)	20,27,48	2002500
wte2	4947	tungsten telluride (wte2)	20,27	3303555
wtic5	5470	tungsten titanium carbide km	49	300530
wcco4	5465	tungsten titanium carbide k2s	20,49	300530
wtic7	5472	tungsten titanium carbide k21	49	300530
wtic6	5471	tungsten titanium carbide k4h	49	300530
wtic4	5469	tungsten titanium carbide k5h	49	300530
wtic3	5468	tungsten titanium carbide k81	49	300530

wtic2	5467	tungsten titanium carbide k84	49	300530
wtic1	5466	tungsten titanium carbide k86, k7h, k3h	49	300530
u	1186	uranium	20,31,32,36,27,37,42,	0
u	1186	uranium	+41,43,44,34	0
mulby	3831	uranium alloy mulberry	34,36,37	0
u18zr	3833	uranium alloy (u82, zr18)	20,34	303330
u90fs	3837	uranium alloy (u90, fs10)	20	303330
u10mo	3832	uranium alloy (u90, mo10)	20,35,36	300
ufs3r	3838	uranium alloy (u93, fs5, zr2)	20	303330
ucreu	3835	uranium alloy (u94.4, cr5.6) (eutectic)	20	3003300
uzr05	3840	uranium alloy (u95, zr5)	20	30303330
u04nb	3834	uranium alloy (u96, nb4)	20,34	303330
u97fs	3836	uranium alloy (u97, fs3)	20	303330
uzr02	3839	uranium alloy (u98.5, zr1.5)	20	303330
ubel3	4724	uranium beryllide (ubel3) (sntrd, 61d)	20,48	305550
ub4	4654	uranium boride (ub4)	20,48	300555
ucamc	4572	uranium carbide (uc) (arcm or cast, 99d)	20,48,53,54	2502
ucavg	4574	uranium carbide (uc) (avg, var. types)	20,48,53,54	2502
ucsnt	4573	uranium carbide (uc) (sintered, 90d)	20,48,53,54	2502
uc2	4576	uranium carbide (uc2)	20,27,48,54	2000500
un	4454	uranium nitride (un) (hp, 95-98 dense)	20,27,48,pwac481-65	2500
uo2px	4096	uranium oxide (uo2) (polyxtal, 97 dens)	20,27,47,48,51	500
uo2	4094	uranium oxide (uo2) (single crystal)	20,27,47,48,51	500
u3o8l	4099	uranium oxide (u3o8) (prsd at 100 psi)	1,20,27,47,48	2002500
u3o8h	4098	uranium oxide (u3o8) (prsd at 4200 psi)	1,20,27,47,48	2002500
uo2cr	5482	uranium oxide + cr (uo2 80 vol) (97 d)	20	4305550
uom03	5486	uranium oxide + mo (uo2 70 vol) (92 d)	20	4305550
uom02	5485	uranium oxide + mo (uo2 80 vol) (91 d)	20	4305550
uom01	5484	uranium oxide + mo (uo2 80 vol) (94 d)	20	4305550
uo2nb	5488	uranium oxide + nb (uo2 80 vol)	20	4305550
uo2sl	5490	uranium oxide + st steel (uo2 70 vol)	20	4305550
uo2s2	5491	uranium oxide + st steel (uo2 80 vol)	20	4305550
uo2zl	5492	uranium oxide + zr (uo2 43,zr 57) (59 p)	20	4305530
uo2z2	5493	uranium oxide + zr (uo2 80,zr 20)	20	305535
upuox	4242	uranium plutonium oxide (4uo2.puo2) see	53	303530
u3si	4738	uranium silicide (u3si)	20,48	20525
urfma	7442	urea-formaldehyde, alpha cellulose fllr	38	25555
urfmn	7441	urea-formaldehyde, molded	38	25555
v	1286	vanadium	20,32,27,41,42,43	0
vbel2	4726	vanadium beryllide (vbel2) (85 pc dens)	20,48	505
vb2	4656	vanadium boride (vb2)	20,27,48	20555
vc	4578	vanadium carbide (vc)	20,27,47,48,54	2022502
vn	4456	vanadium nitride (vn) (pr, strd, 100 d)	20,27,47,48	22505
verm2	5292	vermiculite, expanded (d = 0.19-0.25)	20	305530
verm3	5293	vermiculite, expanded (d = 0.3)	20	305530
vermi	4986	vermiculite brick	20	305550
vermp	4988	vermiculite insulating powder	20	305550
sio2	4062	vitrous silica glass	1,20,27,47,51	2200

Thermal Property Data

vycor	5036	vycor glass	20,27	500
h2ogs	4113	water (h2o) (gas) (satd)	1,2,14,27,46	205550
h2ogl	4112	water (h2o) (gas) (1 atm)	1,2,14,27,46	200050
water	4114	water (h2o) (liquid)	2,14,27,46	0
ice	4116	water (h2o) (solid) (ice)	27,46,51	0
d2o	4118	water, heavy (d2o) (liquid)	14,27	300
glasw	5028	window glass, lime	20	305530
bals1	8516	wood, balsa (across grain)	1,2,27	305555
bals2	8517	wood, balsa (across grain)	1,2,27	305555
cyprs	8518	wood, cypress (across grain)	1,27	305555
mahog	8520	wood, mahogany (across grain)	1,27	305555
maple	8522	wood, maple (across grain)	1,2,27	305555
pinew	8526	wood, norway pine (across grain)	1,2,27	305555
oakld	8525	wood, oak, red, black (across grain)	1,2,27	05555
oakhd	8524	wood, oak, white, live (across grain)	1,2,27	05555
pinel	8527	wood, oregon pine (across grain)	1,2,27	305555
pinew	8529	wood, pine (with grain)	1,2,27	305555
wood2	8513	wood, spruce (across grain)	46	5555
wood1	8512	wood, spruce (with grain)	46	5555
teak	8530	wood, teak (across grain)	1,2	305555
pinev	8528	wood, virginia pine (across grain)	1,2,27	305555
firwh	8532	wood, white fir (across grain)	1,2	305555
pinea	8534	wood, white pine (across grain)	1,2,27	305555
xe	1541	xenon	27,42	30000
yb	1411	ytterbium	20,27,41,42,43	30205
ybb6	4640	ytterbium boride (ybb6) (90.6 pc dens)	48	305555
y	1346	yttrium	41,27,1,20,42,43	20005
yb6	4622	yttrium boride (yb6) (98.4 pc dense)	48	300555
y2o3	4102	yttrium oxide (y2o3) (96-100 pc dense)	20,27,47,48	300
zinc2	3861	zillox 15	1,6,41	355
zn	1191	zinc	2,1,32,27,42,20,41,	0
zn	1191	zinc	+47,51	0
znliq	1192	zinc (liquid)	14,20,27,32,43,47	0
zinc1	3862	zinc alloy astm b69	1,6,41,51	355
znsb	4948	zinc antimonide (znsb)	20,27,47	3303550
znfeo	4252	zinc ferrite (zno.fe2o3) (pr, frd, vac)	20,27	500
zno	4104	zinc oxide (zno) (prsd, fired, 100 d)	1,20,27,47,48,51	2000
zns	4750	zinc sulfide (zns) (cubic crystal)	1,27,47,48,51	310
zinc3	3863	zinc-aluminum alloy astm 23	1,6,41	355
zinc4	3864	zinc-aluminum-copper alloy astm 25	1,6,41	355
zircn	4330	zircon (zro2.sio2) (single crystal)	20,27,48,61	2505
porzr	5282	zircon porcelain, high	20	305535
zr	1196	zirconium	20,27,32,37,43,42,41	20002
zr3zi	3882	zirconium alloy 3zi (zr97,all,sn1,mol)	20	303330
zirca	3881	zirconium alloys zircalloy 2 and 3	1,6,14	200355
zrbet	4728	zirconium beryllide (zrbel3)	20,48	500
zrb2	4658	zirconium boride (zrb2) (hp, 97 pc den)	20,27,47,48	20502
zrb2b	5496	zirconium boride + boron (borolite 101)	47,48	505

zrb2z	5498	zirconium boride + mosi2 (boride z)	47,48	2000500
zrc	4580	zirconium carbide (zrc) (hp or snt,94d)	20,27,48,54	22502
zrh12	4892	zirconium hydride (zrh + zrh2)	20	2225522
zrnpf	4458	zirconium nitride (zrn) (pr sr 88-90 d)	20,27,47,48	500
zrnps	4459	zirconium nitride (zrn) (pr sr 93 d)	20,27,47,48	20502
zroyz	5495	zirconium oxide (y2o3 12, zr 8) (97 d)	20	4305530
zro2	4106	zirconium oxide (zro2) (monoc., 100 d)	1,20,27,47,48,51	0
zro2c	4108	zirconium oxide (zro2 96, cao 6, 91 d)	1,20,27,47,48,51	0
zroti	5494	zirconium oxide + ti cermet zt-15-m	20	5500
zircn	4330	zirconium silicate (zro2.sio2) (xtal)	20,27,48,61	2505
zircp	4332	zirconium silicate (zro2.sio2) (100 d)	20,27,48,61	2500

5.6 Material Data Base

The thermal property data for each material is contained on 1 to 14 cards. The first two cards must be included. The number of additional cards required is dependent on the number of property vs. temperature data pairs for heat capacity and thermal conductivity. A maximum of 24 data pairs (contained on 6 cards) can be defined for each of these properties.

SI units are used. Conversion factors to other unit systems are in Chapter 5.

control card 1

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	A5	alphanumeric identifier - same as in material index
6-10	I5	identification number - same as in material index
11-15	I5	identification number - for finite element reference
16-20	I5	material type = 5 for this data base
21-30	E10.0	density of material [kg/m^3] - this is the value at or near room temperature or the lowest temperature for which heat capacity or thermal conductivity is tabulated, whichever is higher.
31-40	E10.0	transition temperature [K] - or maximum temperature at which material may be used. If a latent heat is specified in columns 41-50, this is the transition temperature at which either a phase change or solid state transition occurs. If a material has more than one transition with a latent heat effect, others are included in the table of heat capacity versus temperature as a triangular peak superimposed over the actual heat capacity curve. This triangular peak has a base width of 10K and is centered at the transition temperature.
41-50	E10.0	latent heat of transition [J/kg]
51-60	I10	thermal generation rate curve number - time dependent, temperature dependent, and constant functional relations are indicated by positive, negative, and zero curve numbers, respectively. The constant value will be the curve multiplier.
61-70	E10.0	thermal generation rate multiplier [W/m^3]

control card 2

<i>column</i>	<i>format</i>	<i>quantity</i>
1-5	I5	number of heat capacity data pairs $2 \leq n_c \leq 24$, if $n_c=0$ or 1, then include the constant heat capacity value on this card.
6-10	I5	number of thermal conductivity data pairs $2 \leq n_k \leq 24$, if $n_k=0$ or 1, then include the constant thermal conductivity value on this card.
11-20	E10.0	heat capacity [J/kg K] - if constant or if the temperature dependence is unknown. When a table of heat capacity versus temperature is listed, the value given here is at or near room temperature, or at the lowest temperature tabulated, whichever is higher.
21-30	E10.0	thermal conductivity [W/m K] - if constant or if the temperature dependence is unknown. When a table of thermal conductivity versus temperature is listed, the value given here is at or near room temperature, or at the lowest temperature tabulated, whichever is higher.

heat capacity table cards - if $n_c \geq 2$, then include heat capacity versus temperature data, 4 data pairs per card, up to a maximum of 24 data pairs.

<i>column</i>	<i>format</i>	<i>quantity</i>
1-80	8E10.0	$T_1, c_1, T_2, c_2, T_3, c_3, T_4, c_4$

thermal conductivity table cards - if $n_k \geq 2$, then include thermal conductivity versus temperature data, 4 data pairs per card, up to a maximum of 24 data pairs.

<i>column</i>	<i>format</i>	<i>quantity</i>
1-80	8E10.0	$T_1, k_1, T_2, k_2, T_3, k_3, T_4, k_4$

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al      1001      n      5 2.698E+03 9.333E+02 3.971E+05
      12      12 9.205E+02 2.385E+02
      0.000E+00 0.000E+00 2.055E+01 1.004E+01 3.315E+01 4.000E+01 5.565E+01 1.803E+02
      7.735E+01 3.410E+02 1.112E+02 5.439E+02 1.732E+02 7.740E+02 2.731E+02 8.996E+02
      7.731E+02 1.130E+03 9.332E+02 1.268E+03 9.332E+02 1.084E+03 2.740E+03 1.084E+03
      4.150E+00 3.807E+02 7.150E+00 7.113E+02 1.015E+01 1.004E+03 2.015E+01 1.590E+03
      3.015E+01 1.590E+03 5.015E+01 8.000E+02 6.015E+01 5.983E+02 1.002E+02 2.900E+02
      1.732E+02 2.385E+02 2.731E+02 2.259E+02 6.731E+02 2.218E+02 9.332E+02 2.100E+02

alliq 1002      n      5 2.360E+03 9.333E+02 3.975E+05
      0      3 1.084E+03 9.205E+01
      9.332E+02 9.205E+01 9.731E+02 1.033E+02 1.063E+03 1.213E+02

sb      1006      n      5 6.696E+03 9.037E+02 1.632E+05
      5      7 2.071E+02 1.841E+01
      2.731E+02 2.059E+02 5.832E+02 2.406E+02 9.031E+02 2.887E+02 9.032E+02 2.552E+02
      1.673E+03 2.552E+02
      2.731E+02 1.883E+01 4.731E+02 1.632E+01 6.731E+02 1.799E+01 7.731E+02 1.966E+01
      9.037E+02 2.385E+01 9.038E+02 2.100E+01 9.731E+02 2.100E+01

sbliq 1007      n      5 6.500E+03 9.037E+02 1.632E+05
      0      0 2.552E+02 2.100E+01

as      1008      n      5 5.730E+03 1.087E+03 3.690E+05
      2      0 3.305E+02 4.000E+00
      2.731E+02 3.243E+02 8.861E+02 4.017E+02

be      1011      n      5 1.848E+03 1.556E+03 1.300E+06
      11      8 1.841E+03 1.841E+02
      0.000E+00 0.000E+00 7.315E+01 6.276E+01 9.815E+01 1.883E+02 2.231E+02 1.423E+03
      2.731E+02 1.715E+03 3.732E+02 2.134E+03 4.731E+02 2.364E+03 6.731E+02 2.699E+03
      1.556E+03 3.577E+03 1.556E+03 3.180E+03 2.203E+03 3.300E+03
      1.981E+02 2.301E+02 2.982E+02 1.820E+02 4.731E+02 1.464E+02 6.731E+02 1.172E+02
      1.073E+03 7.740E+01 1.273E+03 6.067E+01 1.473E+03 5.230E+01 1.556E+03 4.937E+01

bi      1016      n      5 9.750E+03 5.444E+02 5.021E+04
      4      5 1.213E+02 8.000E+00
      2.731E+02 1.218E+02 5.444E+02 1.360E+02 5.445E+02 1.423E+02 1.273E+03 1.753E+02
      2.931E+02 8.000E+00 5.444E+02 7.448E+00 5.445E+02 1.757E+01 6.731E+02 1.548E+01
      9.731E+02 1.548E+01

biliq 1017      n      5 1.000E+04 5.444E+02 5.104E+04
      5      4 1.423E+02 1.088E+01
      5.441E+02 1.423E+02 6.731E+02 1.481E+02 8.731E+02 1.573E+02 1.073E+03 1.661E+02
      1.273E+03 1.732E+02
      5.444E+02 1.096E+01 5.731E+02 1.695E+01 6.731E+02 1.569E+01 9.731E+02 1.548E+01

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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cd      1041      n      5  8.650E+03  5.941E+02  5.439E+04
      6      4  2.301E+02  9.205E+01
      2.731E+02  2.280E+02  2.982E+02  2.301E+02  3.732E+02  2.385E+02  5.941E+02  2.594E+02
      5.941E+02  2.636E+02  1.038E+03  2.636E+02
      2.911E+02  8.786E+01  5.941E+02  1.046E+02  5.941E+02  3.473E+01  7.081E+02  4.979E+01

cdliq  1042      n      5  8.000E+03  5.941E+02  5.523E+04
      0      3  2.636E+02  3.473E+01
      5.941E+02  3.473E+01  6.481E+02  4.393E+01  7.081E+02  4.979E+01

co      1046      n      5  8.860E+03  1.768E+03  2.615E+05
      11      7  4.477E+02  9.623E+01
      0.000E+00  0.000E+00  4.315E+01  4.000E+01  1.382E+02  3.300E+02  2.731E+02  4.000E+02
      7.232E+02  5.356E+02  7.282E+02  1.172E+03  7.331E+02  5.188E+02  1.393E+03  8.000E+02
      1.398E+03  2.900E+03  1.403E+03  6.820E+02  1.768E+03  6.820E+02
      0.000E+00  0.000E+00  2.315E+01  4.812E+02  7.315E+01  2.100E+02  1.581E+02  1.464E+02
      2.982E+02  8.000E+01  4.231E+02  7.950E+01  1.768E+03  2.100E+02

cu      1051      n      5  8.940E+03  1.356E+03  1.339E+05
      12      12  3.849E+02  3.975E+02
      0.000E+00  0.000E+00  2.055E+01  7.950E+00  3.315E+01  4.000E+01  5.565E+01  1.213E+02
      7.735E+01  1.971E+02  9.015E+01  2.318E+02  1.112E+02  2.757E+02  1.672E+02  3.381E+02
      2.222E+02  3.728E+02  2.731E+02  3.833E+02  1.356E+03  5.021E+02  1.356E+03  5.021E+02
      4.150E+00  7.113E+03  6.150E+00  1.046E+04  1.015E+01  1.423E+04  1.515E+01  1.402E+04
      2.015E+01  8.000E+03  3.015E+01  3.598E+03  4.015E+01  1.841E+03  6.015E+01  7.782E+02
      7.315E+01  6.067E+02  1.531E+02  4.477E+02  2.731E+02  4.017E+02  1.356E+03  3.300E+02

au      1056      n      5  1.930E+04  1.337E+03  6.443E+04
      10      7  1.280E+02  3.180E+02
      0.000E+00  0.000E+00  5.315E+01  8.000E+01  9.515E+01  1.046E+02  1.651E+02  1.213E+02
      2.291E+02  1.300E+02  3.111E+02  1.284E+02  3.732E+02  1.305E+02  1.337E+03  1.548E+02
      1.337E+03  1.485E+02  3.239E+03  1.485E+02
      0.000E+00  0.000E+00  1.015E+01  2.803E+03  3.615E+01  5.439E+02  7.315E+01  3.515E+02
      1.732E+02  3.494E+02  2.731E+02  3.180E+02  1.337E+03  2.506E+02

auliq  1057      n      5  1.724E+04  1.337E+03  6.443E+04
      0      0  1.485E+02  1.700E+02

cgeml  1061      n      5  3.510E+03  3.823E+03  0.000E+00
      12      0  4.000E+02  5.439E+02
      0.000E+00  0.000E+00  1.002E+02  2.100E+01  1.501E+02  8.000E+01  2.231E+02  2.720E+02
      2.731E+02  4.268E+02  3.732E+02  7.950E+02  4.731E+02  1.067E+03  5.731E+02  1.289E+03
      6.731E+02  1.443E+03  7.731E+02  1.569E+03  8.731E+02  1.700E+03  1.273E+03  2.029E+03

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cgraf 1066      n      5 2.250E+03 3.773E+03 3.837E+06
  12      7 6.694E+02 1.700E+02
0.000E+00 0.000E+00 7.315E+01 4.000E+01 2.001E+02 4.000E+02 3.732E+02 9.414E+02
4.731E+02 1.172E+03 5.731E+02 1.339E+03 6.731E+02 1.477E+03 8.731E+02 1.682E+03
1.073E+03 1.828E+03 1.273E+03 1.946E+03 1.773E+03 2.071E+03 3.773E+03 2.343E+03
2.731E+02 1.700E+02 3.732E+02 1.506E+02 4.731E+02 1.297E+02 5.731E+02 1.130E+02
6.731E+02 1.004E+02 7.731E+02 9.205E+01 8.731E+02 8.000E+01

camor 1071      n      5 1.510E+03 3.773E+03 3.837E+06
  12      2 0.000E+00 0.000E+00
0.000E+00 0.000E+00 7.315E+01 4.000E+01 2.001E+02 4.000E+02 3.732E+02 9.414E+02
4.731E+02 1.172E+03 5.731E+02 1.339E+03 6.731E+02 1.477E+03 8.731E+02 1.682E+03
1.073E+03 1.828E+03 1.273E+03 1.946E+03 1.773E+03 2.071E+03 3.773E+03 2.343E+03
8.915E+01 9.623E+00 2.731E+02 6.276E+00

fe      1081      n      5 7.870E+03 0.000E+00 0.000E+00
  11      8 4.477E+02 7.113E+01
2.222E+02 4.100E+02 1.036E+03 8.033E+02 1.041E+03 6.895E+03 1.046E+03 7.029E+02
1.174E+03 7.364E+02 1.179E+03 3.933E+03 1.184E+03 6.192E+02 1.669E+03 6.862E+02
1.700E+03 2.950E+03 1.679E+03 7.531E+02 1.810E+03 7.531E+02
0.000E+00 0.000E+00 1.115E+01 8.786E+02 7.315E+01 1.700E+02 1.112E+02 1.046E+02
2.001E+02 8.159E+01 2.982E+02 7.196E+01 1.073E+03 2.900E+01 1.573E+03 3.138E+01

fecry 1082      n      5 7.870E+03 0.000E+00 0.000E+00
  10      8 4.477E+02 7.196E+01
0.000E+00 0.000E+00 2.055E+01 4.602E+00 5.565E+01 7.113E+01 7.735E+01 1.435E+02
9.015E+01 1.845E+02 1.112E+02 2.456E+02 1.672E+02 3.494E+02 2.222E+02 4.100E+02
2.731E+02 4.393E+02 1.036E+03 8.033E+02
0.000E+00 0.000E+00 1.115E+01 8.786E+02 7.315E+01 1.700E+02 1.112E+02 1.046E+02
2.001E+02 8.159E+01 2.982E+02 7.196E+01 1.073E+03 2.900E+01 1.573E+03 3.138E+01

fefur 1083      n      5 7.870E+03 1.810E+03 2.720E+05
  12      3 4.477E+02 7.196E+01
2.731E+02 4.393E+02 1.036E+03 8.033E+02 1.041E+03 6.895E+03 1.046E+03 7.029E+02
1.174E+03 7.364E+02 1.179E+03 3.933E+03 1.184E+03 6.192E+02 1.669E+03 6.862E+02
1.700E+03 2.950E+03 1.679E+03 7.531E+02 1.810E+03 6.694E+02 3.273E+03 5.858E+02
2.731E+02 7.322E+01 1.073E+03 3.012E+01 3.273E+03 3.012E+01

pb      1091      n      5 1.135E+04 6.006E+02 2.385E+04
  6      10 1.297E+02 3.431E+01
2.731E+02 1.276E+02 3.732E+02 1.318E+02 6.006E+02 1.414E+02 6.007E+02 1.423E+02
1.273E+03 1.372E+02 2.017E+03 1.268E+02
2.931E+02 3.456E+01 3.715E+02 3.385E+01 4.776E+02 3.167E+01 5.325E+02 2.900E+01
5.781E+02 2.500E+01 6.053E+02 2.100E+01 6.537E+02 1.700E+01 6.997E+02 1.561E+01
7.998E+02 1.506E+01 9.642E+02 1.498E+01

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

pbliq 1092 n 5 1.060E+04 6.006E+02 2.385E+04

2 2 1.506E+02 1.632E+01

6.006E+02 1.506E+02 2.017E+03 1.268E+02

6.006E+02 1.632E+01 9.731E+02 1.506E+01

mg 1096 n 5 1.740E+03 9.241E+02 3.682E+05

12 7 1.004E+03 1.506E+02

0.000E+00 0.000E+00 2.055E+01 1.700E+01 3.315E+01 8.000E+01 9.015E+01 5.899E+02

1.112E+02 7.071E+02 1.672E+02 8.786E+02 2.222E+02 9.456E+02 2.982E+02 1.017E+03

6.231E+02 1.184E+03 9.241E+02 1.360E+03 9.242E+02 1.339E+03 1.100E+03 1.402E+03

0.000E+00 0.000E+00 1.715E+01 1.464E+03 4.315E+01 4.000E+02 7.815E+01 2.100E+02

1.232E+02 1.590E+02 2.731E+02 1.506E+02 6.731E+02 1.423E+02

mgliq 1097 n 5 1.570E+03 9.241E+02 3.682E+05

2 0 1.339E+03 8.000E+01

9.241E+02 1.339E+03 1.373E+03 1.423E+03

mncry 1101 n 5 7.400E+03 0.000E+00 0.000E+00

6 3 4.812E+02 8.000E+00

0.000E+00 0.000E+00 7.315E+01 1.506E+02 1.232E+02 3.138E+02 1.732E+02 4.100E+02

2.731E+02 4.728E+02 9.901E+02 6.778E+02

0.000E+00 0.000E+00 7.315E+01 5.021E+00 1.232E+02 6.694E+00

mo 1106 n 5 1.020E+04 2.893E+03 2.720E+05

5 7 2.469E+02 1.339E+02

1.615E+01 1.700E+00 9.165E+01 1.300E+02 2.731E+02 2.469E+02 1.373E+03 3.180E+02

2.773E+03 4.393E+02

0.000E+00 0.000E+00 3.315E+01 3.556E+02 8.315E+01 2.100E+02 1.432E+02 1.381E+02

2.731E+02 1.381E+02 1.873E+03 9.205E+01 2.893E+03 8.000E+01

ni 1111 n 5 8.900E+03 1.727E+03 3.012E+05

12 7 4.435E+02 8.786E+01

0.000E+00 0.000E+00 2.055E+01 5.021E+00 5.565E+01 9.372E+01 1.112E+02 2.598E+02

1.672E+02 3.531E+02 2.222E+02 4.058E+02 6.281E+02 5.941E+02 6.331E+02 1.866E+03

6.381E+02 5.230E+02 1.727E+03 6.485E+02 1.727E+03 6.088E+02 3.005E+03 6.088E+02

0.000E+00 0.000E+00 3.315E+01 2.500E+02 9.315E+01 1.300E+02 1.732E+02 1.046E+02

2.731E+02 8.786E+01 6.231E+02 5.439E+01 1.553E+03 7.740E+01

os 1114 n 5 2.257E+04 3.273E+03 1.406E+05

5 2 1.297E+02 8.577E+01

2.731E+02 1.301E+02 1.873E+03 1.611E+02 3.273E+03 1.854E+02 3.273E+03 1.841E+02

5.273E+03 1.841E+02

3.231E+02 8.577E+01 5.231E+02 8.577E+01

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pt      1116      n      5  2.140E+04  2.043E+03  1.046E+05
      8      8  1.339E+02  6.904E+01
0.000E+00 0.000E+00 2.015E+01 4.000E+01 6.315E+01 8.000E+01 1.432E+02 1.172E+02
2.731E+02 1.318E+02 2.043E+03 1.799E+02 2.043E+03 1.820E+02 4.100E+03 1.799E+02
0.000E+00 0.000E+00 5.150E+00 1.300E+03 3.315E+01 2.100E+02 5.315E+01 9.623E+01
1.232E+02 7.322E+01 2.731E+02 7.029E+01 8.731E+02 7.740E+01 1.473E+03 1.025E+02

pu      1121      n      5  1.920E+04  9.111E+02  3.891E+04
      11      9  1.339E+02  7.113E+00
2.731E+02 1.339E+02 3.732E+02 1.372E+02 3.981E+02 7.297E+02 4.231E+02 1.230E+02
4.481E+02 1.230E+02 4.731E+02 3.029E+02 4.982E+02 1.669E+02 7.232E+02 1.669E+02
7.482E+02 4.686E+02 7.731E+02 1.435E+02 9.111E+02 1.435E+02
1.501E+02 1.700E+00 2.102E+02 3.300E+00 2.301E+02 4.602E+00 2.901E+02 7.950E+00
3.302E+02 1.004E+01 3.702E+02 1.300E+01 3.902E+02 1.339E+01 4.031E+02 1.590E+01
8.731E+02 3.180E+01

ag      1126      n      5  1.050E+04  1.234E+03  1.046E+05
      10      11 2.360E+02 4.268E+02
0.000E+00 0.000E+00 2.315E+01 4.000E+01 7.315E+01 1.548E+02 1.232E+02 2.029E+02
1.732E+02 2.218E+02 2.731E+02 2.343E+02 6.731E+02 2.500E+02 1.234E+03 2.887E+02
1.234E+03 2.900E+02 2.485E+03 2.900E+02
4.150E+00 1.506E+04 6.150E+00 1.799E+04 1.415E+01 1.004E+04 2.015E+01 5.021E+03
3.015E+01 1.715E+03 4.015E+01 8.000E+02 9.815E+01 4.770E+02 1.732E+02 4.310E+02
2.731E+02 4.000E+02 6.231E+02 3.598E+02 1.234E+03 3.598E+02

agliq 1127      n      5  9.300E+03  1.234E+03  1.046E+05
      0      0  2.887E+02 2.500E+02

ta      1161      n      5  1.660E+04  3.269E+03  1.715E+05
      10      6  1.381E+02 7.113E+01
0.000E+00 0.000E+00 7.315E+01 1.046E+02 1.732E+02 1.276E+02 2.731E+02 1.381E+02
3.732E+02 1.431E+02 5.231E+02 1.477E+02 8.731E+02 1.527E+02 3.269E+03 1.812E+02
3.269E+03 1.841E+02 5.698E+03 1.841E+02
0.000E+00 0.000E+00 2.315E+01 6.736E+01 1.732E+02 7.322E+01 2.731E+02 7.155E+01
1.273E+03 6.192E+01 3.273E+03 6.192E+01

tc      1164      n      5  1.150E+04  2.473E+03  2.343E+05
      5      0  2.427E+02 1.300E+01
2.731E+02 2.431E+02 2.273E+03 4.125E+02 2.473E+03 4.293E+02 2.474E+03 4.393E+02
3.000E+03 4.393E+02

th      1166      n      5  1.168E+04  1.983E+03  7.113E+04
      11      4  1.172E+02 3.849E+01
0.000E+00 0.000E+00 2.315E+01 2.500E+01 7.315E+01 8.786E+01 1.262E+02 1.046E+02
2.731E+02 1.172E+02 1.668E+03 2.301E+02 1.673E+03 2.632E+03 1.678E+03 2.134E+02
1.983E+03 2.134E+02 1.983E+03 1.966E+02 3.000E+03 1.966E+02
2.731E+02 3.849E+01 5.731E+02 4.017E+01 7.731E+02 4.268E+01 9.232E+02 4.519E+01

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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sn      1171      n      5  7.310E+03  5.050E+02  6.067E+04
      4      5  2.259E+02  6.109E+01
2.731E+02  2.238E+02  5.050E+02  2.678E+02  5.051E+02  2.377E+02  2.543E+03  2.770E+02
2.731E+02  6.402E+01  3.732E+02  6.067E+01  5.050E+02  5.774E+01  5.051E+02  3.300E+01
7.731E+02  3.300E+01

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snliq 1172      n      5  6.850E+03  5.050E+02  6.067E+04
      2      2  2.427E+02  3.300E+01
5.050E+02  2.427E+02  1.273E+03  3.171E+02
5.050E+02  3.300E+01  7.731E+02  3.264E+01

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ti      1176      n      5  4.500E+03  1.948E+03  4.017E+05
      12      7  5.230E+02  2.100E+01
0.000E+00  0.000E+00  2.315E+01  1.300E+01  1.232E+02  3.682E+02  1.732E+02  4.393E+02
2.982E+02  5.230E+02  5.731E+02  5.941E+02  1.153E+03  6.694E+02  1.158E+03  1.724E+04
1.163E+03  6.611E+02  1.948E+03  7.615E+02  1.948E+03  6.987E+02  3.533E+03  6.987E+02
0.000E+00  0.000E+00  5.315E+01  3.640E+01  1.232E+02  3.012E+01  1.981E+02  2.259E+01
2.731E+02  2.100E+01  6.731E+02  1.883E+01  9.731E+02  1.799E+01

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w      1181      n      5  1.930E+04  3.683E+03  1.925E+05
      12      9  1.339E+02  1.966E+02
0.000E+00  0.000E+00  2.315E+01  2.100E+00  3.315E+01  1.046E+01  7.315E+01  6.485E+01
9.815E+01  8.786E+01  1.232E+02  1.025E+02  1.481E+02  1.130E+02  1.981E+02  1.300E+02
2.731E+02  1.339E+02  3.683E+03  2.008E+02  3.683E+03  2.050E+02  6.200E+03  2.050E+02
0.000E+00  0.000E+00  2.315E+01  1.381E+03  5.015E+01  4.000E+02  2.731E+02  2.008E+02
5.731E+02  1.423E+02  1.073E+03  1.172E+02  2.073E+03  1.004E+02  2.873E+03  9.205E+01
3.473E+03  8.996E+01

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u      1186      n      5  1.910E+04  1.405E+03  5.272E+04
      12      7  1.172E+02  2.343E+01
0.000E+00  0.000E+00  2.315E+01  3.138E+01  7.315E+01  8.786E+01  2.731E+02  1.151E+02
6.231E+02  1.464E+02  9.362E+02  2.008E+02  9.411E+02  3.473E+03  9.461E+02  1.883E+02
1.043E+03  1.883E+02  1.048E+03  3.891E+03  1.053E+03  1.607E+02  4.091E+03  1.607E+02
0.000E+00  0.000E+00  7.315E+01  1.883E+01  1.732E+02  2.427E+01  2.731E+02  2.594E+01
6.731E+02  3.473E+01  1.073E+03  4.770E+01  1.173E+03  5.230E+01

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zn      1191      n      5  7.140E+03  6.925E+02  1.004E+05
      6      8  3.891E+02  1.117E+02
2.731E+02  3.849E+02  3.732E+02  4.004E+02  6.731E+02  4.498E+02  6.925E+02  4.519E+02
6.926E+02  5.104E+02  1.180E+03  5.272E+02
2.731E+02  1.125E+02  3.732E+02  1.096E+02  4.731E+02  1.059E+02  5.731E+02  1.013E+02
6.925E+02  9.288E+01  6.926E+02  6.025E+01  7.731E+02  5.941E+01  8.731E+02  5.816E+01

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znliq 1192      n      5  6.800E+03  6.925E+02  1.004E+05
      5      2  5.021E+02  5.941E+01
6.925E+02  5.021E+02  8.731E+02  4.895E+02  1.073E+03  4.519E+02  1.173E+03  4.351E+02
1.273E+03  4.226E+02
6.926E+02  5.941E+01  9.731E+02  5.690E+01

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ze      1196      n      5 6.500E+03 2.125E+03 2.259E+05
      12      8 2.845E+02 3.138E+01
0.000E+00 0.000E+00 1.002E+02 2.100E+02 2.001E+02 2.636E+02 2.731E+02 2.803E+02
2.982E+02 2.845E+02 7.731E+02 3.180E+02 9.731E+02 3.389E+02 1.138E+03 1.682E+02
1.133E+03 8.694E+03 1.138E+03 3.096E+02 1.773E+03 3.515E+02 2.125E+03 3.807E+02
0.000E+00 0.000E+00 3.015E+01 4.812E+01 8.315E+01 3.300E+01 1.731E+02 3.222E+01
2.731E+02 3.264E+01 4.731E+02 2.343E+01 9.731E+02 2.500E+01 1.923E+03 3.180E+01

cr      1201      n      5 7.160E+03 2.163E+03 3.163E+05
      10      8 4.477E+02 8.786E+01
0.000E+00 0.000E+00 7.315E+01 1.700E+02 1.232E+02 3.138E+02 1.731E+02 3.800E+02
2.731E+02 4.393E+02 5.731E+02 5.230E+02 9.731E+02 5.858E+02 1.273E+03 6.778E+02
1.923E+03 1.130E+03 1.923E+03 1.130E+03
0.000E+00 0.000E+00 2.315E+01 5.858E+02 7.315E+01 1.464E+02 1.732E+02 9.623E+01
2.731E+02 8.996E+01 8.731E+02 7.113E+01 1.173E+03 6.485E+01 1.173E+03 6.485E+01

hgliq 1207      n      5 1.350E+04 2.343E+02 1.163E+04
      10      9 1.381E+02 8.000E+00
2.731E+02 1.393E+02 3.732E+02 1.372E+02 4.731E+02 1.360E+02 5.731E+02 1.353E+02
6.731E+02 1.356E+02 8.731E+02 1.381E+02 1.073E+03 1.448E+02 1.273E+03 1.598E+02
1.473E+03 1.799E+02 1.973E+03 2.500E+02
2.731E+02 8.201E+00 3.732E+02 1.046E+01 6.231E+02 1.172E+01 6.731E+02 1.300E+01
8.731E+02 1.356E+01 1.073E+03 1.439E+01 1.273E+03 1.498E+01 1.673E+03 1.540E+01
1.973E+03 1.548E+01

in      1211      n      5 7.300E+03 4.298E+02 2.845E+04
      4      0 2.385E+02 2.343E+01
2.731E+02 2.368E+02 4.298E+02 2.500E+02 4.298E+02 2.661E+02 2.273E+03 2.661E+02

inliq 1212      n      5 7.030E+03 4.298E+02 2.845E+04
      0      0 2.661E+02 4.393E+01

li      1216      n      5 5.300E+02 4.522E+02 4.159E+05
      3      0 3.515E+03 7.113E+01
2.731E+02 3.305E+03 2.982E+02 3.515E+03 4.522E+02 4.121E+03

liliq 1217      n      5 5.080E+02 4.522E+02 4.000E+05
      2      9 4.226E+03 4.226E+01
4.522E+02 4.226E+03 1.973E+03 4.058E+03
4.522E+02 4.226E+01 6.731E+02 5.021E+01 8.731E+02 5.732E+01 1.073E+03 6.276E+01
1.273E+03 6.611E+01 1.473E+03 6.778E+01 1.673E+03 6.694E+01 1.873E+03 6.360E+01
1.973E+03 5.983E+01

na      1221      n      5 9.700E+02 3.710E+02 1.146E+05
      4      4 1.213E+03 1.339E+02
2.731E+02 1.201E+03 3.710E+02 1.268E+03 3.711E+02 1.364E+03 4.731E+02 1.297E+03
2.731E+02 1.339E+02 3.710E+02 1.339E+02 3.711E+02 8.786E+01 4.731E+02 8.000E+01

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$$k \text{ [W/m K]} \quad c \text{ [J/kg K]} \quad T \text{ [K]} \quad \lambda \text{ [J/kg]} \quad \rho \text{ [kg/m}^3\text{]}$$

TOPAZ2D

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nb      1246      n      5  8.570E+03  2.741E+03  2.594E+05
      3      7  2.678E+02  5.021E+01
      2.731E+02  2.678E+02  2.473E+03  3.800E+02  5.200E+03  3.800E+02
      0.000E+00  0.000E+00  2.815E+01  8.619E+01  8.315E+01  5.188E+01  1.382E+02  4.602E+01
      2.501E+02  4.477E+01  2.731E+02  5.021E+01  1.910E+03  6.904E+01

re      1251      n      5  2.100E+04  3.453E+03  1.757E+05
      7      3  1.381E+02  6.067E+01
      0.000E+00  0.000E+00  8.315E+01  8.000E+01  1.531E+02  1.300E+02  2.982E+02  1.381E+02
      2.473E+03  1.925E+02  2.873E+03  2.176E+02  3.073E+03  2.845E+02
      2.731E+02  6.067E+01  6.731E+02  4.602E+01  2.473E+03  4.602E+01

si      1256      n      5  2.330E+03  1.685E+03  1.803E+06
      8      10  7.029E+02  1.300E+02
      2.731E+02  6.862E+02  3.732E+02  8.075E+02  4.731E+02  8.535E+02  8.731E+02  9.372E+02
      1.685E+03  1.033E+03  1.685E+03  1.046E+03  1.900E+03  1.063E+03  3.000E+03  1.063E+03
      0.000E+00  0.000E+00  2.015E+01  1.300E+03  7.815E+01  6.276E+02  1.631E+02  2.900E+02
      2.731E+02  1.381E+02  3.732E+02  9.623E+01  5.731E+02  5.565E+01  7.731E+02  3.975E+01
      1.000E+03  3.138E+01  1.173E+03  2.900E+01

ge-ip 1261      n      5  5.325E+03  1.209E+03  4.310E+05
      11      10  3.222E+02  5.858E+01
      0.000E+00  0.000E+00  1.715E+01  6.276E+00  1.101E+02  2.176E+02  1.732E+02  2.741E+02
      2.731E+02  3.201E+02  4.731E+02  3.661E+02  6.731E+02  3.849E+02  8.731E+02  3.954E+02
      1.211E+03  4.058E+02  1.211E+03  4.038E+02  3.103E+03  4.038E+02
      0.000E+00  0.000E+00  1.315E+01  1.464E+03  7.315E+01  3.800E+02  1.232E+02  1.300E+02
      2.231E+02  7.113E+01  2.731E+02  6.276E+01  3.732E+02  5.021E+01  5.731E+02  3.556E+01
      7.731E+02  3.556E+01  9.731E+02  3.891E+01

ge-n 1262      n      5  5.325E+03  1.211E+03  4.310E+05
      11      10  3.222E+02  5.439E+01
      0.000E+00  0.000E+00  1.715E+01  6.276E+00  1.101E+02  2.176E+02  1.732E+02  2.741E+02
      2.731E+02  3.201E+02  4.731E+02  3.661E+02  6.731E+02  3.849E+02  8.731E+02  3.954E+02
      1.211E+03  4.058E+02  1.211E+03  4.038E+02  3.103E+03  4.038E+02
      0.000E+00  0.000E+00  1.315E+01  1.464E+03  7.315E+01  3.800E+02  1.232E+02  1.300E+02
      2.231E+02  7.113E+01  2.731E+02  6.276E+01  3.732E+02  4.393E+01  5.731E+02  2.500E+01
      7.731E+02  1.883E+01  1.073E+03  1.883E+01

boron 1266      n      5  2.500E+03  2.303E+03  1.700E+06
      11      0  1.046E+03  2.100E+00
      0.000E+00  0.000E+00  7.315E+01  4.000E+01  1.732E+02  4.000E+02  2.731E+02  1.046E+03
      3.732E+02  1.423E+03  4.731E+02  1.700E+03  6.731E+02  1.966E+03  8.731E+02  2.134E+03
      1.273E+03  2.469E+03  1.773E+03  2.720E+03  2.303E+03  2.887E+03

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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hf 1271 n 5 1.320E+04 2.423E+03 1.406E+05
11 3 1.590E+02 2.218E+01
0.000E+00 0.000E+00 3.015E+01 2.100E+01 7.315E+01 1.046E+02 1.232E+02 1.300E+02
1.732E+02 1.360E+02 2.731E+02 1.423E+02 1.350E+03 1.715E+02 1.773E+03 1.841E+02
2.423E+03 2.050E+02 2.423E+03 1.841E+02 5.673E+03 1.841E+02
2.731E+02 2.218E+01 5.731E+02 2.100E+01 8.231E+02 2.050E+01

ir 1276 n 5 2.250E+04 2.727E+03 1.435E+05
12 6 1.297E+02 1.464E+02
0.000E+00 0.000E+00 2.515E+01 4.000E+00 5.715E+01 5.021E+01 7.315E+01 6.694E+01
1.232E+02 1.004E+02 1.732E+02 1.172E+02 2.231E+02 1.300E+02 2.731E+02 1.297E+02
3.732E+02 1.339E+02 2.827E+03 2.050E+02 2.827E+03 2.067E+02 4.800E+03 2.067E+02
7.315E+01 2.301E+02 9.815E+01 1.778E+02 1.232E+02 1.590E+02 1.732E+02 1.527E+02
2.731E+02 1.464E+02 5.231E+02 1.381E+02

rh 1281 n 5 1.240E+04 2.233E+03 2.134E+05
10 5 2.427E+02 1.506E+02
0.000E+00 0.000E+00 2.315E+01 4.000E+00 4.815E+01 4.000E+01 8.315E+01 1.300E+02
1.161E+02 1.700E+02 1.732E+02 2.100E+02 2.231E+02 2.280E+02 2.731E+02 2.427E+02
2.982E+02 2.452E+02 1.877E+03 3.870E+02
7.315E+01 2.359E+02 1.232E+02 1.799E+02 2.231E+02 1.548E+02 2.731E+02 1.519E+02
4.731E+02 1.402E+02

v 1286 n 5 6.100E+03 2.163E+03 3.300E+05
6 2 1.607E+02 2.900E+01
2.731E+02 4.519E+02 6.731E+02 5.523E+02 1.273E+03 6.694E+02 2.163E+03 8.745E+02
2.163E+03 7.824E+02 3.673E+03 7.824E+02
2.731E+02 3.054E+01 1.873E+03 4.937E+01

rh 1291 n 5 1.500E+03 3.120E+02 2.573E+04
4 4 3.809E+02 5.071E+01
2.731E+02 3.598E+02 3.120E+02 3.598E+02 3.121E+02 4.058E+02 3.732E+02 3.849E+02
2.731E+02 5.021E+01 3.120E+02 5.021E+01 3.121E+02 2.900E+01 4.731E+02 3.138E+01

rbliq 1292 n 5 1.475E+03 3.120E+02 2.573E+04
8 10 3.849E+02 2.900E+01
3.120E+02 3.849E+02 6.731E+02 3.300E+02 8.731E+02 3.264E+02 1.073E+03 3.305E+02
1.273E+03 3.494E+02 1.473E+03 3.800E+02 1.773E+03 4.561E+02 1.973E+03 5.188E+02
3.120E+02 2.900E+01 3.231E+02 3.138E+01 4.731E+02 3.138E+01 6.731E+02 2.900E+01
8.731E+02 2.636E+01 1.073E+03 2.259E+01 1.273E+03 1.841E+01 1.673E+03 1.046E+01
1.873E+03 6.485E+00 1.973E+03 4.000E+00

sr 1296 n 5 2.600E+03 1.042E+03 1.046E+05
8 6 3.598E+02 4.000E+01
2.982E+02 3.012E+02 8.571E+02 3.912E+03 8.621E+02 2.322E+03 8.672E+02 4.079E+02
1.042E+03 4.686E+02 1.042E+03 3.682E+02 1.473E+03 3.515E+02 1.973E+03 3.515E+02
2.731E+02 8.900E+01 1.042E+03 8.000E+01 1.042E+03 4.310E+01 1.273E+03 3.800E+01
1.673E+03 2.971E+01 1.973E+03 2.500E+01

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ru    1301    n    5  1.220E+04  2.673E+03  2.523E+05
      12      4  2.343E+02  1.046E+02
0.000E+00  0.000E+00  2.315E+01  2.100E+00  7.315E+01  8.786E+01  1.232E+02  1.700E+02
1.732E+02  2.008E+02  2.231E+02  2.218E+02  2.731E+02  2.343E+02  1.273E+03  2.962E+02
1.473E+03  2.971E+02  1.673E+03  3.012E+02  1.873E+03  3.096E+02  4.173E+03  3.096E+02
2.731E+02  1.088E+02  3.131E+02  1.063E+02  4.731E+02  1.046E+02  5.731E+02  1.046E+02

ca    1306    n    5  1.550E+03  1.118E+03  2.301E+05
      9      0  6.569E+02  1.300E+02
2.731E+02  6.485E+02  6.731E+02  7.908E+02  7.181E+02  8.075E+02  7.232E+02  5.389E+03
7.282E+02  7.615E+02  7.731E+02  7.678E+02  1.123E+03  9.623E+02  1.123E+03  7.740E+02
1.760E+03  7.740E+02

ga    1311    n    5  5.907E+03  3.029E+02  7.991E+04
      4      0  3.724E+02  3.300E+01
2.731E+02  3.682E+02  3.029E+02  3.749E+02  3.031E+02  3.987E+02  2.676E+03  3.987E+02

galiq 1312    n    5  6.090E+03  3.029E+02  7.991E+04
      0      0  3.987E+02  3.300E+01

i-sol 1316    n    5  4.930E+03  3.867E+02  6.025E+04
      6      0  2.176E+02  4.351E-03
2.982E+02  2.176E+02  3.867E+02  2.176E+02  3.867E+02  3.180E+02  4.575E+02  3.180E+02
4.576E+02  1.481E+02  3.000E+03  1.548E+02

p     1321    n    5  1.820E+03  3.172E+02  2.100E+04
      4      0  7.406E+02  4.000E+00
2.731E+02  7.406E+02  3.171E+02  7.406E+02  3.172E+02  8.912E+02  5.531E+02  8.912E+02

se    1326    n    5  4.790E+03  4.902E+02  3.222E+04
      4      0  3.222E+02  7.531E-01
2.731E+02  3.138E+02  4.902E+02  3.891E+02  4.902E+02  4.000E+02  9.580E+02  4.000E+02

s     1331    n    5  2.000E+03  3.921E+02  3.828E+04
      7      5  7.113E+02  2.761E-01
2.731E+02  6.945E+02  3.637E+02  7.740E+02  3.687E+02  3.138E+03  3.736E+02  7.991E+02
3.921E+02  8.117E+02  3.922E+02  1.088E+03  7.177E+02  1.192E+03
2.731E+02  2.761E-01  3.687E+02  2.761E-01  3.688E+02  1.700E-01  3.921E+02  1.700E-01
7.177E+02  1.700E-01

tl    1336    n    5  1.185E+04  5.762E+02  2.100E+04
      7      5  1.297E+02  3.891E+01
2.731E+02  1.284E+02  5.031E+02  1.510E+02  5.081E+02  4.602E+02  5.131E+02  1.632E+02
5.766E+02  1.632E+02  5.767E+02  1.490E+02  1.730E+03  1.490E+02
2.931E+02  3.891E+01  3.732E+02  4.058E+01  5.766E+02  4.310E+01  5.767E+02  2.469E+01
6.731E+02  2.469E+01

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Thermal Property Data
 k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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tlliq 1337      n      5 1.129E+04 5.762E+02 2.100E+04
      0      0 1.506E+02 2.469E+01

sc      1341      n      5 3.000E+03 1.811E+03 3.515E+05
      9      0 5.523E+02 1.300E+01
      2.315E+01 1.423E+02 7.315E+01 2.720E+02 1.232E+02 4.268E+02 1.732E+02 4.979E+02
      2.231E+02 5.356E+02 2.731E+02 5.565E+02 1.812E+03 8.000E+02 1.812E+03 7.113E+02
      3.000E+03 7.113E+02

y      1346      n      5 4.470E+03 1.768E+03 1.925E+05
      8      0 2.900E+02 1.300E+01
      0.000E+00 0.000E+00 1.315E+01 5.021E+01 4.815E+01 1.297E+02 7.315E+01 2.008E+02
      1.232E+02 2.500E+02 1.732E+02 2.803E+02 2.731E+02 2.950E+02 3.481E+02 2.979E+02

la      1351      n      5 6.200E+03 0.000E+00 0.000E+00
      9      0 1.925E+02 1.381E+01
      2.731E+02 1.883E+02 5.832E+02 2.100E+02 5.832E+02 1.966E+02 8.731E+02 2.259E+02
      1.143E+03 2.531E+02 1.143E+03 2.845E+02 1.193E+03 2.845E+02 1.193E+03 2.469E+02
      3.742E+03 2.469E+02

ce      1356      n      5 6.790E+03 1.077E+03 8.000E+04
      8      0 1.925E+02 1.088E+01
      2.731E+02 1.841E+02 2.982E+02 1.925E+02 5.731E+02 2.197E+02 7.731E+02 2.427E+02
      9.981E+02 2.732E+02 1.077E+03 2.699E+02 1.077E+03 2.795E+02 1.373E+03 2.795E+02

pr      1361      n      5 6.800E+03 1.203E+03 6.694E+04
      9      0 1.966E+02 1.172E+01
      2.731E+02 1.925E+02 3.732E+02 2.008E+02 4.731E+02 2.071E+02 5.731E+02 2.176E+02
      6.731E+02 2.301E+02 7.731E+02 2.439E+02 8.731E+02 2.623E+02 9.731E+02 2.845E+02
      1.073E+03 3.096E+02

nd      1366      n      5 7.000E+03 1.293E+03 8.000E+04
      10     0 1.966E+02 1.297E+01
      2.731E+02 1.883E+02 4.731E+02 2.050E+02 6.731E+02 2.326E+02 8.731E+02 2.636E+02
      1.073E+03 3.054E+02 1.135E+03 3.209E+02 1.135E+03 3.079E+02 1.293E+03 3.079E+02
      1.293E+03 3.389E+02 3.300E+03 3.389E+02

sm      1371      n      5 7.500E+03 1.345E+03 5.774E+04
      12     0 1.799E+02 1.300E+01
      2.731E+02 1.799E+02 3.732E+02 2.176E+02 4.731E+02 2.469E+02 5.731E+02 2.636E+02
      6.731E+02 2.778E+02 7.731E+02 2.879E+02 8.731E+02 2.971E+02 1.200E+03 3.180E+02
      1.200E+03 3.117E+02 1.345E+03 3.117E+02 1.345E+03 3.975E+02 2.173E+03 3.975E+02

eu      1376      n      5 5.300E+03 1.099E+03 7.113E+04
      11     0 1.757E+02 1.300E+01
      2.731E+02 1.757E+02 5.031E+02 1.895E+02 5.032E+02 1.950E+02 5.731E+02 1.979E+02
      6.731E+02 2.038E+02 7.731E+02 2.142E+02 8.731E+02 2.276E+02 9.731E+02 2.443E+02
      1.099E+03 2.690E+02 1.099E+03 2.506E+02 1.373E+03 2.506E+02

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k [W/m K] *c* [J/kg K] *T* [K] λ [J/kg] ρ [kg/m³]

Thermal Property Data

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gd      1381      n      5  7.870E+03  1.579E+03  9.623E+04
      7      0  2.301E+02  8.786E+00
      2.731E+02  2.971E+02  2.982E+02  2.301E+02  3.551E+02  2.343E+02  4.731E+02  1.883E+02
      1.579E+03  2.385E+02  1.579E+03  2.134E+02  3.000E+03  2.134E+02

tb      1386      n      5  8.250E+03  1.573E+03  5.774E+04
      10     0  1.824E+02  8.000E+00
      2.282E+02  4.770E+02  2.332E+02  2.500E+02  2.432E+02  2.050E+02  2.731E+02  1.862E+02
      2.982E+02  1.824E+02  3.231E+02  1.799E+02  3.532E+02  1.820E+02  1.673E+03  2.385E+02
      1.673E+03  2.105E+02  3.073E+03  2.105E+02

dy      1391      n      5  8.556E+03  1.773E+03  1.046E+05
      4      0  1.732E+02  1.004E+01
      2.982E+02  1.700E+02  1.680E+03  2.280E+02  1.680E+03  2.050E+02  2.600E+03  2.050E+02

ho      1396      n      5  8.800E+03  1.773E+03  1.046E+05
      4      0  1.653E+02  1.004E+01
      2.982E+02  1.653E+02  1.773E+03  2.289E+02  1.773E+03  2.029E+02  2.873E+03  2.029E+02

er      1401      n      5  9.060E+03  1.800E+03  1.025E+05
      8      0  1.678E+02  9.623E+00
      9.815E+01  1.464E+02  1.732E+02  1.577E+02  2.731E+02  1.665E+02  3.731E+02  1.699E+02
      3.232E+02  1.699E+02  1.800E+03  2.743E+02  1.800E+03  2.008E+02  2.900E+03  2.008E+02

tm      1406      n      5  9.300E+03  1.818E+03  1.088E+05
      6      0  1.598E+02  8.000E+00
      7.731E+01  1.464E+02  1.732E+02  1.548E+02  2.731E+02  1.598E+02  1.818E+03  2.184E+02
      1.818E+03  1.979E+02  2.000E+03  1.979E+02

yb      1411      n      5  7.000E+03  1.097E+03  5.314E+04
      12     0  1.485E+02  8.000E+00
      2.731E+02  1.452E+02  4.231E+02  1.700E+02  5.481E+02  1.791E+02  5.481E+02  1.632E+02
      6.731E+02  1.728E+02  8.731E+02  1.816E+02  1.066E+03  1.828E+02  1.071E+03  1.734E+04
      1.076E+03  2.084E+02  1.097E+03  2.084E+02  1.097E+03  2.125E+02  1.700E+03  2.125E+02

tu      1416      n      5  9.850E+03  1.925E+03  1.088E+05
      6      0  1.506E+02  1.046E+01
      1.732E+02  1.452E+02  2.731E+02  1.519E+02  3.431E+02  1.548E+02  1.925E+03  2.125E+02
      1.925E+03  1.925E+02  3.600E+03  1.925E+02

pm      1421      n      5  7.200E+03  1.308E+03  8.786E+04
      2      0  1.883E+02  1.300E+01
      2.982E+02  1.883E+02  1.308E+03  2.594E+02

ac      1426      n      5  1.010E+04  1.320E+03  4.602E+04
      4      0  1.300E+02  1.300E+01
      2.982E+02  1.300E+02  1.320E+03  1.700E+02  1.320E+03  1.464E+02  3.173E+03  1.300E+02

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

am	1430	n	5	1.170E+04	1.123E+03	0.000E+00			
	0	0		1.300E+02	1.300E+01				
at	1437	n	5	7.500E+03	5.751E+02	5.690E+04			
	4	0		1.393E+02	4.000E-01				
	2.982E+02	1.393E+02	5.751E+02	1.393E+02	5.752E+02	1.992E+02	6.502E+02	1.992E+02	
bk	1440	n	5	1.200E+04	0.000E+00	0.000E+00			
	0	0		1.300E+02	1.300E+01				
cf	1443	n	5	1.200E+04	0.000E+00	0.000E+00			
	0	0		1.300E+02	1.300E+01				
cm	1446	n	5	7.000E+03	0.000E+00	0.000E+00			
	0	0		1.300E+02	1.300E+01				
cs	1449	n	5	1.200E+04	0.000E+00	0.000E+00			
	0	0		1.300E+02	1.300E+01				
fm	1452	n	5	1.200E+04	0.000E+00	0.000E+00			
	0	0		1.300E+02	1.300E+01				
fr	1455	n	5	1.200E+04	3.002E+02	9.372E+04			
	0	0		1.423E+02	1.300E+01				
mf	1461	n	5	1.200E+04	0.000E+00	0.000E+00			
	0	0		1.300E+02	1.300E+01				
mp	1464	n	5	1.800E+04	9.131E+02	0.000E+00			
	0	0		1.300E+02	1.300E+01				
ms	1467	n	5	1.200E+04	0.000E+00	0.000E+00			
	0	0		1.300E+02	1.300E+01				
po	1473	n	5	9.320E+03	5.271E+02	4.770E+04			
	4	0		1.213E+02	1.700E+00				
	2.731E+02	1.213E+02	5.271E+02	1.381E+02	5.272E+02	1.799E+02	1.235E+03	1.799E+02	
pa	1476	n	5	1.540E+04	1.503E+03	7.238E+04			
	4	0		1.213E+02	1.300E+01				
	2.731E+02	1.130E+02	1.503E+03	2.008E+02	1.503E+03	1.464E+02	1.573E+03	1.464E+02	
ra	1479	n	5	5.000E+03	9.731E+02	4.268E+04			
	4	0		1.205E+02	1.300E+01				
	2.731E+02	1.130E+02	9.731E+02	1.297E+02	9.732E+02	1.464E+02	1.973E+03	1.464E+02	

te 1488 n 5 6.240E+03 7.226E+02 1.059E+05
 4 6 2.008E+02 3.300E+00
 2.731E+02 1.966E+02 7.226E+02 2.761E+02 7.227E+02 2.950E+02 1.263E+03 2.950E+02
 1.232E+02 8.000E+00 1.732E+02 5.858E+00 2.731E+02 3.800E+00 3.732E+02 2.500E+00
 4.731E+02 1.883E+00 6.231E+02 1.883E+00

lw 1491 n 5 1.200E+04 0.000E+00 0.000E+00
 0 0 1.300E+02 1.300E+01

argas 1501 n 5 1.784E+00 0.000E+00 0.000E+00
 1 12 5.188E+02 1.799E-02
 0.000E+00 0.000E+00 1.732E+02 1.088E-02 2.731E+02 1.657E-02 3.732E+02 2.134E-02
 5.731E+02 2.950E-02 7.731E+02 3.510E-02 1.073E+03 4.393E-02 1.473E+03 5.439E-02
 2.073E+03 6.870E-02 2.773E+03 8.326E-02 3.273E+03 9.288E-02 5.273E+03 1.284E-01

elgas 1506 n 5 3.214E+00 0.000E+00 0.000E+00
 4 8 4.770E+02 8.786E-03
 2.982E+02 4.770E+02 3.732E+02 4.937E+02 4.731E+02 5.063E+02 3.000E+03 5.481E+02
 2.332E+02 6.397E-03 2.442E+02 6.916E-03 2.664E+02 7.607E-03 2.775E+02 7.954E-03
 2.887E+02 8.473E-03 3.109E+02 9.163E-03 3.220E+02 9.682E-03 3.221E+02 9.682E-03

f-gas 1511 n 5 1.696E+00 0.000E+00 0.000E+00
 4 10 0.000E+00 0.000E+00
 2.731E+02 7.448E+02 2.982E+02 8.242E+02 7.731E+02 9.540E+02 3.000E+03 1.029E+03
 8.875E+01 7.573E-03 1.443E+02 1.280E-02 1.998E+02 1.816E-02 2.332E+02 2.125E-02
 2.442E+02 2.213E-02 2.553E+02 2.318E-02 2.664E+02 2.423E-02 3.220E+02 2.853E-02
 3.664E+02 3.180E-02 3.665E+02 3.180E-02

hegas 1516 n 5 1.770E-01 0.000E+00 0.000E+00
 1 12 5.188E+03 1.502E-01
 0.000E+00 0.000E+00 3.315E+01 3.527E-02 8.875E+01 6.820E-02 1.732E+02 1.054E-01
 2.731E+02 1.414E-01 2.982E+02 1.502E-01 3.220E+02 1.573E-01 3.732E+02 1.703E-01
 4.731E+02 2.121E-01 7.731E+02 2.912E-01 1.473E+03 4.414E-01 2.773E+03 6.640E-01

h-gas 1521 n 5 8.990E-02 0.000E+00 0.000E+00
 8 11 1.423E+04 1.858E-01
 2.731E+02 1.414E+04 2.982E+02 1.427E+04 3.732E+02 1.448E+04 7.731E+02 1.469E+04
 1.273E+03 1.556E+04 2.273E+03 1.749E+04 2.673E+03 1.812E+04 2.973E+03 1.862E+04
 0.000E+00 0.000E+00 3.315E+01 2.506E-02 1.732E+02 1.125E-01 2.731E+02 1.728E-01
 3.732E+02 2.167E-01 5.731E+02 2.946E-01 1.773E+03 1.046E+00 2.073E+03 1.300E+00
 2.373E+03 1.700E+00 2.573E+03 3.300E+00 2.773E+03 6.360E+00

negas 1526 n 5 8.999E-01 0.000E+00 0.000E+00
 1 12 1.029E+03 4.853E-02
 2.332E+02 4.096E-02 2.731E+02 4.561E-02 3.231E+02 5.063E-02 3.732E+02 5.648E-02
 4.731E+02 6.611E-02 5.731E+02 7.448E-02 7.731E+02 9.079E-02 1.073E+03 1.121E-01
 1.473E+03 1.377E-01 2.073E+03 1.720E-01 2.773E+03 2.075E-01 3.273E+03 2.314E-01

Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

n-gas	1531	n	5	1.251E+00	0.000E+00	0.000E+00			
	7	8		1.042E+03	2.402E-02				
	2.731E+02	1.021E+03	3.732E+02	1.042E+03	6.731E+02	1.088E+03	9.731E+02	1.159E+03	
	1.273E+03	1.213E+03	2.273E+03	1.297E+03	3.000E+03	1.322E+03			
	7.315E+01	6.904E-03	1.443E+02	1.385E-02	1.998E+02	1.858E-02	2.731E+02	2.402E-02	
	3.732E+02	3.125E-02	4.731E+02	3.799E-02	5.731E+02	4.414E-02	6.731E+02	4.833E-02	
o-gas	1536	n	5	1.429E+00	0.000E+00	0.000E+00			
	6	4		7.950E+02	2.636E-02				
	2.731E+02	7.950E+02	3.732E+02	9.205E+02	5.731E+02	1.004E+03	7.731E+02	1.046E+0	
	1.373E+03	1.130E+03	5.273E+03	1.300E+03					
	7.315E+01	6.569E-03	1.981E+02	1.820E-02	2.731E+02	2.456E-02	3.732E+02	3.264E-02	
xe	1541	n	5	5.887E+00	1.613E+02	2.343E+04			
	0	12		1.586E+02	5.858E-03				
	1.732E+02	4.058E-03	2.731E+02	5.607E-03	3.732E+02	7.071E-03	4.731E+02	8.410E-03	
	5.731E+02	9.665E-03	7.731E+02	1.205E-02	1.073E+03	1.527E-02	1.473E+03	1.925E-02	
	2.073E+03	2.469E-02	2.773E+03	3.050E-02	3.273E+03	3.439E-02	5.273E+03	4.870E-02	
h-h2o	1546	n	5	7.590E+00	0.000E+00	0.000E+00			
	1	7		1.343E+02	4.607E-03				
	2.731E+02	3.804E-03	3.109E+02	4.841E-03	3.110E+02	4.841E-03			
h-h2o	1551	n	5	1.800E-01	0.000E+00	0.000E+00			
	2	10		7.113E+03	1.403E-01				
	2.731E+02	7.071E+03	2.973E+03	9.205E+03					
	7.315E+01	1.925E-02	8.915E+01	4.602E-02	1.443E+02	7.322E-02	1.998E+02	9.958E-02	
	2.822E+02	1.151E-01	2.999E+02	1.402E-01	3.220E+02	1.485E-01	3.732E+02	1.619E-01	
	1.731E+02	1.907E-01	5.731E+02	2.222E-01					
h-h2o	1556	n	5	3.733E-01	1.165E+02	1.883E+04			
	1	7		2.469E+02	9.265E-03				
	2.731E+02	9.301E-03	3.109E+02	9.858E-03					
h-h2o	1561	n	5	9.730E+00	2.113E+02	0.000E+00			
	1	0		9.372E+01	4.000E-03				
h-h2o	1566	n	5	2.700E-01	0.000E+00	0.000E+00			
	4	7		4.728E+03	9.623E-01				
	2.731E+02	4.728E+03	1.273E+03	5.188E+03	2.273E+03	5.816E+03	2.973E+03	6.109E+03	
	7.315E+01	1.300E-02	7.315E+01	2.845E-02	1.732E+02	6.276E-02	2.731E+02	9.205E-02	
	3.732E+02	1.130E-01	4.731E+02	1.423E-01	6.731E+02	1.883E-01			

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

Thermal Property Data

a7075 2001 n 5 2.801E+03 9.332E+02 3.975E+05
10 6 8.000E+02 1.213E+02
6.315E+01 4.602E+02 1.232E+02 5.858E+02 1.732E+02 6.820E+02 2.231E+02 7.615E+02
2.731E+02 8.201E+02 3.732E+02 9.037E+02 4.731E+02 9.665E+02 5.731E+02 1.038E+03
6.731E+02 1.130E+03 7.232E+02 1.197E+03
2.231E+02 7.950E+01 2.731E+02 1.234E+02 3.732E+02 1.381E+02 4.731E+02 1.715E+02
5.731E+02 1.778E+02 6.981E+02 1.700E+02

a707a 2002 n 5 2.801E+03 9.332E+02 3.975E+05
10 6 8.000E+02 1.632E+02
6.315E+01 4.602E+02 1.232E+02 5.858E+02 1.732E+02 6.820E+02 2.231E+02 7.615E+02
2.731E+02 8.201E+02 3.732E+02 9.037E+02 4.731E+02 9.665E+02 5.731E+02 1.038E+03
6.731E+02 1.130E+03 7.232E+02 1.197E+03
1.232E+02 1.213E+02 2.731E+02 1.632E+02 3.732E+02 1.757E+02 4.731E+02 1.799E+02
5.731E+02 1.778E+02 6.981E+02 1.700E+02

alamg 2003 n 5 2.660E+03 8.731E+02 3.800E+05
2 0 8.786E+02 1.300E+02
2.731E+02 8.786E+02 8.731E+02 1.300E+03

a7079 2004 n 5 2.740E+03 9.332E+02 3.975E+05
9 0 7.950E+02 1.213E+02
7.315E+01 6.987E+02 1.732E+02 7.950E+02 2.731E+02 8.159E+02 3.732E+02 7.950E+02
4.731E+02 7.615E+02 5.731E+02 7.238E+02 6.231E+02 7.113E+02 6.731E+02 7.113E+02
7.232E+02 7.322E+02

a2024 2005 n 5 2.780E+03 9.332E+02 3.975E+05
9 5 8.000E+02 1.300E+02
7.315E+01 4.686E+02 1.732E+02 6.904E+02 2.231E+02 7.699E+02 2.731E+02 8.284E+02
3.732E+02 9.121E+02 4.731E+02 9.623E+02 5.731E+02 1.017E+03 6.731E+02 1.092E+03
7.232E+02 1.155E+03
1.232E+02 8.000E+01 3.732E+02 1.339E+02 4.731E+02 1.715E+02 5.731E+02 1.883E+02
6.981E+02 1.736E+02

a202a 2006 n 5 2.780E+03 9.332E+02 3.975E+05
9 6 8.000E+02 1.757E+02
7.315E+01 4.686E+02 1.732E+02 6.904E+02 2.231E+02 7.699E+02 2.731E+02 8.284E+02
3.732E+02 9.121E+02 4.731E+02 9.623E+02 5.731E+02 1.017E+03 6.731E+02 1.092E+03
7.232E+02 1.155E+03
1.232E+02 1.464E+02 2.731E+02 1.757E+02 3.732E+02 1.841E+02 4.731E+02 1.883E+02
5.731E+02 1.883E+02 6.981E+02 1.736E+02

alal1 2007 n 5 2.700E+03 8.731E+02 3.891E+05
2 2 8.786E+02 2.100E+02
2.731E+02 8.000E+02 4.731E+02 9.623E+02
2.731E+02 2.100E+02 4.731E+02 2.134E+02

Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

ala12	2008	n	5	2.700E+03	8.131E+02	3.891E+05
2	2	8.786E+02	1.883E+02			
2.731E+02	8.000E+02	4.731E+02	9.623E+02			
2.731E+02	1.883E+02	4.731E+02	1.966E+02			
ala13	2009	n	5	2.700E+03	7.731E+02	3.891E+05
2	2	8.786E+02	1.700E+02			
2.731E+02	8.000E+02	4.731E+02	9.623E+02			
2.731E+02	1.700E+02	4.731E+02	1.799E+02			
ala14	2010	n	5	2.700E+03	7.731E+02	3.891E+05
2	2	8.786E+02	1.464E+02			
2.731E+02	8.000E+02	4.731E+02	9.623E+02			
2.731E+02	1.464E+02	4.731E+02	1.632E+02			
ala15	2011	n	5	2.700E+03	7.731E+02	3.891E+05
2	2	8.786E+02	1.300E+02			
2.731E+02	8.000E+02	4.731E+02	9.623E+02			
2.731E+02	1.300E+02	4.731E+02	1.464E+02			
ala16	2012	n	5	2.700E+03	7.731E+02	3.891E+05
2	2	8.786E+02	1.046E+02			
2.731E+02	8.000E+02	4.731E+02	9.623E+02			
2.731E+02	1.046E+02	4.731E+02	1.297E+02			
ala17	2013	n	5	2.700E+03	7.731E+02	3.891E+05
2	2	8.786E+02	8.000E+01			
2.731E+02	8.000E+02	4.731E+02	9.623E+02			
2.731E+02	8.000E+01	4.731E+02	1.088E+02			
bralm	2101	n	5	8.600E+03	1.243E+03	0.000E+00
0	0	3.800E+02	1.004E+02			
brcar	2105	n	5	8.570E+03	1.213E+03	0.000E+00
3	5	4.000E+02	1.004E+02			
2.731E+02	3.975E+02	4.731E+02	4.895E+02	7.731E+02	5.272E+02	
2.731E+02	9.623E+01	3.732E+02	1.046E+02	4.731E+02	1.088E+02	5.731E+02 1.130E+02
6.731E+02	1.151E+02					
brpbl	2111	n	5	8.500E+03	1.150E+03	0.000E+00
0	0	3.800E+02	1.172E+02			
brnum	2116	n	5	8.400E+03	0.000E+00	0.000E+00
0	0	3.800E+02	1.300E+02			
brdc	2121	n	5	8.750E+03	1.260E+03	0.000E+00
0	0	3.800E+02	7.196E+01			

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

Thermal Property Data

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brrdw 2122      n      5 8.750E+03 1.295E+03 0.000E+00
      0      0 3.800E+02 1.464E+02

brtin 2126      n      5 8.460E+03 1.173E+03 0.000E+00
      0      0 3.800E+02 1.130E+02

bryel 2131      n      5 8.470E+03 1.205E+03 0.000E+00
      0      0 3.800E+02 1.172E+02

bronz 2141      n      5 8.800E+03 0.000E+00 0.000E+00
      0      0 3.800E+02 1.883E+02

broal 2146      n      5 7.900E+03 1.313E+03 0.000E+00
      0      0 3.800E+02 7.113E+01

broar 2151      n      5 8.500E+03 1.163E+03 0.000E+00
      0      0 3.800E+02 1.213E+02

brocm 2156      n      5 8.800E+03 1.313E+03 0.000E+00
      0      0 3.800E+02 1.883E+02

bromn 2161      n      5 8.360E+03 1.173E+03 0.000E+00
      0      0 3.800E+02 1.046E+02

broph 2166      n      5 8.780E+03 0.000E+00 0.000E+00
      0      0 3.800E+02 5.021E+01

bropm 2167      n      5 8.860E+03 1.323E+03 0.000E+00
      0      0 3.800E+02 7.113E+01

bropl 2168      n      5 8.900E+03 1.323E+03 0.000E+00
      0      0 3.800E+02 2.050E+02

brsih 2171      n      5 8.530E+03 1.293E+03 0.000E+00
      0      7 3.800E+02 3.300E+01
      0.000E+00 0.000E+00 2.315E+01 3.800E+00 7.315E+01 1.339E+01 1.232E+02 1.883E+01
      1.732E+02 2.500E+01 2.731E+02 3.138E+01 3.732E+02 3.800E+01

brsil 2172      n      5 8.750E+03 1.293E+03 0.000E+00
      0      0 3.800E+02 5.439E+01

brsnh 2176      n      5 9.200E+03 1.213E+03 0.000E+00
      0      0 3.800E+02 4.000E+01

brsnl 2177      n      5 8.700E+03 1.117E+03 0.000E+00
      0      0 3.800E+02 5.021E+01

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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cuber 2181      n      5  8.750E+03 1.273E+03 1.300E+05
      2      5  3.975E+02 2.100E+02
      2.731E+02 3.849E+02 1.273E+03 5.021E+02
      3.150E+00 1.548E+00 2.315E+01 1.300E+01 7.315E+01 3.800E+01 2.731E+02 2.100E+02
      3.732E+02 2.594E+02

cubeh 2182      n      5  8.260E+03 1.273E+03 1.300E+05
      2      0  3.975E+02 1.088E+02
      2.731E+02 3.849E+02 1.273E+03 5.021E+02

cuchr 2183      n      5  8.880E+03 1.373E+03 1.300E+05
      2      2  3.800E+02 3.431E+02
      2.731E+02 3.849E+02 1.273E+03 5.021E+02
      2.731E+02 3.264E+02 9.731E+02 2.971E+02

cunis 2185      n      5  8.800E+03 1.020E+08 1.700E+05
      0      0  3.800E+02 3.300E+01

cugzn 2186      n      5  8.850E+03 1.338E+03 0.000E+00
      0      0  3.800E+02 2.301E+02

cuwgt 2191      n      5  8.900E+03 1.323E+03 1.464E+05
      0      0  3.800E+02 3.800E+02

cuman 2195      n      5  8.700E+03 0.000E+00 0.000E+00
      0      2  3.800E+02 2.218E+01
      2.911E+02 2.218E+01 3.732E+02 2.636E+01

cual1 2201      n      5  8.900E+03 1.273E+03 1.300E+05
      2      6  3.800E+02 2.176E+02
      2.731E+02 3.849E+02 1.273E+03 5.021E+02
      3.131E+02 2.197E+02 3.732E+02 2.322E+02 5.731E+02 2.741E+02 6.731E+02 2.887E+02
      8.731E+02 3.054E+02 1.273E+03 3.180E+02

cupr1 2202      n      5  8.900E+03 1.376E+03 0.000E+00
      0      0  3.800E+02 4.000E+01

cupr3 2203      n      5  8.900E+03 1.473E+03 0.000E+00
      0      0  3.800E+02 2.900E+01

mg001 2421      n      5  1.810E+03 7.372E+02 3.724E+05
      5      2  1.025E+03 5.858E+01
      2.731E+02 1.004E+03 5.731E+02 1.172E+03 7.372E+02 1.318E+03 7.372E+02 1.300E+03
      1.073E+03 1.423E+03
      2.731E+02 5.439E+01 5.731E+02 7.950E+01

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mg002 2422      n      5 1.775E+03 8.381E+02 3.389E+05
      10      5 9.832E+02 8.000E+01
      7.315E+01 6.694E+02 1.732E+02 8.000E+02 2.731E+02 9.623E+02 3.732E+02 1.046E+03
      4.731E+02 1.109E+03 5.731E+02 1.151E+03 6.231E+02 1.172E+03 8.381E+02 1.423E+03
      8.382E+02 1.339E+03 1.073E+03 1.423E+03
      1.481E+02 5.439E+01 2.731E+02 7.740E+01 3.732E+02 9.205E+01 4.731E+02 1.025E+02
      5.931E+02 1.088E+02

mg003 2423      n      5 1.770E+03 8.781E+02 3.389E+05
      9      5 1.004E+03 8.000E+01
      2.731E+02 9.874E+02 3.732E+02 1.100E+03 4.731E+02 1.180E+03 5.731E+02 1.238E+03
      6.731E+02 1.293E+03 7.731E+02 1.343E+03 8.781E+02 1.389E+03 8.782E+02 1.339E+03
      1.073E+03 1.423E+03
      1.481E+02 5.439E+01 2.731E+02 7.740E+01 3.732E+02 9.205E+01 4.731E+02 1.025E+02
      5.931E+02 1.088E+02

mg004 2424      n      5 1.800E+03 7.832E+02 3.724E+05
      5      2 1.025E+03 7.531E+01
      2.731E+02 1.004E+03 5.731E+02 1.172E+03 7.832E+02 1.339E+03 7.832E+02 1.297E+03
      1.073E+03 1.423E+03
      2.731E+02 7.113E+01 5.731E+02 9.623E+01

mg005 2425      n      5 1.835E+03 7.282E+02 3.724E+05
      5      2 1.025E+03 7.113E+01
      2.731E+02 1.004E+03 5.731E+02 1.172E+03 7.282E+02 1.318E+03 7.282E+02 1.276E+03
      1.073E+03 1.423E+03
      2.731E+02 6.694E+01 5.731E+02 8.786E+01

mg006 2426      n      5 1.800E+03 7.631E+02 3.556E+05
      10      2 9.623E+02 5.439E+01
      7.315E+01 6.694E+02 1.732E+02 8.000E+02 2.731E+02 9.623E+02 3.732E+02 1.046E+03
      4.731E+02 1.100E+03 5.731E+02 1.151E+03 6.731E+02 1.192E+03 7.631E+02 1.222E+03
      9.031E+02 1.423E+03 1.073E+03 1.423E+03
      2.731E+02 5.021E+01 5.731E+02 7.950E+01

mg007 2427      n      5 1.800E+03 7.631E+02 3.724E+05
      5      2 1.004E+03 5.439E+01
      2.731E+02 1.004E+03 5.731E+02 1.172E+03 7.631E+02 1.339E+03 7.632E+02 1.297E+03
      1.073E+03 1.423E+03
      2.731E+02 5.021E+01 5.731E+02 7.531E+01

mg008 2428      n      5 1.800E+03 7.482E+02 3.724E+05
      5      2 1.025E+03 7.950E+01
      2.731E+02 1.004E+03 5.731E+02 1.172E+03 7.482E+02 1.339E+03 7.482E+02 1.297E+03
      1.073E+03 1.423E+03
      2.731E+02 7.531E+01 5.731E+02 1.004E+02

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Thermal Property Data
 k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

mg009 2429 n 5 1.810E+03 7.411E+02 3.724E+05
 5 2 1.025E+03 5.439E+01
 2.731E+02 1.004E+03 5.731E+02 1.172E+03 7.411E+02 1.339E+03 7.412E+02 1.297E+03
 1.073E+03 1.423E+03
 2.731E+02 5.021E+01 5.731E+02 7.531E+01

mg010 2430 n 5 1.810E+03 7.411E+02 3.724E+05
 5 2 1.025E+03 5.439E+01
 2.731E+02 1.004E+03 5.731E+02 1.172E+03 7.411E+02 1.339E+03 7.412E+02 1.297E+03
 1.073E+03 1.423E+03
 2.731E+02 5.021E+01 5.731E+02 7.531E+01

mg011 2431 n 5 1.825E+03 7.161E+02 3.724E+05
 5 2 1.025E+03 5.439E+01
 2.731E+02 1.004E+03 5.731E+02 1.172E+03 7.161E+02 1.297E+03 7.162E+02 1.300E+03
 1.073E+03 1.423E+03
 2.731E+02 5.021E+01 5.731E+02 7.531E+01

mg012 2432 n 5 1.770E+03 8.731E+02 3.724E+05
 5 2 1.025E+03 1.088E+02
 2.731E+02 1.004E+03 5.731E+02 1.172E+03 8.731E+02 1.423E+03 8.732E+02 1.339E+03
 1.073E+03 1.423E+03
 2.731E+02 1.046E+02 5.731E+02 1.300E+02

mg013 2433 n 5 1.810E+03 7.482E+02 3.724E+05
 5 2 1.025E+03 8.000E+01
 2.731E+02 1.004E+03 5.731E+02 1.172E+03 7.482E+02 1.339E+03 7.482E+02 1.297E+03
 1.073E+03 1.423E+03
 2.731E+02 7.950E+01 5.731E+02 1.046E+02

mg014 2434 n 5 1.830E+03 8.231E+02 3.724E+05
 5 2 1.025E+03 1.004E+02
 2.731E+02 1.004E+03 5.731E+02 1.172E+03 8.231E+02 1.402E+03 8.232E+02 1.318E+03
 1.073E+03 1.423E+03
 2.731E+02 9.623E+01 5.731E+02 1.172E+02

mg015 2435 n 5 1.790E+03 8.661E+02 3.724E+05
 5 2 1.025E+03 1.046E+02
 2.731E+02 1.004E+03 5.731E+02 1.172E+03 8.661E+02 1.423E+03 8.662E+02 1.339E+03
 1.073E+03 1.423E+03
 2.731E+02 1.004E+02 5.731E+02 1.300E+02

mg016 2436 n 5 1.810E+03 8.642E+02 3.724E+05
 5 2 1.025E+03 1.004E+02
 2.731E+02 1.004E+03 5.731E+02 1.172E+03 8.642E+02 1.423E+03 8.642E+02 1.339E+03
 1.073E+03 1.423E+03
 2.731E+02 9.623E+01 5.731E+02 1.213E+02

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mg017 2437    n    5 1.830E+03 8.161E+02 3.724E+05
      5    2 1.025E+03 1.046E+02
      2.731E+02 1.004E+03 5.731E+02 1.172E+03 8.161E+02 1.402E+03 8.162E+02 1.318E+03
      1.073E+03 1.423E+03
      2.731E+02 1.004E+02 5.731E+02 1.213E+02

mg018 2438    n    5 1.790E+03 8.621E+02 3.264E+05
      6    2 1.025E+03 1.130E+02
      2.731E+02 1.025E+03 4.731E+02 1.100E+03 6.731E+02 1.264E+03 8.621E+02 1.427E+03
      8.622E+02 1.331E+03 9.981E+02 1.381E+03
      2.731E+02 1.130E+02 5.731E+02 1.339E+02

mg019 2439    n    5 1.790E+03 8.621E+02 3.264E+05
      6    2 1.025E+03 1.046E+02
      2.731E+02 1.025E+03 4.731E+02 1.100E+03 6.731E+02 1.264E+03 8.621E+02 1.427E+03
      8.622E+02 1.331E+03 9.981E+02 1.381E+03
      2.731E+02 1.046E+02 5.731E+02 1.300E+02

mg020 2440    n    5 1.790E+03 8.621E+02 3.264E+05
      6    2 1.025E+03 9.205E+01
      2.731E+02 1.025E+03 4.731E+02 1.100E+03 6.731E+02 1.264E+03 8.621E+02 1.427E+03
      8.622E+02 1.331E+03 9.981E+02 1.381E+03
      2.731E+02 9.205E+01 5.731E+02 1.172E+02

mg021 2441    n    5 1.780E+03 8.781E+02 3.724E+05
      6    2 1.025E+03 1.381E+02
      2.731E+02 1.025E+03 4.731E+02 1.100E+03 6.731E+02 1.264E+03 8.781E+02 1.443E+03
      8.782E+02 1.339E+03 1.073E+03 1.423E+03
      2.731E+02 1.339E+02 5.731E+02 1.402E+02

mg022 2442    n    5 1.820E+03 8.621E+02 3.305E+05
      6    2 1.025E+03 1.046E+02
      2.731E+02 1.004E+03 4.731E+02 1.100E+03 6.731E+02 1.264E+03 8.621E+02 1.427E+03
      8.622E+02 1.331E+03 9.981E+02 1.381E+03
      2.731E+02 1.025E+02 5.731E+02 1.300E+02

mg023 2443    n    5 1.830E+03 8.231E+02 3.724E+05
      5    2 1.025E+03 1.046E+02
      2.731E+02 1.004E+03 5.731E+02 1.172E+03 8.231E+02 1.423E+03 8.232E+02 1.339E+03
      1.073E+03 1.423E+03
      2.731E+02 1.004E+02 5.731E+02 1.300E+02

mg024 2444    n    5 1.750E+03 9.031E+02 3.724E+05
      5    2 1.025E+03 1.172E+02
      2.731E+02 1.004E+03 5.731E+02 1.172E+03 9.031E+02 1.423E+03 9.032E+02 1.339E+03
      1.073E+03 1.423E+03
      2.731E+02 1.172E+02 5.731E+02 1.339E+02

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

mg025 2445 n 5 1.760E+03 9.211E+02 3.724E+05
 5 2 1.025E+03 1.297E+02
 2.731E+02 1.004E+03 5.731E+02 1.172E+03 8.731E+02 1.423E+03 8.732E+02 1.339E+03
 1.073E+03 1.423E+03
 2.731E+02 1.300E+02 5.731E+02 1.339E+02

mg026 2446 n 5 1.760E+03 9.211E+02 3.724E+05
 5 2 1.025E+03 1.423E+02
 2.731E+02 1.004E+03 5.731E+02 1.172E+03 8.731E+02 1.423E+03 8.732E+02 1.339E+03
 1.073E+03 1.423E+03
 2.731E+02 1.423E+02 5.731E+02 1.423E+02

mg027 2447 n 5 1.760E+03 9.211E+02 3.724E+05
 5 2 1.025E+03 1.318E+02
 2.731E+02 1.004E+03 5.731E+02 1.172E+03 8.731E+02 1.423E+03 8.732E+02 1.339E+03
 1.073E+03 1.423E+03
 2.731E+02 1.297E+02 5.731E+02 1.402E+02

mg028 2448 n 5 1.760E+03 8.781E+02 3.389E+05
 5 2 1.025E+03 1.088E+02
 2.731E+02 1.004E+03 5.731E+02 1.172E+03 8.781E+02 1.423E+03 8.782E+02 1.339E+03
 1.073E+03 1.423E+03
 2.731E+02 1.046E+02 5.731E+02 1.300E+02

mg029 2449 n 5 1.750E+03 9.031E+02 3.724E+05
 5 2 1.025E+03 1.464E+02
 2.731E+02 1.004E+03 5.731E+02 1.172E+03 9.031E+02 1.464E+03 9.032E+02 1.381E+03
 1.073E+03 1.423E+03
 2.731E+02 1.464E+02 5.731E+02 1.423E+02

mg030 2450 n 5 1.760E+03 8.331E+02 3.389E+05
 5 2 1.025E+03 1.360E+02
 2.731E+02 1.004E+03 5.731E+02 1.172E+03 8.331E+02 1.423E+03 8.332E+02 1.339E+03
 1.073E+03 1.423E+03
 2.731E+02 1.339E+02 5.731E+02 1.381E+02

mg031 2451 n 5 1.820E+03 7.832E+02 3.724E+05
 5 2 9.623E+02 1.130E+02
 2.731E+02 9.623E+02 5.731E+02 1.172E+03 7.832E+02 1.381E+03 7.832E+02 1.297E+03
 1.073E+03 1.423E+03
 2.731E+02 1.088E+02 5.731E+02 1.297E+02

mg032 2452 n 5 1.860E+03 8.231E+02 3.724E+05
 5 2 9.623E+02 1.130E+02
 2.731E+02 9.623E+02 5.731E+02 1.172E+03 8.231E+02 1.423E+03 8.232E+02 1.339E+03
 1.073E+03 1.423E+03
 2.731E+02 1.109E+02 5.731E+02 1.318E+02

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mg033 2453      n      5 1.860E+03 7.731E+02 3.724E+05
      5      2 9.623E+02 1.130E+02
      2.731E+02 9.623E+02 5.731E+02 1.172E+03 7.731E+02 1.381E+03 7.732E+02 1.297E+03
      1.073E+03 1.423E+03
      2.731E+02 1.109E+02 5.731E+02 1.339E+02

mg034 2454      n      5 1.800E+03 8.231E+02 3.724E+05
      5      2 1.025E+03 1.300E+02
      2.731E+02 1.004E+03 5.731E+02 1.172E+03 8.231E+02 1.423E+03 8.232E+02 1.339E+03
      1.073E+03 1.423E+03
      2.731E+02 1.213E+02 5.731E+02 1.360E+02

mg035 2455      n      5 1.810E+03 8.221E+02 3.180E+05
      7      2 1.021E+03 1.109E+02
      2.731E+02 1.004E+03 4.731E+02 1.088E+03 6.731E+02 1.300E+03 8.221E+02 1.423E+03
      8.222E+02 1.339E+03 1.073E+03 1.464E+03 1.373E+03 1.590E+03
      2.731E+02 1.088E+02 5.731E+02 1.297E+02

mg036 2456      n      5 1.830E+03 7.931E+02 3.180E+05
      6      2 1.046E+03 1.172E+02
      2.731E+02 1.029E+03 4.731E+02 1.096E+03 6.731E+02 1.272E+03 7.931E+02 1.393E+03
      7.932E+02 1.305E+03 9.981E+02 1.414E+03
      2.731E+02 1.130E+02 5.731E+02 1.297E+02

mg037 2457      n      5 1.800E+03 8.731E+02 3.724E+05
      5      2 1.025E+03 1.004E+02
      2.731E+02 1.004E+03 5.731E+02 1.172E+03 8.731E+02 1.443E+03 8.732E+02 1.360E+03
      1.073E+03 1.423E+03
      2.731E+02 9.623E+01 5.731E+02 1.172E+02

mg038 2458      n      5 1.800E+03 8.182E+02 3.724E+05
      5      2 1.025E+03 1.004E+02
      2.731E+02 1.004E+03 5.731E+02 1.172E+03 8.182E+02 1.423E+03 8.182E+02 1.339E+03
      1.073E+03 1.423E+03
      2.731E+02 9.832E+01 5.731E+02 1.213E+02

mg039 2459      n      5 1.760E+03 8.731E+02 3.724E+05
      5      2 9.623E+02 1.213E+02
      2.731E+02 9.623E+02 5.731E+02 1.172E+03 8.731E+02 1.443E+03 8.732E+02 1.360E+03
      1.073E+03 1.423E+03
      2.731E+02 1.172E+02 5.731E+02 1.339E+02

mg040 2460      n      5 1.800E+03 8.981E+02 3.724E+05
      5      2 1.025E+03 1.339E+02
      2.731E+02 1.004E+03 5.731E+02 1.172E+03 8.981E+02 1.464E+03 8.982E+02 1.381E+03
      1.073E+03 1.423E+03
      2.731E+02 1.318E+02 5.731E+02 1.402E+02

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

mg041 2461 n 5 1.800E+03 8.731E+02 3.724E+05
 5 2 9.623E+02 1.300E+02
 2.731E+02 9.623E+02 5.731E+02 1.172E+03 8.731E+02 1.443E+03 8.732E+02 1.360E+03
 1.073E+03 1.423E+03
 2.731E+02 1.234E+02 5.731E+02 1.402E+02

mg042 2462 n 5 1.820E+03 8.231E+02 3.724E+05
 5 2 9.623E+02 1.130E+02
 2.731E+02 9.623E+02 5.731E+02 1.172E+03 8.231E+02 1.402E+03 8.232E+02 1.318E+03
 1.073E+03 1.423E+03
 2.731E+02 1.109E+02 5.731E+02 1.318E+02

mg043 2463 n 5 1.780E+03 8.731E+02 3.724E+05
 5 0 1.004E+03 1.297E+02
 2.731E+02 1.004E+03 5.731E+02 1.172E+03 8.731E+02 1.423E+03 8.732E+02 1.339E+03
 1.073E+03 1.423E+03

mg044 2464 n 5 1.760E+03 8.231E+02 3.724E+05
 5 2 1.004E+03 1.188E+02
 2.731E+02 1.004E+03 5.731E+02 1.172E+03 8.231E+02 1.402E+03 8.232E+02 1.318E+03
 1.073E+03 1.423E+03
 2.731E+02 1.172E+02 6.731E+02 1.213E+02

mg045 2465 n 5 1.740E+03 7.232E+02 3.724E+05
 5 2 9.623E+02 9.623E+01
 2.731E+02 9.623E+02 5.731E+02 1.172E+03 7.232E+02 1.297E+03 7.232E+02 1.300E+03
 1.073E+03 1.423E+03
 2.731E+02 9.623E+01 6.731E+02 1.046E+02

mg046 2466 n 5 1.760E+03 7.731E+02 3.724E+05
 5 3 1.004E+03 1.213E+02
 2.731E+02 1.004E+03 5.731E+02 1.172E+03 7.731E+02 1.339E+03 7.732E+02 1.297E+03
 1.073E+03 1.423E+03
 3.231E+02 1.234E+02 4.731E+02 1.259E+02 6.731E+02 1.276E+02

mg047 2467 n 5 1.740E+03 7.731E+02 3.724E+05
 5 2 9.623E+02 1.297E+02
 2.731E+02 9.623E+02 5.731E+02 1.172E+03 7.731E+02 1.339E+03 7.732E+02 1.297E+03
 1.073E+03 1.423E+03
 3.231E+02 1.297E+02 4.231E+02 1.276E+02

ninvr 2501 n 5 8.000E+03 1.698E+03 2.900E+05
 0 0 5.146E+02 1.088E+01

nican 2502 n 5 8.220E+03 1.663E+03 2.900E+05
 2 2 4.602E+02 1.381E+01
 2.731E+02 4.393E+02 5.731E+02 5.439E+02
 2.982E+02 1.381E+01 5.981E+02 1.883E+01

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nicka 2503      n      5  8.890E+03  1.708E+03  3.054E+05
      5      5  4.393E+02  6.694E+01
      2.731E+02  4.310E+02  6.211E+02  5.941E+02  6.261E+02  1.866E+03  6.311E+02  5.230E+02
      1.708E+03  6.485E+02
      2.731E+02  7.029E+01  4.731E+02  5.648E+01  6.531E+02  4.561E+01  9.731E+02  5.648E+01
      1.708E+03  7.615E+01

nich3 2504      n      5  8.940E+03  1.543E+03  2.900E+05
      2      2  3.849E+02  1.300E+01
      2.731E+02  3.800E+02  5.731E+02  4.000E+02
      2.982E+02  1.300E+01  5.981E+02  1.757E+01

nicon 2506      n      5  8.890E+03  1.493E+03  2.900E+05
      2     11  3.975E+02  2.218E+01
      2.731E+02  3.891E+02  5.731E+02  4.310E+02
      6.150E+00  1.339E+00  8.150E+00  2.720E+00  1.315E+01  5.021E+00  2.315E+01  9.623E+00
      3.315E+01  1.548E+01  4.315E+01  1.883E+01  7.315E+01  2.008E+01  1.732E+02  2.218E+01
      2.731E+02  2.218E+01  3.732E+02  2.678E+01  6.731E+02  3.180E+01

nicod 2508      n      5  7.800E+03  1.383E+03  2.900E+05
      2      2  4.602E+02  2.100E+01
      2.731E+02  4.393E+02  5.731E+02  5.439E+02
      3.231E+02  2.100E+01  6.231E+02  2.594E+01

nidur 2510      n      5  8.260E+03  1.708E+03  2.900E+05
      2      2  4.351E+02  1.841E+01
      2.731E+02  4.268E+02  5.731E+02  5.021E+02
      3.231E+02  1.841E+01  6.231E+02  2.343E+01

niduh 2512      n      5  8.260E+03  1.708E+03  2.900E+05
      2      2  4.351E+02  1.966E+01
      2.731E+02  4.268E+02  5.731E+02  5.021E+02
      3.231E+02  1.966E+01  6.231E+02  2.469E+01

nid20 2514      n      5  7.920E+03  1.523E+03  2.900E+05
      2      2  4.602E+02  2.100E+01
      2.731E+02  4.393E+02  5.731E+02  5.439E+02
      3.732E+02  2.100E+01  6.731E+02  2.594E+01

nihsa 2516      n      5  8.800E+03  1.563E+03  2.900E+05
      2      2  3.933E+02  9.623E+00
      2.982E+02  3.933E+02  5.981E+02  4.351E+02
      2.731E+02  9.623E+00  1.223E+03  2.594E+01

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

nihsb 2518 n 5 9.240E+03 1.593E+03 2.900E+05
 4 6 3.807E+02 1.046E+01
 2.731E+02 3.800E+02 5.731E+02 4.000E+02 8.231E+02 5.104E+02 1.473E+03 6.485E+02
 2.015E+01 8.410E+00 2.731E+02 1.025E+01 4.731E+02 1.213E+01 7.731E+02 1.632E+01
 1.073E+03 2.469E+01 1.323E+03 2.761E+01

nihsd 2520 n 5 8.940E+03 1.543E+03 2.900E+05
 2 9 3.849E+02 1.046E+01
 2.731E+02 3.800E+02 1.473E+03 6.987E+02
 2.015E+01 9.623E+00 2.982E+02 1.046E+01 4.731E+02 1.130E+01 7.731E+02 1.548E+01
 8.731E+02 1.799E+01 9.731E+02 2.427E+01 1.073E+03 2.720E+01 1.173E+03 2.887E+01
 1.343E+03 3.012E+01

nihsd 2522 n 5 7.800E+03 1.393E+03 2.900E+05
 2 2 4.519E+02 2.100E+01
 2.731E+02 4.393E+02 5.731E+02 5.230E+02
 2.982E+02 2.100E+01 5.981E+02 2.594E+01

nihsn 2523 n 5 8.790E+03 1.573E+03 2.900E+05
 2 4 3.975E+02 9.665E+00
 2.731E+02 3.975E+02 5.731E+02 4.812E+02
 2.731E+02 1.046E+01 6.731E+02 1.590E+01 9.232E+02 2.050E+01 1.073E+03 2.385E+01

nihsr 2524 n 5 8.220E+03 1.563E+03 2.900E+05
 3 2 4.393E+02 9.205E+00
 2.731E+02 4.268E+02 6.731E+02 4.812E+02 1.563E+03 8.786E+02
 2.982E+02 9.079E+00 1.473E+03 2.887E+01

nihsx 2526 n 5 8.230E+03 1.553E+03 2.900E+05
 2 3 4.268E+02 8.786E+00
 2.731E+02 4.000E+02 5.731E+02 4.812E+02
 2.731E+02 9.414E+00 1.023E+03 2.364E+01 1.198E+03 2.741E+01

nihs0 2528 n 5 8.740E+03 1.703E+03 2.900E+05
 2 2 4.937E+02 3.339E+01
 2.731E+02 4.393E+02 5.731E+02 5.439E+02
 3.231E+02 3.300E+01 6.231E+02 3.800E+01

nillg 2530 n 5 8.580E+03 1.527E+03 2.900E+05
 2 2 4.393E+02 1.213E+01
 2.731E+02 4.000E+02 5.731E+02 4.812E+02
 2.982E+02 1.213E+01 5.981E+02 1.715E+01

nillr 2532 n 5 8.310E+03 1.597E+03 2.900E+05
 2 2 4.602E+02 1.297E+01
 2.731E+02 4.393E+02 5.731E+02 5.230E+02
 3.732E+02 1.297E+01 6.731E+02 1.799E+01

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ninc1 2534      n      5 8.010E+03 1.390E+08 2.720E+05
      2      2 4.812E+02 1.213E+01
      2.731E+02 4.393E+02 5.731E+02 5.858E+02
      3.231E+02 1.213E+01 6.231E+02 1.715E+01

ninc9 2536      n      5 8.230E+03 1.573E+03 2.720E+05
      11      2 4.000E+02 1.339E+01
      2.731E+02 4.000E+02 5.731E+02 4.602E+02 7.731E+02 4.979E+02 8.731E+02 5.523E+02
      9.232E+02 5.356E+02 9.731E+02 5.523E+02 1.023E+03 6.067E+02 1.073E+03 7.489E+02
      1.143E+03 9.832E+02 1.203E+03 6.862E+02 1.373E+03 7.448E+02
      2.982E+02 1.339E+01 1.073E+03 2.050E+01

nincn 2538      n      5 8.470E+03 1.663E+03 2.900E+05
      4      9 4.519E+02 1.423E+01
      2.731E+02 4.393E+02 5.731E+02 5.021E+02 8.731E+02 5.607E+02 1.173E+03 6.485E+02
      4.150E+00 2.900E-01 1.315E+01 1.300E+00 2.315E+01 2.500E+00 4.315E+01 5.439E+00
      7.315E+01 9.205E+00 2.731E+02 1.297E+01 4.731E+02 1.611E+01 6.731E+02 1.966E+01
      1.048E+03 2.720E+01

nincn 2540      n      5 8.300E+03 1.663E+03 2.900E+05
      4      3 4.519E+02 1.046E+01
      2.731E+02 4.393E+02 5.731E+02 5.021E+02 8.731E+02 5.607E+02 1.173E+03 6.485E+02
      2.731E+02 1.046E+01 7.731E+02 1.883E+01 1.223E+03 2.594E+01

nincw 2542      n      5 8.310E+03 1.663E+03 2.900E+05
      2      2 4.393E+02 1.473E+01
      2.731E+02 4.393E+02 5.731E+02 5.439E+02
      3.231E+02 1.464E+01 6.231E+02 1.966E+01

ninc2 2543      n      5 8.370E+03 1.593E+03 2.900E+05
      6      5 4.602E+02 1.300E+01
      2.731E+02 4.393E+02 5.731E+02 5.439E+02 7.731E+02 5.565E+02 1.073E+03 7.113E+02
      1.173E+03 6.485E+02 1.373E+03 6.485E+02
      2.731E+02 1.172E+01 3.732E+02 1.423E+01 7.731E+02 1.925E+01 1.273E+03 3.012E+01
      1.473E+03 3.389E+01

nincx 2544      n      5 8.280E+03 1.663E+03 2.900E+05
      4      3 4.393E+02 1.423E+01
      2.731E+02 4.310E+02 4.731E+02 4.895E+02 9.731E+02 5.941E+02 1.473E+03 8.000E+02
      2.731E+02 1.339E+01 6.731E+02 2.259E+01 1.173E+03 3.682E+01

ninc6 2545      n      5 8.480E+03 1.623E+03 2.900E+05
      2      4 4.561E+02 1.506E+01
      2.731E+02 4.393E+02 5.731E+02 5.439E+02
      2.731E+02 1.464E+01 5.731E+02 1.841E+01 7.731E+02 2.218E+01 1.143E+03 2.887E+01

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

ninc7 2546 n 5 8.170E+03 1.663E+03 2.900E+05

2 2 4.602E+02 1.300E+01

2.731E+02 4.393E+02 5.731E+02 5.439E+02

2.731E+02 1.213E+01 1.173E+03 1.837E+01

nin7c 2547 n 5 7.910E+03 1.533E+03 2.500E+05

3 2 4.100E+02 1.213E+01

2.731E+02 4.393E+02 5.731E+02 5.439E+02 1.473E+03 9.121E+02

4.832E+02 1.213E+01 1.498E+03 3.033E+01

nimon 2548 n 5 8.835E+03 1.563E+03 2.845E+05

6 11 4.310E+02 2.594E+01

2.731E+02 4.000E+02 3.032E+02 4.310E+02 3.732E+02 4.414E+02 4.731E+02 4.602E+02

5.731E+02 4.749E+02 1.533E+03 5.314E+02

4.150E+00 9.205E-01 8.150E+00 2.427E+00 1.315E+01 4.000E+00 2.315E+01 7.531E+00

4.315E+01 1.381E+01 7.315E+01 1.715E+01 1.732E+02 1.966E+01 2.731E+02 2.176E+01

3.732E+02 2.594E+01 6.731E+02 3.096E+01 1.223E+03 4.686E+01

nimou 2549 n 5 8.835E+03 1.563E+03 2.845E+05

6 2 4.310E+02 1.715E+01

2.731E+02 4.000E+02 3.032E+02 4.310E+02 3.732E+02 4.414E+02 4.731E+02 4.602E+02

5.731E+02 4.749E+02 1.533E+03 5.314E+02

2.731E+02 1.548E+01 1.223E+03 4.686E+01

niml4 2550 n 5 8.860E+03 1.523E+03 2.500E+05

2 2 4.393E+02 2.481E+01

2.731E+02 4.000E+02 5.731E+02 4.812E+02

3.231E+02 2.469E+01 6.231E+02 2.971E+01

nimoc 2551 n 5 8.630E+03 1.588E+03 2.500E+05

2 2 4.393E+02 2.678E+01

2.731E+02 4.000E+02 5.731E+02 4.812E+02

3.231E+02 2.678E+01 6.231E+02 3.180E+01

nimlh 2552 n 5 8.480E+03 1.553E+03 2.500E+05

2 2 4.393E+02 2.100E+01

2.731E+02 4.000E+02 5.731E+02 4.812E+02

3.231E+02 2.100E+01 6.231E+02 2.594E+01

nimow 2553 n 5 8.630E+03 1.315E+08 2.500E+05

2 2 4.393E+02 2.678E+01

2.731E+02 4.000E+02 5.731E+02 4.812E+02

3.231E+02 2.678E+01 6.231E+02 3.180E+01

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nimlk 2554      n      5  8.465E+03  1.588E+03  2.500E+05
  11      3  4.268E+02  1.883E+01
  1.131E+02  2.971E+02  2.001E+02  3.640E+02  2.931E+02  4.000E+02  3.732E+02  4.519E+02
  4.731E+02  4.770E+02  6.731E+02  4.979E+02  8.731E+02  5.356E+02  9.731E+02  5.690E+02
  1.073E+03  6.150E+02  1.173E+03  6.862E+02  1.273E+03  7.950E+02
  1.152E+02  1.300E+01  2.731E+02  1.715E+01  1.173E+03  4.142E+01

nimhu 2555      n      5  8.480E+03  1.558E+03  2.500E+05
  2      2  4.393E+02  2.678E+01
  2.731E+02  4.000E+02  5.731E+02  4.812E+02
  3.231E+02  2.678E+01  6.231E+02  3.180E+01

nimkr 2556      n      5  8.450E+03  1.593E+03  2.500E+05
  2      2  4.393E+02  1.883E+01
  2.731E+02  4.000E+02  5.731E+02  4.812E+02
  3.231E+02  1.883E+01  6.231E+02  2.385E+01

nim4h 2557      n      5  8.830E+03  0.000E+00  0.000E+00
  2      2  4.393E+02  2.594E+01
  2.731E+02  4.000E+02  5.731E+02  4.812E+02
  3.732E+02  2.594E+01  6.731E+02  3.096E+01

nimlr 2558      n      5  8.840E+03  1.573E+03  2.500E+05
  2      5  4.393E+02  2.594E+01
  2.731E+02  4.000E+02  5.731E+02  4.812E+02
  3.231E+02  2.594E+01  4.731E+02  2.720E+01  6.731E+02  3.096E+01  8.731E+02  3.473E+01
  1.073E+03  3.933E+01

nimls 2560      n      5  8.360E+03  1.503E+03  2.500E+05
  2      2  4.393E+02  1.966E+01
  2.731E+02  4.000E+02  5.731E+02  4.812E+02
  3.732E+02  1.958E+01  6.731E+02  2.678E+01

nim25 2561      n      5  8.210E+03  1.523E+03  2.900E+05
  3      3  4.393E+02  9.623E+00
  2.731E+02  4.268E+02  6.981E+02  4.812E+02  1.473E+03  9.205E+02
  3.732E+02  9.623E+00  1.273E+03  2.678E+01  1.423E+03  3.033E+01

nichr 2562      n      5  8.360E+03  1.643E+03  2.900E+05
  2      3  4.310E+02  9.623E+00
  2.731E+02  4.310E+02  1.173E+03  6.527E+02
  3.732E+02  1.339E+01  7.731E+02  1.841E+01  1.223E+03  2.648E+01

nimnd 2564      n      5  7.910E+03  1.623E+03  2.900E+05
  2      2  4.602E+02  1.423E+01
  2.731E+02  4.393E+02  5.731E+02  5.439E+02
  3.231E+02  1.423E+01  6.231E+02  1.925E+01

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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nim75 2566      n      5 8.350E+03 1.663E+03 2.900E+05
      2      4 4.602E+02 1.297E+01
      2.731E+02 4.393E+02 5.731E+02 5.439E+02
      2.731E+02 1.300E+01 3.732E+02 1.360E+01 9.731E+02 2.469E+01 1.173E+03 2.900E+01

nim80 2568      n      5 8.250E+03 1.638E+03 2.900E+05
      2      3 4.602E+02 1.172E+01
      2.731E+02 4.393E+02 5.731E+02 5.439E+02
      3.231E+02 1.130E+01 7.731E+02 1.883E+01 1.173E+03 2.761E+01

nim8a 2570      n      5 8.170E+03 1.643E+03 2.900E+05
      2      3 4.000E+02 1.172E+01
      2.731E+02 4.000E+02 5.731E+02 4.812E+02
      3.231E+02 1.130E+01 7.731E+02 1.883E+01 1.173E+03 2.761E+01

nim90 2572      n      5 8.250E+03 1.623E+03 2.900E+05
      2      2 4.310E+02 1.300E+01
      2.731E+02 4.310E+02 5.731E+02 5.230E+02
      3.732E+02 1.300E+01 1.173E+03 2.761E+01

nim95 2573      n      5 8.060E+03 1.623E+03 2.900E+05
      2      4 4.602E+02 1.300E+01
      2.731E+02 4.393E+02 5.731E+02 5.439E+02
      2.731E+02 1.088E+01 5.731E+02 1.590E+01 8.731E+02 2.008E+01 1.073E+03 2.406E+01

niper 2574      n      5 8.750E+03 1.673E+03 2.900E+05
      2      0 4.435E+02 5.774E+01
      2.731E+02 4.310E+02 6.231E+02 5.941E+02

nim15 2575      n      5 7.990E+03 1.623E+03 2.900E+05
      2      4 4.602E+02 1.172E+01
      2.731E+02 4.393E+02 5.731E+02 5.439E+02
      3.231E+02 1.088E+01 8.731E+02 1.925E+01 1.073E+03 2.301E+01 1.273E+03 2.761E+01

niren 2576      n      5 8.230E+03 1.523E+03 2.900E+05
      3      3 4.393E+02 9.205E+00
      2.731E+02 4.000E+02 7.731E+02 5.230E+02 1.523E+03 9.414E+02
      2.731E+02 1.004E+01 5.731E+02 1.423E+01 1.523E+03 3.012E+01

nim10 2577      n      5 8.000E+03 1.623E+03 2.900E+05
      2      4 4.602E+02 1.130E+01
      2.731E+02 4.393E+02 5.731E+02 5.439E+02
      3.231E+02 1.130E+01 5.731E+02 1.381E+01 8.731E+02 1.841E+01 1.073E+03 2.176E+01

niudm 2578      n      5 8.050E+03 1.673E+03 2.900E+05
      2      2 4.393E+02 1.088E+01
      2.731E+02 4.000E+02 5.731E+02 4.812E+02
      2.731E+02 1.088E+01 1.199E+03 2.552E+01

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niwsp 2580      n      5 8.200E+03 1.589E+03 2.900E+05
  2      3 4.000E+02 1.130E+01
  2.731E+02 4.000E+02 5.731E+02 4.812E+02
  2.731E+02 1.109E+01 9.731E+02 2.100E+01 1.133E+03 2.761E+01

ni330 2582      n      5 8.850E+03 1.708E+03 2.900E+05
  2      0 4.602E+02 6.067E+01
  2.731E+02 4.310E+02 6.211E+02 5.941E+02

nial1 2584      n      5 8.200E+03 0.000E+00 0.000E+00
  2      2 4.602E+02 1.339E+01
  2.731E+02 4.393E+02 5.731E+02 5.439E+02
  2.982E+02 1.339E+01 5.981E+02 1.841E+01

nial2 2586      n      5 8.250E+03 0.000E+00 0.000E+00
  2      2 4.602E+02 1.339E+01
  2.731E+02 4.393E+02 5.731E+02 5.439E+02
  3.732E+02 1.339E+01 6.731E+02 1.841E+01

nial3 2588      n      5 7.950E+03 0.000E+00 0.000E+00
  2      2 4.602E+02 1.297E+01
  2.731E+02 4.393E+02 5.731E+02 5.439E+02
  3.732E+02 1.297E+01 6.731E+02 1.799E+01

ni995 2590      n      5 8.890E+03 1.708E+03 3.054E+05
  2      6 4.602E+02 6.067E+01
  2.222E+02 4.058E+02 6.281E+02 5.941E+02
  3.732E+02 6.067E+01 4.731E+02 5.858E+01 5.731E+02 5.104E+01 6.731E+02 4.686E+01
  7.731E+02 5.104E+01 8.731E+02 5.690E+01

nidae 2592      n      5 8.800E+03 1.700E+03 2.900E+05
  2      3 4.602E+02 4.812E+01
  2.231E+02 4.000E+02 6.231E+02 5.858E+02
  2.731E+02 4.602E+01 5.731E+02 2.971E+01 1.173E+03 4.937E+01

cohel 2612      n      5 8.846E+03 1.573E+03 2.500E+05
  2      3 3.515E+02 1.464E+01
  4.432E+02 3.515E+02 1.423E+03 5.941E+02
  4.331E+02 1.464E+01 8.731E+02 2.301E+01 1.333E+03 3.264E+01

coh21 2614      n      5 8.300E+03 1.623E+03 2.500E+05
  3      2 4.226E+02 1.300E+01
  2.731E+02 4.000E+02 8.131E+02 5.774E+02 1.473E+03 7.448E+02
  2.731E+02 1.172E+01 8.731E+02 2.029E+01

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

coh2a	2615	n	5	8.300E+03	1.623E+03	2.500E+05			
	3	2		4.226E+02	2.500E+01				
	2.731E+02	4.000E+02	8.131E+02	5.774E+02	1.473E+03	7.448E+02			
	1.048E+03	3.264E+01	1.373E+03	3.598E+01					
coh23	2616	n	5	8.540E+03	1.573E+03	2.500E+05			
	2	5		4.000E+02	1.339E+01				
	2.731E+02	3.975E+02	1.473E+03	7.113E+02					
	2.731E+02	1.300E+01	4.731E+02	1.527E+01	5.731E+02	1.778E+01	7.731E+02	1.904E+01	
	8.731E+02	2.113E+01							
coh25	2618	n	5	9.150E+03	1.603E+03	2.500E+05			
	2	2		3.849E+02	9.205E+00				
	2.731E+02	3.800E+02	1.473E+03	6.485E+02					
	2.731E+02	8.996E+00	1.173E+03	2.636E+01					
coh27	2620	n	5	8.210E+03	1.573E+03	2.500E+05			
	2	4		4.000E+02	1.300E+01				
	2.731E+02	3.975E+02	1.473E+03	7.113E+02					
	2.731E+02	1.088E+01	4.731E+02	1.381E+01	7.731E+02	1.799E+01	8.731E+02	1.966E+01	
coh30	2622	n	5	8.310E+03	1.573E+03	2.500E+05			
	2	2		4.000E+02	1.300E+01				
	2.731E+02	3.975E+02	1.473E+03	7.113E+02					
	2.731E+02	1.172E+01	8.731E+02	2.100E+01					
coh31	2624	n	5	8.610E+03	1.643E+03	2.500E+05			
	2	5		4.000E+02	1.300E+01				
	2.731E+02	3.975E+02	1.473E+03	6.485E+02					
	2.731E+02	1.172E+01	4.731E+02	1.481E+01	5.731E+02	1.736E+01	7.731E+02	1.946E+01	
	8.731E+02	2.176E+01							
coh36	2626	n	5	9.040E+03	1.663E+03	2.500E+05			
	2	2		3.849E+02	9.372E+00				
	2.731E+02	3.800E+02	1.473E+03	6.485E+02					
	2.731E+02	9.205E+00	1.173E+03	2.500E+01					
cojg2	2628	n	5	8.260E+03	1.573E+03	2.500E+05			
	2	2		4.000E+02	1.464E+01				
	2.731E+02	4.000E+02	1.473E+03	7.322E+02					
	3.732E+02	1.464E+01	1.073E+03	2.594E+01					
coj15	2630	n	5	8.000E+03	1.573E+03	2.500E+05			
	2	2		4.000E+02	1.004E+01				
	2.731E+02	3.975E+02	1.473E+03	6.904E+02					
	2.982E+02	1.004E+01	1.173E+03	2.900E+01					

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cok42 2632      n      5 8.400E+03 1.573E+03 2.500E+05
      2      6 4.000E+02 1.300E+01
      2.731E+02 4.268E+02 1.473E+03 7.113E+02
      2.731E+02 1.172E+01 4.731E+02 1.464E+01 5.731E+02 1.700E+01 6.731E+02 1.841E+01
      7.731E+02 1.966E+01 8.731E+02 2.176E+01

comtm 2634      n      5 8.215E+03 1.553E+03 2.720E+05
      2      2 4.351E+02 1.297E+01
      2.731E+02 4.000E+02 1.473E+03 7.113E+02
      3.732E+02 1.297E+01 1.073E+03 2.427E+01

comtl 2636      n      5 8.215E+03 1.553E+03 2.720E+05
      2      2 4.351E+02 1.632E+01
      2.731E+02 4.000E+02 1.473E+03 7.113E+02
      3.732E+02 1.632E+01 8.731E+02 2.469E+01

cos59 2638      n      5 8.350E+03 1.588E+03 2.500E+05
      2      2 4.000E+02 1.297E+01
      2.731E+02 3.975E+02 1.473E+03 7.113E+02
      3.732E+02 1.297E+01 9.731E+02 2.301E+01

cos31 2640      n      5 8.680E+03 1.560E+03 2.500E+05
      2      4 4.000E+02 1.297E+01
      2.731E+02 3.975E+02 1.473E+03 7.113E+02
      2.731E+02 1.300E+01 4.231E+02 1.464E+01 7.731E+02 2.100E+01 9.731E+02 2.301E+01

cov36 2642      n      5 8.600E+03 1.573E+03 2.500E+05
      2      2 4.000E+02 1.300E+01
      2.731E+02 4.000E+02 1.473E+03 7.322E+02
      2.731E+02 1.172E+01 8.731E+02 2.100E+01

cow52 2644      n      5 8.400E+03 1.573E+03 2.500E+05
      2      7 4.000E+02 2.500E+01
      2.731E+02 3.975E+02 1.473E+03 7.113E+02
      3.732E+02 2.500E+01 6.731E+02 2.636E+01 9.731E+02 2.845E+01 1.073E+03 2.971E+01
      1.173E+03 3.159E+01 1.273E+03 3.431E+01 1.373E+03 4.017E+01

cow5c 2645      n      5 8.400E+03 1.573E+03 2.500E+05
      2      3 4.000E+02 1.966E+01
      2.731E+02 3.975E+02 1.473E+03 7.113E+02
      3.732E+02 1.966E+01 9.731E+02 2.259E+01 1.373E+03 2.552E+01

cocrw 2646      n      5 8.440E+03 1.573E+03 2.500E+05
      2      2 4.000E+02 1.300E+01
      2.731E+02 4.000E+02 1.473E+03 7.113E+02
      2.731E+02 1.172E+01 8.731E+02 2.100E+01

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Thermal Property Data
 k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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tial1 2712    n    5 4.500E+03 1.773E+03 3.800E+05
      3      2 5.439E+02 9.623E+00
      2.731E+02 5.230E+02 5.731E+02 6.067E+02 1.773E+03 7.531E+02
      2.731E+02 9.414E+00 6.731E+02 1.381E+01

tial2 2714    n    5 4.500E+03 1.773E+03 3.800E+05
      3      4 5.439E+02 8.000E+00
      2.731E+02 5.230E+02 5.731E+02 6.067E+02 1.773E+03 7.531E+02
      3.732E+02 8.000E+00 5.731E+02 1.151E+01 8.731E+02 1.653E+01 1.173E+03 2.218E+01

tial3 2716    n    5 4.500E+03 1.773E+03 3.800E+05
      3      2 5.439E+02 9.205E+00
      2.731E+02 5.230E+02 5.731E+02 6.067E+02 1.773E+03 7.531E+02
      3.732E+02 9.205E+00 1.173E+03 1.925E+01

tial4 2718    n    5 4.500E+03 1.773E+03 3.800E+05
      3      4 5.439E+02 7.950E+00
      2.731E+02 5.230E+02 5.731E+02 6.067E+02 1.773E+03 7.531E+02
      2.731E+02 7.740E+00 6.731E+02 1.172E+01 8.731E+02 1.485E+01 9.232E+02 1.966E+01

tial5 2720    n    5 4.500E+03 1.773E+03 3.800E+05
      3      2 5.439E+02 8.000E+00
      2.731E+02 5.230E+02 5.731E+02 6.067E+02 1.773E+03 7.531E+02
      2.731E+02 8.159E+00 1.173E+03 2.134E+01

tih40 2722    n    5 4.520E+03 1.773E+03 3.800E+05
      3      3 5.439E+02 7.531E+00
      2.731E+02 5.230E+02 5.731E+02 6.067E+02 1.773E+03 7.531E+02
      2.015E+01 5.021E+00 2.731E+02 7.113E+00 8.231E+02 1.213E+01

tih50 2724    n    5 4.600E+03 1.773E+03 3.800E+05
      3      2 5.230E+02 7.531E+00
      2.731E+02 5.021E+02 5.731E+02 6.067E+02 1.773E+03 7.531E+02
      2.731E+02 7.322E+00 7.731E+02 1.276E+01

tih51 2726    n    5 4.600E+03 1.773E+03 3.800E+05
      3      2 5.230E+02 6.694E+00
      2.731E+02 5.021E+02 5.731E+02 6.067E+02 1.773E+03 7.531E+02
      2.731E+02 6.360E+00 6.731E+02 1.125E+01

tial6 2728    n    5 4.500E+03 1.773E+03 3.800E+05
      3      2 5.230E+02 7.531E+00
      2.731E+02 5.021E+02 5.731E+02 6.067E+02 1.773E+03 7.531E+02
      2.731E+02 7.113E+00 1.173E+03 1.966E+01

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tia17 2730      n      5 4.500E+03 1.773E+03 3.800E+05
      3      3 5.230E+02 8.000E+00
      2.731E+02 5.021E+02 5.731E+02 6.067E+02 1.773E+03 7.531E+02
      3.732E+02 7.950E+00 8.731E+02 1.590E+01 1.173E+03 2.155E+01

tia11 2732      n      5 4.500E+03 1.773E+03 3.800E+05
      3      2 5.230E+02 7.531E+00
      2.731E+02 5.021E+02 5.731E+02 6.067E+02 1.773E+03 7.531E+02
      2.731E+02 7.113E+00 8.731E+02 1.381E+01

ti155 2734      n      5 4.500E+03 1.773E+03 3.800E+05
      3      3 5.439E+02 8.000E+00
      2.731E+02 5.230E+02 5.731E+02 6.067E+02 1.773E+03 7.531E+02
      2.731E+02 7.950E+00 6.731E+02 1.130E+01 8.731E+02 1.464E+01

tia12 2736      n      5 4.480E+03 1.773E+03 3.800E+05
      3      2 5.439E+02 7.113E+00
      2.731E+02 5.230E+02 5.731E+02 6.067E+02 1.773E+03 7.531E+02
      2.731E+02 6.485E+00 7.731E+02 1.318E+01

ti555 2738      n      5 4.600E+03 1.773E+03 3.800E+05
      3      2 5.021E+02 7.950E+00
      2.731E+02 4.812E+02 5.731E+02 5.858E+02 1.773E+03 7.322E+02
      2.731E+02 7.740E+00 8.731E+02 1.360E+01

tia13 2740      n      5 4.450E+03 1.813E+03 3.800E+05
      6      6 5.230E+02 7.113E+00
      2.231E+02 5.021E+02 3.732E+02 5.607E+02 5.731E+02 6.150E+02 7.731E+02 6.694E+02
      9.731E+02 7.908E+02 1.173E+03 9.288E+02
      1.732E+02 5.648E+00 2.731E+02 6.904E+00 4.731E+02 8.996E+00 6.731E+02 1.192E+01
      8.731E+02 1.506E+01 9.731E+02 1.715E+01

tia15 2742      n      5 4.370E+03 1.773E+03 3.800E+05
      3      2 5.439E+02 5.858E+00
      2.731E+02 5.230E+02 5.731E+02 6.067E+02 1.773E+03 7.531E+02
      2.731E+02 5.774E+00 7.731E+02 1.192E+01

ti150 2744      n      5 4.600E+03 1.773E+03 3.800E+05
      8      2 5.439E+02 1.590E+01
      2.731E+02 5.439E+02 3.732E+02 5.523E+02 4.731E+02 5.648E+02 5.731E+02 5.941E+02
      6.731E+02 6.402E+02 7.731E+02 6.904E+02 8.731E+02 7.615E+02 9.731E+02 8.452E+02
      2.731E+02 1.548E+01 9.232E+02 1.700E+01

tia14 2746      n      5 4.600E+03 1.773E+03 3.800E+05
      3      2 5.230E+02 1.632E+01
      2.731E+02 5.021E+02 5.731E+02 6.067E+02 1.773E+03 7.531E+02
      3.732E+02 1.632E+01 8.731E+02 1.632E+01

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Thermal Property Data
 k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

ti140	2748	n	5	4.600E+03	1.773E+03	3.800E+05
3	4	5.230E+02	1.172E+01			
2.731E+02	5.021E+02	5.731E+02	6.067E+02	1.773E+03	7.531E+02	
2.731E+02	1.172E+01	4.731E+02	1.297E+01	6.731E+02	1.464E+01	8.731E+02 1.700E+01
ti100	2750	n	5	4.580E+03	1.773E+03	3.800E+05
3	3	5.230E+02	1.088E+01			
2.731E+02	5.021E+02	5.731E+02	6.067E+02	1.773E+03	7.531E+02	
2.731E+02	1.067E+01	6.731E+02	1.464E+01	8.231E+02	1.695E+01	
tial8	2752	n	5	4.500E+03	1.773E+03	3.800E+05
3	2	5.230E+02	7.531E+00			
2.731E+02	5.021E+02	5.731E+02	6.067E+02	1.773E+03	7.531E+02	
3.732E+02	7.531E+00	1.173E+03	2.176E+01			
tial9	2754	n	5	4.600E+03	1.773E+03	3.800E+05
3	3	5.230E+02	9.205E+00			
2.731E+02	5.021E+02	5.731E+02	6.067E+02	1.773E+03	7.531E+02	
2.731E+02	8.996E+00	6.731E+02	1.360E+01	1.073E+03	2.029E+01	
tih65	2756	n	5	4.680E+03	1.773E+03	3.800E+05
3	2	5.230E+02	7.531E+00			
2.731E+02	5.021E+02	5.731E+02	6.067E+02	1.773E+03	7.531E+02	
2.731E+02	7.322E+00	6.731E+02	1.125E+01			
tih60	2758	n	5	4.650E+03	1.773E+03	3.800E+05
3	2	5.230E+02	7.531E+00			
2.731E+02	5.021E+02	5.731E+02	6.067E+02	1.773E+03	7.531E+02	
2.731E+02	7.113E+00	6.731E+02	1.213E+01			
tih55	2760	n	5	4.760E+03	1.773E+03	3.800E+05
3	2	5.230E+02	7.531E+00			
2.731E+02	5.021E+02	5.731E+02	6.067E+02	1.773E+03	7.531E+02	
2.731E+02	7.113E+00	6.731E+02	1.213E+01			
ti680	2762	n	5	4.840E+03	1.773E+03	3.800E+05
3	2	4.812E+02	7.113E+00			
2.731E+02	4.602E+02	5.731E+02	5.648E+02	1.773E+03	7.113E+02	
2.731E+02	6.904E+00	7.731E+02	1.360E+01			
ti679	2764	n	5	4.840E+03	1.773E+03	3.800E+05
3	2	4.812E+02	6.694E+00			
2.731E+02	4.602E+02	5.731E+02	5.648E+02	1.773E+03	7.113E+02	
2.731E+02	6.485E+00	7.731E+02	1.300E+01			

tiv15 2766 n 5 4.800E+03 1.773E+03 3.800E+05
 9 4 5.272E+02 8.000E+00
 0.000E+00 0.000E+00 3.315E+01 4.000E+01 7.315E+01 2.301E+02 1.232E+02 3.682E+02
 1.732E+02 4.519E+02 2.982E+02 5.272E+02 3.732E+02 5.607E+02 4.731E+02 5.899E+02
 9.232E+02 6.611E+02
 1.732E+02 6.276E+00 4.731E+02 1.192E+01 6.731E+02 1.548E+01 9.232E+02 1.966E+01

tiv14 2768 n 5 5.100E+03 1.773E+03 3.800E+05
 9 2 5.272E+02 7.950E+00
 0.000E+00 0.000E+00 3.315E+01 4.000E+01 7.315E+01 2.301E+02 1.232E+02 3.682E+02
 1.732E+02 4.519E+02 2.231E+02 4.937E+02 2.982E+02 5.272E+02 3.732E+02 5.481E+02
 9.232E+02 6.862E+02
 2.731E+02 7.531E+00 9.731E+02 2.364E+01

tia10 2770 n 5 4.600E+03 1.773E+03 3.800E+05
 3 6 5.230E+02 9.205E+00
 2.731E+02 5.021E+02 5.731E+02 6.067E+02 1.773E+03 7.531E+02
 4.731E+02 9.958E+00 5.231E+02 1.276E+01 6.731E+02 1.423E+01 8.731E+02 1.700E+01
 9.731E+02 1.841E+01 1.073E+03 1.987E+01

gci01 3001 n 5 7.190E+03 1.473E+03 2.720E+05
 3 3 4.602E+02 5.021E+01
 2.731E+02 4.435E+02 3.732E+02 4.937E+02 6.731E+02 6.360E+02
 3.981E+02 5.104E+01 5.731E+02 4.268E+01 6.981E+02 3.975E+01

gci02 3002 n 5 7.190E+03 1.473E+03 2.720E+05
 3 3 4.602E+02 7.113E+01
 2.731E+02 4.435E+02 3.732E+02 4.937E+02 6.731E+02 6.360E+02
 3.981E+02 7.196E+01 5.731E+02 5.356E+01 6.981E+02 4.435E+01

gci03 3003 n 5 7.190E+03 1.473E+03 2.720E+05
 4 5 4.602E+02 4.000E+01
 2.731E+02 4.435E+02 3.732E+02 4.686E+02 6.731E+02 6.360E+02 9.731E+02 7.950E+02
 3.732E+02 4.393E+01 5.731E+02 3.849E+01 7.731E+02 3.264E+01 9.731E+02 2.720E+01
 1.173E+03 2.427E+01

gci04 3004 n 5 7.190E+03 1.473E+03 2.720E+05
 4 5 4.602E+02 5.021E+01
 2.731E+02 4.435E+02 3.732E+02 4.686E+02 6.731E+02 6.360E+02 9.731E+02 7.950E+02
 3.732E+02 5.021E+01 5.731E+02 4.310E+01 7.731E+02 3.682E+01 9.731E+02 3.300E+01
 1.173E+03 2.594E+01

gci05 3005 n 5 7.190E+03 1.473E+03 2.720E+05
 4 5 4.602E+02 5.858E+01
 2.731E+02 4.435E+02 3.732E+02 4.937E+02 6.731E+02 6.360E+02 9.731E+02 7.950E+02
 2.731E+02 5.858E+01 5.731E+02 4.602E+01 6.731E+02 4.435E+01 9.731E+02 3.682E+01
 1.173E+03 3.096E+01

Thermal Property Data
 k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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gci06 3006      n      5 7.190E+03 1.473E+03 2.720E+05
  4      5 4.602E+02 6.694E+01
  2.731E+02 4.435E+02 3.732E+02 4.686E+02 6.731E+02 6.360E+02 9.731E+02 7.950E+02
  3.732E+02 6.694E+01 5.731E+02 5.356E+01 7.731E+02 4.100E+01 9.731E+02 3.515E+01
  1.173E+03 2.176E+01

gc107 3007      n      5 7.190E+03 1.473E+03 2.720E+05
  4      5 4.602E+02 7.950E+01
  2.731E+02 4.435E+02 3.732E+02 4.686E+02 6.731E+02 6.360E+02 9.731E+02 7.950E+02
  3.732E+02 8.033E+01 5.731E+02 5.774E+01 7.731E+02 4.519E+01 9.731E+02 3.800E+01
  1.173E+03 3.264E+01

ind01 3021      n      5 7.430E+03 1.393E+03 2.720E+05
  4      3 4.602E+02 3.300E+01
  2.731E+02 4.435E+02 3.732E+02 4.686E+02 6.731E+02 6.360E+02 9.731E+02 7.950E+02
  2.731E+02 3.305E+01 3.732E+02 3.096E+01 9.731E+02 1.841E+01

ind02 3022      n      5 7.200E+03 1.423E+03 2.720E+05
  0      0 4.602E+02 3.305E+01

ind03 3023      n      5 7.200E+03 1.423E+03 2.720E+05
  0      0 4.602E+02 2.887E+01

incfb 3026      n      5 7.200E+03 1.393E+03 2.720E+05
  4      3 4.602E+02 3.800E+01
  2.731E+02 4.435E+02 3.732E+02 4.686E+02 6.731E+02 6.360E+02 9.731E+02 7.950E+02
  3.732E+02 3.933E+01 7.731E+02 2.971E+01 1.273E+03 2.594E+01

incpb 3027      n      5 7.200E+03 1.393E+03 2.720E+05
  4      2 4.602E+02 3.800E+01
  2.731E+02 4.435E+02 3.732E+02 4.686E+02 6.731E+02 6.360E+02 9.731E+02 7.950E+02
  3.732E+02 3.891E+01 1.173E+03 1.883E+01

kovar 3031      n      5 7.700E+03 1.453E+03 2.720E+05
  7      2 4.602E+02 1.423E+01
  2.731E+02 4.435E+02 3.732E+02 4.686E+02 6.731E+02 6.360E+02 1.036E+03 8.033E+02
  1.041E+03 6.895E+03 1.046E+03 5.858E+02 1.473E+03 6.276E+02
  3.231E+02 1.423E+01 1.173E+03 2.100E+01

innir 3032      n      5 7.300E+03 1.503E+03 2.720E+05
  7      0 4.602E+02 3.975E+01
  2.731E+02 4.435E+02 3.732E+02 4.686E+02 6.731E+02 6.360E+02 1.036E+03 8.033E+02
  1.041E+03 6.895E+03 1.046E+03 5.858E+02 1.473E+03 6.276E+02

innr3 3033      n      5 7.400E+03 1.503E+03 2.720E+05
  0      0 4.602E+02 3.933E+01

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innr4 3034      n      5  7.400E+03  1.473E+03  2.720E+05
      0      0  5.021E+02  3.800E+01

innrd 3035      n      5  7.410E+03  1.503E+03  2.720E+05
      0      0  4.602E+02  1.339E+01

innml 3036      n      5  7.200E+03  0.000E+00  0.000E+00
      0      0  5.272E+02  5.104E+01

inwrt 3037      n      5  7.700E+03  1.773E+03  2.720E+05
      7      3  4.602E+02  5.358E+01
      2.731E+02  4.435E+02  3.732E+02  4.686E+02  6.731E+02  6.360E+02  1.036E+03  8.033E+02
      1.041E+03  6.895E+03  1.046E+03  5.858E+02  1.473E+03  6.276E+02
      2.731E+02  6.025E+01  3.732E+02  5.648E+01  7.731E+02  3.975E+01

innit 3041      n      5  7.200E+03  1.448E+03  2.720E+05
      0      0  4.602E+02  4.602E+01

stall 3101      n      5  7.750E+03  1.723E+03  2.720E+05
      9      6  5.021E+02  4.000E+01
      2.551E+02  5.021E+02  4.771E+02  5.188E+02  7.001E+02  6.192E+02  9.211E+02  7.531E+02
      1.036E+03  8.000E+02  1.041E+03  6.895E+03  1.046E+03  6.276E+02  1.144E+03  5.858E+02
      1.367E+03  6.067E+02
      2.551E+02  4.310E+01  4.771E+02  4.226E+01  7.001E+02  3.862E+01  9.211E+02  3.222E+01
      1.061E+03  2.594E+01  1.144E+03  2.699E+01

stalc 3106      n      5  7.830E+03  1.723E+03  2.720E+05
      0      0  4.602E+02  4.602E+01

stcfc 3111      n      5  7.830E+03  1.773E+03  2.720E+05
      7      2  4.602E+02  4.602E+01
      2.731E+02  4.477E+02  6.731E+02  6.067E+02  7.731E+02  6.778E+02  9.951E+02  9.205E+02
      1.000E+03  7.071E+03  1.005E+03  6.694E+02  1.273E+03  6.485E+02
      2.911E+02  4.561E+01  3.732E+02  4.477E+01

stcar 3116      n      5  7.860E+03  1.809E+03  2.720E+05
      10     4  4.602E+02  7.113E+01
      2.731E+02  4.393E+02  3.481E+02  5.021E+02  4.731E+02  5.648E+02  6.731E+02  6.276E+02
      8.731E+02  7.113E+02  9.731E+02  8.000E+02  1.036E+03  8.000E+02  1.041E+03  6.895E+03
      1.046E+03  7.029E+02  1.223E+03  6.694E+02
      2.001E+02  8.159E+01  2.982E+02  7.113E+01  1.073E+03  2.900E+01  1.573E+03  3.138E+01

sthsp 3121      n      5  8.200E+03  1.773E+03  2.720E+05
      0      0  4.602E+02  3.556E+01

stst2 3126      n      5  7.700E+03  1.723E+03  2.720E+05
      0      0  5.021E+02  1.632E+01

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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stst3 3131      n      5 8.000E+03 1.673E+03 2.720E+05
      3      3 5.021E+02 1.464E+01
      2.731E+02 4.812E+02 6.731E+02 5.732E+02 1.573E+03 7.113E+02
      2.731E+02 1.381E+01 7.731E+02 2.134E+01 1.173E+03 2.803E+01

st304 3133      n      5 7.920E+03 1.673E+03 2.720E+05
      2      6 5.021E+02 1.464E+01
      2.731E+02 5.021E+02 6.731E+02 5.648E+02
      7.315E+01 6.904E+00 1.732E+02 1.088E+01 2.731E+02 1.339E+01 3.732E+02 1.632E+01
      7.731E+02 2.176E+01 9.731E+02 2.594E+01

st347 3135      n      5 7.920E+03 1.673E+03 2.720E+05
      7     12 4.602E+02 1.464E+01
      0.000E+00 0.000E+00 1.315E+01 4.000E+01 1.232E+02 3.300E+02 2.731E+02 4.477E+02
      4.731E+02 4.812E+02 6.731E+02 5.565E+02 1.573E+03 7.113E+02
      0.000E+00 0.000E+00 8.150E+00 5.439E-01 1.315E+01 9.205E-01 2.315E+01 2.176E+00
      4.315E+01 5.021E+00 7.315E+01 7.531E+00 1.732E+02 1.300E+01 3.732E+02 1.464E+01
      4.731E+02 1.590E+01 1.173E+03 2.636E+01 1.373E+03 2.720E+01 1.573E+03 2.900E+01

stst4 3141      n      5 7.750E+03 1.773E+03 2.720E+05
      3      2 4.602E+02 2.509E+01
      2.731E+02 4.000E+02 7.731E+02 7.113E+02 9.731E+02 9.623E+02
      2.731E+02 2.385E+01 7.731E+02 2.887E+01

st34a 3146      n      5 7.750E+03 1.743E+03 2.720E+05
      2      2 4.602E+02 1.700E+01
      2.731E+02 4.602E+02 7.731E+02 7.113E+02
      2.731E+02 1.700E+01 1.223E+03 2.900E+01

st34b 3151      n      5 7.600E+03 1.763E+03 2.720E+05
      5      2 4.602E+02 2.190E+01
      2.731E+02 4.602E+02 8.932E+02 7.322E+02 8.981E+02 6.904E+03 9.031E+02 6.694E+02
      1.473E+03 7.531E+02
      2.731E+02 2.259E+01 1.373E+03 3.933E+01

st345 3161      n      5 7.890E+03 1.673E+03 2.720E+05
      2      2 4.602E+02 3.800E+01
      2.731E+02 4.393E+02 6.731E+02 6.360E+02
      3.732E+02 3.682E+01 7.731E+02 3.389E+01

stph4 3171      n      5 7.750E+03 1.773E+03 2.720E+05
      2      3 3.300E+02 1.464E+01
      3.732E+02 3.300E+02 9.731E+02 9.205E+02
      3.732E+02 1.464E+01 8.731E+02 2.259E+01 1.673E+03 3.180E+01

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stph7 3176      n      5  7.600E+03  1.773E+03  2.720E+05
  10      3  3.300E+02  1.700E+01
  3.732E+02  3.389E+02  6.481E+02  3.724E+02  6.981E+02  3.096E+02  7.531E+02  3.556E+02
  8.182E+02  5.314E+02  8.681E+02  6.025E+02  9.281E+02  5.523E+02  9.731E+02  4.853E+02
  1.073E+03  4.100E+02  1.373E+03  4.268E+02
  3.732E+02  1.700E+01  7.731E+02  2.176E+01  1.323E+03  3.305E+01

stuh8 3181      n      5  7.840E+03  1.773E+03  2.720E+05
  0      0  4.477E+02  5.774E+01

st199 3186      n      5  7.800E+03  0.000E+00  0.000E+00
  0      6  5.021E+02  1.339E+01
  2.931E+02  1.351E+01  3.732E+02  1.452E+01  4.731E+02  1.569E+01  5.731E+02  1.686E+01
  7.731E+02  1.941E+01  9.131E+02  2.117E+01

ssc01 3201      n      5  8.150E+03  1.548E+03  2.720E+05
  0      0  4.602E+02  1.339E+01

ssc02 3202      n      5  8.030E+03  1.623E+03  2.720E+05
  0      0  4.602E+02  1.548E+01

ssc03 3203      n      5  7.960E+03  1.598E+03  2.720E+05
  0      0  4.602E+02  1.966E+01

ssc04 3204      n      5  8.040E+03  1.733E+03  2.720E+05
  0      0  4.602E+02  2.100E+01

ssc05 3205      n      5  7.750E+03  1.673E+03  2.720E+05
  0      0  5.021E+02  2.301E+01

ssc06 3206      n      5  7.720E+03  1.793E+03  2.720E+05
  0      0  5.021E+02  2.900E+01

ssc07 3207      n      5  7.550E+03  1.753E+03  2.720E+05
  0      0  5.021E+02  3.096E+01

ssc08 3208      n      5  7.610E+03  1.773E+03  2.720E+05
  0      0  4.602E+02  2.500E+01

ssc09 3209      n      5  7.530E+03  1.773E+03  2.720E+05
  0      0  5.021E+02  2.176E+01

ssc10 3210      n      5  7.730E+03  1.643E+03  2.720E+05
  0      0  5.021E+02  1.883E+01

ssc11 3211      n      5  7.680E+03  1.733E+03  2.720E+05
  0      0  5.858E+02  1.715E+01

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

ssc12 3212 n 5 7.750E+03 1.673E+03 4.720E+05
0 0 5.021E+02 1.611E+01

ssc13 3213 n 5 7.730E+03 1.673E+03 2.720E+05
0 0 5.021E+02 1.423E+01

cnisa 3312 n 5 8.000E+03 1.573E+03 0.000E+00
0 0 4.393E+02 2.343E+01

be96a 3501 n 5 1.840E+03 1.473E+03 1.300E+06
9 7 1.799E+03 1.423E+02
0.000E+00 0.000E+00 7.315E+01 8.000E+01 9.815E+01 1.883E+02 2.231E+02 1.423E+03
2.731E+02 1.715E+03 3.732E+02 2.134E+03 4.731E+02 2.364E+03 6.731E+02 2.699E+03
1.473E+03 3.515E+03
3.231E+02 1.423E+02 3.732E+02 1.297E+02 4.731E+02 1.130E+02 5.731E+02 1.025E+02
6.731E+02 9.623E+01 1.273E+03 5.858E+01 1.473E+03 5.021E+01

be96h 3502 n 5 1.840E+03 1.473E+03 1.300E+06
9 8 1.799E+03 1.757E+02
0.000E+00 0.000E+00 7.315E+01 8.000E+01 9.815E+01 1.883E+02 2.231E+02 1.423E+03
2.731E+02 1.715E+03 3.732E+02 2.134E+03 4.731E+02 2.364E+03 6.731E+02 2.699E+03
1.473E+03 3.515E+03
3.231E+02 1.757E+02 3.732E+02 1.590E+02 4.731E+02 1.339E+02 5.731E+02 1.192E+02
6.731E+02 1.109E+02 9.731E+02 8.786E+01 1.273E+03 5.858E+01 1.473E+03 5.021E+01

be98a 3503 n 5 1.823E+03 1.473E+03 1.300E+06
9 6 1.799E+03 1.339E+02
0.000E+00 0.000E+00 7.315E+01 8.000E+01 9.815E+01 1.883E+02 2.231E+02 1.423E+03
2.731E+02 1.715E+03 3.732E+02 2.134E+03 4.731E+02 2.364E+03 6.731E+02 2.699E+03
1.473E+03 3.515E+03
3.231E+02 1.339E+02 3.732E+02 1.234E+02 4.731E+02 1.130E+02 5.731E+02 1.046E+02
1.273E+03 5.858E+01 1.473E+03 5.021E+01

be98h 3504 n 5 1.823E+03 1.473E+03 1.300E+06
9 7 1.799E+03 1.590E+02
0.000E+00 0.000E+00 7.315E+01 8.000E+01 9.815E+01 1.883E+02 2.231E+02 1.423E+03
2.731E+02 1.715E+03 3.732E+02 2.134E+03 4.731E+02 2.364E+03 6.731E+02 2.699E+03
1.473E+03 3.515E+03
3.231E+02 1.590E+02 3.732E+02 1.423E+02 4.731E+02 1.234E+02 5.731E+02 1.130E+02
6.731E+02 1.025E+02 1.273E+03 5.858E+01 1.473E+03 5.021E+01

be995 3505 n 5 1.840E+03 1.473E+03 1.300E+06
11 6 1.841E+03 1.548E+02
0.000E+00 0.000E+00 7.315E+01 8.000E+01 9.815E+01 1.883E+02 1.732E+02 8.996E+02
2.231E+02 1.339E+03 2.731E+02 1.695E+03 3.231E+02 1.987E+03 3.732E+02 2.134E+03
4.731E+02 2.364E+03 6.731E+02 2.699E+03 1.473E+03 3.515E+03
3.231E+02 1.548E+02 3.732E+02 1.381E+02 4.731E+02 1.213E+02 6.731E+02 1.004E+02
1.273E+03 5.858E+01 1.473E+03 5.021E+01

k [W/m K] *c* [J/kg K] *T* [K] λ [J/kg] ρ [kg/m³]

Thermal Property Data

pbant 3601 n 5 1.096E+04 5.631E+02 2.385E+04
0 0 1.339E+02 2.971E+01

pbsbh 3602 n 5 1.070E+04 5.631E+02 2.385E+04
0 0 1.339E+02 2.699E+01

sold1 3611 n 5 8.690E+03 4.581E+02 4.000E+04
0 0 2.385E+02 5.690E+01

sold2 3612 n 5 8.500E+03 4.522E+02 6.485E+04
4 0 1.966E+02 5.021E+01
2.982E+02 1.975E+02 4.551E+02 1.975E+02 4.552E+02 2.021E+02 2.016E+03 2.021E+02

sold4 3613 n 5 8.890E+03 4.531E+02 5.690E+04
0 0 2.134E+02 4.602E+01

sold3 3614 n 5 9.200E+03 4.591E+02 4.853E+04
0 0 2.301E+02 4.728E+01

moati 3671 n 5 1.020E+04 2.883E+03 2.720E+05
9 3 2.552E+02 1.172E+02
3.732E+02 2.678E+02 7.731E+02 2.761E+02 9.731E+02 2.824E+02 1.173E+03 2.900E+02
1.473E+03 3.138E+02 1.773E+03 3.452E+02 2.073E+03 3.807E+02 2.273E+03 4.100E+02
2.673E+03 4.726E+02
2.931E+02 1.180E+02 1.163E+03 1.067E+02 2.673E+03 6.694E+01

moafe 3672 n 5 1.020E+04 2.873E+03 2.720E+05
4 3 2.761E+02 1.381E+01
2.731E+02 2.761E+02 7.731E+02 2.385E+02 1.473E+03 3.138E+02 2.873E+03 5.523E+02
2.731E+02 1.381E+02 1.073E+03 1.172E+02 2.773E+03 8.786E+01

mow30 3673 n 5 9.940E+03 2.873E+03 2.500E+05
7 4 2.008E+02 1.230E+02
4.731E+02 2.008E+02 6.731E+02 2.155E+02 1.073E+03 2.489E+02 1.473E+03 2.900E+02
1.973E+03 3.598E+02 2.473E+03 4.372E+02 2.873E+03 5.104E+02
3.732E+02 1.230E+02 1.173E+03 8.117E+01 2.273E+03 4.393E+01 2.773E+03 3.849E+01

nbtaw 3681 n 5 1.070E+04 2.673E+03 2.301E+05
2 2 2.008E+02 4.477E+01
2.731E+02 2.008E+02 2.673E+03 3.515E+02
2.731E+02 4.477E+01 2.573E+03 6.694E+01

nbtiz 3682 n 5 7.770E+03 2.673E+03 2.720E+05
4 2 2.552E+02 2.900E+01
2.731E+02 2.531E+02 1.173E+03 3.414E+02 1.773E+03 4.142E+02 2.573E+03 5.188E+02
2.731E+02 2.900E+01 2.573E+03 5.648E+01

Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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nbtas 3683      n      5  9.000E+03  2.673E+03  2.500E+05
  2      4  2.500E+02  4.477E+01
  2.731E+02  2.500E+02  2.673E+03  3.800E+02
  2.731E+02  4.477E+01  5.731E+02  5.983E+01  7.731E+02  6.694E+01  1.173E+03  7.908E+01

nbwmo 3684      n      5  9.600E+03  2.673E+03  2.500E+05
  6      3  2.469E+02  5.021E+01
  2.731E+02  2.469E+02  9.731E+02  2.678E+02  1.473E+03  3.096E+02  1.873E+03  3.598E+02
  2.273E+03  4.226E+02  2.673E+03  4.979E+02
  2.731E+02  5.021E+01  1.173E+03  6.234E+01  2.573E+03  7.699E+01

pustd 3701      n      5  1.575E+04  8.631E+02  8.786E+03
  9      4  1.339E+02  8.000E+00
  1.732E+02  1.213E+02  2.731E+02  1.300E+02  3.732E+02  1.339E+02  5.731E+02  1.548E+02
  7.731E+02  1.757E+02  8.231E+02  2.887E+02  8.731E+02  1.506E+02  9.232E+02  4.100E+02
  9.731E+02  3.800E+02
  1.732E+02  5.439E+00  2.731E+02  6.694E+00  3.732E+02  8.000E+00  8.731E+02  1.925E+01

silva 3751      n      5  1.050E+04  1.153E+03  1.046E+05
  0      0  2.500E+02  3.598E+02

talow 3781      n      5  1.696E+04  3.348E+03  1.715E+05
  5      3  1.300E+02  5.439E+01
  5.231E+02  1.339E+02  1.273E+03  1.757E+02  1.773E+03  2.008E+02  2.273E+03  2.197E+02
  2.873E+03  2.364E+02
  4.231E+02  5.356E+01  1.773E+03  6.987E+01  2.873E+03  7.950E+01

tanbl 3782      n      5  1.650E+04  3.173E+03  1.700E+05
  4      4  1.381E+02  4.519E+01
  2.731E+02  1.381E+02  4.731E+02  1.464E+02  8.731E+02  1.527E+02  3.173E+03  1.799E+02
  2.731E+02  4.498E+01  5.731E+02  4.812E+01  8.731E+02  5.439E+01  1.273E+03  6.694E+01

tacuz 3783      n      5  1.666E+04  3.173E+03  1.700E+05
  4      4  1.381E+02  4.000E+01
  2.731E+02  1.381E+02  1.273E+03  1.423E+02  2.273E+03  1.757E+02  3.173E+03  2.176E+02
  2.731E+02  4.000E+01  1.273E+03  5.146E+01  2.073E+03  6.150E+01  2.673E+03  6.569E+01

tanbv 3784      n      5  1.155E+04  2.473E+03  2.100E+05
  5      4  1.130E+02  2.720E+01
  2.731E+02  1.130E+02  8.731E+02  2.720E+02  1.273E+03  4.058E+02  1.773E+03  5.858E+02
  2.473E+03  8.912E+02
  2.731E+02  2.720E+01  1.273E+03  4.602E+01  1.873E+03  5.565E+01  2.473E+03  6.067E+01

tawhf 3785      n      5  1.695E+04  3.256E+03  1.700E+05
  4      3  9.205E+01  4.058E+01
  2.731E+02  9.205E+01  1.073E+03  1.297E+02  1.773E+03  1.700E+02  2.773E+03  2.343E+02
  2.731E+02  4.058E+01  2.273E+03  8.703E+01  2.773E+03  9.372E+01

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k [W/m K] *c* [J/kg K] *T* [K] λ [J/kg] ρ [kg/m³]

Thermal Property Data

w25re 3801 n 5 1.670E+04 3.573E+03 1.841E+05
2 2 1.339E+02 6.485E+01
2.982E+02 1.339E+02 2.673E+03 2.100E+02
1.573E+03 6.485E+01 2.573E+03 6.276E+01

wnicu 3802 n 5 1.670E+04 3.273E+03 1.883E+05
2 3 1.339E+02 7.740E+01
2.731E+02 1.339E+02 3.273E+03 1.883E+02
2.731E+02 7.740E+01 8.731E+02 7.322E+01 1.173E+03 7.280E+01

mulby 3831 n 5 1.650E+04 1.483E+03 6.276E+04
8 5 1.464E+02 1.046E+01
2.982E+02 1.443E+02 4.731E+02 1.611E+02 5.731E+02 1.700E+02 9.411E+02 2.075E+02
9.412E+02 1.862E+02 1.048E+03 1.862E+02 1.048E+03 1.665E+02 1.273E+03 1.665E+02
2.982E+02 1.088E+01 3.732E+02 1.381E+01 5.731E+02 2.134E+01 7.232E+02 2.636E+01
1.173E+03 4.000E+01

u10mo 3832 n 5 1.725E+04 1.523E+03 6.276E+04
2 3 1.339E+02 1.464E+01
3.131E+02 1.339E+02 9.731E+02 1.799E+02
2.731E+02 1.172E+01 6.731E+02 2.343E+01 1.073E+03 3.800E+01

u18zr 3833 n 5 1.410E+04 1.523E+03 8.000E+04
2 4 1.700E+02 1.088E+01
2.731E+02 1.700E+02 9.232E+02 2.500E+02
2.982E+02 1.088E+01 5.731E+02 1.700E+01 7.731E+02 2.176E+01 1.173E+03 3.389E+01

u04nb 3834 n 5 1.770E+04 1.523E+03 6.276E+04
2 2 1.300E+02 2.100E+01
2.731E+02 1.300E+02 9.232E+02 2.100E+02
3.831E+02 2.280E+01 6.231E+02 2.720E+01

ucreu 3835 n 5 1.850E+04 1.373E+03 6.276E+04
3 4 1.046E+02 2.845E+01
7.315E+01 5.021E+01 2.731E+02 1.046E+02 7.731E+02 2.427E+02
2.731E+02 2.845E+01 5.731E+02 3.264E+01 8.731E+02 3.933E+01 1.173E+03 4.728E+01

u97fs 3836 n 5 1.830E+04 1.373E+03 6.276E+04
2 2 1.300E+02 2.134E+01
2.731E+02 1.300E+02 9.731E+02 1.883E+02
3.732E+02 2.134E+01 9.731E+02 4.017E+01

u90fs 3837 n 5 1.720E+04 1.373E+03 6.276E+04
2 2 1.339E+02 1.506E+01
2.731E+02 1.339E+02 9.731E+02 1.799E+02
3.732E+02 1.506E+01 9.731E+02 3.012E+01

Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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ufs3r 3838      n      5 1.760E+04 1.373E+03 6.276E+04
  3      3 1.300E+02 2.008E+01
  2.731E+02 1.300E+02 6.731E+02 1.700E+02 8.731E+02 2.500E+02
  3.732E-02 2.008E+01 8.731E+02 3.300E+01 9.731E+02 3.800E+01

uzr02 3339      n      5 1.860E+04 1.523E+03 8.000E+04
  3      4 1.172E+02 2.259E+01
  2.731E-02 1.172E+02 6.231E+02 1.464E+02 9.332E+02 2.008E+02
  2.982E-02 2.259E+01 5.731E+02 2.803E+01 7.731E+02 3.389E+01 1.073E+03 4.393E+01

uzr05 3840      n      5 1.750E+04 1.523E+03 8.000E+04
  2      4 1.300E+02 1.883E+01
  2.731E+02 1.300E+02 9.232E+02 2.100E+02
  2.982E-02 1.883E+01 5.731E+02 2.500E+01 7.731E+02 3.054E+01 1.173E+03 4.393E+01

zinc2 3861      n      5 7.180E+03 6.951E+02 1.004E+05
  0      0 4.017E+02 1.046E+02

zinc1 3862      n      5 7.140E+03 6.921E+02 1.004E+05
  0      0 3.933E+02 1.075E+02

zinc3 3863      n      5 6.600E+03 6.597E+02 1.004E+05
  0      0 4.000E+02 1.130E+02

zinc4 3864      n      5 6.700E+03 6.591E+02 1.004E+05
  0      0 4.000E+02 1.088E+02

zirca 3881      n      5 6.560E+03 2.083E+03 2.301E+05
  0      0 2.900E+02 1.381E+01

zr32i 3882      n      5 6.460E+03 2.073E+03 2.100E+05
  2      2 2.845E+02 7.950E+00
  2.731E+02 2.845E+02 7.731E+02 3.180E+02
  2.731E+02 7.950E+00 8.731E+02 1.883E+01

dan35 3901      n      5 6.430E+03 0.000E+00 0.000E+00
  2      2 4.000E+02 7.113E+00
  2.731E+02 4.100E+02 1.173E+03 4.812E+02
  2.731E+02 7.280E+00 1.073E+03 2.301E+01

aloxd 4012      n      5 3.980E+03 2.318E+03 5.523E+05
  10     10 7.782E+02 3.849E+01
  0.000E+00 0.000E+00 7.315E+01 4.000E+01 2.231E+02 5.858E+02 2.731E+02 7.280E+02
  3.732E+02 9.288E+02 4.731E+02 1.025E+03 5.731E+02 1.109E+03 7.731E+02 1.172E+03
  1.173E+03 1.300E+03 1.973E+03 1.305E+03
  2.731E+02 4.000E+01 3.732E+02 2.887E+01 4.731E+02 2.218E+01 5.731E+02 1.757E+01
  6.731E+02 1.381E+01 7.731E+02 1.172E+01 9.731E+02 9.205E+00 1.173E+03 7.531E+00
  1.473E+03 8.000E+00 1.973E+03 1.046E+01

```

```
aloxp 4014      n      5 2.200E+03 2.318E+03 5.523E+05
  10    10 7.782E+02 1.757E+01
  0.000E+00 0.000E+00 7.315E+01 4.000E+01 2.231E+02 5.858E+02 2.731E+02 7.280E+02
  3.732E+02 9.288E+02 4.731E+02 1.025E+03 5.731E+02 1.109E+03 7.731E+02 1.172E+03
  1.173E+03 1.300E+03 1.973E+03 1.305E+03
  2.731E+02 1.925E+01 3.732E+02 1.339E+01 4.731E+02 1.004E+01 5.731E+02 7.950E+00
  6.731E+02 6.276E+00 7.731E+02 5.439E+00 9.731E+02 4.000E+00 1.173E+03 3.300E+00
  1.473E+03 3.800E+00 1.973E+03 4.602E+00
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```
aloxs 4016      n      5 3.980E+03 2.318E+03 5.523E+05
  10    11 7.782E+02 5.021E+01
  0.000E+00 0.000E+00 7.315E+01 4.000E+01 2.231E+02 5.858E+02 2.731E+02 7.280E+02
  3.732E+02 9.288E+02 4.731E+02 1.025E+03 5.731E+02 1.109E+03 7.731E+02 1.172E+03
  1.173E+03 1.300E+03 1.973E+03 1.305E+03
  3.231E+02 4.393E+01 3.732E+02 3.682E+01 4.731E+02 2.720E+01 5.731E+02 2.100E+01
  6.731E+02 1.700E+01 7.731E+02 1.300E+01 1.073E+03 7.531E+00 1.273E+03 6.276E+00
  1.473E+03 5.439E+00 1.673E+03 5.439E+00 1.873E+03 6.694E+00
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```
aloxf 4018      n      5 5.000E+02 2.318E+03 5.523E+05
  10      3 7.782E+02 4.000E-02
  0.000E+00 0.000E+00 7.315E+01 4.000E+01 2.231E+02 5.858E+02 2.731E+02 7.280E+02
  3.732E+02 9.288E+02 4.731E+02 1.025E+03 5.731E+02 1.109E+03 7.731E+02 1.172E+03
  1.173E+03 1.300E+03 1.973E+03 1.305E+03
  6.231E+02 4.000E-02 1.073E+03 1.757E-01 1.273E+03 3.138E-01
```

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aloxl 4019      n      5 1.900E+03 2.318E+03 5.523E+05
  10      5 7.782E+02 5.230E+00
  0.000E+00 0.000E+00 7.315E+01 4.000E+01 2.231E+02 5.858E+02 2.731E+02 7.280E+02
  3.732E+02 9.288E+02 4.731E+02 1.025E+03 5.731E+02 1.109E+03 7.731E+02 1.172E+03
  1.173E+03 1.300E+03 1.973E+03 1.305E+03
  4.231E+02 5.230E+00 5.731E+02 3.800E+00 7.731E+02 2.900E+00 1.073E+03 2.176E+00
  1.273E+03 2.008E+00
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beo 4022      n      5 2.900E+03 2.823E+03 2.305E+06
  12    11 1.046E+03 2.552E+02
  0.000E+00 0.000E+00 7.315E+01 4.000E+01 1.732E+02 5.021E+02 2.731E+02 9.414E+02
  3.732E+02 1.289E+03 4.731E+02 1.506E+03 5.731E+02 1.653E+03 6.731E+02 1.766E+03
  8.731E+02 1.908E+03 1.073E+03 2.029E+03 1.773E+03 2.197E+03 2.823E+03 2.573E+03
  2.731E+02 2.678E+02 3.732E+02 1.925E+02 4.731E+02 1.464E+02 6.731E+02 8.786E+01
  8.731E+02 5.858E+01 1.073E+03 3.975E+01 1.273E+03 2.900E+01 1.473E+03 2.218E+01
  1.773E+03 1.757E+01 1.973E+03 1.548E+01 2.373E+03 1.506E+01
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Thermal Property Data

 k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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beoxm 4024      n      5 2.300E+03 2.823E+03 2.305E+06
  12      11 1.046E+03 1.381E+02
0.000E+00 0.000E+00 7.315E+01 4.000E+01 1.732E+02 5.021E+02 2.731E+02 9.414E+02
3.732E+02 1.289E+03 4.731E+02 1.506E+03 5.731E+02 1.653E+03 6.731E+02 1.766E+03
8.731E+02 1.908E+03 1.073E+03 2.029E+03 1.773E+03 2.197E+03 2.823E+03 2.573E+03
2.731E+02 1.464E+02 3.732E+02 1.004E+02 4.731E+02 7.364E+01 6.731E+02 4.728E+01
8.731E+02 3.389E+01 1.073E+03 2.720E+01 1.273E+03 2.301E+01 1.473E+03 2.100E+01
1.773E+03 1.700E+01 1.973E+03 1.464E+01 2.373E+03 1.464E+01

cao 4026      n      5 3.030E+03 2.873E+03 9.205E+05
  11      5 7.531E+02 1.381E+01
0.000E+00 0.000E+00 7.315E+01 1.700E+02 1.232E+02 3.933E+02 1.732E+02 5.565E+02
2.231E+02 6.694E+02 2.731E+02 7.364E+02 3.732E+02 8.201E+02 4.731E+02 8.703E+02
6.731E+02 9.121E+02 1.173E+03 9.665E+02 2.473E+03 1.075E+03
3.732E+02 1.381E+01 4.731E+02 1.004E+01 6.731E+02 8.000E+00 8.731E+02 7.531E+00
1.273E+03 7.113E+00

co2 4027      n      5 1.977E+00 1.947E+02 5.732E+05
  5      5 8.786E+02 1.464E-02
2.731E+02 8.577E+02 3.732E+02 9.414E+02 4.731E+02 1.004E+03 5.731E+02 1.088E+03
6.731E+02 1.151E+03
2.231E+02 1.105E-02 2.731E+02 1.452E-02 3.732E+02 2.213E-02 4.731E+02 3.059E-02
5.731E+02 3.958E-02

caopp 4028      n      5 1.700E+03 2.873E+03 9.205E+05
  11      2 7.531E+02 3.180E-01
0.000E+00 0.000E+00 7.315E+01 1.700E+02 1.232E+02 3.933E+02 1.732E+02 5.565E+02
2.231E+02 6.694E+02 2.731E+02 7.364E+02 3.732E+02 8.201E+02 4.731E+02 8.703E+02
6.731E+02 9.121E+02 1.173E+03 9.665E+02 2.473E+03 1.075E+03
3.732E+02 3.180E-01 1.173E+03 4.895E-01

cogas 4029      n      5 1.250E+00 8.163E+01 2.155E+05
  3      3 1.046E+03 2.343E-02
2.982E+02 1.038E+03 3.732E+02 1.042E+03 6.731E+02 1.088E+03
8.205E+01 7.113E-03 9.205E+01 7.950E-03 2.731E+02 2.343E-02

ceo2 4030      n      5 6.100E+03 2.273E+03 4.602E+05
  11      10 3.515E+02 1.172E+01
0.000E+00 0.000E+00 4.815E+01 3.138E+01 1.232E+02 1.883E+02 1.732E+02 2.594E+02
2.231E+02 3.096E+02 2.731E+02 3.431E+02 3.732E+02 3.807E+02 5.731E+02 4.000E+02
7.731E+02 4.393E+02 1.773E+03 4.979E+02 2.073E+03 5.104E+02
3.231E+02 1.151E+01 3.732E+02 1.029E+01 4.731E+02 8.075E+00 6.731E+02 5.439E+00
1.073E+03 2.720E+00 1.273E+03 1.757E+00 1.373E+03 1.276E+00 1.473E+03 1.004E+00
1.673E+03 8.000E-01 1.973E+03 9.205E-01

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cobox 4034      n      5 6.460E+03 2.073E+03 6.694E+05
  10      0 7.029E+02 1.004E+01
0.000E+00 0.000E+00 4.315E+01 3.300E+01 7.315E+01 1.423E+02 1.232E+02 3.515E+02
1.732E+02 5.146E+02 2.731E+02 8.242E+02 2.982E+02 7.029E+02 4.731E+02 7.071E+02
7.731E+02 7.364E+02 1.773E+03 8.452E+02

cuo  4036      n      5 6.500E+03 1.603E+03 1.700E+05
  5      2 5.356E+02 1.799E+01
1.732E+02 4.226E+02 2.731E+02 5.188E+02 4.731E+02 6.276E+02 7.731E+02 7.029E+02
1.273E+03 8.033E+02
2.731E+02 1.883E+01 4.731E+02 1.172E+01

gd2o3 4038      n      5 7.640E+03 2.603E+03 0.000E+00
  11      2 3.054E+02 1.004E+01
0.000E+00 0.000E+00 2.315E+01 2.100E+01 1.232E+02 1.700E+02 1.732E+02 2.259E+02
2.731E+02 2.845E+02 3.732E+02 3.096E+02 4.731E+02 3.222E+02 7.731E+02 3.389E+02
1.273E+03 3.640E+02 1.773E+03 3.800E+02 2.073E+03 3.849E+02
1.273E+03 1.004E+01 1.273E+03 1.004E+01

hfo2  4040      n      5 9.100E+03 3.073E+03 3.389E+05
  2      3 2.720E+02 1.700E+00
2.731E+02 2.678E+02 2.873E+03 6.109E+02
3.732E+02 1.700E+00 1.273E+03 2.500E+00 2.073E+03 2.594E+00

fe2o3 4042      n      5 5.240E+03 1.833E+03 0.000E+00
  12      0 6.276E+02 1.300E+01
7.315E+01 1.004E+02 1.732E+02 4.100E+02 2.731E+02 6.109E+02 3.732E+02 7.531E+02
4.731E+02 8.000E+02 6.731E+02 9.414E+02 9.451E+02 1.075E+03 9.501E+02 1.824E+03
9.551E+02 9.414E+02 1.050E+03 9.414E+02 1.050E+03 8.786E+02 1.773E+03 9.037E+02

fe3o4 4044      n      5 5.200E+03 1.811E+03 5.983E+05
  4      0 6.527E+02 5.021E+00
2.982E+02 6.527E+02 9.031E+02 1.180E+03 9.032E+02 8.661E+02 1.773E+03 8.619E+02

pbo  4046      n      5 8.000E+03 1.163E+03 5.272E+04
  10      2 2.050E+02 2.900E+00
0.000E+00 0.000E+00 1.315E+01 4.000E+00 2.315E+01 3.300E+01 4.315E+01 6.276E+01
7.315E+01 1.004E+02 1.232E+02 1.423E+02 1.732E+02 1.695E+02 2.731E+02 2.008E+02
6.731E+02 2.448E+02 1.173E+03 2.803E+02
2.731E+02 3.138E+00 4.731E+02 1.172E+00

mgox  4048      n      5 3.580E+03 3.123E+03 1.925E+06
  8      8 9.205E+02 6.904E+01
9.815E+01 2.500E+02 1.732E+02 6.694E+02 2.731E+02 8.786E+02 3.732E+02 1.046E+03
4.731E+02 1.109E+03 6.731E+02 1.192E+03 1.273E+03 1.297E+03 2.473E+03 1.423E+03
2.731E+02 7.531E+01 3.732E+02 4.812E+01 4.731E+02 3.800E+01 5.731E+02 3.012E+01
6.731E+02 2.500E+01 7.731E+02 2.100E+01 9.731E+02 1.590E+01 1.173E+03 1.381E+01

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$$k \text{ [W/m K]} \quad c \text{ [J/kg K]} \quad T \text{ [K]} \quad \lambda \text{ [J/kg]} \quad \rho \text{ [kg/m}^3\text{]}$$

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sio2  4062      n      5  2.200E+03  1.938E+03  1.883E+05
  11    11  7.448E+02  1.381E+00
  0.000E+00  0.000E+00  2.315E+01  4.000E+01  1.232E+02  3.556E+02  2.231E+02  6.067E+02
  2.731E+02  7.071E+02  3.732E+02  8.577E+02  4.731E+02  9.498E+02  7.731E+02  1.109E+03
  1.073E+03  1.213E+03  1.573E+03  1.326E+03  1.973E+03  1.464E+03
  4.150E+00  1.172E-01  4.315E+01  2.500E-01  7.315E+01  3.975E-01  1.232E+02  8.159E-01
  1.732E+02  1.025E+00  2.731E+02  1.326E+00  4.731E+02  1.715E+00  6.731E+02  2.008E+00
  8.731E+02  2.385E+00  1.073E+03  3.012E+00  1.273E+03  4.000E+00

sio2c 4064      n      5  2.650E+03  1.708E+03  1.883E+05
  12     7  7.531E+02  1.172E+01
  1.732E+02  5.021E+02  2.731E+02  6.987E+02  3.732E+02  8.619E+02  4.731E+02  9.665E+02
  6.731E+02  1.121E+03  7.731E+02  1.213E+03  8.461E+02  1.276E+03  8.511E+02  3.289E+03
  8.562E+02  1.121E+03  1.073E+03  1.163E+03  1.573E+03  1.268E+03  1.973E+03  1.356E+03
  2.731E+02  1.300E+01  3.732E+02  8.786E+00  4.231E+02  7.615E+00  4.731E+02  6.611E+00
  5.731E+02  5.439E+00  6.731E+02  4.602E+00  7.731E+02  3.975E+00

sio2a 4066      n      5  2.650E+03  1.708E+03  1.883E+05
  12     7  7.531E+02  6.485E+00
  1.732E+02  5.021E+02  2.731E+02  6.987E+02  3.732E+02  8.619E+02  4.731E+02  9.665E+02
  6.731E+02  1.121E+03  7.731E+02  1.213E+03  8.461E+02  1.276E+03  8.511E+02  3.289E+03
  8.562E+02  1.121E+03  1.073E+03  1.163E+03  1.573E+03  1.268E+03  1.973E+03  1.356E+03
  2.731E+02  6.778E+00  3.732E+02  5.272E+00  4.231E+02  4.602E+00  4.731E+02  4.226E+00
  5.731E+02  3.682E+00  6.731E+02  3.300E+00  7.731E+02  3.138E+00

sio2f 4068      n      5  1.600E+02  1.883E+03  1.883E+05
  11     2  7.448E+02  5.523E-02
  0.000E+00  0.000E+00  2.315E+01  4.000E+01  1.232E+02  3.556E+02  2.231E+02  6.067E+02
  2.731E+02  7.071E+02  3.732E+02  8.577E+02  4.731E+02  9.498E+02  7.731E+02  1.109E+03
  1.073E+03  1.213E+03  1.573E+03  1.326E+03  1.973E+03  1.464E+03
  7.615E+01  5.523E-02  3.002E+02  5.523E-02

so2    4071      n      5  2.927E+00  0.000E+00  0.000E+00
  3     2  6.360E+02  9.456E-03
  2.731E+02  6.276E+02  4.731E+02  7.113E+02  6.731E+02  8.075E+02
  2.731E+02  8.661E-03  3.732E+02  1.192E-02

tho2   4072      n      5  9.600E+03  3.473E+03  2.845E+05
  11     9  2.343E+02  1.172E+01
  0.000E+00  0.000E+00  1.315E+01  4.000E+00  7.315E+01  7.113E+01  1.232E+02  1.297E+02
  1.732E+02  1.757E+02  2.231E+02  2.050E+02  2.731E+02  2.259E+02  3.732E+02  2.552E+02
  5.731E+02  2.720E+02  7.731E+02  2.845E+02  2.773E+03  3.473E+02
  2.731E+02  1.300E+01  3.732E+02  9.623E+00  4.731E+02  7.531E+00  5.731E+02  6.276E+00
  7.731E+02  4.602E+00  1.073E+03  3.300E+00  1.473E+03  2.500E+00  1.973E+03  2.301E+00
  2.473E+03  1.799E+00

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Thermal Property Data
 k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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sno2  4074      n      5  5.560E+03  1.898E+03  3.180E+05
      7      2  3.431E+02  3.138E+01
      2.731E+02  3.222E+02  3.732E+02  4.058E+02  4.731E+02  4.477E+02  5.731E+02  4.770E+02
      6.731E+02  4.937E+02  1.073E+03  5.481E+02  1.473E+03  5.899E+02
      2.982E+02  3.138E+01  4.231E+02  2.218E+01

tio2c  4082      n      5  4.250E+03  2.093E+03  7.113E+05
      12     9  6.862E+02  1.423E+01
      0.000E+00  0.000E+00  3.315E+01  3.300E+01  1.232E+02  3.300E+02  1.732E+02  4.602E+02
      2.231E+02  5.858E+02  2.731E+02  6.611E+02  3.732E+02  7.615E+02  4.731E+02  8.159E+02
      5.731E+02  8.452E+02  7.731E+02  8.786E+02  1.073E+03  9.205E+02  1.773E+03  9.623E+02
      3.231E+02  1.339E+01  3.732E+02  1.192E+01  4.231E+02  1.067E+01  6.731E+02  7.699E+00
      7.731E+02  6.987E+00  8.731E+02  6.820E+00  9.731E+02  7.029E+00  1.073E+03  7.615E+00
      1.123E+03  8.117E+00

tio2a  4084      n      5  4.250E+03  2.093E+03  7.113E+05
      12     7  6.862E+02  8.786E+00
      0.000E+00  0.000E+00  3.315E+01  3.300E+01  1.232E+02  3.300E+02  1.732E+02  4.602E+02
      2.231E+02  5.858E+02  2.731E+02  6.611E+02  3.732E+02  7.615E+02  4.731E+02  8.159E+02
      5.731E+02  8.452E+02  7.731E+02  8.786E+02  1.073E+03  9.205E+02  1.773E+03  9.623E+02
      3.231E+02  8.000E+00  4.731E+02  6.694E+00  5.731E+02  5.899E+00  6.731E+02  5.356E+00
      7.731E+02  5.230E+00  8.731E+02  5.439E+00  1.073E+03  6.778E+00

tio2   4086      n      5  4.250E+03  2.093E+03  7.113E+05
      12     9  6.862E+02  1.046E+01
      0.000E+00  0.000E+00  3.315E+01  3.300E+01  1.232E+02  3.300E+02  1.732E+02  4.602E+02
      2.231E+02  5.858E+02  2.731E+02  6.611E+02  3.732E+02  7.615E+02  4.731E+02  8.159E+02
      5.731E+02  8.452E+02  7.731E+02  8.786E+02  1.073E+03  9.205E+02  1.773E+03  9.623E+02
      3.732E+02  8.954E+00  4.731E+02  7.531E+00  5.731E+02  6.276E+00  6.731E+02  5.188E+00
      7.731E+02  4.393E+00  8.731E+02  3.891E+00  9.731E+02  3.515E+00  1.073E+03  3.305E+00
      1.173E+03  3.305E+00

wo3    4092      n      5  7.160E+03  1.743E+03  3.054E+05
      9      0  3.096E+02  2.500E+01
      0.000E+00  0.000E+00  3.315E+01  1.700E+01  7.315E+01  8.000E+01  1.232E+02  1.590E+02
      1.732E+02  2.134E+02  2.231E+02  2.594E+02  2.731E+02  2.900E+02  3.732E+02  3.556E+02
      1.573E+03  5.230E+02

uo2    4094      n      5  1.096E+04  3.153E+03  0.000E+00
      11     8  2.427E+02  1.046E+01
      0.000E+00  0.000E+00  1.315E+01  1.300E+01  2.615E+01  1.339E+02  3.515E+01  3.800E+01
      1.732E+02  1.799E+02  2.731E+02  2.343E+02  3.732E+02  2.636E+02  4.731E+02  2.824E+02
      6.731E+02  3.021E+02  1.473E+03  3.305E+02  2.273E+03  3.431E+02
      2.982E+02  1.046E+01  3.732E+02  8.786E+00  4.731E+02  7.531E+00  5.731E+02  6.276E+00
      7.731E+02  5.523E+00  9.731E+02  5.146E+00  1.073E+03  5.188E+00  1.273E+03  6.067E+00

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TOPAZ2D

Thermal Property Data
k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ[kg/m³]

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zro2c 4108      n      5 5.080E+03 2.823E+03 7.071E+05
  10      6 4.561E+02 1.590E+00
0.000E+00 0.000E+00 2.315E+01 8.000E+00 1.732E+02 3.264E+02 2.731E+02 4.435E+02
3.732E+02 4.979E+02 4.731E+02 5.439E+02 6.731E+02 5.858E+02 1.073E+03 6.527E+02
1.273E+03 6.694E+02 2.473E+03 7.029E+02
2.731E+02 1.590E+00 6.731E+02 1.841E+00 1.273E+03 2.259E+00 1.473E+03 2.500E+00
1.673E+03 2.845E+00 1.873E+03 3.222E+00

h2ogl 4112      n      5 5.980E-01 3.732E+02 2.257E+06
  0      3 1.966E+03 2.343E-02
3.732E+02 2.351E-02 4.731E+02 3.138E-02 7.731E+02 5.669E-02

h2ogs 4113      n      5 5.980E-01 0.000E+00 0.000E+00
  7     10 1.883E+03 1.778E-02
3.131E+02 1.883E+03 3.732E+02 1.966E+03 4.731E+02 2.887E+03 5.231E+02 3.724E+03
5.481E+02 4.561E+03 5.731E+02 6.611E+03 6.092E+02 1.046E+04
2.231E+02 1.500E-02 2.731E+02 1.590E-02 3.732E+02 2.351E-02 4.231E+02 2.887E-02
4.731E+02 3.598E-02 5.231E+02 4.477E-02 5.481E+02 5.146E-02 5.731E+02 6.025E-02
5.981E+02 7.113E-02 6.092E+02 7.657E-02

water 4114      n      5 1.000E+03 2.731E+02 3.335E+05
  11      7 4.000E+03 6.025E-01
2.731E+02 4.217E+03 3.231E+02 4.174E+03 3.732E+02 4.209E+03 4.231E+02 4.305E+03
4.731E+02 4.489E+03 5.231E+02 4.894E+03 5.481E+02 5.356E+03 5.731E+02 5.899E+03
5.981E+02 7.029E+03 6.231E+02 1.464E+04 6.291E+02 2.301E+04
2.731E+02 5.506E-01 3.231E+02 6.464E-01 3.732E+02 6.828E-01 3.970E+02 6.849E-01
4.731E+02 6.653E-01 5.731E+02 5.356E-01 6.381E+02 3.209E-01

ice 4116      n      5 9.170E+02 2.731E+02 3.335E+05
  12      2 2.113E+03 2.100E+00
0.000E+00 0.000E+00 2.315E+01 1.510E+02 7.315E+01 6.778E+02 9.315E+01 8.326E+02
1.232E+02 1.029E+03 1.732E+02 1.377E+03 2.231E+02 1.715E+03 2.731E+02 2.113E+03
2.732E+02 4.000E+03 4.731E+02 4.477E+03 5.231E+02 5.314E+03 5.731E+02 5.899E+03
1.432E+02 3.556E+00 2.731E+02 2.100E+00

d2o 4118      n      5 1.100E+03 2.770E+02 3.300E+05
  2      2 4.205E+03 5.607E-01
2.832E+02 4.222E+03 3.081E+02 4.201E+03
2.731E+02 5.356E-01 3.732E+02 6.402E-01

batit 4212      n      5 5.900E+03 1.893E+03 0.000E+00
  12      2 4.393E+02 4.000E+00
0.000E+00 0.000E+00 3.315E+01 2.100E+01 1.232E+02 2.385E+02 2.102E+02 3.975E+02
2.181E+02 3.800E+02 2.731E+02 4.310E+02 3.732E+02 4.728E+02 4.731E+02 4.979E+02
5.731E+02 5.146E+02 7.731E+02 5.356E+02 1.073E+03 5.523E+02 1.773E+03 5.816E+02
2.982E+02 4.268E+00 3.981E+02 4.017E+00

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batis 4213      n      5 5.900E+03 1.893E+03 0.000E+00
  12      2 4.393E+02 3.389E+00
0.000E+00 0.000E+00 3.315E+01 2.100E+01 1.232E+02 2.385E+02 2.102E+02 3.975E+02
2.181E+02 3.800E+02 2.731E+02 4.310E+02 3.732E+02 4.728E+02 4.731E+02 4.979E+02
5.731E+02 5.146E+02 7.731E+02 5.356E+02 1.073E+03 5.523E+02 1.773E+03 5.816E+02
2.982E+02 3.389E+00 4.731E+02 2.427E+00

batim 4214      n      5 5.900E+03 1.893E+03 0.000E+00
  12      2 4.393E+02 1.297E+00
0.000E+00 0.000E+00 3.315E+01 2.100E+01 1.232E+02 2.385E+02 2.102E+02 3.975E+02
2.181E+02 3.800E+02 2.731E+02 4.310E+02 3.732E+02 4.728E+02 4.731E+02 4.979E+02
5.731E+02 5.146E+02 7.731E+02 5.356E+02 1.073E+03 5.523E+02 1.773E+03 5.816E+02
2.982E+02 1.297E+00 4.231E+02 1.004E+00

catit 4216      n      5 4.100E+03 2.243E+03 0.000E+00
  12      2 7.280E+02 4.602E+00
0.000E+00 0.000E+00 3.315E+01 2.500E+01 1.232E+02 3.556E+02 1.732E+02 5.146E+02
2.231E+02 6.276E+02 2.731E+02 7.029E+02 3.732E+02 8.033E+02 4.731E+02 8.619E+02
5.731E+02 8.954E+02 7.731E+02 9.372E+02 1.073E+03 9.623E+02 1.773E+03 9.958E+02
3.231E+02 4.602E+00 4.231E+02 4.000E+00

cnlox 4218      n      5 6.500E+03 0.000E+00 0.000E+00
  0      0 7.531E+02 3.598E+00

cuoli 4220      n      5 6.300E+03 0.000E+00 0.000E+00
  0      5 6.694E+02 1.527E+01
4.982E+02 1.527E+01 5.731E+02 1.300E+01 6.731E+02 1.046E+01 7.731E+02 9.330E+00
1.073E+03 8.159E+00

nioli 4222      n      5 6.600E+03 0.000E+00 0.000E+00
  0      7 7.113E+02 1.318E+01
3.981E+02 1.318E+01 5.731E+02 8.075E+00 6.731E+02 6.485E+00 7.731E+02 5.230E+00
9.731E+02 4.000E+00 1.173E+03 3.891E+00 1.373E+03 3.975E+00

spinx 4224      n      5 3.600E+03 2.408E+03 0.000E+00
  12      3 8.117E+02 1.300E+01
0.000E+00 0.000E+00 7.315E+01 6.694E+01 9.815E+01 1.464E+02 1.732E+02 4.477E+02
2.231E+02 6.234E+02 2.731E+02 7.573E+02 3.732E+02 9.623E+02 4.731E+02 1.088E+03
7.731E+02 1.172E+03 1.273E+03 1.339E+03 1.773E+03 1.443E+03 2.273E+03 1.548E+03
2.982E+02 1.423E+01 3.231E+02 1.213E+01 4.231E+02 9.498E+00

spinl 4225      n      5 3.600E+03 2.408E+03 0.000E+00
  12      8 8.117E+02 1.506E+01
0.000E+00 0.000E+00 7.315E+01 6.694E+01 9.815E+01 1.464E+02 1.732E+02 4.477E+02
2.231E+02 6.234E+02 2.731E+02 7.573E+02 3.732E+02 9.623E+02 4.731E+02 1.088E+03
7.731E+02 1.172E+03 1.273E+03 1.339E+03 1.773E+03 1.443E+03 2.273E+03 1.548E+03
3.732E+02 1.506E+01 4.731E+02 1.297E+01 6.731E+02 1.017E+01 8.731E+02 7.950E+00
1.073E+03 6.569E+00 1.273E+03 5.648E+00 1.473E+03 5.439E+00 1.588E+03 2.100E+00

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

niznf 4226 n 5 4.700E+03 0.000E+00 0.000E+00
 6 0 6.067E+02 3.724E+00
 0 0 0.000E+00 0.000E+00 2.315E+01 2.900E+01 1.732E+02 4.226E+02 2.231E+02 5.188E+02
 2.731E+02 5.858E+02 3.481E+02 6.443E+02

kerox 4232 n 5 2.680E+03 6.711E+02 1.300E+05
 0 2 9.205E+02 2.100E+00
 8.315E+01 1.715E+00 2.731E+02 2.100E+00

kerom 4233 n 5 2.680E+03 6.711E+02 1.300E+05
 0 2 9.205E+02 1.715E+00
 8.315E+01 1.715E+00 2.731E+02 1.715E+00

srtil 4234 n 5 5.110E+03 2.311E+03 0.000E+00
 12 3 5.356E+02 5.858E+00
 0 0 0.000E+00 0.000E+00 2.315E+01 2.100E+01 7.315E+01 1.757E+02 1.232E+02 3.012E+02
 1.732E+02 4.017E+02 2.231E+02 4.686E+02 2.731E+02 5.188E+02 3.732E+02 5.816E+02
 4.731E+02 6.192E+02 6.731E+02 6.485E+02 1.073E+03 6.778E+02 1.873E+03 7.155E+02
 2.982E+02 5.858E+00 4.731E+02 4.602E+00 7.731E+02 4.602E+00

srtip 4235 n 5 4.000E+03 2.311E+03 0.000E+00
 12 2 5.356E+02 2.385E+01
 0 0 0.000E+00 0.000E+00 2.315E+01 2.100E+01 7.315E+01 1.757E+02 1.232E+02 3.012E+02
 1.732E+02 4.017E+02 2.231E+02 4.686E+02 2.731E+02 5.188E+02 3.732E+02 5.816E+02
 4.731E+02 6.192E+02 6.731E+02 6.485E+02 1.073E+03 6.778E+02 1.873E+03 7.155E+02
 7.315E+01 4.602E+00 3.732E+02 1.883E+00

uprox 4242 n 5 1.060E+04 2.973E+03 0.000E+00
 9 9 2.500E+02 7.615E+00
 3.732E+02 2.636E+02 4.731E+02 2.845E+02 6.731E+02 3.096E+02 8.731E+02 3.180E+02
 1.073E+03 3.201E+02 1.273E+03 3.201E+02 1.473E+03 3.243E+02 1.673E+03 3.300E+02
 1.873E+03 3.535E+02
 3.732E+02 7.615E+00 4.731E+02 6.987E+00 6.731E+02 5.021E+00 8.731E+02 3.891E+00
 1.073E+03 3.096E+00 1.273E+03 2.500E+00 1.473E+03 2.197E+00 1.673E+03 2.050E+00
 1.873E+03 2.008E+00

znfeo 4252 n 5 5.330E+03 1.863E+03 0.000E+00
 8 3 5.858E+02 4.017E+00
 0 0 0.000E+00 0.000E+00 2.315E+01 2.900E+01 1.232E+02 3.012E+02 1.732E+02 4.000E+02
 2.231E+02 5.104E+02 2.731E+02 5.732E+02 3.732E+02 6.443E+02 9.731E+02 9.707E+02
 9.815E+01 3.975E+00 2.731E+02 4.017E+00 3.732E+02 4.100E+00

topaz 4301 n 5 3.540E+03 0.000E+00 0.000E+00
 0 3 1.300E+03 1.925E+01
 2.982E+02 1.925E+01 3.732E+02 1.632E+01 4.231E+02 1.360E+01

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topac 4302      n      5 3.540E+03 0.000E+00 0.000E+00
      0      3 1.300E+03 2.100E+01
      2.731E+02 2.343E+01 3.732E+02 1.715E+01 4.231E+02 1.443E+01

andal 4312      n      5 3.140E+03 1.818E+03 0.000E+00
      8      0 7.699E+02 1.100E+01
      1.232E+02 3.138E+02 2.731E+02 7.238E+02 3.732E+02 8.996E+02 4.731E+02 1.004E+03
      5.731E+02 1.063E+03 7.731E+02 1.142E+03 1.073E+03 1.226E+03 1.773E+03 1.368E+03

kyan  4314      n      5 3.650E+03 1.818E+03 0.000E+00
      8      2 7.699E+02 1.732E+01
      1.232E+02 3.138E+02 2.731E+02 7.238E+02 3.732E+02 8.996E+02 4.731E+02 1.004E+03
      5.731E+02 1.063E+03 7.731E+02 1.142E+03 1.073E+03 1.226E+03 1.773E+03 1.368E+03
      2.731E+02 1.824E+01 4.731E+02 1.046E+01

mull  4316      n      5 3.200E+03 2.123E+03 0.000E+00
      8      8 7.657E+02 6.276E+00
      1.232E+02 3.138E+02 2.731E+02 7.238E+02 3.732E+02 8.996E+02 4.731E+02 1.004E+03
      5.731E+02 1.063E+03 7.731E+02 1.142E+03 1.073E+03 1.205E+03 1.773E+03 1.368E+03
      3.732E+02 6.067E+00 4.731E+02 5.523E+00 5.731E+02 5.104E+00 6.731E+02 4.770E+00
      8.731E+02 4.310E+00 1.073E+03 3.975E+00 1.273E+03 3.891E+00 1.473E+03 3.849E+00

beryl 4318      n      5 2.650E+03 1.683E+03 0.000E+00
      0      0 1.300E+03 6.276E+00

bspod 4320      n      5 3.100E+03 0.000E+00 0.000E+00
      0      3 1.300E+03 1.046E+00
      3.732E+02 1.046E+00 8.731E+02 1.318E+00 1.173E+03 1.423E+00

cordr 4322      n      5 2.100E+03 0.000E+00 0.000E+00
      8      2 7.740E+02 2.218E+00
      0.000E+00 0.000E+00 3.315E+01 2.100E+01 1.232E+02 3.431E+02 1.732E+02 5.021E+02
      2.231E+02 5.858E+02 2.731E+02 7.322E+02 3.231E+02 8.159E+02 1.273E+03 1.300E+03
      3.732E+02 2.218E+00 1.273E+03 2.050E+00

forst 4324      n      5 3.200E+03 2.183E+03 5.439E+05
      10     5 8.000E+02 5.858E+00
      0.000E+00 0.000E+00 2.315E+01 4.000E+01 1.732E+02 5.230E+02 2.231E+02 6.904E+02
      2.731E+02 7.740E+02 3.732E+02 9.414E+02 4.731E+02 1.046E+03 6.731E+02 1.146E+03
      9.731E+02 1.222E+03 1.873E+03 1.423E+03
      3.732E+02 5.858E+00 6.731E+02 4.268E+00 8.731E+02 3.389E+00 1.073E+03 2.761E+00
      1.473E+03 2.343E+00

steat 4326      n      5 3.000E+03 1.827E+03 0.000E+00
      10     0 8.000E+02 3.300E+00
      0.000E+00 0.000E+00 2.315E+01 4.000E+01 1.732E+02 5.230E+02 2.231E+02 6.904E+02
      2.731E+02 7.740E+02 3.732E+02 9.414E+02 4.731E+02 1.046E+03 6.731E+02 1.146E+03
      9.731E+02 1.222E+03 1.873E+03 1.423E+03

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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orthc 4328      n      5 2.600E+03 0.000E+00 0.000E+00
  0      0 1.300E+03 4.000E+00

analc 4329      n      5 2.260E+03 0.000E+00 0.000E+00
  0      0 1.339E+03 3.431E+00

zircn 4330      n      5 4.600E+03 1.814E+03 0.000E+00
  9      0 5.439E+02 4.000E+00
0.000E+00 0.000E+00 4.815E+01 2.100E+01 1.732E+02 3.556E+02 2.731E+02 5.146E+02
3.732E+02 6.234E+02 4.731E+02 6.862E+02 6.731E+02 7.531E+02 9.731E+02 8.033E+02
1.873E+03 8.870E+02

zircp 4332      n      5 4.600E+03 1.814E+03 0.000E+00
  9      9 5.439E+02 6.276E+00
0.000E+00 0.000E+00 4.815E+01 2.100E+01 1.732E+02 3.556E+02 2.731E+02 5.146E+02
3.732E+02 6.234E+02 4.731E+02 6.862E+02 6.731E+02 7.531E+02 9.731E+02 8.033E+02
1.873E+03 8.870E+02
3.732E+02 6.485E+00 4.731E+02 5.941E+00 5.731E+02 5.523E+00 6.731E+02 5.188E+00
8.731E+02 4.686E+00 1.073E+03 4.268E+00 1.273E+03 4.058E+00 1.473E+03 3.933E+00
2.173E+03 3.515E+00

aln 4412      n      5 3.200E+03 2.273E+03 0.000E+00
 10      5 7.322E+02 3.515E+01
0.000E+00 0.000E+00 5.315E+01 3.300E+01 2.231E+02 5.439E+02 2.982E+02 7.322E+02
3.732E+02 8.786E+02 4.731E+02 1.004E+03 6.731E+02 1.088E+03 8.731E+02 1.151E+03
1.173E+03 1.213E+03 1.873E+03 1.300E+03
2.982E+02 3.515E+01 5.731E+02 2.741E+01 7.731E+02 2.343E+01 9.731E+02 2.113E+01
1.073E+03 2.008E+01

be3n2 4414      n      5 1.700E+03 2.473E+03 2.347E+06
  2      0 1.300E+03 7.113E-01
2.982E+02 1.300E+03 7.731E+02 2.364E+03

bn 4416      n      5 2.100E+03 3.003E+03 0.000E+00
  9      2 7.950E+02 3.284E+01
0.000E+00 0.000E+00 3.315E+01 4.000E+01 2.982E+02 7.950E+02 3.732E+02 1.004E+03
5.731E+02 1.381E+03 7.731E+02 1.598E+03 1.073E+03 1.820E+03 1.473E+03 1.966E+03
2.173E+03 2.008E+03
2.982E+02 3.284E+01 2.273E+03 1.925E+01

bnppa 4418      n      5 2.100E+03 3.003E+03 0.000E+00
  9      4 7.950E+02 2.100E+01
0.000E+00 0.000E+00 3.315E+01 4.000E+01 2.982E+02 7.950E+02 3.732E+02 1.004E+03
5.731E+02 1.381E+03 7.731E+02 1.598E+03 1.073E+03 1.820E+03 1.473E+03 1.966E+03
2.173E+03 2.008E+03
2.982E+02 2.100E+01 5.731E+02 1.757E+01 7.731E+02 1.590E+01 1.273E+03 1.464E+01

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bnox2 4420      n      5 2.100E+03 0.000E+00 0.000E+00
      5      3 7.950E+02 2.887E+01
      2.982E+02 7.950E+02 3.732E+02 9.916E+02 5.731E+02 1.360E+03 7.731E+02 1.632E+03
      1.073E+03 1.966E+03
      6.231E+02 2.887E+01 9.731E+02 2.720E+01 1.273E+03 2.636E+01

bnoxp 4422      n      5 2.100E+03 0.000E+00 0.000E+00
      5      3 7.950E+02 1.506E+01
      2.982E+02 7.950E+02 3.732E+02 9.916E+02 5.731E+02 1.360E+03 7.731E+02 1.632E+03
      1.073E+03 1.966E+03
      6.231E+02 1.506E+01 9.731E+02 1.339E+01 1.373E+03 1.213E+01

bnac  4424      n      5 1.620E+03 0.000E+00 0.000E+00
      6      4 7.950E+02 1.904E+01
      3.032E+02 7.950E+02 3.732E+02 1.046E+03 4.731E+02 1.300E+03 5.731E+02 1.402E+03
      8.731E+02 1.720E+03 1.273E+03 1.900E+03
      5.731E+02 1.904E+01 6.731E+02 1.736E+01 7.731E+02 1.700E+01 1.273E+03 1.611E+01

crn    4426      n      5 6.100E+03 1.773E+03 0.000E+00
      2      0 7.531E+02 1.213E+01
      2.982E+02 6.987E+02 7.731E+02 8.159E+02

cr2n   4428      n      5 6.500E+03 1.923E+03 0.000E+00
      2      0 6.276E+02 2.259E+01
      2.982E+02 6.276E+02 7.731E+02 7.113E+02

hfn    4430      n      5 1.085E+04 3.304E+08 0.000E+00
      7      4 2.100E+02 1.172E+01
      2.982E+02 2.100E+02 7.731E+02 2.900E+02 9.731E+02 3.222E+02 1.173E+03 3.264E+02
      1.673E+03 3.264E+02 1.973E+03 3.096E+02 2.773E+03 2.218E+02
      5.731E+02 1.172E+01 1.173E+03 1.339E+01 1.673E+03 1.590E+01 2.273E+03 2.845E+01

mo2n   4432      n      5 8.000E+03 1.173E+03 0.000E+00
      2      0 3.096E+02 1.715E+01
      2.982E+02 3.096E+02 7.731E+02 4.435E+02

nbn    4434      n      5 8.360E+03 2.477E+03 0.000E+00
      3      0 4.017E+02 4.000E+00
      2.982E+02 4.017E+02 5.731E+02 4.435E+02 7.731E+02 4.728E+02

nb2n   4436      n      5 8.310E+03 2.588E+03 0.000E+00
      2      0 3.222E+02 7.950E+00
      2.982E+02 3.222E+02 7.731E+02 4.000E+02

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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pun  4438      n      5  1.425E+04  2.873E+03  0.000E+00
      8      8  1.883E+02  1.381E+01
2.982E+02  1.883E+02  4.231E+02  2.100E+02  5.731E+02  2.218E+02  7.731E+02  2.301E+02
9.131E+02  2.301E+02  1.073E+03  2.343E+02  1.273E+03  2.427E+02  1.423E+03  2.636E+02
5.231E+02  1.381E+01  7.731E+02  1.339E+01  8.731E+02  1.172E+01  1.073E+03  1.130E+01
1.173E+03  1.300E+01  1.473E+03  1.297E+01  1.573E+03  1.339E+01  1.673E+03  1.506E+01

si3n4 4442      n      5  2.800E+03  2.143E+03  0.000E+00
      4      4  6.904E+02  7.950E+00
2.982E+02  6.904E+02  7.731E+02  1.046E+03  1.473E+03  1.381E+03  2.073E+03  1.590E+03
5.731E+02  7.950E+00  1.073E+03  6.276E+00  1.473E+03  5.439E+00  2.073E+03  7.113E+00

si3nl 4444      n      5  2.200E+03  2.143E+03  0.000E+00
      4      2  6.904E+02  1.548E+00
2.982E+02  6.904E+02  7.731E+02  1.046E+03  1.473E+03  1.381E+03  2.073E+03  1.590E+03
4.731E+02  1.548E+00  1.573E+03  1.548E+00

tan   4446      n      5  1.430E+04  3.363E+03  0.000E+00
      3      0  2.050E+02  7.950E+00
2.982E+02  2.050E+02  7.731E+02  2.971E+02  2.773E+03  3.300E+02

ta2n  4448      n      5  1.586E+04  2.323E+03  0.000E+00
      2      5  1.300E+02  1.046E+01
2.982E+02  1.300E+02  2.773E+03  3.800E+02
2.982E+02  1.046E+01  1.073E+03  1.046E+01  1.473E+03  1.381E+01  2.273E+03  3.515E+01
2.773E+03  3.800E+01

tinit 4452      n      5  4.500E+03  3.203E+03  0.000E+00
      8      3  6.025E+02  2.500E+01
1.932E+02  4.000E+02  2.731E+02  5.774E+02  3.732E+02  6.778E+02  4.731E+02  7.448E+02
6.731E+02  8.033E+02  1.073E+03  8.577E+02  1.773E+03  9.079E+02  2.773E+03  9.414E+02
4.731E+02  2.500E+01  1.273E+03  1.300E+01  2.073E+03  2.500E+01

un    4454      n      5  1.380E+04  1.873E+03  0.000E+00
      8      4  1.883E+02  1.381E+01
2.982E+02  1.883E+02  4.231E+02  2.100E+02  5.731E+02  2.218E+02  7.731E+02  2.301E+02
9.131E+02  2.301E+02  1.073E+03  2.343E+02  1.273E+03  2.427E+02  1.423E+03  2.636E+02
2.731E+02  1.381E+01  1.273E+03  2.469E+01  1.873E+03  2.636E+01  3.273E+03  2.636E+01

vn    4456      n      5  6.100E+03  2.373E+03  0.000E+00
      11     0  5.858E+02  1.213E+01
0.000E+00  0.000E+00  3.315E+01  2.100E+01  1.232E+02  2.971E+02  1.732E+02  4.100E+02
2.231E+02  5.021E+02  2.731E+02  5.607E+02  3.732E+02  6.485E+02  4.731E+02  7.071E+02
7.731E+02  7.866E+02  1.073E+03  8.000E+02  1.573E+03  9.121E+02

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zrnpf 4458 n 5 6.500E+03 3.253E+03 0.000E+00
 8 6 3.849E+02 1.046E+01
 2.982E+02 3.849E+02 3.732E+02 4.000E+02 4.731E+02 4.393E+02 6.731E+02 4.686E+02
 1.473E+03 5.356E+02 2.073E+03 5.690E+02 2.473E+03 5.816E+02 3.073E+03 5.858E+02
 3.732E+02 1.046E+01 1.273E+03 2.134E+01 1.573E+03 2.385E+01 1.773E+03 2.469E+01
 1.973E+03 2.427E+01 2.473E+03 2.176E+01

zrnp5 4459 n 5 6.800E+03 3.253E+03 0.000E+00
 8 4 3.849E+02 8.786E+00
 2.982E+02 3.849E+02 3.732E+02 4.000E+02 4.731E+02 4.393E+02 6.731E+02 4.686E+02
 1.473E+03 5.356E+02 2.073E+03 5.690E+02 2.473E+03 5.816E+02 3.073E+03 5.858E+02
 3.732E+02 8.786E+00 1.773E+03 1.700E+01 2.073E+03 1.715E+01 2.473E+03 1.590E+01

be2c 4512 n 5 2.100E+03 2.373E+03 2.339E+06
 3 0 1.339E+03 2.343E+01
 2.982E+02 1.423E+03 5.731E+02 1.908E+03 1.473E+03 3.234E+03

b4c-d 4514 n 5 2.400E+03 2.623E+03 0.000E+00
 11 8 9.205E+02 2.845E+01
 0.000E+00 0.000E+00 9.815E+01 8.000E+01 2.731E+02 8.996E+02 3.732E+02 1.079E+03
 4.731E+02 1.205E+03 9.731E+02 1.778E+03 1.273E+03 2.071E+03 1.573E+03 2.301E+03
 1.973E+03 2.500E+03 2.273E+03 2.615E+03 2.573E+03 2.657E+03
 2.731E+02 2.887E+01 5.731E+02 2.176E+01 8.731E+02 1.715E+01 1.173E+03 1.464E+01
 1.473E+03 1.423E+01 1.873E+03 1.464E+01 2.373E+03 1.590E+01 2.673E+03 1.715E+01

b4c-p 4515 n 5 2.000E+03 2.623E+03 0.000E+00
 11 3 9.205E+02 1.715E+01
 0.000E+00 0.000E+00 9.815E+01 8.000E+01 2.731E+02 8.996E+02 3.732E+02 1.079E+03
 4.731E+02 1.205E+03 9.731E+02 1.778E+03 1.273E+03 2.071E+03 1.573E+03 2.301E+03
 1.973E+03 2.500E+03 2.273E+03 2.615E+03 2.573E+03 2.657E+03
 2.731E+02 1.757E+01 1.073E+03 7.950E+00 1.373E+03 6.694E+00

hfc 4518 n 5 1.260E+04 4.173E+03 0.000E+00
 10 0 1.883E+02 2.900E+01
 0.000E+00 0.000E+00 2.315E+01 6.276E+00 7.315E+01 6.694E+01 1.232E+02 1.130E+02
 1.732E+02 1.423E+02 2.731E+02 1.841E+02 4.731E+02 2.343E+02 6.731E+02 2.720E+02
 8.731E+02 2.900E+02 2.473E+03 3.054E+02

mo2c 4520 n 5 9.000E+03 2.773E+03 0.000E+00
 9 3 3.473E+02 2.100E+01
 4.731E+02 3.577E+02 6.731E+02 3.640E+02 8.731E+02 3.849E+02 1.473E+03 4.812E+02
 1.773E+03 5.188E+02 1.973E+03 5.272E+02 2.073E+03 5.293E+02 2.173E+03 5.272E+02
 2.273E+03 5.209E+02
 1.273E+03 2.100E+01 1.873E+03 2.500E+01 2.373E+03 3.556E+01

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nbc 4522 n 5 7.600E+03 0.000E+00 0.000E+00
  9 0 3.556E+02 3.300E+01
0.000E+00 0.000E+00 2.315E+01 1.300E+01 7.315E+01 1.172E+02 1.732E+02 2.500E+02
2.731E+02 3.431E+02 3.732E+02 3.933E+02 5.731E+02 4.435E+02 8.731E+02 4.728E+02
2.773E+03 5.858E+02

puc 4524 n 5 1.350E+04 0.000E+00 0.000E+00
  7 3 1.841E+02 1.088E+01
3.732E+02 1.857E+02 4.731E+02 2.008E+02 5.731E+02 2.105E+02 6.731E+02 2.167E+02
8.731E+02 2.251E+02 1.273E+03 2.360E+02 1.973E+03 2.515E+02
3.431E+02 7.113E+00 4.731E+02 9.623E+00 6.731E+02 1.300E+01

sicx1 4531 n 5 3.210E+03 2.973E+03 0.000E+00
  12 3 6.778E+02 8.786E+01
0.000E+00 0.000E+00 4.315E+01 8.000E+00 7.315E+01 5.439E+01 1.232E+02 1.715E+02
2.231E+02 4.937E+02 2.731E+02 6.276E+02 3.732E+02 8.242E+02 4.731E+02 9.623E+02
5.731E+02 1.046E+03 6.731E+02 1.092E+03 1.473E+03 1.314E+03 1.873E+03 1.402E+03
3.111E+02 8.996E+01 3.662E+02 8.619E+01 4.221E+02 8.452E+01

sicx2 4532 n 5 3.210E+03 2.973E+03 0.000E+00
  12 0 6.778E+02 4.895E+02
0.000E+00 0.000E+00 4.315E+01 8.000E+00 7.315E+01 5.439E+01 1.232E+02 1.715E+02
2.231E+02 4.937E+02 2.731E+02 6.276E+02 3.732E+02 8.242E+02 4.731E+02 9.623E+02
5.731E+02 1.046E+03 6.731E+02 1.092E+03 1.473E+03 1.314E+03 1.873E+03 1.402E+03

sicsb 4533 n 5 3.100E+03 2.973E+03 0.000E+00
  12 6 6.778E+02 1.700E+02
0.000E+00 0.000E+00 4.315E+01 8.000E+00 7.315E+01 5.439E+01 1.232E+02 1.715E+02
2.231E+02 4.937E+02 2.731E+02 6.276E+02 3.732E+02 8.242E+02 4.731E+02 9.623E+02
5.731E+02 1.046E+03 6.731E+02 1.092E+03 1.473E+03 1.314E+03 1.873E+03 1.402E+03
5.731E+02 1.653E+02 8.731E+02 1.067E+02 1.173E+03 6.067E+01 1.473E+03 2.900E+01
1.773E+03 1.464E+01 1.873E+03 1.300E+01

sickt 4534 n 5 3.100E+03 2.973E+03 0.000E+00
  12 7 6.778E+02 1.799E+02
0.000E+00 0.000E+00 4.315E+01 8.000E+00 7.315E+01 5.439E+01 1.232E+02 1.715E+02
2.231E+02 4.937E+02 2.731E+02 6.276E+02 3.732E+02 8.242E+02 4.731E+02 9.623E+02
5.731E+02 1.046E+03 6.731E+02 1.092E+03 1.473E+03 1.314E+03 1.873E+03 1.402E+03
2.982E+02 1.799E+02 4.731E+02 1.381E+02 7.731E+02 7.950E+01 1.073E+03 4.058E+01
1.273E+03 2.385E+01 1.473E+03 1.715E+01 1.573E+03 1.715E+01

siccf 4535 n 5 2.700E+03 2.973E+03 0.000E+00
  12 3 6.778E+02 2.176E+01
0.000E+00 0.000E+00 4.315E+01 8.000E+00 7.315E+01 5.439E+01 1.232E+02 1.715E+02
2.231E+02 4.937E+02 2.731E+02 6.276E+02 3.732E+02 8.242E+02 4.731E+02 9.623E+02
5.731E+02 1.046E+03 6.731E+02 1.092E+03 1.473E+03 1.314E+03 1.873E+03 1.402E+03
3.732E+02 2.176E+01 6.731E+02 1.700E+01 1.073E+03 1.297E+01

```

```
sicfb 4536      n      5 2.700E+03 2.973E+03 0.000E+00
  12      5 6.778E+02 4.602E+01
  0.000E+00 0.000E+00 4.315E+01 8.000E+00 7.315E+01 5.439E+01 1.232E+02 1.715E+02
  2.231E+02 4.937E+02 2.731E+02 6.276E+02 3.732E+02 8.242E+02 4.731E+02 9.623E+02
  5.731E+02 1.046E+03 6.731E+02 1.092E+03 1.473E+03 1.314E+03 1.873E+03 1.402E+03
  3.732E+02 4.602E+01 5.731E+02 2.900E+01 8.731E+02 1.700E+01 1.173E+03 1.300E+01
  1.373E+03 1.300E+01
```

```
sicrx 4537      n      5 2.900E+03 2.973E+03 0.000E+00
  12      4 6.778E+02 5.188E+01
  0.000E+00 0.000E+00 4.315E+01 8.000E+00 7.315E+01 5.439E+01 1.232E+02 1.715E+02
  2.231E+02 4.937E+02 2.731E+02 6.276E+02 3.732E+02 8.242E+02 4.731E+02 9.623E+02
  5.731E+02 1.046E+03 6.731E+02 1.092E+03 1.473E+03 1.314E+03 1.873E+03 1.402E+03
  3.732E+02 5.188E+01 7.731E+02 3.012E+01 1.073E+03 2.218E+01 1.273E+03 2.050E+01
```

```
sicrp 4538      n      5 2.070E+03 2.973E+03 0.000E+00
  12      5 6.778E+02 1.841E+01
  0.000E+00 0.000E+00 4.315E+01 8.000E+00 7.315E+01 5.439E+01 1.232E+02 1.715E+02
  2.231E+02 4.937E+02 2.731E+02 6.276E+02 3.732E+02 8.242E+02 4.731E+02 9.623E+02
  5.731E+02 1.046E+03 6.731E+02 1.092E+03 1.473E+03 1.314E+03 1.873E+03 1.402E+03
  8.731E+02 1.841E+01 1.073E+03 1.590E+01 1.273E+03 1.381E+01 1.473E+03 1.213E+01
  1.673E+03 1.088E+01
```

```
sical 4539      n      5 2.500E+03 2.973E+03 0.000E+00
  12      2 6.778E+02 1.112E+01
  0.000E+00 0.000E+00 4.315E+01 8.000E+00 7.315E+01 5.439E+01 1.232E+02 1.715E+02
  2.231E+02 4.937E+02 2.731E+02 6.276E+02 3.732E+02 8.242E+02 4.731E+02 9.623E+02
  5.731E+02 1.046E+03 6.731E+02 1.092E+03 1.473E+03 1.314E+03 1.873E+03 1.402E+03
  1.123E+03 1.172E+01 1.398E+03 1.172E+01
```

```
sicrd 4540      n      5 2.700E+03 2.973E+03 0.000E+00
  12      2 6.778E+02 4.000E+01
  0.000E+00 0.000E+00 4.315E+01 8.000E+00 7.315E+01 5.439E+01 1.232E+02 1.715E+02
  2.231E+02 4.937E+02 2.731E+02 6.276E+02 3.732E+02 8.242E+02 4.731E+02 9.623E+02
  5.731E+02 1.046E+03 6.731E+02 1.092E+03 1.473E+03 1.314E+03 1.873E+03 1.402E+03
  2.931E+02 4.000E+01 6.981E+02 4.000E+01
```

```
sicnb 4541      n      5 2.660E+03 2.973E+03 0.000E+00
  12      4 6.778E+02 4.000E+01
  0.000E+00 0.000E+00 4.315E+01 8.000E+00 7.315E+01 5.439E+01 1.232E+02 1.715E+02
  2.231E+02 4.937E+02 2.731E+02 6.276E+02 3.732E+02 8.242E+02 4.731E+02 9.623E+02
  5.731E+02 1.046E+03 6.731E+02 1.092E+03 1.473E+03 1.314E+03 1.873E+03 1.402E+03
  4.731E+02 4.000E+01 8.731E+02 2.500E+01 1.173E+03 1.700E+01 1.473E+03 1.300E+01
```


Thermal Property Data
 k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

```

siefv 4542      n      5 4.600E+02 2.973E+03 0.000E+00
  12      2 6.778E+02 1.046E-01
0.000E+00 0.000E+00 4.315E+01 8.000E+00 7.315E+01 5.439E+01 1.232E+02 1.715E+02
2.231E+02 4.937E+02 2.731E+02 6.276E+02 3.732E+02 8.242E+02 4.731E+02 9.623E+02
5.731E+02 1.046E+03 6.731E+02 1.092E+03 1.473E+03 1.314E+03 1.873E+03 1.402E+03
5.731E+02 1.046E-01 1.073E+03 5.021E-01

```

```

sicpa 4543      n      5 1.585E+03 2.973E+03 0.000E+00
  12      3 6.778E+02 2.500E-01
0.000E+00 0.000E+00 4.315E+01 8.000E+00 7.315E+01 5.439E+01 1.232E+02 1.715E+02
2.231E+02 4.937E+02 2.731E+02 6.276E+02 3.732E+02 8.242E+02 4.731E+02 9.623E+02
5.731E+02 1.046E+03 6.731E+02 1.092E+03 1.473E+03 1.314E+03 1.873E+03 1.402E+03
3.732E+02 2.500E-01 7.731E+02 3.222E-01 1.273E+03 3.556E+02

```

```

sicph 4544      n      5 1.585E+03 2.973E+03 0.000E+00
  12      3 6.778E+02 6.904E-01
0.000E+00 0.000E+00 4.315E+01 8.000E+00 7.315E+01 5.439E+01 1.232E+02 1.715E+02
2.231E+02 4.937E+02 2.731E+02 6.276E+02 3.732E+02 8.242E+02 4.731E+02 9.623E+02
5.731E+02 1.046E+03 6.731E+02 1.092E+03 1.473E+03 1.314E+03 1.873E+03 1.402E+03
3.732E+02 6.904E-01 7.731E+02 7.531E-01 1.273E+03 7.113E-01

```

```

tac 4562      n      5 1.400E+04 4.123E+03 0.000E+00
  11      3 1.904E+02 3.300E+01
0.000E+00 0.000E+00 7.315E+01 7.531E+01 1.232E+02 1.130E+02 1.732E+02 1.423E+02
2.731E+02 1.841E+02 3.732E+02 2.050E+02 5.731E+02 2.343E+02 1.073E+03 2.657E+02
1.773E+03 2.971E+02 2.273E+03 3.138E+02 2.873E+03 3.284E+02
2.982E+02 2.218E+01 5.731E+02 3.300E+01 2.873E+03 3.300E+01

```

```

thc 4564      n      5 8.500E+03 2.896E+03 0.000E+00
  12      4 1.715E+02 8.786E+00
7.315E+01 8.000E+01 1.232E+02 1.172E+02 1.732E+02 1.464E+02 2.231E+02 1.590E+02
2.731E+02 1.700E+02 3.732E+02 1.841E+02 4.731E+02 2.008E+02 5.731E+02 2.100E+02
6.731E+02 2.176E+02 8.731E+02 2.259E+02 1.273E+03 2.343E+02 1.973E+03 2.500E+02
4.231E+02 8.912E+00 4.731E+02 8.159E+00 5.731E+02 7.489E+00 6.731E+02 7.406E+00

```

```

thc2 4565      n      5 6.600E+03 2.928E+03 0.000E+00
  12      4 2.218E+02 2.448E+01
0.000E+00 0.000E+00 1.315E+01 2.900E+00 4.315E+01 4.000E+01 7.315E+01 8.000E+01
1.232E+02 1.284E+02 1.732E+02 1.657E+02 2.231E+02 1.946E+02 2.731E+02 2.142E+02
3.732E+02 2.406E+02 4.731E+02 2.636E+02 6.731E+02 2.824E+02 1.073E+03 3.138E+02
4.231E+02 2.448E+01 4.731E+02 2.335E+01 5.731E+02 2.075E+01 6.731E+02 2.008E+01

```

```

tic96 4566      n      5 4.740E+03 3.338E+03 0.000E+00
  9      4 5.690E+02 3.138E+01
0.000E+00 0.000E+00 7.315E+01 5.021E+01 1.732E+02 3.300E+02 2.731E+02 5.439E+02
3.732E+02 6.694E+02 4.731E+02 7.406E+02 7.731E+02 8.201E+02 1.473E+03 8.996E+02
2.373E+03 9.414E+02
2.731E+02 3.138E+01 1.473E+03 4.351E+01 1.873E+03 4.602E+01 2.473E+03 4.728E+01

```

```

tic93 4567      n      5 4.560E+03 3.338E+03 0.000E+00
      9      2 5.690E+02 1.632E+01
0.000E+00 0.000E+00 7.315E+01 5.021E+01 1.732E+02 3.300E+02 2.731E+02 5.439E+02
3.732E+02 6.694E+02 4.731E+02 7.406E+02 7.731E+02 8.201E+02 1.473E+03 8.996E+02
2.373E+03 9.414E+02
2.731E+02 1.632E+01 8.731E+02 2.050E+01

wc      4568      n      5 1.560E+04 3.073E+03 0.000E+00
      6      2 1.841E+02 4.000E+01
2.982E+02 1.841E+02 4.731E+02 2.301E+02 1.273E+03 2.761E+02 2.073E+03 3.284E+02
2.473E+03 3.431E+02 2.773E+03 3.431E+02
1.073E+03 4.000E+01 2.873E+03 5.858E+01

ucamc 4572      n      5 1.360E+04 2.773E+03 0.000E+00
      12     5 2.029E+02 2.636E+01
0.000E+00 0.000E+00 1.315E+01 4.000E+00 7.315E+01 7.950E+01 1.232E+02 1.238E+02
1.732E+02 1.590E+02 2.231E+02 1.812E+02 2.731E+02 1.966E+02 3.732E+02 2.176E+02
4.731E+02 2.259E+02 6.731E+02 2.427E+02 1.173E+03 2.636E+02 1.773E+03 2.824E+02
3.732E+02 2.008E+01 5.731E+02 1.841E+01 7.731E+02 1.883E+01 1.073E+03 2.427E+01
1.773E+03 3.431E+01

ucsnt 4573      n      5 1.230E+04 2.773E+03 0.000E+00
      12     5 2.029E+02 1.736E+01
0.000E+00 0.000E+00 1.315E+01 4.000E+00 7.315E+01 7.950E+01 1.232E+02 1.238E+02
1.732E+02 1.590E+02 2.231E+02 1.812E+02 2.731E+02 1.966E+02 3.732E+02 2.176E+02
4.731E+02 2.259E+02 6.731E+02 2.427E+02 1.173E+03 2.636E+02 1.773E+03 2.824E+02
3.732E+02 1.736E+01 5.731E+02 1.715E+01 7.731E+02 1.736E+01 1.073E+03 2.008E+01
1.773E+03 3.284E+01

ucavg 4574      n      5 1.350E+04 2.773E+03 0.000E+00
      12     0 2.029E+02 2.385E+01
0.000E+00 0.000E+00 1.315E+01 4.000E+00 7.315E+01 7.950E+01 1.232E+02 1.238E+02
1.732E+02 1.590E+02 2.231E+02 1.812E+02 2.731E+02 1.966E+02 3.732E+02 2.176E+02
4.731E+02 2.259E+02 6.731E+02 2.427E+02 1.173E+03 2.636E+02 1.773E+03 2.824E+02

uc2     4576      n      5 1.130E+04 2.700E+03 0.000E+00
      12     4 2.343E+02 3.300E+01
0.000E+00 0.000E+00 1.315E+01 4.000E+00 1.232E+02 1.234E+02 1.732E+02 1.682E+02
2.231E+02 2.021E+02 2.731E+02 2.238E+02 3.732E+02 2.469E+02 4.731E+02 2.636E+02
6.731E+02 2.824E+02 1.073E+03 3.138E+02 1.473E+03 3.800E+02 2.088E+03 5.230E+02
2.731E+02 3.473E+01 1.473E+03 1.300E+01 1.673E+03 1.172E+01 2.073E+03 1.841E+01

vc      4578      n      5 5.600E+03 2.923E+03 0.000E+00
      8      4 5.858E+02 3.640E+01
0.000E+00 0.000E+00 1.315E+01 4.000E+01 1.732E+02 3.300E+02 2.731E+02 5.021E+02
3.732E+02 5.858E+02 5.731E+02 6.904E+02 1.673E+03 9.832E+02 2.773E+03 1.590E+03
1.173E+03 3.640E+01 1.673E+03 3.300E+01 2.073E+03 3.849E+01 2.373E+03 4.770E+01

```

Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

```

zrc  4580    n    5 6.000E+03 3.573E+03 0.000E+00
      9      2 3.682E+02 3.300E+01
0.000E+00 0.000E+00 4.315E+01 2.100E+01 1.732E+02 2.427E+02 2.731E+02 3.556E+02
3.732E+02 4.142E+02 5.731E+02 4.686E+02 1.073E+03 5.104E+02 1.773E+03 5.356E+02
2.773E+03 6.276E+02
5.731E+02 3.300E+01 2.773E+03 4.000E+01

bab6 4612    n    5 4.340E+03 2.533E+03 0.000E+00
      0      0 1.300E+03 4.477E+01

sib4 4614    n    5 2.460E+03 1.366E+03 0.000E+00
      4      2 1.046E+03 9.832E+00
3.732E+02 1.046E+03 7.731E+02 1.700E+03 1.273E+03 2.100E+03 2.073E+03 2.500E+03
3.131E+02 9.832E+00 5.731E+02 7.196E+00

cab6 4616    n    5 2.460E+03 2.503E+03 0.000E+00
      0      0 1.300E+03 3.916E+01

hfb2 4618    n    5 1.120E+04 3.373E+03 0.000E+00
      7      3 2.500E+02 4.000E+01
0.000E+00 0.000E+00 1.232E+02 8.000E+00 2.231E+02 2.050E+02 2.982E+02 2.500E+02
3.732E+02 2.845E+02 5.731E+02 3.389E+02 2.873E+03 4.979E+02
2.731E+02 4.000E+01 1.273E+03 6.276E+01 2.273E+03 1.046E+02

nbb2 4620    n    5 6.800E+03 3.173E+03 0.000E+00
      8      3 4.000E+02 1.700E+01
0.000E+00 0.000E+00 5.315E+01 2.900E+01 1.732E+02 2.500E+02 2.731E+02 3.975E+02
3.732E+02 4.853E+02 1.273E+03 8.284E+02 1.773E+03 9.079E+02 2.273E+03 9.498E+02
2.731E+02 1.700E+01 1.273E+03 1.700E+01 2.273E+03 3.556E+01

yb6  4622    n    5 3.600E+03 2.573E+03 0.000E+00
      0      0 6.276E+02 2.900E+01

lab6 4624    n    5 4.600E+03 2.423E+03 0.000E+00
      0      0 6.276E+02 4.770E+01

ceb6 4626    n    5 4.700E+03 2.463E+03 0.000E+00
      0      0 6.276E+02 3.389E+01

prb6 4628    n    5 4.600E+03 0.000E+00 0.000E+00
      0      0 6.276E+02 4.100E+01

ndb6 4630    n    5 4.800E+03 2.813E+03 0.000E+00
      0      0 6.276E+02 4.728E+01

smb6 4632    n    5 4.900E+03 2.813E+03 0.000E+00
      0      0 6.276E+02 1.381E+01

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eub6  4634      n      5  4.600E+03  0.000E+00  0.000E+00
      0      0  6.276E+02  2.301E+01

gdb6  4636      n      5  5.000E+03  2.373E+03  0.000E+00
      0      0  6.276E+02  2.050E+01

tbb6  4638      n      5  5.000E+03  0.000E+00  0.000E+00
      0      0  6.276E+02  2.008E+01

ybb6  4640      n      5  5.000E+03  0.000E+00  0.000E+00
      0      0  6.276E+02  2.500E+01

tab   4642      n      5  1.210E+04  2.703E+03  0.000E+00
      4      3  2.301E+02  1.172E+02
      2.982E+02  2.100E+02  4.731E+02  2.301E+02  7.731E+02  2.636E+02  1.173E+03  3.264E+02
      5.731E+02  1.172E+02  1.173E+03  4.602E+01  2.773E+03  5.021E+01

tab2  4644      n      5  1.200E+04  3.273E+03  0.000E+00
      8      4  2.259E+02  8.619E+01
      0.000E+00  0.000E+00  2.315E+01  4.000E+00  1.732E+02  1.548E+02  2.731E+02  2.100E+02
      3.732E+02  2.845E+02  7.731E+02  3.800E+02  1.273E+03  4.602E+02  2.773E+03  4.602E+02
      6.731E+02  8.619E+01  1.073E+03  4.310E+01  1.173E+03  3.807E+01  1.973E+03  3.975E+01

thb4  4646      n      5  8.450E+03  2.483E+03  0.000E+00
      4      3  4.937E+02  1.590E+01
      4.731E+02  4.937E+02  7.731E+02  5.104E+02  1.073E+03  5.188E+02  2.273E+03  5.188E+02
      2.931E+02  1.590E+01  8.731E+02  2.678E+01  1.873E+03  3.598E+01

thb6  4648      n      5  6.800E+03  2.423E+03  0.000E+00
      0      0  6.276E+02  4.310E+01

tib2  4650      n      5  4.300E+03  3.143E+03  0.000E+00
      8      3  6.694E+02  2.500E+01
      0.000E+00  0.000E+00  6.315E+01  4.000E+00  2.731E+02  6.276E+02  3.732E+02  7.531E+02
      5.731E+02  9.205E+02  7.731E+02  1.004E+03  1.273E+03  1.151E+03  2.773E+03  1.506E+03
      2.731E+02  2.500E+01  1.073E+03  3.300E+01  2.573E+03  5.439E+01

wb    4652      n      5  1.600E+04  3.193E+03  0.000E+00
      5      2  1.757E+02  4.602E+00
      2.982E+02  1.757E+02  3.732E+02  2.134E+02  5.731E+02  2.552E+02  1.073E+03  2.720E+02
      2.473E+03  4.100E+02
      1.273E+03  4.602E+00  2.673E+03  3.800E+00

ub4   4654      n      5  9.380E+03  2.753E+03  0.000E+00
      0      0  5.021E+02  5.021E+00

vb2   4656      n      5  5.070E+03  2.697E+03  0.000E+00
      0      0  6.611E+02  5.690E+01

```

Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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zrb2 4658      n      5 5.900E+03 3.273E+03 0.000E+00
      8      3 4.000E+02 2.500E+01
      0.000E+00 0.000E+00 4.315E+01 2.100E+01 2.731E+02 3.975E+02 3.732E+02 5.021E+02
      5.731E+02 6.276E+02 1.273E+03 7.740E+02 1.773E+03 8.000E+02 2.573E+03 8.000E+02
      2.731E+02 2.500E+01 1.273E+03 3.975E+01 2.273E+03 6.485E+01

mobed 4712      n      5 2.916E+03 1.923E+03 0.000E+00
      5      5 1.088E+03 4.000E+01
      2.982E+02 1.088E+03 3.732E+02 1.226E+03 4.731E+02 1.347E+03 6.731E+02 1.523E+03
      1.073E+03 1.791E+03
      5.731E+02 4.310E+01 8.731E+02 3.849E+01 1.073E+03 3.787E+01 1.173E+03 3.933E+01
      1.273E+03 4.000E+01

nbbed 4714      n      5 2.800E+03 1.923E+03 0.000E+00
      7      4 1.105E+03 2.301E+01
      2.982E+02 1.105E+03 3.732E+02 1.234E+03 4.731E+02 1.364E+03 5.731E+02 1.464E+03
      6.731E+02 1.523E+03 9.731E+02 1.700E+03 1.673E+03 1.799E+03
      2.982E+02 2.301E+01 7.731E+02 2.500E+01 1.373E+03 3.138E+01 1.773E+03 3.300E+01

nbbe8 4716      n      5 3.200E+03 2.023E+03 0.000E+00
      4      2 9.205E+02 3.138E+01
      2.982E+02 9.205E+02 4.731E+02 1.172E+03 6.731E+02 1.297E+03 1.073E+03 1.506E+03
      5.731E+02 3.138E+02 1.773E+03 3.515E+01

tabed 4718      n      5 4.100E+03 2.123E+03 1.163E+06
      6      3 7.740E+02 4.000E+01
      2.982E+02 7.740E+02 3.732E+02 8.661E+02 5.731E+02 1.008E+03 7.731E+02 1.113E+03
      9.731E+02 1.155E+03 1.773E+03 1.300E+03
      2.982E+02 4.000E+01 7.232E+02 2.761E+01 1.773E+03 3.800E+01

tabe8 4720      n      5 5.000E+03 2.253E+03 0.000E+00
      2      3 8.786E+02 2.900E+01
      7.232E+02 8.786E+02 1.773E+03 1.088E+03
      5.731E+02 2.900E+01 8.731E+02 2.900E+01 1.773E+03 3.264E+01

tibed 4722      n      5 2.200E+03 1.811E+03 0.000E+00
      5      6 1.423E+03 2.385E+01
      2.982E+02 1.423E+03 3.732E+02 1.623E+03 4.731E+02 1.795E+03 5.731E+02 1.904E+03
      1.073E+03 2.335E+03
      5.731E+02 2.385E+01 7.731E+02 2.427E+01 8.731E+02 2.531E+01 9.731E+02 2.761E+01
      1.073E+03 3.138E+01 1.273E+03 4.100E+01

ube13 4724      n      5 2.700E+03 0.000E+00 0.000E+00
      0      3 8.000E+02 2.100E+01
      3.732E+02 2.100E+01 6.731E+02 2.594E+01 9.731E+02 2.720E+01

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vbe12 4726      n      5 1.900E+03 1.978E+03 0.000E+00
      3      0 1.464E+03 3.096E+01
      3.231E+02 1.464E+03 5.731E+02 1.925E+03 6.731E+02 2.033E+03

zrbet 4728      n      5 2.750E+03 2.143E+03 0.000E+00
      5      3 1.138E+03 3.975E+01
      2.731E+02 1.096E+03 4.731E+02 1.414E+03 6.731E+02 1.611E+03 1.073E+03 1.841E+03
      1.773E+03 2.008E+03
      5.731E+02 3.975E+01 7.731E+02 3.800E+01 1.773E+03 3.724E+01

ces 4742      n      5 5.930E+03 2.573E+03 0.000E+00
      7      0 2.900E+02 8.000E+00
      0.000E+00 0.000E+00 2.315E+01 1.700E+01 7.315E+01 1.632E+02 1.232E+02 2.218E+02
      1.732E+02 2.594E+02 2.731E+02 2.887E+02 1.273E+03 4.393E+02

ce2s3 4744      n      5 5.200E+03 2.173E+03 0.000E+00
      8      2 3.431E+02 5.858E-01
      0.000E+00 0.000E+00 2.315E+01 2.100E+01 7.315E+01 1.590E+02 1.232E+02 2.552E+02
      1.732E+02 3.054E+02 2.231E+02 3.305E+02 2.982E+02 3.431E+02 1.273E+03 4.812E+02
      2.731E+02 5.858E-01 1.673E+03 1.300E+00

fes2 4746      n      5 5.000E+03 1.444E+03 0.000E+00
      8      0 5.565E+02 3.791E+01
      2.982E+02 5.565E+02 3.732E+02 6.025E+02 4.731E+02 6.402E+02 5.731E+02 6.611E+02
      6.731E+02 6.778E+02 7.731E+02 6.862E+02 8.731E+02 6.945E+02 9.731E+02 7.029E+02

pus 4747      n      5 1.059E+04 2.623E+03 0.000E+00
      0      3 2.301E+02 9.623E+00
      2.982E+02 9.623E+00 3.732E+02 7.950E+00 9.232E+02 1.548E+01

sms 4748      n      5 6.010E+03 2.213E+03 0.000E+00
      0      5 2.900E+02 3.800E+00
      2.731E+02 3.975E+00 4.731E+02 2.720E+00 6.731E+02 2.008E+00 8.731E+02 1.715E+00
      1.073E+03 1.548E+00

zns 4750      n      5 4.100E+03 1.918E+03 3.891E+05
      9      2 4.728E+02 2.594E+01
      2.982E+02 4.728E+02 3.732E+02 5.021E+02 4.731E+02 5.230E+02 5.731E+02 5.356E+02
      8.731E+02 5.607E+02 1.288E+03 5.858E+02 1.293E+03 2.820E+04 1.298E+03 5.858E+02
      1.373E+03 5.858E+02
      8.315E+01 6.276E+00 2.731E+02 2.594E+01

pup 4762      n      5 9.890E+03 2.873E+03 0.000E+00
      2      2 2.301E+02 5.439E+00
      2.982E+02 2.301E+02 9.232E+02 2.343E+02
      2.982E+02 5.439E+00 9.232E+02 7.113E+00

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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crai2 4772      n      5 5.000E+03 1.843E+03 0.000E+00
      5      8 4.937E+02 7.950E+00
      2.982E+02 4.937E+02 3.732E+02 5.899E+02 4.731E+02 6.736E+02 6.731E+02 7.908E+02
      8.731E+02 8.786E+02
      2.982E+02 7.950E+00 3.732E+02 6.653E+00 4.731E+02 5.230E+00 5.731E+02 4.100E+00
      6.731E+02 3.300E+00 7.731E+02 2.845E+00 8.731E+02 2.615E+00 8.981E+02 2.594E+00

cos  4774      n      5 6.600E+03 0.000E+00 0.000E+00
      0      0 5.858E+02 9.623E+00

mg2si 4776      n      5 1.970E+03 1.344E+03 0.000E+00
      2      4 8.000E+02 8.000E+00
      3.732E+02 8.000E+02 1.273E+03 1.300E+03
      2.731E+02 8.000E+00 3.732E+02 6.276E+00 4.731E+02 4.895E+00 5.731E+02 3.891E+00

mnsi2 4778      n      5 5.240E+03 1.548E+03 0.000E+00
      2      6 5.858E+02 7.196E+00
      2.982E+02 5.858E+02 7.731E+02 7.113E+02
      2.982E+02 7.196E+00 3.732E+02 6.192E+00 4.731E+02 5.104E+00 6.731E+02 3.515E+00
      8.731E+02 2.594E+00 9.232E+02 2.427E+00

mosi2 4780      n      5 6.260E+03 2.243E+03 0.000E+00
      5      6 4.000E+02 4.519E+01
      2.731E+02 4.000E+02 4.731E+02 4.728E+02 6.731E+02 5.021E+02 1.273E+03 5.439E+02
      1.773E+03 5.774E+02
      3.732E+02 4.519E+01 6.731E+02 3.264E+01 1.073E+03 2.134E+01 1.473E+03 1.381E+01
      1.773E+03 1.088E+01 2.073E+03 1.213E+01

nbsi2 4782      n      5 5.290E+03 2.223E+03 0.000E+00
      2      0 4.602E+02 4.000E+01
      2.731E+02 4.602E+02 7.731E+02 5.439E+02

tasi2 4784      n      5 8.830E+03 2.673E+03 0.000E+00
      2      0 3.138E+02 3.703E+01
      2.731E+02 3.138E+02 7.731E+02 3.800E+02

wsi2  4786      n      5 9.400E+03 2.173E+03 0.000E+00
      3      8 3.079E+02 4.058E+01
      2.982E+02 3.079E+02 1.173E+03 3.397E+02 1.773E+03 3.485E+02
      6.731E+02 4.058E+01 9.731E+02 3.222E+01 1.073E+03 3.054E+01 1.273E+03 2.971E+01
      1.573E+03 3.096E+01 1.673E+03 3.243E+01 1.773E+03 3.724E+01 1.823E+03 3.975E+01

u3si  4788      n      5 1.545E+04 1.223E+03 0.000E+00
      0      0 1.757E+02 1.674E+01

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nh4br 4812      n      5 2.430E+03 7.251E+02 0.000E+00
      6      2 1.004E+03 2.500E+00
      7.315E+01 4.602E+02 1.232E+02 7.531E+02 1.732E+02 8.786E+02 2.231E+02 9.623E+02
      2.731E+02 1.004E+03 6.731E+02 1.172E+03
      8.315E+01 6.694E+00 2.731E+02 2.500E+00

nh4cl 4814      n      5 1.530E+03 6.131E+02 0.000E+00
      9      2 1.678E+03 2.500E+00
      7.315E+01 5.858E+02 1.232E+02 1.088E+03 1.732E+02 1.381E+03 2.231E+02 1.548E+03
      2.982E+02 1.678E+03 4.527E+02 2.075E+03 4.576E+02 1.799E+04 4.627E+02 1.611E+03
      5.001E+02 1.724E+03
      8.315E+01 1.088E+01 2.731E+02 2.500E+00

baf2  4816      n      5 4.890E+03 1.553E+03 2.105E+05
      6      6 4.393E+02 1.130E+01
      7.315E+01 2.008E+02 1.232E+02 3.222E+02 1.732E+02 3.807E+02 2.231E+02 4.000E+02
      2.731E+02 4.310E+02 1.073E+03 5.439E+02
      2.231E+02 2.008E+01 2.482E+02 1.464E+01 2.731E+02 1.300E+01 2.982E+02 1.130E+01
      3.231E+02 1.088E+01 3.732E+02 1.046E+01

caf2  4818      n      5 3.180E+03 1.633E+03 2.500E+05
      12     7 1.167E+03 9.623E+00
      2.982E+02 1.167E+03 3.732E+02 1.092E+03 4.731E+02 1.063E+03 5.731E+02 1.067E+03
      6.731E+02 1.084E+03 8.731E+02 1.138E+03 1.073E+03 1.205E+03 1.273E+03 1.276E+03
      1.419E+03 1.331E+03 1.424E+03 1.360E+04 1.429E+03 1.410E+03 1.633E+03 1.607E+03
      2.231E+02 1.590E+01 2.731E+02 1.046E+01 3.732E+02 7.740E+00 4.731E+02 5.021E+00
      5.731E+02 3.300E+00 6.731E+02 2.900E+00 1.073E+03 2.301E+00

caf2a 4820      n      5 3.180E+03 1.633E+03 2.500E+05
      12     0 1.167E+03 4.017E+00
      2.982E+02 1.167E+03 3.732E+02 1.092E+03 4.731E+02 1.063E+03 5.731E+02 1.067E+03
      6.731E+02 1.084E+03 8.731E+02 1.138E+03 1.073E+03 1.205E+03 1.273E+03 1.276E+03
      1.419E+03 1.331E+03 1.424E+03 1.360E+04 1.429E+03 1.410E+03 1.633E+03 1.607E+03

lif  4822      n      5 2.640E+03 1.123E+03 1.033E+06
      6      2 1.632E+03 1.109E+01
      2.982E+02 1.632E+03 3.732E+02 1.799E+03 1.073E+03 2.385E+03 1.123E+03 2.427E+03
      1.123E+03 2.500E+03 1.173E+03 2.500E+03
      2.731E+02 1.109E+01 7.731E+02 6.276E+00

lifpb 4824      n      5 2.460E+03 1.123E+03 1.033E+06
      6      4 1.632E+03 1.004E+01
      2.982E+02 1.632E+03 3.732E+02 1.799E+03 1.073E+03 2.385E+03 1.123E+03 2.427E+03
      1.123E+03 2.500E+03 1.173E+03 2.500E+03
      2.275E+02 1.176E+01 2.464E+02 1.159E+01 3.142E+02 9.623E+00 3.387E+02 9.330E+00

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

kgc12 4826 n 5 5.440E+03 5.501E+02 6.694E+04
 6 2 2.845E+02 1.297E+00
 7.315E+01 1.297E+02 1.232E+02 3.100E+02 1.732E+02 2.469E+02 2.231E+02 2.720E+02
 2.731E+02 2.845E+02 5.501E+02 3.305E+02
 8.315E+01 1.715E+00 2.731E+02 1.297E+00

kgc1 4828 n 5 2.750E+03 1.003E+03 1.883E+05
 8 2 4.351E+02 3.807E+00
 7.315E+01 1.966E+02 1.232E+02 3.180E+02 1.732E+02 3.724E+02 2.231E+02 4.079E+02
 2.731E+02 4.226E+02 5.731E+02 4.728E+02 6.731E+02 4.895E+02 9.731E+02 5.272E+02
 8.315E+01 9.705E+00 2.731E+02 3.807E+00

kgc13 4830 n 5 2.750E+03 1.003E+03 1.883E+05
 8 0 4.351E+02 4.812E+00
 7.315E+01 1.966E+02 1.232E+02 3.180E+02 1.732E+02 3.724E+02 2.231E+02 4.079E+02
 2.731E+02 4.226E+02 5.731E+02 4.728E+02 6.731E+02 4.895E+02 9.731E+02 5.272E+02

kgc190 4831 n 5 2.660E+03 1.015E+03 2.301E+05
 6 2 4.477E+02 2.887E+00
 7.315E+01 2.050E+02 1.232E+02 3.264E+02 1.732E+02 3.849E+02 2.231E+02 4.226E+02
 2.731E+02 4.351E+02 9.731E+02 5.481E+02
 8.315E+01 5.071E+00 2.731E+02 2.887E+00

kgc175 4832 n 5 2.550E+03 1.015E+03 2.500E+05
 6 2 4.770E+02 2.100E+00
 7.315E+01 2.176E+02 1.232E+02 3.473E+02 1.732E+02 4.100E+02 2.231E+02 4.519E+02
 2.731E+02 4.644E+02 9.731E+02 5.816E+02
 8.315E+01 2.887E+00 2.731E+02 2.100E+00

kgc150 4833 n 5 2.360E+03 1.015E+03 2.887E+05
 6 2 5.314E+02 2.500E+00
 7.315E+01 2.177E+02 1.232E+02 3.891E+02 1.732E+02 4.602E+02 2.231E+02 5.021E+02
 2.731E+02 5.188E+02 9.731E+02 6.485E+02
 8.315E+01 2.500E+00 2.731E+02 2.500E+00

kgc175 4834 n 5 2.160E+03 1.015E+03 3.264E+05
 6 2 5.983E+02 3.305E+00
 7.315E+01 2.720E+02 1.232E+02 4.393E+02 1.732E+02 5.146E+02 2.231E+02 5.648E+02
 2.731E+02 5.858E+02 9.731E+02 7.322E+02
 8.315E+01 4.602E+00 2.731E+02 3.305E+00

kgc190 4835 n 5 2.050E+03 1.015E+03 3.473E+05
 6 2 6.485E+02 5.021E+00
 7.315E+01 2.971E+02 1.232E+02 4.770E+02 1.732E+02 5.607E+02 2.231E+02 6.150E+02
 2.731E+02 6.360E+02 9.731E+02 7.950E+02
 8.315E+01 7.991E+00 2.731E+02 5.021E+00

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ[kg/m³]

Thermal Property Data

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kcl  4836      n      5  1.980E+03  1.043E+03  3.598E+05
      8      3  6.862E+02  8.000E+00
      7.315E+01  3.138E+02  1.232E+02  5.063E+02  1.732E+02  5.941E+02  2.231E+02  6.485E+02
      2.731E+02  6.820E+02  3.732E+02  6.904E+02  4.731E+02  7.113E+02  1.043E+03  8.619E+02
      8.315E+01  3.556E+01  2.731E+02  9.205E+00  3.732E+02  5.021E+00

kclsy 4837      n      5  1.990E+03  1.043E+03  3.598E+05
      8      3  6.862E+02  8.000E+00
      7.315E+01  3.138E+02  1.232E+02  5.063E+02  1.732E+02  5.941E+02  2.231E+02  6.485E+02
      2.731E+02  6.820E+02  3.732E+02  6.904E+02  4.731E+02  7.113E+02  1.043E+03  8.619E+02
      8.315E+01  1.590E+01  2.731E+02  7.531E+00  3.732E+02  5.021E+00

kcl50 4838      n      5  2.070E+03  1.043E+03  4.000E+05
      6      2  7.699E+02  7.113E+00
      7.315E+01  3.515E+02  1.232E+02  5.648E+02  1.732E+02  6.694E+02  2.231E+02  7.322E+02
      2.731E+02  7.573E+02  9.731E+02  9.456E+02
      8.315E+01  1.883E+01  2.731E+02  7.113E+00

kf  4840      n      5  2.480E+03  1.123E+03  4.770E+05
      6      2  8.619E+02  7.113E+00
      7.315E+01  3.891E+02  1.232E+02  6.485E+02  1.732E+02  7.615E+02  2.231E+02  8.284E+02
      2.982E+02  8.619E+02  1.123E+03  1.046E+03
      8.315E+01  2.343E+01  2.731E+02  7.113E+00

ki  4842      n      5  3.130E+03  9.551E+02  1.300E+05
      8      2  3.054E+02  2.887E+00
      7.315E+01  1.423E+02  1.232E+02  2.259E+02  1.732E+02  2.678E+02  2.231E+02  2.900E+02
      2.731E+02  3.012E+02  5.731E+02  3.305E+02  7.731E+02  3.264E+02  9.551E+02  2.987E+02
      8.315E+01  1.213E+01  2.731E+02  2.887E+00

rbcl 4844      n      5  2.800E+03  9.882E+02  1.523E+05
      6      2  4.310E+02  2.100E+00
      7.315E+01  1.966E+02  1.232E+02  3.138E+02  1.732E+02  3.724E+02  2.231E+02  4.100E+02
      2.731E+02  4.226E+02  9.882E+02  4.853E+02
      8.315E+01  2.887E+00  2.731E+02  2.100E+00

rbi  4846      n      5  3.550E+03  9.131E+02  5.899E+04
      6      2  2.343E+02  3.305E+00
      7.315E+01  1.088E+02  1.232E+02  1.757E+02  1.732E+02  2.100E+02  2.231E+02  2.301E+02
      2.731E+02  2.360E+02  9.131E+02  2.690E+02
      8.315E+01  5.899E+00  2.731E+02  3.305E+00

agcl 4848      n      5  5.560E+03  7.282E+02  8.452E+04
      8      0  3.556E+02  1.134E+00
      7.315E+01  1.632E+02  1.232E+02  2.636E+02  1.732E+02  3.096E+02  2.231E+02  3.389E+02
      2.982E+02  3.556E+02  3.732E+02  3.891E+02  4.731E+02  4.142E+02  7.282E+02  4.393E+02

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Thermal Property Data

 k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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nabr 4850      n      5 3.203E+03 1.023E+03 2.500E+05
  7      2 5.104E+02 2.500E+00
  7.315E+01 2.301E+02 1.232E+02 3.682E+02 1.732E+02 4.351E+02 2.231E+02 4.728E+02
  2.982E+02 5.104E+02 5.731E+02 5.314E+02 1.023E+03 5.858E+02
  8.315E+01 5.021E+00 2.731E+02 2.500E+00

nacl 4852      n      5 2.165E+03 1.073E+03 5.021E+05
  8     10 8.703E+02 8.159E+00
  7.315E+01 4.017E+02 1.232E+02 6.402E+02 1.732E+02 7.573E+02 2.231E+02 8.284E+02
  2.982E+02 8.703E+02 1.073E+03 1.088E+03 1.073E+03 1.146E+03 1.673E+03 1.146E+03
  8.315E+01 3.431E+01 1.732E+02 1.700E+01 2.731E+02 9.205E+00 3.231E+02 7.113E+00
  3.732E+02 5.858E+00 4.731E+02 4.000E+00 5.481E+02 3.556E+00 7.731E+02 4.000E+00
  9.232E+02 4.812E+00 1.073E+03 5.439E+00

naclr 4854     n      5 2.165E+03 1.073E+03 5.021E+05
  8     10 8.703E+02 5.523E+00
  7.315E+01 4.017E+02 1.232E+02 6.402E+02 1.732E+02 7.573E+02 2.231E+02 8.284E+02
  2.982E+02 8.703E+02 1.073E+03 1.088E+03 1.073E+03 1.146E+03 1.673E+03 1.146E+03
  8.315E+01 1.799E+01 1.732E+02 1.046E+01 2.731E+02 6.276E+00 3.231E+02 5.021E+00
  3.732E+02 4.000E+00 4.731E+02 3.054E+00 6.731E+02 2.050E+00 8.731E+02 1.464E+00
  9.731E+02 1.339E+00 1.073E+03 1.300E+00

naf 4856      n      5 2.558E+03 1.263E+03 6.694E+05
  8      2 1.113E+03 1.050E+01
  7.315E+01 5.439E+02 1.232E+02 8.000E+02 1.732E+02 1.004E+03 2.231E+02 1.088E+03
  2.982E+02 1.113E+03 3.732E+02 1.155E+03 7.731E+02 1.331E+03 1.263E+03 1.523E+03
  8.315E+01 5.188E+01 2.731E+02 1.050E+01

nh3lq 4880     n      5 6.180E+02 1.954E+02 0.000E+00
  6      2 4.686E+03 5.021E-02
  2.132E+02 4.393E+03 2.731E+02 4.602E+03 3.131E+02 4.853E+03 3.532E+02 5.397E+03
  3.732E+02 6.192E+03 3.831E+02 6.736E+03
  2.581E+02 5.021E-02 3.032E+02 5.021E-02

nh3 4881      n      5 7.710E-01 2.398E+02 1.370E+06
  5      3 2.084E+03 2.443E-02
  2.982E+02 2.084E+03 4.731E+02 2.406E+03 7.731E+02 2.870E+03 1.073E+03 3.322E+03
  1.773E+03 4.360E+03
  2.231E+02 1.715E-02 2.731E+02 2.192E-02 3.231E+02 2.699E-02

lih 4882      n      5 7.000E+02 9.591E+02 2.594E+06
  4      7 4.000E+03 7.322E+00
  1.732E+02 2.301E+03 2.731E+02 3.933E+03 4.731E+02 5.648E+03 9.731E+02 7.950E+03
  2.731E+02 7.531E+00 3.732E+02 6.485E+00 4.731E+02 5.523E+00 5.731E+02 5.021E+00
  6.731E+02 4.602E+00 7.731E+02 4.000E+00 8.731E+02 4.100E+00

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lihcg 4884      n      5  7.000E+02  9.591E+02  2.594E+06
    4      8  4.000E+03  1.297E+01
    1.732E+02  2.301E+03  2.731E+02  3.933E+03  4.731E+02  5.648E+03  9.731E+02  7.950E+03
    2.731E+02  1.339E+01  3.231E+02  1.300E+01  3.732E+02  1.088E+01  4.731E+02  7.950E+00
    5.731E+02  6.067E+00  6.731E+02  5.021E+00  7.731E+02  4.602E+00  8.731E+02  4.351E+00

ch4  4890      n      5  7.167E-01  1.117E+02  5.092E+05
    4      6  2.259E+03  3.393E-02
    2.731E+02  2.176E+03  3.732E+02  2.427E+03  4.731E+02  2.761E+03  5.731E+02  3.138E+03
    1.117E+02  1.172E-02  1.732E+02  1.862E-02  2.231E+02  2.452E-02  2.731E+02  3.054E-02
    3.231E+02  3.724E-02  3.732E+02  4.561E-02

zrh12 4892     n      5  6.300E+03  0.000E+00  0.000E+00
    3      0  2.900E+02  1.841E+01
    2.731E+02  2.900E+02  5.731E+02  5.021E+02  7.731E+02  7.113E+02

sbtep 4912     n      5  6.500E+03  9.022E+02  0.000E+00
    0      0  2.100E+02  4.602E+00

sbtec 4913     n      5  6.500E+03  9.022E+02  0.000E+00
    0      0  2.100E+02  3.305E+00

astex 4914     n      5  6.000E+03  0.000E+00  0.000E+00
    0      0  2.343E+02  2.594E+00

bitep 4916     n      5  7.700E+03  8.532E+02  0.000E+00
    6      0  1.544E+02  2.500E+00
    7.315E+01  1.300E+02  1.232E+02  1.464E+02  1.732E+02  1.506E+02  2.731E+02  1.540E+02
    3.732E+02  1.556E+02  8.731E+02  1.987E+02

bites 4918     n      5  6.800E+03  0.000E+00  0.000E+00
    0      6  1.757E+02  2.365E+00
    7.315E+01  2.803E+00  1.232E+02  2.176E+00  1.732E+02  2.008E+00  2.231E+02  2.050E+00
    2.731E+02  2.259E+00  3.231E+02  2.552E+00

insbp 4920     n      5  7.000E+03  8.081E+02  2.050E+05
    11     8  2.176E+02  1.632E+01
    0.000E+00  0.000E+00  5.315E+01  1.046E+02  9.315E+01  1.527E+02  1.232E+02  1.757E+02
    1.732E+02  1.925E+02  2.731E+02  2.134E+02  3.732E+02  2.280E+02  4.731E+02  2.385E+02
    8.081E+02  2.435E+02  8.082E+02  2.343E+02  1.073E+03  2.343E+02
    1.732E+02  3.012E+01  2.231E+02  2.301E+01  2.731E+02  1.799E+01  3.732E+02  1.297E+01
    4.731E+02  1.046E+01  5.731E+02  8.996E+00  6.731E+02  8.000E+00  7.731E+02  7.950E+00

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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insbs 4921      n      5 7.000E+03 8.081E+02 2.050E+05
  11      7 2.176E+02 7.113E+01
0.000E+00 0.000E+00 5.315E+01 1.046E+02 9.315E+01 1.527E+02 1.232E+02 1.757E+02
1.732E+02 1.925E+02 2.731E+02 2.134E+02 3.732E+02 2.280E+02 4.731E+02 2.385E+02
8.081E+02 2.435E+02 8.082E+02 2.343E+02 1.073E+03 2.343E+02
1.932E+02 1.172E+02 2.231E+02 9.205E+01 2.731E+02 7.531E+01 3.732E+02 5.439E+01
4.731E+02 4.602E+01 5.731E+02 3.975E+01 6.731E+02 3.800E+01

inasp 4922      n      5 6.000E+03 1.216E+03 0.000E+00
  10      6 2.500E+02 5.272E+01
0.000E+00 0.000E+00 1.315E+01 1.700E+01 7.315E+01 1.423E+02 1.232E+02 2.029E+02
1.732E+02 2.280E+02 2.231E+02 2.427E+02 2.731E+02 2.500E+02 3.732E+02 2.594E+02
4.731E+02 2.653E+02 1.216E+03 2.887E+02
9.315E+01 8.996E+01 1.232E+02 7.740E+01 1.732E+02 6.443E+01 2.231E+02 5.439E+01
2.731E+02 4.853E+01 2.982E+02 5.272E+01

inass 4923      n      5 6.000E+03 1.216E+03 0.000E+00
  10      5 2.500E+02 2.678E+01
0.000E+00 0.000E+00 1.315E+01 1.700E+01 7.315E+01 1.423E+02 1.232E+02 2.029E+02
1.732E+02 2.280E+02 2.231E+02 2.427E+02 2.731E+02 2.500E+02 3.732E+02 2.594E+02
4.731E+02 2.653E+02 1.216E+03 2.887E+02
2.982E+02 2.678E+01 4.731E+02 1.569E+01 5.731E+02 1.297E+01 8.731E+02 9.623E+00
1.173E+03 8.000E+00

inte  4924      n      5 4.629E+03 3.831E+02 0.000E+00
   0      4 2.008E+02 1.300E+00
7.315E+01 1.715E+00 1.732E+02 1.300E+00 2.731E+02 1.213E+00 3.732E+02 1.464E+00

pbtes 4926      n      5 8.160E+03 1.190E+03 0.000E+00
   0      7 1.506E+02 2.100E+00
7.315E+01 1.029E+01 1.732E+02 5.021E+00 2.231E+02 3.096E+00 2.731E+02 2.301E+00
4.731E+02 1.300E+00 5.731E+02 1.172E+00 6.731E+02 1.423E+00

pbtep 4927      n      5 8.160E+03 1.190E+03 0.000E+00
   0      7 1.506E+02 2.343E+00
7.315E+01 8.786E+00 1.732E+02 4.602E+00 1.732E+02 3.300E+00 2.731E+02 2.500E+00
3.732E+02 1.966E+00 5.731E+02 1.506E+00 7.731E+02 1.423E+00

mnsel 4928      n      5 5.500E+03 0.000E+00 0.000E+00
  10      2 3.849E+02 2.803E+00
5.315E+01 1.700E+02 8.315E+01 2.845E+02 1.082E+02 3.556E+02 1.131E+02 3.807E+02
1.232E+02 3.556E+02 2.381E+02 4.142E+02 2.432E+02 8.000E+02 2.531E+02 4.770E+02
2.632E+02 3.849E+02 2.881E+02 3.849E+02
2.982E+02 2.803E+00 8.731E+02 1.300E+00

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mnte4 4930      n      5 5.700E+03 0.000E+00 0.000E+00
  11      6 4.017E+02 1.300E+00
  4.815E+01 1.464E+02 7.315E+01 1.883E+02 1.232E+02 2.573E+02 1.732E+02 2.900E+02
  2.231E+02 3.201E+02 2.731E+02 3.556E+02 2.931E+02 3.849E+02 3.032E+02 4.000E+02
  3.131E+02 3.300E+02 3.231E+02 3.138E+02 7.731E+02 3.300E+02
  2.731E+02 1.381E+00 3.732E+02 7.950E-01 4.731E+02 4.812E-01 5.731E+02 3.800E-01
  6.731E+02 3.300E-01 7.731E+02 3.300E-01

mnten 4931      n      5 5.700E+03 0.000E+00 0.000E+00
  11      5 4.017E+02 1.700E+00
  4.815E+01 1.464E+02 7.315E+01 1.883E+02 1.232E+02 2.573E+02 1.732E+02 2.900E+02
  2.231E+02 3.201E+02 2.731E+02 3.556E+02 2.931E+02 3.849E+02 3.032E+02 4.000E+02
  3.131E+02 3.300E+02 3.231E+02 3.138E+02 7.731E+02 3.300E+02
  3.732E+02 1.841E+00 5.731E+02 1.569E+00 7.731E+02 1.423E+00 1.073E+03 1.276E+00
  1.373E+03 1.192E+00

mose2 4932      n      5 5.000E+03 1.273E+03 0.000E+00
  0      0 3.012E+02 2.301E+00

mote2 4934      n      5 5.500E+03 0.000E+00 0.000E+00
  0      0 2.259E+02 2.008E+00

site  4936      n      5 3.920E+03 0.000E+00 0.000E+00
  0      0 3.300E+02 6.276E+00

snte8 4938      n      5 6.500E+03 0.000E+00 0.000E+00
  0      0 2.100E+02 2.594E+00

snte6 4939      n      5 6.500E+03 0.000E+00 0.000E+00
  0      0 2.100E+02 1.778E+00

snte2 4940      n      5 6.500E+03 0.000E+00 0.000E+00
  0      0 2.100E+02 9.832E-01

ag2se 4942      n      5 8.000E+03 1.153E+03 0.000E+00
  12      2 2.803E+02 8.000E-01
  0.000E+00 0.000E+00 2.315E+01 7.113E+01 4.815E+01 1.423E+02 7.315E+01 1.925E+02
  9.815E+01 2.134E+02 1.232E+02 2.343E+02 1.732E+02 2.500E+02 2.731E+02 2.720E+02
  2.982E+02 2.803E+02 4.061E+02 3.012E+02 4.062E+02 2.845E+02 4.731E+02 2.803E+02
  2.931E+02 8.000E-01 3.481E+02 8.000E-01

tasb  4944      n      5 1.400E+04 0.000E+00 0.000E+00
  0      2 1.700E+02 1.883E+01
  2.982E+02 1.883E+01 6.981E+02 1.883E+01

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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wso2 4946      n      5 1.000E+04 1.273E+03 0.000E+00
      0      5 2.259E+02 3.431E+00
      2.731E+02 2.900E+00 3.732E+02 5.021E+00 4.731E+02 5.230E+00 5.731E+02 5.230E+00
      6.731E+02 5.230E+00

wte2 4947      n      5 1.200E+04 1.273E+03 0.000E+00
      0      0 1.757E+02 1.590E+00

znsh 4948      n      5 6.300E+03 8.431E+02 0.000E+00
      0      5 2.720E+02 2.343E+00
      2.982E+02 2.343E+00 3.732E+02 1.799E+00 4.731E+02 1.297E+00 5.731E+02 1.300E+00
      6.731E+02 1.300E+00

bano3 4952      n      5 3.240E+03 8.651E+02 9.456E+04
      0      2 8.786E+02 1.297E+00
      8.315E+01 3.305E+00 2.731E+02 1.297E+00

baso4 4954      n      5 4.500E+03 1.853E+03 0.000E+00
      0      2 6.694E+02 1.700E+00
      2.731E+02 1.715E+00 3.732E+02 1.506E+00

cacon 4956      n      5 2.610E+03 1.612E+03 5.314E+05
      10      0 8.000E+02 2.259E+00
      2.731E+02 7.908E+02 3.732E+02 9.121E+02 4.731E+02 1.000E+03 5.731E+02 1.071E+03
      6.731E+02 1.130E+03 7.731E+02 1.188E+03 8.731E+02 1.243E+03 9.731E+02 1.293E+03
      1.073E+03 1.347E+03 1.172E+03 1.381E+03

caccp 4957      n      5 2.710E+03 1.612E+03 5.314E+05
      10      8 8.000E+02 4.393E+00
      2.731E+02 7.908E+02 3.732E+02 9.121E+02 4.731E+02 1.000E+03 5.731E+02 1.071E+03
      6.731E+02 1.130E+03 7.731E+02 1.188E+03 8.731E+02 1.243E+03 9.731E+02 1.293E+03
      1.073E+03 1.347E+03 1.172E+03 1.381E+03
      8.315E+01 2.900E+01 1.732E+02 1.300E+01 2.731E+02 5.021E+00 3.231E+02 3.800E+00
      3.732E+02 3.012E+00 4.731E+02 2.552E+00 5.731E+02 2.301E+00 6.731E+02 2.134E+00

caccs 4958      n      5 2.710E+03 1.612E+03 5.314E+05
      10      8 8.000E+02 3.849E+00
      2.731E+02 7.908E+02 3.732E+02 9.121E+02 4.731E+02 1.000E+03 5.731E+02 1.071E+03
      6.731E+02 1.130E+03 7.731E+02 1.188E+03 8.731E+02 1.243E+03 9.731E+02 1.293E+03
      1.073E+03 1.347E+03 1.172E+03 1.381E+03
      8.315E+01 1.799E+01 1.732E+02 9.205E+00 2.731E+02 4.000E+00 3.231E+02 3.556E+00
      3.732E+02 2.720E+00 4.731E+02 2.385E+00 5.731E+02 2.176E+00 6.731E+02 2.050E+00

dolom 4960      n      5 2.700E+03 1.003E+03 0.000E+00
      0      0 9.205E+02 2.900E+00

gypsm 4962      n      5 2.320E+03 4.011E+02 0.000E+00
      0      0 1.088E+03 1.297E+00

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plas1 4963      n      5 1.250E+03 4.011E+02 0.000E+00
      0      0 1.088E+03 4.310E-01

gyrsa 4964      n      5 2.110E+03 4.011E+02 0.000E+00
      0      0 1.088E+03 7.531E-01

cuso4 4966      n      5 3.606E+03 4.731E+02 0.000E+00
      0      2 7.531E+02 2.100E+00
      8.315E+01 2.887E+00 2.731E+02 2.100E+00

bluev 4967      n      5 2.284E+03 3.831E+02 0.000E+00
      0      0 1.172E+03 2.259E+00

litbr 4968      n      5 2.140E+03 1.203E+03 0.000E+00
      0      0 1.130E+03 1.757E+00

mgso4 4970      n      5 2.660E+03 1.397E+03 1.213E+05
      0      2 1.300E+03 2.500E+00
      3.315E+01 2.500E+00 2.731E+02 2.500E+00

epsom 4971      n      5 1.680E+03 4.231E+02 0.000E+00
      0      0 1.506E+03 2.427E+00

kalum 4972      n      5 1.800E+03 3.657E+02 0.000E+00
      0      2 1.548E+03 2.100E+00
      8.315E+01 1.297E+00 2.731E+02 2.100E+00

cralm 4973      n      5 1.826E+03 3.621E+02 0.000E+00
      0      2 1.339E+03 2.100E+00
      8.315E+01 1.297E+00 2.731E+02 2.100E+00

kfecr 4974      n      5 1.850E+03 3.431E+02 0.000E+00
      0      2 1.130E+03 1.715E+00
      8.315E+01 1.715E+00 2.731E+02 1.715E+00

kno3  4976      n      5 2.109E+03 6.092E+02 1.071E+05
      6      2 8.000E+02 2.100E+00
      2.731E+02 7.866E+02 4.011E+02 1.042E+03 4.012E+02 1.084E+03 6.092E+02 1.084E+03
      6.092E+02 1.113E+03 6.831E+02 1.113E+03
      8.315E+01 1.715E+00 2.731E+02 2.100E+00

nacl6 4978      n      5 2.490E+03 5.281E+02 0.000E+00
      4      0 9.205E+02 1.130E+00
      2.731E+02 8.786E+02 5.281E+02 1.339E+03 5.282E+02 1.300E+03 5.731E+02 1.300E+03

srso4 4980      n      5 3.960E+03 1.878E+03 0.000E+00
      0      2 5.858E+02 1.799E+00
      2.731E+02 1.883E+00 3.732E+02 1.548E+00

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Thermal Property Data
 k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

micax 4982 n 5 2.800E+03 0.000E+00 0.000E+00
 0 0 8.000E+02 4.000E+00

micac 4983 n 5 2.800E+03 0.000E+00 0.000E+00
 0 0 8.000E+02 7.113E-01

micas 4984 n 5 2.790E+03 0.000E+00 0.000E+00
 0 2 8.000E+02 2.100E+00
 4.731E+02 2.100E+00 8.731E+02 2.500E+00

micab 4985 n 5 6.800E+02 0.000E+00 0.000E+00
 0 0 8.000E+02 1.700E-01

vermi 4986 n 5 4.850E+02 0.000E+00 0.000E+00
 0 2 8.000E+02 1.700E-01
 4.731E+02 1.700E-01 6.731E+02 1.841E-01

micap 4987 n 5 3.300E+02 0.000E+00 0.000E+00
 0 2 8.000E+02 1.213E-01
 4.731E+02 1.213E-01 7.731E+02 1.569E-01

vermp 4988 n 5 2.700E+02 0.000E+00 0.000E+00
 0 2 8.000E+02 1.213E-01
 4.731E+02 1.213E-01 7.731E+02 1.569E-01

pyrop 4990 n 5 2.800E+03 0.000E+00 0.000E+00
 2 5 8.000E+02 4.770E+00
 2.731E+02 8.000E+02 7.731E+02 1.300E+03
 2.731E+02 4.979E+00 3.732E+02 4.000E+00 4.731E+02 3.556E+00 5.731E+02 3.138E+00
 6.731E+02 2.803E+00

pyron 4991 n 5 2.800E+03 0.000E+00 0.000E+00
 2 5 8.000E+02 2.427E+00
 2.731E+02 8.000E+02 7.731E+02 1.300E+03
 2.731E+02 2.500E+00 3.732E+02 2.100E+00 4.731E+02 1.799E+00 5.731E+02 1.590E+00
 6.731E+02 1.423E+00

talc 4994 n 5 2.790E+03 0.000E+00 0.000E+00
 10 0 8.159E+02 2.971E+00
 0.000E+00 0.000E+00 2.315E+01 4.000E+01 1.732E+02 5.230E+02 2.231E+02 6.904E+02
 2.731E+02 7.740E+02 3.732E+02 9.414E+02 4.731E+02 1.046E+03 6.731E+02 1.146E+03
 9.731E+02 1.222E+03 1.873E+03 1.423E+03

tourm 4996 n 5 3.100E+03 0.000E+00 0.000E+00
 0 2 8.000E+02 4.602E+00
 8.315E+01 3.807E+00 2.731E+02 4.602E+00

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ[kg/m³]

Thermal Property Data

glass 5012 n 5 2.300E+03 0.000E+00 0.000E+00
0 0 8.000E+02 1.046E+00

glabc 5014 n 5 2.520E+03 0.000E+00 0.000E+00
4 3 6.694E+02 1.046E+00
2.731E+02 6.276E+02 3.732E+02 7.531E+02 5.731E+02 9.205E+02 8.731E+02 1.025E+03
1.732E+02 7.531E-01 2.731E+02 1.046E+00 3.732E+02 1.130E+00

pyrex 5016 n 5 2.220E+03 8.292E+02 0.000E+00
7 3 7.280E+02 1.130E+00
1.232E+02 3.640E+02 1.732E+02 4.937E+02 2.731E+02 6.820E+02 3.732E+02 8.535E+02
4.731E+02 9.916E+02 5.731E+02 1.092E+03 6.731E+02 1.146E+03
1.732E+02 8.786E-01 2.731E+02 1.088E+00 8.731E+02 1.757E+00

pyrc6 5018 n 5 2.600E+03 0.000E+00 0.000E+00
6 5 7.824E+02 3.975E+00
2.731E+02 7.531E+02 3.732E+02 8.745E+02 4.731E+02 9.665E+02 5.731E+02 1.025E+03
7.731E+02 1.117E+03 1.173E+03 1.259E+03
2.731E+02 4.058E+00 4.731E+02 3.473E+00 6.731E+02 3.222E+00 8.731E+02 3.054E+00
1.273E+03 2.900E+00

pyrc8 5019 n 5 2.500E+03 0.000E+00 0.000E+00
6 6 8.075E+02 2.050E+00
2.731E+02 7.740E+02 3.732E+02 9.121E+02 4.731E+02 1.004E+03 5.731E+02 1.079E+03
7.731E+02 1.180E+03 1.073E+03 1.305E+03
2.731E+02 2.008E+00 4.731E+02 2.218E+00 6.731E+02 2.322E+00 8.731E+02 2.322E+00
1.073E+03 2.238E+00 1.273E+03 2.113E+00

diabg 5020 n 5 2.400E+03 0.000E+00 0.000E+00
4 4 7.531E+02 1.172E+00
2.731E+02 7.113E+02 3.732E+02 8.000E+02 7.731E+02 1.130E+03 1.173E+03 1.300E+03
2.731E+02 1.146E+00 3.732E+02 1.300E+00 4.731E+02 1.368E+00 5.731E+02 1.477E+00

hint 5022 n 5 2.400E+03 0.000E+00 0.000E+00
4 3 5.021E+02 7.531E-01
2.731E+02 5.021E+02 3.732E+02 5.858E+02 7.731E+02 7.531E+02 1.173E+03 7.950E+02
1.732E+02 5.439E-01 2.731E+02 7.113E-01 3.732E+02 8.000E-01

glast 5024 n 5 1.440E+02 0.000E+00 0.000E+00
4 2 7.531E+02 3.473E-02
2.731E+02 7.113E+02 3.732E+02 8.000E+02 7.731E+02 1.130E+03 1.173E+03 1.300E+03
7.615E+01 3.473E-02 3.002E+02 3.473E-02

glasl 5026 n 5 3.040E+03 0.000E+00 0.000E+00
3 2 5.021E+02 1.130E+00
2.731E+02 5.021E+02 3.732E+02 5.858E+02 7.731E+02 7.113E+02
3.231E+02 1.172E+00 4.231E+02 1.423E+00

Thermal Property Data

k [W/m K] *c* [J/kg K] *T* [K] *λ* [J/kg] *ρ* [kg/m³]

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glasw 5028      n      5 2.480E+03 0.000E+00 0.000E+00
  3      2 7.531E+02 1.130E+00
  2.731E+02 7.113E+02 3.732E+02 8.786E+02 7.731E+02 1.130E+03
  3.231E+02 1.318E+00 4.231E+02 1.700E+00

obsid 5030      n      5 2.400E+03 0.000E+00 0.000E+00
  3      6 7.531E+02 1.372E+00
  2.731E+02 7.113E+02 3.732E+02 8.786E+02 7.731E+02 1.130E+03
  2.731E+02 1.343E+00 3.732E+02 1.456E+00 4.731E+02 1.565E+00 5.731E+02 1.700E+00
  6.731E+02 1.782E+00 7.731E+02 1.891E+00

glasc 5032      n      5 2.300E+03 0.000E+00 0.000E+00
  4      4 7.531E+02 1.300E+00
  2.731E+02 7.113E+02 3.732E+02 8.786E+02 7.731E+02 1.130E+03 1.173E+03 1.300E+03
  3.732E+02 1.339E+00 5.731E+02 1.653E+00 7.731E+02 2.134E+00 9.232E+02 2.552E+00

glasg 5034      n      5 2.500E+03 0.000E+00 0.000E+00
  3      2 7.531E+02 1.213E+00
  2.731E+02 7.113E+02 3.732E+02 8.786E+02 7.731E+02 1.130E+03
  2.731E+02 1.213E+00 7.731E+02 1.464E+00

vycor 5036      n      5 2.190E+03 1.773E+03 0.000E+00
  11     8 7.448E+02 1.339E+00
  0.000E+00 0.000E+00 2.315E+01 4.000E+01 1.232E+02 3.556E+02 2.231E+02 6.067E+02
  2.731E+02 7.071E+02 3.732E+02 8.577E+02 4.731E+02 9.498E+02 7.731E+02 1.109E+03
  1.073E+03 1.213E+03 1.573E+03 1.326E+03 1.973E+03 1.464E+03
  1.732E+02 1.004E+00 2.731E+02 1.300E+00 3.732E+02 1.506E+00 5.731E+02 1.700E+00
  6.731E+02 1.757E+00 7.731E+02 1.883E+00 8.731E+02 2.100E+00 1.073E+03 2.594E+00

bralf 5212      n      5 2.900E+03 2.003E+03 5.523E+05
  7      2 7.531E+02 3.096E+00
  2.731E+02 7.113E+02 3.732E+02 9.205E+02 4.731E+02 1.025E+03 5.731E+02 1.109E+03
  7.731E+02 1.172E+03 1.173E+03 1.300E+03 1.973E+03 1.305E+03
  7.001E+02 3.096E+00 1.273E+03 2.301E+00

bral1 5214      n      5 2.330E+03 1.973E+03 4.000E+05
  5      2 7.531E+02 1.381E+00
  2.731E+02 7.113E+02 3.732E+02 8.996E+02 5.731E+02 1.067E+03 1.073E+03 1.213E+03
  1.873E+03 1.339E+03
  1.273E+03 1.381E+00 1.274E+03 1.381E+00

bral2 5215      n      5 2.570E+03 1.973E+03 4.000E+05
  5      2 7.531E+02 1.506E+00
  2.731E+02 7.113E+02 3.732E+02 8.996E+02 5.731E+02 1.067E+03 1.073E+03 1.213E+03
  1.873E+03 1.339E+03
  1.273E+03 1.506E+00 1.274E+03 1.506E+00

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bral3 5216      n      5 2.850E+03 1.973E+03 5.021E+05
      5      5 7.531E+02 2.900E+00
      2.731E+02 7.113E+02 3.732E+02 8.996E+02 5.731E+02 1.088E+03 1.073E+03 1.234E+03
      1.873E+03 1.339E+03
      6.231E+02 2.900E+00 7.731E+02 2.636E+00 9.731E+02 2.427E+00 1.173E+03 2.343E+00
      1.473E+03 2.301E+00

brimm 5218      n      5 2.000E+03 0.000E+00 0.000E+00
      3      0 8.000E+02 7.113E-01
      2.731E+02 8.000E+02 7.731E+02 1.046E+03 1.273E+03 1.130E+03

bricf 5224      n      5 1.470E+03 0.000E+00 0.000E+00
      10     2 8.000E+02 3.598E+00
      2.001E+02 4.000E+02 3.732E+02 9.414E+02 4.731E+02 1.172E+03 5.731E+02 1.339E+03
      6.731E+02 1.477E+03 8.731E+02 1.682E+03 1.073E+03 1.828E+03 1.273E+03 1.946E+03
      1.773E+03 2.071E+03 3.773E+03 2.343E+03
      1.273E+03 3.598E+00 1.274E+03 3.598E+00

bricr 5232      n      5 3.200E+03 0.000E+00 0.000E+00
      5      3 6.276E+02 1.172E+00
      2.731E+02 5.858E+02 3.732E+02 7.113E+02 4.731E+02 8.000E+02 7.731E+02 1.046E+03
      1.773E+03 1.213E+03
      4.731E+02 1.172E+00 9.232E+02 1.481E+00 1.588E+03 1.745E+00

brcrm 5234      n      5 3.000E+03 2.003E+03 1.046E+06
      5      3 7.531E+02 2.100E+00
      2.731E+02 7.113E+02 4.731E+02 1.004E+03 7.731E+02 1.130E+03 1.273E+03 1.300E+03
      1.773E+03 1.339E+03
      6.731E+02 2.008E+00 1.073E+03 1.841E+00 1.273E+03 1.700E+00

concn 5240      n      5 1.600E+03 0.000E+00 0.000E+00
      4      0 6.276E+02 3.300E-01
      2.731E+02 6.276E+02 4.731E+02 9.205E+02 7.731E+02 1.046E+03 1.273E+03 1.300E+03

concs 5241      n      5 2.300E+03 0.000E+00 0.000E+00
      4      0 6.276E+02 1.046E+00
      2.731E+02 6.276E+02 4.731E+02 9.205E+02 7.731E+02 1.046E+03 1.273E+03 1.300E+03

conl4 5242      n      5 2.300E+03 0.000E+00 0.000E+00
      4      0 6.276E+02 7.531E-01
      2.731E+02 6.276E+02 4.731E+02 9.205E+02 7.731E+02 1.046E+03 1.273E+03 1.300E+03

conlw 5243      n      5 9.500E+02 0.000E+00 0.000E+00
      4      2 6.276E+02 2.100E-01
      2.731E+02 6.276E+02 4.731E+02 9.205E+02 7.731E+02 1.046E+03 1.273E+03 1.300E+03
      5.231E+02 2.100E-01 6.731E+02 2.100E-01

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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diata 5246      n      5  4.400E+02  0.000E+00  0.000E+00
      4      2  7.950E+02  8.786E-02
      2.731E+02  7.531E+02  4.731E+02  9.623E+02  7.731E+02  1.130E+03  1.073E+03  1.300E+03
      4.731E+02  8.786E-02  1.173E+03  1.339E-01

diatp 5247      n      5  4.400E+02  0.000E+00  0.000E+00
      4      2  7.950E+02  1.381E-01
      2.731E+02  7.531E+02  4.731E+02  9.623E+02  7.731E+02  1.130E+03  1.073E+03  1.300E+03
      4.731E+02  1.381E-01  1.173E+03  1.841E-01

diatm 5248      n      5  6.100E+02  0.000E+00  0.000E+00
      4      2  7.950E+02  2.427E-01
      2.731E+02  7.531E+02  4.731E+02  9.623E+02  7.731E+02  1.130E+03  1.073E+03  1.300E+03
      4.731E+02  2.427E-01  1.173E+03  3.096E-01

diath 5249      n      5  5.900E+02  0.000E+00  0.000E+00
      4      2  7.950E+02  2.259E-01
      2.731E+02  7.531E+02  4.731E+02  9.623E+02  7.731E+02  1.130E+03  1.073E+03  1.300E+03
      4.731E+02  2.259E-01  1.273E+03  5.858E-01

diatl 5250      n      5  4.400E+02  0.000E+00  0.000E+00
      4      4  7.950E+02  9.205E-02
      2.731E+02  7.531E+02  4.731E+02  9.623E+02  7.731E+02  1.130E+03  1.073E+03  1.300E+03
      2.731E+02  8.786E-02  5.731E+02  1.130E-01  6.731E+02  1.192E-01  8.131E+02  1.300E-01

diatt 5251      n      5  6.000E+02  0.000E+00  0.000E+00
      4      7  7.950E+02  2.218E-01
      2.731E+02  7.531E+02  4.731E+02  9.623E+02  7.731E+02  1.130E+03  1.073E+03  1.300E+03
      2.731E+02  2.176E-01  3.732E+02  2.259E-01  4.731E+02  2.385E-01  6.731E+02  2.636E-01
      8.131E+02  2.761E-01  1.073E+03  3.096E-01  1.373E+03  3.473E-01

brids 5254      n      5  2.700E+03  2.003E+03  0.000E+00
      5      2  8.000E+02  1.700E+00
      2.731E+02  7.950E+02  4.731E+02  1.004E+03  7.731E+02  1.046E+03  1.273E+03  1.130E+03
      1.773E+03  1.172E+03
      3.231E+02  1.700E+00  1.273E+03  2.176E+00

brief 5256      n      5  9.500E+02  1.673E+03  0.000E+00
      5      2  7.322E+02  2.900E-01
      2.731E+02  7.113E+02  4.731E+02  1.004E+03  7.731E+02  1.130E+03  1.273E+03  1.300E+03
      1.773E+03  1.339E+03
      5.731E+02  3.138E-01  8.731E+02  3.556E-01

brifn 5258      n      5  1.980E+03  1.953E+03  0.000E+00
      5      2  7.322E+02  1.297E+00
      2.731E+02  7.113E+02  4.731E+02  1.004E+03  7.731E+02  1.130E+03  1.273E+03  1.300E+03
      1.773E+03  1.339E+03
      1.273E+03  1.297E+00  1.274E+03  1.297E+00

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brifm 5259      n      5 2.000E+03 1.953E+03 0.000E+00
      5      4 7.531E+02 1.004E+00
      2.731E+02 7.113E+02 4.731E+02 1.004E+03 7.731E+02 4.130E+03 1.273E+03 1.300E+03
      1.773E+03 1.339E+03
      4.731E+02 1.004E+00 8.731E+02 1.464E+00 1.273E+03 1.632E+00 1.673E+03 1.757E+00

brifa 5260      n      5 2.000E+03 1.873E+03 0.000E+00
      5      2 7.531E+02 1.088E+00
      2.731E+02 7.113E+02 4.731E+02 1.004E+03 7.731E+02 4.130E+03 1.273E+03 1.300E+03
      1.773E+03 1.339E+03
      1.273E+03 1.088E+00 1.274E+03 1.088E+00

brifr 5262      n      5 2.760E+03 2.003E+03 5.439E+05
      6      2 7.950E+02 1.004E+00
      2.731E+02 7.740E+02 3.732E+02 9.414E+02 4.731E+02 1.046E+03 6.731E+02 1.146E+03
      9.731E+02 1.222E+03 1.873E+03 1.423E+03
      6.731E+02 1.004E+00 6.741E+02 1.004E+00

brika 5264      n      5 4.300E+02 0.000E+00 0.000E+00
      11     2 7.740E+02 2.500E-01
      0.000E+00 0.000E+00 3.315E+01 2.100E+01 1.232E+02 3.431E+02 1.732E+02 5.021E+02
      2.231E+02 5.858E+02 2.731E+02 7.322E+02 3.231E+02 8.159E+02 4.731E+02 1.004E+03
      7.731E+02 1.130E+03 1.273E+03 1.300E+03 1.773E+03 1.339E+03
      7.731E+02 2.615E-01 1.423E+03 4.519E-01

brikb 5265      n      5 3.000E+02 0.000E+00 9.000E+00
      11     2 7.740E+02 8.000E-02
      0.000E+00 0.000E+00 3.315E+01 2.100E+01 1.232E+02 3.431E+02 1.732E+02 5.021E+02
      2.231E+02 5.858E+02 2.731E+02 7.322E+02 3.231E+02 8.159E+02 4.731E+02 1.004E+03
      7.731E+02 1.130E+03 1.273E+03 1.300E+03 1.773E+03 1.339E+03
      4.731E+02 8.703E-02 1.033E+03 1.966E-01

magns 5266      n      5 2.670E+03 2.003E+03 1.883E+06
      6      2 8.000E+02 3.473E+00
      1.732E+02 6.694E+02 2.731E+02 8.000E+02 4.731E+02 1.088E+03 7.731E+02 1.213E+03
      1.273E+03 1.300E+03 1.773E+03 1.339E+03
      1.273E+03 3.473E+00 1.274E+03 3.473E+00

magnp 5267      n      5 2.530E+03 2.003E+03 1.883E+06
      6      3 8.000E+02 3.849E+00
      1.732E+02 6.694E+02 2.731E+02 8.000E+02 4.731E+02 1.088E+03 7.731E+02 1.213E+03
      1.273E+03 1.300E+03 1.773E+03 1.339E+03
      4.731E+02 3.849E+00 9.731E+02 2.720E+00 1.473E+03 1.925E+00

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

magna 5268 n 5 3.080E+03 2.003E+03 1.883E+06
 6 2 8.000E+02 4.937E+00
 1.732E+02 6.694E+02 2.731E+02 8.000E+02 4.731E+02 1.088E+03 7.731E+02 1.213E+03
 1.273E+03 1.300E+03 1.773E+03 1.339E+03
 1.073E+03 4.937E+00 1.473E+03 3.300E+00

magnb 5269 n 5 2.760E+03 2.003E+03 1.883E+06
 6 3 8.000E+02 4.812E+00
 1.732E+02 6.694E+02 2.731E+02 8.000E+02 4.731E+02 1.088E+03 7.731E+02 1.213E+03
 1.273E+03 1.300E+03 1.773E+03 1.339E+03
 1.073E+03 4.812E+00 1.273E+03 3.640E+00 1.473E+03 3.138E+00

magnc 5270 n 5 2.920E+03 2.003E+03 1.883E+06
 6 4 8.000E+02 3.682E+00
 1.732E+02 6.694E+02 2.731E+02 8.000E+02 4.731E+02 1.088E+03 7.731E+02 1.213E+03
 1.273E+03 1.300E+03 1.773E+03 1.339E+03
 1.073E+03 3.682E+00 1.173E+03 3.598E+00 1.273E+03 3.494E+00 1.473E+03 3.180E+00

porbe 5280 n 5 2.900E+03 0.000E+00 0.000E+00
 8 2 1.004E+03 1.300E+02
 1.732E+02 5.021E+02 2.731E+02 9.414E+02 3.732E+02 1.297E+03 4.731E+02 1.506E+03
 5.731E+02 1.700E+03 6.731E+02 1.757E+03 1.073E+03 2.008E+03 1.773E+03 2.176E+03
 2.731E+02 1.339E+02 4.731E+02 7.113E+01

poral 5281 n 5 3.400E+03 0.000E+00 0.000E+00
 8 3 7.950E+02 1.883E+01
 2.731E+02 7.782E+02 4.731E+02 9.456E+02 6.731E+02 1.092E+03 7.731E+02 1.155E+03
 8.731E+02 1.192E+03 9.731E+02 1.213E+03 1.273E+03 1.300E+03 1.773E+03 1.339E+03
 3.231E+02 1.883E+01 3.732E+02 1.632E+01 4.731E+02 1.297E+01

porer 5282 n 5 3.900E+03 0.000E+00 0.000E+00
 4 0 5.858E+02 5.858E+00
 2.731E+02 5.858E+02 3.732E+02 7.113E+02 7.731E+02 8.000E+02 1.273E+03 9.623E+02

pornt 5283 n 5 2.900E+03 0.000E+00 0.000E+00
 5 2 7.531E+02 1.883E+00
 2.731E+02 7.113E+02 3.732E+02 8.000E+02 4.731E+02 9.205E+02 7.731E+02 1.046E+03
 1.273E+03 1.172E+03
 2.982E+02 1.883E+00 1.473E+03 1.883E+00

porc5 5284 n 5 3.400E+03 0.000E+00 0.000E+00
 4 0 7.531E+02 1.130E+01
 2.731E+02 7.113E+02 4.731E+02 9.205E+02 7.731E+02 1.046E+03 1.273E+03 1.172E+03

porce 5286 n 5 3.400E+03 0.000E+00 0.000E+00
 4 0 7.531E+02 2.100E+00
 2.731E+02 7.113E+02 4.731E+02 9.205E+02 7.731E+02 1.046E+03 1.273E+03 1.172E+03

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verm2 5292      n      5  2.200E+02  0.000E+00  0.000E+00
      5      2  7.531E+02  4.000E-02
      2.731E+02  7.113E+02  4.731E+02  1.004E+03  7.731E+02  1.130E+03  1.273E+03  1.300E+03
      1.773E+03  1.339E+03
      4.731E+02  7.113E-02  6.731E+02  1.151E-01

verm3 5293      n      5  3.000E+02  0.000E+00  0.000E+00
      5      2  7.531E+02  5.021E-02
      2.731E+02  7.113E+02  4.731E+02  1.004E+03  7.731E+02  1.130E+03  1.273E+03  1.300E+03
      1.773E+03  1.339E+03
      3.732E+02  6.904E-02  4.982E+02  9.623E-02

brisi 5294      n      5  1.800E+03  1.983E+03  1.464E+05
      6      3  7.531E+02  1.700E+00
      2.731E+02  7.113E+02  3.732E+02  8.577E+02  4.731E+02  9.623E+02  7.731E+02  1.109E+03
      1.273E+03  1.300E+03  1.773E+03  1.339E+03
      7.731E+02  1.700E+00  1.273E+03  1.841E+00  1.473E+03  2.008E+00

brisl 5296      n      5  1.930E+03  1.903E+03  2.100E+05
      6      2  7.531E+02  9.372E-01
      2.731E+02  7.113E+02  3.732E+02  8.577E+02  4.731E+02  9.623E+02  7.731E+02  1.109E+03
      1.273E+03  1.300E+03  1.773E+03  1.339E+03
      1.273E+03  9.372E-01  1.274E+03  9.372E-01

brisk 5298      n      5  2.310E+03  1.818E+03  0.000E+00
      5      2  7.113E+02  1.464E+00
      2.731E+02  7.113E+02  4.731E+02  1.004E+03  7.731E+02  1.130E+03  1.273E+03  1.300E+03
      1.773E+03  1.339E+03
      9.232E+02  1.464E+00  1.423E+03  1.464E+00

alcr1 5412      n      5  5.900E+03  2.123E+03  0.000E+00
      2      2  5.021E+02  4.602E+01
      2.731E+02  5.021E+02  5.731E+02  6.694E+02
      2.931E+02  4.602E+01  5.331E+02  5.021E+01

alcr2 5413      n      5  5.900E+03  2.123E+03  0.000E+00
      2      0  6.276E+02  9.205E+00
      2.731E+02  6.276E+02  5.731E+02  9.205E+02

beobe 5414      n      5  2.850E+03  0.000E+00  0.000E+00
      6      8  1.088E+03  2.100E+02
      2.982E+02  1.088E+03  3.732E+02  1.305E+03  4.731E+02  1.515E+03  5.731E+02  1.644E+03
      7.731E+02  1.824E+03  1.073E+03  2.059E+03
      2.982E+02  2.100E+02  3.732E+02  1.590E+02  4.731E+02  1.172E+02  5.731E+02  8.786E+01
      6.731E+02  7.113E+01  8.731E+02  5.021E+01  1.073E+03  3.800E+01  1.273E+03  2.900E+01

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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beomo 5416      n      5 2.975E+03 0.000E+00 0.000E+00
   7      6 1.038E+03 8.786E+01
  2.982E+02 1.038E+03 3.732E+02 1.238E+03 4.731E+02 1.490E+03 5.731E+02 1.619E+03
  6.731E+02 1.703E+03 8.731E+02 1.833E+03 1.073E+03 1.966E+03
  3.732E+02 1.590E+02 5.731E+02 8.786E+01 6.731E+02 7.113E+01 8.731E+02 5.021E+01
  1.073E+03 3.640E+01 1.273E+03 2.900E+01

beosi 5418      n      5 2.900E+03 0.000E+00 0.000E+00
  10      2 1.046E+03 1.925E+02
  1.732E+02 5.021E+02 2.731E+02 9.623E+02 3.732E+02 1.297E+03 4.731E+02 1.506E+03
  5.731E+02 1.653E+03 6.731E+02 1.770E+03 8.731E+02 1.908E+03 1.073E+03 2.008E+03
  1.773E+03 2.197E+03 2.823E+03 2.573E+03
  3.231E+02 1.925E+02 4.731E+02 1.339E+02

bebeo 5420      n      5 1.840E+03 1.556E+03 1.300E+06
   8      4 1.820E+03 1.799E+02
  2.982E+02 1.820E+03 3.732E+02 2.050E+03 4.731E+02 2.301E+03 5.731E+02 2.469E+03
  6.731E+02 2.615E+03 8.731E+02 2.824E+03 1.073E+03 2.992E+03 1.473E+03 3.305E+03
  2.731E+02 1.799E+02 6.731E+02 1.234E+02 1.073E+03 8.159E+01 1.473E+03 4.393E+01

chcni 5422      n      5 6.700E+03 1.727E+03 0.000E+00
   0      0 5.021E+02 1.130E+01

sicsi 5424      n      5 2.500E+03 0.000E+00 0.000E+00
   0      3 8.000E+02 6.067E+01
  4.731E+02 6.067E+01 7.731E+02 4.393E+01 1.173E+03 3.138E+01

stcol 5426      n      5 5.500E+03 1.768E+03 0.000E+00
   3      0 5.021E+02 4.602E+00
  2.731E+02 5.021E+02 6.731E+02 6.276E+02 1.073E+03 6.694E+02

stco2 5427      n      5 5.800E+03 1.768E+03 0.000E+00
   3      0 5.021E+02 6.276E+00
  2.731E+02 5.021E+02 6.731E+02 6.276E+02 1.073E+03 6.694E+02

stco3 5428      n      5 6.200E+03 1.768E+03 0.000E+00
   3      0 5.021E+02 6.694E+00
  2.731E+02 5.021E+02 6.731E+02 6.276E+02 1.073E+03 6.694E+02

stco4 5429      n      5 6.600E+03 1.768E+03 0.000E+00
   3      0 5.021E+02 1.046E+01
  2.731E+02 5.021E+02 6.731E+02 6.276E+02 1.073E+03 6.694E+02

ticcl 5430      n      5 5.420E+03 0.000E+00 0.000E+00
   2      0 5.439E+02 3.556E+01
  2.731E+02 5.439E+02 7.731E+02 7.113E+02

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ticc2 5431      n      5 5.500E+03 0.000E+00 0.000E+00
      2      0 5.439E+02 3.138E+01
      2.731E+02 5.439E+02 7.731E+02 7.113E+02

ticc3 5432      n      5 5.500E+03 0.000E+00 0.000E+00
      2      0 5.439E+02 3.300E+01
      2.731E+02 5.439E+02 7.731E+02 7.113E+02

ticc4 5433      n      5 6.000E+03 0.000E+00 0.000E+00
      2      2 5.439E+02 1.925E+01
      2.731E+02 5.439E+02 7.731E+02 7.113E+02
      3.732E+02 1.925E+01 7.232E+02 2.259E+01

ticc5 5434      n      5 5.600E+03 0.000E+00 0.000E+00
      2      2 5.439E+02 2.636E+01
      2.731E+02 5.439E+02 7.731E+02 7.113E+02
      3.732E+02 2.636E+01 7.232E+02 3.096E+01

ticc6 5435      n      5 5.800E+03 0.000E+00 0.000E+00
      2      2 5.439E+02 2.259E+01
      2.731E+02 5.439E+02 7.731E+02 7.113E+02
      3.732E+02 2.259E+01 7.232E+02 2.552E+01

ticc7 5436      n      5 6.300E+03 0.000E+00 0.000E+00
      2      2 5.439E+02 1.966E+01
      2.731E+02 5.439E+02 7.731E+02 7.113E+02
      3.732E+02 1.966E+01 7.232E+02 2.385E+01

ticc8 5437      n      5 6.600E+03 0.000E+00 0.000E+00
      2      2 5.439E+02 2.008E+01
      2.731E+02 5.439E+02 7.731E+02 7.113E+02
      3.732E+02 2.008E+01 7.232E+02 2.500E+01

ticc9 5438      n      5 5.700E+03 0.000E+00 0.000E+00
      2      2 5.439E+02 1.715E+01
      2.731E+02 5.439E+02 7.731E+02 7.113E+02
      3.732E+02 1.715E+01 7.232E+02 2.134E+01

ticl0 5439      n      5 6.000E+03 0.000E+00 0.000E+00
      6      5 6.276E+02 2.343E+01
      3.732E+02 6.276E+02 1.473E+03 8.577E+02 1.543E+03 2.134E+03 1.583E+03 2.134E+03
      1.588E+03 8.033E+02 1.773E+03 8.033E+02
      3.732E+02 2.343E+01 8.731E+02 1.904E+01 1.073E+03 7.113E+00 1.273E+03 5.858E+00
      2.073E+03 3.800E+00

ticcr 5442      n      5 6.000E+03 1.727E+03 0.000E+00
      0      0 4.602E+02 2.900E+01

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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wcco1 5452      n      5 1.400E+04 1.727E+03 0.000E+00
      2      4 2.100E+02 1.130E+02
      2.731E+02 2.100E+02 8.731E+02 2.900E+02
      3.231E+02 1.130E+02 4.731E+02 9.832E+01 6.731E+02 8.577E+01 8.731E+02 7.950E+01

wcco2 5453      n      5 1.400E+04 1.727E+03 0.000E+00
      2      3 2.100E+02 5.439E+01
      2.731E+02 2.100E+02 8.731E+02 2.900E+02
      3.231E+02 5.439E+01 5.731E+02 4.812E+01 9.731E+02 4.393E+01

wcco3 5454      n      5 1.490E+04 1.727E+03 0.000E+00
      2      2 2.100E+02 1.004E+02
      2.731E+02 2.100E+02 8.731E+02 2.900E+02
      3.732E+02 1.000E+02 7.232E+02 7.699E+01

wcco5 5456      n      5 1.530E+04 1.727E+03 0.000E+00
      2      2 2.100E+02 6.694E+01
      2.731E+02 2.100E+02 8.731E+02 2.900E+02
      3.732E+02 6.694E+01 7.232E+02 6.067E+01

wcco6 5457      n      5 1.410E+04 1.727E+03 0.000E+00
      2      2 2.100E+02 9.163E+01
      2.731E+02 2.100E+02 8.731E+02 2.900E+02
      3.732E+02 9.163E+01 7.232E+02 6.485E+01

wcco7 5458      n      5 1.380E+04 1.727E+03 0.000E+00
      2      2 2.100E+02 7.406E+01
      2.731E+02 2.100E+02 8.731E+02 2.900E+02
      3.732E+02 7.406E+01 7.232E+02 6.443E+01

wcco8 5459      n      5 1.400E+04 1.727E+03 0.000E+00
      2      2 2.100E+02 5.397E+01
      2.731E+02 2.100E+02 8.731E+02 2.900E+02
      3.732E+02 5.397E+01 7.232E+02 5.146E+01

wcco9 5460      n      5 1.480E+04 1.727E+03 0.000E+00
      2      2 2.100E+02 8.201E+01
      2.731E+02 2.100E+02 8.731E+02 2.900E+02
      3.732E+02 8.201E+01 7.232E+02 6.694E+01

wcco10 5461     n      5 1.525E+04 1.727E+03 0.000E+00
      2      2 2.100E+02 1.213E+02
      2.731E+02 2.100E+02 8.731E+02 2.900E+02
      3.231E+02 1.213E+02 4.731E+02 1.213E+02

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wcc11 5462      n      5 1.510E+04 1.727E+03 0.000E+00
      2      2 2.100E+02 1.004E+02
      2.731E+02 2.100E+02 8.731E+02 2.900E+02
      3.231E+02 1.004E+02 4.731E+02 1.004E+02

wcc12 5463      n      5 1.495E+04 1.727E+03 0.000E+00
      2      2 2.100E+02 1.004E+02
      2.731E+02 2.100E+02 8.731E+02 2.900E+02
      3.231E+02 1.004E+02 4.731E+02 1.004E+02

wcco4 5465      n      5 1.290E+04 1.727E+03 0.000E+00
      2      2 3.800E+02 5.272E+01
      2.731E+02 3.800E+02 7.731E+02 4.602E+02
      3.732E+02 5.272E+01 7.232E+02 4.770E+01

wtic1 5466      n      5 1.110E+04 1.727E+03 0.000E+00
      2      2 3.800E+02 2.803E+01
      2.731E+02 3.800E+02 7.731E+02 4.602E+02
      3.732E+02 2.803E+01 7.232E+02 3.012E+01

wtic2 5467      n      5 1.170E+04 1.727E+03 0.000E+00
      2      2 3.800E+02 5.314E+01
      2.731E+02 3.800E+02 7.731E+02 4.602E+02
      3.732E+02 5.314E+01 7.232E+02 4.602E+01

wtic3 5468      n      5 1.160E+04 1.727E+03 0.000E+00
      2      2 3.800E+02 4.268E+01
      2.731E+02 3.800E+02 7.731E+02 4.602E+02
      3.732E+02 4.268E+01 7.232E+02 4.142E+01

wtic4 5469      n      5 1.150E+04 1.727E+03 0.000E+00
      2      2 3.800E+02 3.556E+01
      2.731E+02 3.800E+02 7.731E+02 4.602E+02
      3.732E+02 3.556E+01 7.232E+02 3.724E+01

wtic5 5470      n      5 1.290E+04 1.727E+03 0.000E+00
      2      2 3.800E+02 5.983E+01
      2.731E+02 3.800E+02 7.731E+02 4.602E+02
      3.732E+02 5.983E+01 7.232E+02 4.937E+01

wtic6 5471      n      5 1.250E+04 1.727E+03 0.000E+00
      2      2 3.800E+02 4.686E+01
      2.731E+02 3.800E+02 7.731E+02 4.602E+02
      3.732E+02 4.686E+01 7.232E+02 4.435E+01

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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wtic7 5472      n      5 1.230E+04 1.727E+03 0.000E+00
  2      2 3.800E+02 4.435E+01
  2.731E+02 3.800E+02 7.731E+02 4.602E+02
  3.732E+02 4.435E+01 7.232E+02 4.393E+01

uo2cr 5482      n      5 1.000E+04 0.000E+00 0.000E+00
  0      3 3.300E+02 1.590E+01
  4.731E+02 1.590E+01 9.731E+02 1.590E+01 1.173E+03 1.925E+01

uomol 5484      n      5 1.000E+04 0.000E+00 0.000E+00
  0      5 3.300E+02 1.841E+01
  4.731E+02 1.841E+01 6.731E+02 1.715E+01 8.731E+02 1.883E+01 1.073E+03 2.050E+01
  1.173E+03 2.500E+01

uomo2 5485      n      5 1.000E+04 0.000E+00 0.000E+00
  0      3 3.300E+02 1.381E+01
  3.732E+02 1.381E+01 6.731E+02 1.130E+01 9.731E+02 1.088E+01

uomo3 5486      n      5 1.000E+04 0.000E+00 0.000E+00
  0      2 3.300E+02 2.008E+01
  3.732E+02 2.008E+01 1.073E+03 2.008E+01

uo2nb 5488      n      5 1.000E+04 0.000E+00 0.000E+00
  0      2 3.300E+02 9.623E+00
  3.732E+02 9.623E+00 1.173E+03 9.623E+00

uo2s1 5490      n      5 1.000E+04 0.000E+00 0.000E+00
  0      4 3.300E+02 7.950E+00
  3.732E+02 7.950E+00 5.731E+02 8.000E+00 7.731E+02 1.004E+01 1.173E+03 1.423E+01

uo2s2 5491      n      5 1.000E+04 0.000E+00 0.000E+00
  0      4 3.300E+02 6.276E+00
  3.732E+02 6.276E+00 5.731E+02 6.694E+00 7.731E+02 7.531E+00 1.173E+03 1.088E+01

uo2z1 5492      n      5 4.000E+03 0.000E+00 0.000E+00
  4      2 2.594E+02 1.339E+01
  2.731E+02 2.594E+02 4.731E+02 2.900E+02 7.731E+02 3.138E+02 9.731E+02 3.264E+02
  3.231E+02 1.339E+01 9.731E+02 9.205E+00

uo2z2 5493      n      5 8.710E+03 0.000E+00 0.000E+00
  4      0 2.427E+02 1.088E+01
  2.731E+02 2.427E+02 4.731E+02 2.887E+02 7.731E+02 3.096E+02 9.731E+02 3.138E+02
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k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

Thermal Property Data

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zroti 5494      n      5  5.700E+03  0.000E+00  0.000E+00
  9      6  4.435E+02  6.276E+00
  2.982E+02  4.435E+02  3.732E+02  5.063E+02  4.231E+02  5.356E+02  4.731E+02  5.460E+02
  5.731E+02  5.607E+02  7.731E+02  5.774E+02  8.731E+02  5.941E+02  1.073E+03  6.443E+02
  1.173E+03  6.569E+02
  2.982E+02  6.276E+00  6.731E+02  3.975E+00  8.731E+02  3.180E+00  1.073E+03  2.887E+00
  1.273E+03  2.971E+00  1.473E+03  3.180E+00

zroyz 5495      n      5  5.500E+03  0.000E+00  0.000E+00
  5      2  4.393E+02  2.469E+00
  2.731E+02  4.393E+02  4.731E+02  5.439E+02  7.731E+02  5.858E+02  1.473E+03  6.694E+02
  1.873E+03  5.858E+02
  1.073E+03  2.469E+00  2.473E+03  2.469E+00

zrk2b 5496      n      5  5.300E+03  3.273E+03  0.000E+00
  3      0  4.602E+02  2.761E+01
  2.982E+02  4.602E+02  7.731E+02  7.950E+02  1.273E+03  1.046E+03

zrb2z 5498      n      5  5.200E+03  2.643E+03  0.000E+00
  3      2  5.021E+02  2.100E+01
  2.982E+02  5.021E+02  5.731E+02  6.694E+02  2.273E+03  8.996E+02
  2.982E+02  2.100E+01  1.273E+03  3.138E+01

air  5501      n      5  1.290E+00  7.880E+01  2.050E+05
  2      7  1.004E+03  2.500E-02
  1.232E+02  1.004E+03  3.732E+02  9.916E+02
  7.880E+01  6.904E-03  1.732E+02  1.573E-02  2.731E+02  2.414E-02  3.732E+02  3.180E-02
  4.731E+02  3.870E-02  5.731E+02  4.485E-02  6.731E+02  5.063E-02

grntl 6012      n      5  2.650E+03  0.000E+00  0.000E+00
  0      0  8.000E+02  1.715E+00

grnth 6013      n      5  2.650E+03  0.000E+00  0.000E+00
  0      0  8.000E+02  3.975E+00

grntm 6014      n      5  2.650E+03  0.000E+00  0.000E+00
  0      0  8.000E+02  2.500E+00

limst 6016      n      5  2.500E+03  0.000E+00  0.000E+00
  0      0  9.205E+02  1.700E+00

limsw 6017      n      5  1.650E+03  0.000E+00  0.000E+00
  0      0  9.205E+02  9.205E-01

chalk 6018      n      5  1.540E+03  0.000E+00  0.000E+00
  0      0  9.205E+02  8.000E-01

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Thermal Property Data

k [W/m K] *c* [J/kg K] *T* [K] λ [J/kg] ρ [kg/m³]

marbd 6020	n	5	2.700E+03	0.000E+00	0.000E+00				
0	2		8.786E+02	3.556E+00					
8.315E+01	5.021E+00	2.731E+02	3.800E+00						
marbl 6021	n	5	2.700E+03	0.000E+00	0.000E+00				
0	0		8.786E+02	2.500E+00					
rocks 6022	n	5	2.600E+03	0.000E+00	0.000E+00				
0	0		8.000E+02	1.757E+00					
sands 6024	n	5	2.600E+03	0.000E+00	0.000E+00				
0	0		9.623E+02	4.000E+00					
sandl 6025	n	5	2.200E+03	0.000E+00	0.000E+00				
0	0		9.623E+02	1.841E+00					
sandm 6026	n	5	2.300E+03	0.000E+00	0.000E+00				
0	0		9.623E+02	2.500E+00					
shale 6028	n	5	2.400E+03	0.000E+00	0.000E+00				
0	0		8.000E+02	1.700E+00					
slate 6030	n	5	2.760E+03	0.000E+00	0.000E+00				
0	0		8.000E+02	1.883E+00					
sanqf 6032	n	5	8.800E+02	0.000E+00	0.000E+00				
8	0		7.448E+02	1.700E-01					
2.231E+02	6.067E+02	2.731E+02	7.071E+02	3.732E+02	8.577E+02	4.731E+02	9.498E+02		
7.731E+02	1.109E+03	1.073E+03	1.213E+03	1.573E+03	1.326E+03	1.973E+03	1.464E+03		
sanqw 6033	n	5	1.820E+03	0.000E+00	0.000E+00				
0	0		1.464E+03	2.218E+00					
sandy 6034	n	5	1.600E+03	0.000E+00	0.000E+00				
0	0		7.531E+02	3.300E-01					
sandq 6036	n	5	1.700E+03	0.000E+00	0.000E+00				
0	0		7.531E+02	1.700E+00					
sandn 6038	n	5	1.700E+03	0.000E+00	0.000E+00				
0	0		8.000E+02	8.000E-01					
sanqp 6039	n	5	1.870E+03	0.000E+00	0.000E+00				
0	0		1.590E+03	1.130E+00					
soill 6042	n	5	1.200E+03	0.000E+00	0.000E+00				
0	0		8.000E+02	2.500E-01					

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

Thermal Property Data

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soil2 6043      n      5 1.600E+03 0.000E+00 0.000E+00
      0      0 1.046E+03 4.000E-01

soil3 6044      n      5 1.500E+03 0.000E+00 0.000E+00
      0      0 2.900E+03 1.506E+00

soils 6046      n      5 1.300E+03 0.000E+00 0.000E+00
      0      0 1.046E+03 8.000E-01

soilm 6048      n      5 2.000E+03 0.000E+00 0.000E+00
      0      0 9.623E+02 1.339E-02

soild 6050      n      5 1.650E+03 0.000E+00 0.000E+00
      0      0 7.950E+02 2.636E-01

soilw 6052      n      5 1.750E+03 0.000E+00 0.000E+00
      0      0 1.004E+03 5.858E-01

absr1 7001      n      5 1.040E+03 0.000E+00 0.000E+00
      0      0 1.506E+03 1.381E-01

absr2 7002      n      5 1.040E+03 0.000E+00 0.000E+00
      0      0 1.506E+03 2.100E-01

acdel 7006      n      5 1.420E+03 3.582E+02 0.000E+00
      0      0 1.464E+03 2.301E-01

acrlp 7011      n      5 1.200E+03 3.332E+02 0.000E+00
      4      4 1.423E+03 0.000E+00
      7.315E+01 4.602E+02 1.732E+02 9.205E+02 2.731E+02 1.172E+03 3.732E+02 1.757E+03
      1.732E+02 1.004E-01 2.731E+02 1.464E-01 2.982E+02 1.527E-01 3.481E+02 1.569E-01

acrlh 7012      n      5 1.200E+03 3.332E+02 0.000E+00
      0      0 1.423E+03 2.500E-01

alkis 7016      n      5 1.600E+02 3.781E+02 0.000E+00
      0      0 1.700E+03 5.021E-02

ally1 7021      n      5 1.300E+03 4.231E+02 0.000E+00
      0      0 2.343E+03 2.050E-01

ally2 7022      n      5 1.300E+03 4.231E+02 0.000E+00
      0      0 1.088E+03 2.050E-01

buacr 7026      n      5 1.340E+03 0.000E+00 0.000E+00
      0      0 1.443E+03 4.000E-01

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

butyr 7031	n	5	9.000E+02	4.231E+02	0.000E+00				
0	0		1.966E+03	8.786E-02					
celal 7036	n	5	1.300E+03	4.782E+02	0.000E+00				
0	0		1.464E+03	1.700E-01					
cela2 7037	n	5	1.300E+03	4.782E+02	0.000E+00				
0	0		1.464E+03	3.300E-01					
ceabl 7041	n	5	1.200E+03	0.000E+00	0.000E+00				
0	0		1.464E+03	1.700E-01					
ceab2 7042	n	5	1.200E+03	0.000E+00	0.000E+00				
0	0		1.464E+03	3.300E-01					
cenip 7046	n	5	1.380E+03	3.231E+02	0.000E+00				
0	0		1.464E+03	2.301E-01					
cepr1 7051	n	5	1.200E+03	0.000E+00	0.000E+00				
0	0		1.464E+03	1.700E-01					
cepr2 7052	n	5	1.200E+03	0.000E+00	0.000E+00				
0	0		1.464E+03	3.300E-01					
cetra 7056	n	5	1.300E+03	0.000E+00	0.000E+00				
0	0		1.464E+03	2.500E-01					
dapon 7061	n	5	1.650E+03	0.000E+00	0.000E+00				
0	0		1.130E+03	3.054E-01					
epcr1 7066	n	5	1.210E+03	3.532E+02	0.000E+00				
7	0		1.172E+03	1.946E-01					
2.231E+02	9.623E+02	2.731E+02	1.088E+03	3.732E+02	1.506E+03	4.731E+02	2.259E+03		
5.031E+02	3.012E+03	5.631E+02	1.464E+03	6.231E+02	1.464E+03				
epgfm 7071	n	5	1.900E+03	0.000E+00	0.000E+00				
0	4		7.950E+02	1.700E-01					
2.231E+02	1.300E-01	2.982E+02	1.700E-01	4.481E+02	2.500E-01	5.731E+02	2.100E-01		
epsfc 7076	n	5	1.800E+03	0.000E+00	0.000E+00				
0	0		1.004E+03	6.276E-01					
epunc 7081	n	5	1.200E+03	0.000E+00	0.000E+00				
0	0		1.046E+03	1.883E-01					
ethce 7086	n	5	1.150E+03	0.000E+00	0.000E+00				
0	0		2.100E+03	2.301E-01					

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ethva 7091      n      5 1.200E+03 0.000E+00 0.000E+00
      0      0 2.301E+03 7.531E-02

fcttf 7101      n      5 2.120E+03 4.632E+02 0.000E+00
      0      0 9.205E+02 2.500E-01

fcfep 7106      n      5 2.200E+03 4.782E+02 0.000E+00
      0      0 1.172E+03 2.500E-01

fctfe 7111      n      5 2.170E+03 5.331E+02 0.000E+00
      2      9 1.004E+03 2.500E-01
      2.731E+02 9.623E+02 3.732E+02 1.088E+03
      5.150E+00 5.858E-02 8.150E+00 8.000E-02 1.315E+01 1.130E-01 2.315E+01 1.590E-01
      4.315E+01 1.966E-01 7.315E+01 2.301E-01 2.731E+02 2.343E-01 4.731E+02 3.300E-01
      5.731E+02 4.000E-01

fctfr 7112      n      5 1.990E+03 5.331E+02 0.000E+00
      3      2 9.205E+02 4.142E-01
      1.732E+02 5.858E+02 2.731E+02 8.996E+02 2.982E+02 9.832E+02
      3.332E+02 4.142E-01 5.731E+02 5.983E-01

melml 7121      n      5 1.400E+03 3.682E+02 0.000E+00
      0      0 1.700E+03 1.700E-01

melm2 7122      n      5 2.000E+03 4.782E+02 0.000E+00
      0      0 1.700E+03 7.113E-01

melac 7123      n      5 1.500E+03 3.682E+02 0.000E+00
      0      0 1.700E+03 3.556E-01

melas 7124      n      5 1.850E+03 3.682E+02 0.000E+00
      0      0 1.700E+03 6.276E-01

melaf 7125      n      5 1.450E+03 3.682E+02 0.000E+00
      0      0 1.700E+03 3.138E-01

melgf 7126      n      5 1.900E+03 4.782E+02 0.000E+00
      0      0 1.700E+03 4.812E-01

melff 7127      n      5 1.520E+03 3.932E+02 0.000E+00
      0      0 1.700E+03 4.435E-01

memac 7131      n      5 1.180E+03 0.000E+00 0.000E+00
      0      5 1.464E+03 2.100E-01
      3.150E+00 6.276E-02 1.315E+01 6.276E-02 2.315E+01 7.531E-02 2.615E+01 8.000E-02
      2.982E+02 2.100E-01

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Thermal Property Data
 k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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neopr 7136      n      5  1.250E+03  3.882E+02  0.000E+00
      0      0  2.176E+03  1.925E-01

nitr  7141      n      5  1.000E+03  0.000E+00  0.000E+00
      0      0  1.966E+03  2.427E-01

nylon  7151      n      5  1.120E+03  3.732E+02  0.000E+00
      5      5  1.700E+03  2.427E-01
      2.482E+02  1.213E+03  2.731E+02  1.381E+03  2.982E+02  1.548E+03  3.732E+02  2.100E+03
      4.731E+02  2.803E+03
      4.150E+00  1.300E-02  8.150E+00  2.900E-02  1.315E+01  5.021E-02  2.315E+01  1.046E-01
      2.982E+02  2.427E-01

nylgf  7156      n      5  1.400E+03  4.231E+02  0.000E+00
      0      0  1.339E+03  2.100E-01

pfppf  7161      n      5  1.280E+03  0.000E+00  0.000E+00
      0      0  1.700E+03  2.100E-01

phcnf  7171      n      5  1.310E+03  3.932E+02  0.000E+00
      0      0  1.464E+03  1.700E-01

phcaf  7172      n      5  1.700E+03  3.932E+02  0.000E+00
      0      0  1.300E+03  3.515E-01

phmdf  7176      n      5  1.240E+03  4.231E+02  0.000E+00
      0      0  1.300E+03  1.715E-01

phmhf  7177      n      5  3.000E+03  4.231E+02  0.000E+00
      0      0  1.300E+03  6.736E-01

phrpd  7181      n      5  1.380E+03  0.000E+00  0.000E+00
      C      0  1.300E+03  3.800E-01

phnxy  7191      n      5  1.250E+03  3.481E+02  0.000E+00
      0      0  1.700E+03  1.757E-01

plamt  7201      n      5  1.800E+03  3.932E+02  0.000E+00
      0      0  1.300E+03  2.100E-01

palle  7211      n      5  9.000E+02  3.831E+02  0.000E+00
      0      0  2.100E+03  1.300E-01

pcarb  7221      n      5  1.350E+03  3.932E+02  0.000E+00
      0      6  1.700E+03  1.925E-01

pestg  7231      n      5  1.230E+03  3.932E+02  0.000E+00
      0      0  1.130E+03  1.757E-01

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pethl 7241      n      5 9.200E+02 3.682E+02 0.000E+00
      0      0 2.100E+03 3.305E-01

pethm 7242      n      5 9.350E+02 3.682E+02 0.000E+00
      0      0 2.301E+03 4.142E-01

pethh 7243      n      5 9.500E+02 3.682E+02 0.000E+00
      0      0 2.301E+03 5.021E-01

pinht 7251      n      5 1.420E+03 4.782E+02 0.000E+00
      0      0 1.130E+03 1.130E+00

pprom 7261      n      5 9.100E+02 3.932E+02 0.000E+00
      0      0 1.925E+03 1.339E-01

pproc 7262      n      5 9.100E+02 3.932E+02 0.000E+00
      0      0 2.343E+03 1.300E-01

pprop 7263      n      5 1.270E+03 3.932E+02 0.000E+00
      0      0 1.925E+03 1.799E-01

pstyf 7271      n      5 1.000E+02 3.582E+02 0.000E+00
      0      0 1.130E+03 3.473E-02

pstyg 7276      n      5 1.050E+03 3.332E+02 0.000E+00
      0      6 1.423E+03 1.300E-01
      7.315E+01 4.602E-02 1.932E+02 7.113E-02 2.731E+02 1.130E-01 3.231E+02 1.464E-01
      3.732E+02 1.590E-01 4.731E+02 1.590E-01

pstym 7281      n      5 1.080E+03 3.231E+02 0.000E+00
      0      0 1.339E+03 8.000E-02

pstyp 7286      n      5 4.000E+01 3.431E+02 0.000E+00
      0      3 1.130E+03 4.000E-02
      1.232E+02 1.464E-02 2.731E+02 3.800E-02 3.431E+02 5.021E-02

pstyl 7287      n      5 3.800E+01 3.582E+02 0.000E+00
      0      2 1.130E+03 3.284E-02
      7.615E+01 3.284E-02 3.002E+02 3.284E-02

pstyh 7288      n      5 4.600E+01 3.582E+02 0.000E+00
      0      2 1.130E+03 2.594E-02
      7.615E+01 2.594E-02 3.002E+02 2.594E-02

pstyv 7289      n      5 4.600E+01 3.582E+02 0.000E+00
      0      2 1.130E+03 8.117E-03
      2.015E+01 8.117E-03 7.615E+01 8.117E-03

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Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

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paulf 7291      n      5 1.250E+03 4.432E+02 0.000E+00
    0      0 1.300E+03 2.594E-01

puref 7301      n      5 6.000E+01 3.682E+02 0.000E+00
    0      0 1.757E+03 4.000E-02

putef 7302      n      5 4.000E+01 4.782E+02 0.000E+00
    0      4 1.700E+03 4.000E-02
    7.315E+01 8.000E-03 2.731E+02 2.500E-02 2.982E+02 3.300E-02 5.731E+02 6.276E-02

puref 7311      n      5 1.250E+03 3.882E+02 0.000E+00
    0      0 1.700E+03 2.900E-01

pvina 7321      n      5 1.250E+03 0.000E+00 0.000E+00
    0      0 1.300E+03 7.950E-01

pvimb 7331      n      5 1.100E+03 3.182E+02 0.000E+00
    0      0 1.700E+03 8.000E-02

pvinc 7341      n      5 1.180E+03 0.000E+00 0.000E+00
    0      0 1.297E+03 1.548E-01

pvich 7351      n      5 1.500E+03 3.332E+02 0.000E+00
    0      0 1.700E+03 1.700E-01

pvicf 7352      n      5 1.400E+03 3.332E+02 0.000E+00
    0      0 1.004E+03 2.500E-01

pvicf 7356      n      5 1.200E+03 0.000E+00 0.000E+00
    0      0 1.700E+03 1.700E-01

pvicf 7357      n      5 1.400E+03 0.000E+00 0.000E+00
    0      0 1.004E+03 1.700E-01

pvicf 7361      n      5 1.680E+03 4.181E+02 0.000E+00
    0      0 1.339E+03 1.300E-01

pvicm 7362      n      5 1.700E+03 3.481E+02 0.000E+00
    0      0 1.339E+03 1.300E-01

pvick 7366      n      5 1.760E+03 0.000E+00 0.000E+00
    0      0 1.381E+03 1.300E-01

pvtpx 7371      n      5 8.300E+02 0.000E+00 0.000E+00
    0      0 2.176E+03 1.700E-01

ruban 7381      n      5 9.300E+02 3.532E+02 0.000E+00
    0      0 2.100E+03 1.381E-01

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k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ[kg/m³]

Thermal Property Data

rubbd 7382 n 5 1.100E+03 3.532E+02 0.000E+00
0 2 2.100E+03 2.100E-01
3.081E+02 2.176E-01 3.732E+02 2.259E-01

rubbk 7383 n 5 1.100E+03 3.532E+02 0.000E+00
0 2 2.100E+03 2.900E-01
3.081E+02 3.012E-01 3.732E+02 2.720E-01

rubbf 7386 n 5 1.000E+02 3.431E+02 0.000E+00
0 0 2.100E+03 4.000E-02

silff 7401 n 5 2.500E+02 5.331E+02 0.000E+00
0 0 1.339E+03 1.700E-01

silfr 7402 n 5 3.000E+02 5.331E+02 0.000E+00
0 0 1.339E+03 8.000E-02

silmd 7411 n 5 1.800E+03 5.881E+02 0.000E+00
0 0 1.046E+03 1.700E-01

silrl 7421 n 5 1.300E+03 5.581E+02 0.000E+00
0 0 1.300E+03 1.381E-01

silrm 7422 n 5 1.300E+03 5.581E+02 0.000E+00
0 0 1.300E+03 3.300E-01

silrh 7423 n 5 1.300E+03 5.581E+02 0.000E+00
0 0 1.300E+03 7.531E-01

silrl 7424 n 5 1.400E+03 5.581E+02 0.000E+00
0 0 1.300E+03 2.720E-01

stbrc 7431 n 5 1.000E+03 3.532E+02 0.000E+00
0 0 1.757E+03 2.427E-01

urfmn 7441 n 5 1.500E+03 0.000E+00 0.000E+00
0 0 1.700E+03 1.300E-01

urfma 7442 n 5 1.500E+03 0.000E+00 0.000E+00
0 0 1.700E+03 3.800E-01

brtol 7501 n 5 2.600E+03 0.000E+00 0.000E+00
0 0 8.033E+02 4.954E-01

cmb-3 7502 n 5 1.725E+03 0.000E+00 0.000E+00
0 0 1.356E+03 2.623E-01

Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

cmc-4 7503 n 5 1.590E+03 0.000E+00 0.000E+00
0 0 1.172E+03 2.602E-01

datb 7504 n 5 1.795E+03 0.000E+00 0.000E+00
0 0 1.300E+03 2.500E-01

1x041 7505 n 5 1.865E+03 5.531E+02 0.000E+00
2 9 1.172E+03 4.000E-01
2.982E+02 1.172E+03 5.531E+02 1.464E+03
2.192E+02 4.000E-01 2.553E+02 4.046E-01 2.942E+02 3.870E-01 3.220E+02 3.749E-01
3.471E+02 3.628E-01 3.732E+02 3.494E-01 4.131E+02 3.305E-01 5.531E+02 1.700E-01
1.273E+03 1.700E-01

hem03 7506 n 5 1.870E+03 0.000E+00 0.000E+00
3 0 9.623E+02 1.146E-01
3.081E+02 9.581E+02 3.231E+02 9.749E+02 3.431E+02 1.021E+03

hem04 7507 n 5 1.780E+03 0.000E+00 0.000E+00
0 0 1.300E+03 5.322E-01

nitro 7508 n 5 1.580E+03 4.082E+02 0.000E+00
0 0 1.300E+03 2.301E-01

e9011 7509 n 5 1.770E+03 5.531E+02 0.000E+00
0 0 1.172E+03 4.310E-01

e9404 7510 n 5 1.836E+03 5.531E+02 0.000E+00
6 9 1.004E+03 4.268E-01
2.192E+02 7.531E+02 2.553E+02 1.088E+03 2.942E+02 1.004E+03 3.276E+02 1.046E+03
3.581E+02 1.172E+03 5.531E+02 1.464E+03
2.192E+02 4.812E-01 2.553E+02 4.548E-01 2.942E+02 4.234E-01 3.220E+02 4.008E-01
3.471E+02 3.833E-01 4.131E+02 3.305E-01 5.531E+02 1.700E-01 6.731E+02 8.000E-02
1.273E+03 8.000E-02

petn 7511 n 5 1.760E+03 4.152E+02 0.000E+00
0 0 1.700E+03 2.100E-01

tetr1 7512 n 5 1.710E+03 4.031E+02 0.000E+00
0 0 1.300E+03 2.858E-01

tnt 7513 n 5 1.550E+03 3.540E+02 0.000E+00
0 0 1.372E+03 2.602E-01

hem01 7514 n 5 1.700E+03 0.000E+00 0.000E+00
0 2 9.623E+02 1.004E+00
3.794E+02 1.021E+00 4.803E+02 9.540E-01

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hem02 7515      n      5 1.700E+03 0.000E+00 0.000E+00
      2      2 1.046E+03 5.272E-01
      3.706E+02 1.109E+03 4.779E+02 1.025E+03
      3.706E+02 5.272E-01 4.779E+02 8.786E-01

tatb 7516      n      5 1.880E+03
      8      8 1.047E+03 7.991E-01
      2.931E+02 1.047E+03 3.131E+02 1.107E+03 3.331E+02 1.159E+03 3.531E+02 1.248E+03
      3.731E+02 1.316E+03 3.931E+02 1.372E+03 4.131E+02 1.415E+03 4.331E+02 1.470E+03
      2.931E+02 7.991E-01 3.131E+02 7.531E-01 3.331E+02 7.280E-01 3.531E+02 7.155E-01
      3.731E+02 6.904E-01 3.931E+02 6.653E-01 4.131E+02 6.276E-01 4.331E+02 5.941E-01

1x04 7517      n      5 1.870E+03
      8      8 1.023E+03 4.477E-01
      2.931E+02 1.023E+03 3.131E+02 1.082E+03 3.331E+02 1.142E+03 3.531E+02 1.213E+03
      3.731E+02 1.279E+03 3.931E+02 1.340E+03 4.131E+02 1.379E+03 4.331E+02 1.436E+03
      2.931E+02 4.477E-01 3.131E+02 4.268E-01 3.331E+02 4.100E-01 3.531E+02 4.058E-01
      3.731E+02 4.017E-01 3.931E+02 3.933E-01 4.131E+02 3.766E-01 4.331E+02 3.598E-01

1x07 7518      n      5 1.870E+03
      8      8 1.049E+03 5.021E-01
      2.931E+02 1.049E+03 3.131E+02 1.104E+03 3.331E+02 1.145E+03 3.531E+02 1.187E+03
      3.731E+02 1.236E+03 3.931E+02 1.279E+03 4.131E+02 1.325E+03 4.331E+02 1.373E+03
      2.931E+02 5.021E-01 3.131E+02 4.728E-01 3.331E+02 4.519E-01 3.531E+02 4.351E-01
      3.731E+02 4.184E-01 3.931E+02 4.017E-01 4.131E+02 3.891E-01 4.331E+02 3.724E-01

1x09 7519      n      5 1.840E+03
      8      8 1.056E+03 5.146E-01
      2.931E+02 1.056E+03 3.131E+02 1.108E+03 3.331E+02 1.163E+03 3.531E+02 1.216E+03
      3.731E+02 1.256E+03 3.931E+02 1.313E+03 4.131E+02 1.361E+03 4.331E+02 1.411E+03
      2.931E+02 5.146E-01 3.131E+02 4.895E-01 3.331E+02 4.728E-01 3.531E+02 4.184E-01
      3.731E+02 3.975E-01 3.931E+02 3.891E-01 4.131E+02 3.682E-01 4.331E+02 3.556E-01

1x10 7520      n      5 1.860E+03
      8      8 1.056E+03 5.146E-01
      2.931E+02 1.056E+03 3.131E+02 1.104E+03 3.331E+02 1.150E+03 3.531E+02 1.197E+03
      3.731E+02 1.223E+03 3.931E+02 1.296E+03 4.131E+02 1.341E+03 4.331E+02 1.417E+03
      2.931E+02 5.146E-01 3.131E+02 4.937E-01 3.331E+02 4.728E-01 3.531E+02 4.519E-01
      3.731E+02 4.351E-01 3.931E+02 4.268E-01 4.131E+02 4.142E-01 4.331E+02 4.058E-01

fbrfx 8201      n      5 3.240E+02 0.000E+00 0.000E+00
      5      4 8.000E+02 2.500E-02
      2.772E+02 7.113E+02 5.561E+02 1.046E+03 8.311E+02 1.197E+03 1.111E+03 1.300E+03
      2.273E+03 1.300E+03
      2.931E+02 2.301E-02 4.832E+02 6.937E-01 1.228E+03 2.410E+00 1.428E+03 2.870E+00

```


Thermal Property Data

k [W/m K] c [J/kg K] T [K] λ [J/kg] ρ [kg/m³]

rattn	8211	n	5	1.500E+04	0.000E+00	0.000E+00
0	0	5.397E+02	4.000E+00			
litbe	8216	n	5	2.137E+03	1.203E+03	0.000E+00
0	0	1.130E+03	1.799E+00			
snowf	8231	n	5	1.000E+02	2.731E+02	3.335E+05
0	0	2.100E+03	1.046E-01			
snowp	8232	n	5	5.500E+02	2.731E+02	3.335E+05
0	0	2.100E+03	4.686E-01			
wood1	8511	n	5	4.100E+02	0.000E+00	0.000E+00
0	0	1.300E+03	2.301E-01			
wood2	8512	n	5	4.100E+02	0.000E+00	0.000E+00
0	0	1.300E+03	1.300E-01			
corkg	8514	n	5	1.500E+02	0.000E+00	0.000E+00
0	0	2.008E+03	4.310E-02			
corkr	8515	n	5	1.300E+02	0.000E+00	0.000E+00
0	0	2.008E+03	4.477E-02			
bals1	8516	n	5	1.300E+02	0.000E+00	0.000E+00
0	0	2.301E+03	5.021E-02			
bals2	8517	n	5	3.200E+02	0.000E+00	0.000E+00
0	0	2.301E+03	8.000E-02			
cyprs	8518	n	5	4.600E+02	0.000E+00	0.000E+00
0	0	2.301E+03	9.623E-02			
mahog	8520	n	5	5.400E+02	0.000E+00	0.000E+00
0	0	2.301E+03	1.297E-01			
maple	8522	n	5	7.100E+02	0.000E+00	0.000E+00
0	0	2.301E+03	1.757E-01			
oakhd	8524	n	5	8.250E+02	0.000E+00	0.000E+00
0	0	2.385E+03	2.100E-01			
oakld	8525	n	5	6.100E+02	0.000E+00	0.000E+00
0	0	2.385E+03	1.464E-01			
pinew	8526	n	5	5.500E+02	0.000E+00	0.000E+00
0	0	2.301E+03	1.506E-01			

k [W/m K] *c* [J/kg K] *T* [K] λ [J/kg] ρ [kg/m³]

Thermal Property Data

pinel 8527 n 5 5.100E+02 0.000E+00 0.000E+00
0 0 2.301E+03 1.130E-01

pinev 8528 n 5 5.400E+02 0.000E+00 0.000E+00
0 0 2.301E+03 1.423E-01

pinew 8529 n 5 5.500E+02 0.000E+00 0.000E+00
0 0 2.301E+03 3.431E-01

teak 8530 n 5 6.400E+02 0.000E+00 0.000E+00
0 0 2.301E+03 1.715E-01

firwh 8532 n 5 4.500E+02 0.000E+00 0.000E+00
0 0 2.301E+03 1.088E-01

pinea 8534 n 5 5.300E+02 0.000E+00 0.000E+00
0 0 2.301E+03 1.297E-01

6 *Units, Constants, and Conversion Factors*

TABLE 4 Any consistent set of units can be used.

Quantity		Units	
temperature	K	K	R
length	m	cm	ft
time	s	s	hr
density	kg/m ³	g/cm ³	lb/ft ³
specific heat	J/kg K	cal/g K	Btu/lb R
thermal conductivity	W/m K	cal/s cm K	Btu/hr ft R
thermal generation	W/m ³	cal/s cm ³	Btu/hr ft ³
heat flux	W/m ²	cal/s cm ²	Btu/hr ft ²
latent heat	J/kg	cal/g	Btu/lb
thermal conductance	W/m ² K	cal/s cm ² K	Btu/hr ft ² R
contact resistance	m ² K/W	s cm ² K/cal	hr ft ² R/Btu

TABLE 5 Gas constant and Stefan-Boltzman constant

gas constant	8.314e+03 J/(kg mole) K
	1.987e+00 Btu/(lb mole) R
	1.987e+00 cal/(g mole) K
Stefan-Boltzman	5.670e-08 W/m ² K ⁴
	1.712e-09 Btu/hr ft ² R ⁴
	1.355e-12 cal/s cm ² K ⁴

TABLE 6 Conversion factors

temperature	$1 \text{ R} = 1.8 \text{ K}$ $\text{R} = \frac{5}{9} \text{ C} + 459.67$ $\text{K} = \text{C} + 273.15$
length	$1 \text{ m} = 3.281 \text{ ft}$ $1 \text{ cm} = 0.3937 \text{ in}$
mass	$1 \text{ kg} = 2.205 \text{ lb}$
density	$1 \text{ kg/m}^3 = 0.06243 \text{ lb/ft}^3$ $1 \text{ g/cm}^3 = 0.03613 \text{ lb/in}^3$
heat	$1 \text{ J} = 9.478\text{e-}04 \text{ Btu}$ $1 \text{ cal} = 3.966\text{e-}03 \text{ Btu}$ $1 \text{ cal} = 4.184 \text{ J}$
heat rate	$1 \text{ W} = 1 \text{ J/s}$ $1 \text{ W} = 3.412 \text{ Btu/hr}$ $1 \text{ cal/s} = 14.28 \text{ Btu/hr}$ $1 \text{ cal/s} = 4.184 \text{ W}$
specific heat	$1 \text{ J/kg K} = 2.388\text{e-}04 \text{ Btu/lb R}$ $1 \text{ cal/g K} = 1 \text{ Btu/lb R}$ $1 \text{ cal/g K} = 4184 \text{ J/kg K}$
thermal conductivity	$1 \text{ W/m K} = 0.5778 \text{ Btu/hr ft R}$ $1 \text{ cal/s cm K} = 241.8 \text{ Btu/hr ft R}$ $1 \text{ cal/s cm K} = 418.4 \text{ W/m K}$
thermal generation	$1 \text{ W/m}^3 = 0.09660 \text{ Btu/hr ft}^3$ $1 \text{ cal/s cm}^3 = 4.042\text{e+}05 \text{ Btu/hr ft}^3$ $1 \text{ cal/s cm}^3 = 4.184\text{e+}06 \text{ W/m}^3$
heat flux	$1 \text{ W/m}^2 = 0.3170 \text{ Btu/hr ft}^2$ $1 \text{ cal/s cm}^2 = 1.326\text{e+}04 \text{ Btu/hr ft}^2$ $1 \text{ cal/s cm}^2 = 4.184\text{e+}04 \text{ W/m}^2$
thermal conductance	$1 \text{ W/m}^2 \text{ K} = 0.1761 \text{ Btu/hr ft}^2 \text{ R}$ $1 \text{ cal/s cm}^2 \text{ K} = 7368 \text{ Btu/hr ft}^2 \text{ R}$ $1 \text{ cal/s cm}^2 \text{ K} = 4.184\text{e+}04 \text{ W/m}^2 \text{ K}$
latent heat	$1 \text{ J/kg} = 4.298\text{e-}04 \text{ Btu/lb}$ $1 \text{ cal/g} = 1.799 \text{ Btu/lb}$ $1 \text{ cal/g} = 4.184\text{e+}03 \text{ J/kg}$

TABLE 7 Chemical Kinetic Data [14]

explosive	TATB	TNT	LX-10
Q_1 (cal/g)	-50.	-30.	-100.
$\ln Z_1$	29.5	35.0	38.3
E_1 (kcal/m)	42.0	44.0	46.0
Q_2 (cal/g)	900.	900.	300.
$\ln Z_2$	45.0	26.0	45.1
E_2 (kcal/m)	60.0	34.5	52.7
Q_3 (cal/g)	950.	930.	1200.
$\ln Z_3$	45.0	26.2	28.1
E_3 (kcal/m)	54.0	33.5	34.0

The above chemical kinetic data is for a three step reaction sequence model based on an endothermic induction reaction followed by an autocatalytic exothermic process. This three term model includes the following steps

with a heat source term expressed as

$$q = N_A Q_1 Z_1 e^{-E_1/(RT)} + N_A N_B Q_2 Z_2 e^{-E_2/(RT)} + N_B Q_3 Z_3 e^{-E_3/(RT)}$$

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