TABLES OF THERMODYNAMIC FUNCTIONS FOR GASEOUS THORIUM, URANIUM, AND PLUTONIUM OXIDES

by

David W. Green

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TABLES OF THERMODYNAMIC FUNCTIONS FOR GASEOUS
THORIUM, URANIUM, AND PLUTONIUM OXIDES

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David W. Green

Chemical Engineering Division

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The measured and estimated spectroscopic data for thorium, uranium, and plutonium oxide vapor species have been used with the methods of statistical mechanics to calculate thermodynamic functions. Evaluation of the uncertainties in data, methods of estimating molecular parameters, effects of assumptions, redetermination of $\Delta H_f^\circ(298.15 \text{ K})$ values, and the presentation of tables of thermodynamic functions have been discussed elsewhere.¹ The resultant tables are also given here.

Table 1 summarizes the data that were used to generate the thermodynamic functions given in Tables 2 to 15. The rotational and vibrational contributions are from measured and estimated spectroscopic data. The parameters for the electric contribution are for an increasing-density-of-states model.² The values of $\Delta H_f^\circ(298.15 \text{ K})$ are calculated¹ in each case from evaluated ΔG_f° equations and consistent thermodynamic functions. Contributions to the thermodynamic functions from vibrational anharmonicity, vibration-rotation interaction, centrifugal stretching, and other "correction" terms are not included because they are small relative to the uncertainties in the thermodynamic functions at temperatures above 3000 K.

Table 1. Summary of Data for Uranium, Plutonium, and Thorium Oxide Vapor Species.

	UO	UO ₂	UO ₃	PuO	PuO ₂	ThO	ThO ₂
Rotation ^a	r = 0.184 nm	linear r = 0.179 nm	T-shaped 2r = 0.176 nm r = 0.179 nm	r = 0.184 nm	linear r = 0.179 nm	r = 0.184 nm	$\theta = 122.5^\circ$ r = 0.180 nm
Vibration ^b (frequency in cm ⁻¹)	820.0	755.4, 178.0 (2), 776.1	343.5, 745.6, 852.6, 200, 297, 205	822.3	746.50, 183 (2), 734.25	890.99	787.40, 250, 735.35
Electronic ^c	g = 1, x = 920 cm ⁻¹ IP = 45,000 cm ⁻¹	g = 1, x = 400 IP = 45,000	g = 1, x = 2000 IP = 85,000	g = 1, x = 260, IP = 47,000	g = 1, x = 670, IP = 75,000	g = 1, x = 430, IP = 49,000	g = 1, x = 2000 IP = 70,000
ΔH_f° (298 K) (kJ)	19.9	-466.9	-804.3	-91.0	-464.0	-21.8	-451

^aBond angles are measured; ³⁻⁶ bond distances are estimated¹, except for ThO.⁷

^bAll frequencies above 300 cm⁻¹ are measured; ³⁻⁷ those below are estimated.¹

^cModel parameters^{1,2} are derived; ionization potentials are measured.⁸

Table 2. Thermodynamic Functions for ThO(g); Units for Columns 2-5 Are cal K⁻¹ mol⁻¹ and for Columns 6-9 Are kcal mol⁻¹.

T(K)	C _p ^o	S ^o	$-\left(\frac{G^o-H_0^o}{T}\right)$	$-\left(\frac{G^o-H_{298}^o}{T}\right)$	H ^o -H ₀ ^o	H ^o -H ₂₉₈ ^o	ΔH _f ^o	ΔG _f ^o
0.0	0.0	0.0	INF	INF	0.0	-2.29	-4.9	-4.9
298.15	8.89	58.20	50.54	58.20	2.29	0.0	-5.2	-11.4
300.00	8.90	58.26	50.58	58.20	2.30	0.02	-5.2	-11.5
400.00	9.51	60.91	52.85	58.56	3.23	0.94	-5.3	-13.6
500.00	9.91	63.08	54.68	59.25	4.20	1.91	-5.4	-15.6
600.00	10.18	64.91	56.24	60.05	5.20	2.92	-5.5	-17.7
700.00	10.37	66.50	57.59	60.86	6.23	3.95	-5.5	-19.7
800.00	10.50	67.89	58.79	61.65	7.28	4.99	-5.6	-21.7
900.00	10.60	69.13	59.88	62.42	8.33	6.05	-5.8	-23.7
1000.00	10.67	70.25	60.86	63.14	9.40	7.11	-5.9	-25.7
1100.00	10.73	71.27	61.76	63.84	10.47	8.19	-6.1	-27.7
1200.00	10.77	72.21	62.59	64.50	11.54	9.26	-6.2	-29.6
1300.00	10.81	73.07	63.37	65.12	12.62	10.34	-6.4	-31.6
1400.00	10.84	73.88	64.09	65.72	13.71	11.42	-6.6	-33.5
1500.00	10.87	74.63	64.77	66.29	14.79	12.50	-6.9	-35.4
1600.00	10.90	75.33	65.40	66.83	15.88	13.59	-7.1	-37.3
1700.00	10.92	75.99	66.01	67.35	16.97	14.69	-8.2	-39.1
1800.00	10.93	76.62	66.58	67.85	18.06	15.79	-9.4	-40.9
1900.00	10.95	77.21	67.12	68.33	19.16	16.87	-9.7	-42.7
2000.00	10.97	77.77	67.64	68.79	20.26	17.97	-9.0	-44.5
2100.00	10.98	78.31	68.14	69.23	21.35	19.07	-12.7	-46.2
2200.00	11.00	78.82	68.61	69.65	22.45	20.17	-13.1	-47.7
2300.00	11.01	79.31	69.07	70.06	23.55	21.27	-13.6	-49.3
2400.00	11.02	79.78	69.50	70.46	24.66	22.37	-14.0	-50.9
2500.00	11.04	80.23	69.92	70.84	25.76	23.47	-14.5	-52.4
2600.00	11.05	80.66	70.33	71.21	26.87	24.58	-15.0	-53.9
2700.00	11.06	81.08	70.72	71.56	27.97	25.69	-15.4	-55.4
2800.00	11.07	81.48	71.10	71.91	29.08	26.79	-15.9	-56.8
2900.00	11.08	81.87	71.46	72.25	30.19	27.90	-16.4	-58.3
3000.00	11.09	82.25	71.81	72.58	31.30	29.01	-16.8	-59.7
3100.00	11.10	82.61	72.16	72.89	32.41	30.12	-17.3	-61.2
3200.00	11.11	82.96	72.49	73.20	33.52	31.23	-17.8	-62.6
3300.00	11.13	83.31	72.81	73.50	34.63	32.35	-18.2	-64.0
3400.00	11.14	83.64	73.12	73.80	35.75	33.46	-18.7	-65.3
3500.00	11.15	83.96	73.43	74.08	36.86	34.57	-19.2	-66.7
3600.00	11.16	84.28	73.73	74.36	37.98	35.69	-19.6	-68.1
3700.00	11.17	84.58	74.02	74.63	39.10	36.81	-20.1	-69.4
3800.00	11.18	84.88	74.30	74.90	40.21	37.93	-20.5	-70.7
3900.00	11.19	85.17	74.57	75.16	41.33	39.05	-21.1	-72.0
4000.00	11.20	85.46	74.84	75.41	42.46	40.17	-21.5	-73.3
4100.00	11.22	85.73	75.10	75.66	43.58	41.29	-22.0	-74.6
4200.00	11.23	86.00	75.36	75.90	44.70	42.41	-22.5	-75.9
4300.00	11.24	86.27	75.61	76.14	45.83	43.54	-23.0	-77.2
4400.00	11.25	86.53	75.86	76.38	46.95	44.67	-23.4	-78.4
4500.00	11.27	86.78	76.10	76.60	48.08	45.79	-23.9	-79.7
4600.00	11.28	87.03	76.33	76.83	49.21	46.92	-24.4	-80.9
4700.00	11.30	87.27	76.56	77.05	50.34	48.05	-24.9	-82.1
4800.00	11.31	87.51	76.79	77.26	51.47	49.19	-25.3	-83.3
4900.00	11.32	87.74	77.01	77.47	52.61	50.32	-25.8	-84.5
5000.00	11.34	87.97	77.23	77.68	53.74	51.45	-161.3	-85.0
5100.00	11.36	88.20	77.44	77.89	54.88	52.59	-161.8	-83.4
5200.00	11.37	88.42	77.65	78.09	56.02	53.73	-162.3	-81.9
5300.00	11.39	88.64	77.85	78.28	57.16	54.87	-162.8	-80.4
5400.00	11.41	88.85	78.05	78.48	58.30	56.01	-163.2	-78.8
5500.00	11.44	89.06	78.25	78.67	59.45	57.16	-163.7	-77.2
5600.00	11.50	89.27	78.45	78.86	60.62	58.33	-164.2	-75.7
5700.00	11.52	89.48	78.64	79.04	61.77	59.48	-164.6	-74.1
5800.00	11.55	89.68	78.83	79.22	62.92	60.63	-165.1	-72.5
5900.00	11.57	89.87	79.01	79.40	64.08	61.79	-165.6	-70.9
6000.00	11.60	90.07	79.20	79.58	65.23	62.95	-166.0	-69.3

Table 3. Thermodynamic Functions for $\text{ThO}_2(\text{g})$; Units for Columns 2-5 Are $\text{cal K}^{-1} \text{mol}^{-1}$ and for Columns 6-9 Are kcal mol^{-1} .

T(K)	C_p°	S°	$-\left(\frac{G^\circ - H_0^\circ}{T}\right)$	$-\left(\frac{G^\circ - H_{298}^\circ}{T}\right)$	$H^\circ - H_0^\circ$	$H^\circ - H_{298}^\circ$	ΔH_f°	ΔG_f°
0.0	0.0	0.0	INF	INF	0.0	-2.79	-107.0	-107.0
298.15	11.16	67.00	57.65	67.00	2.79	0.0	-107.8	-109.4
300.00	11.18	67.07	57.71	67.00	2.81	0.02	-107.8	-109.4
400.00	12.09	70.42	60.48	67.45	3.98	1.19	-108.0	-109.9
500.00	12.77	73.19	62.75	68.33	5.22	2.43	-108.2	-110.3
600.00	13.30	75.57	64.70	69.34	6.52	3.74	-108.3	-110.7
700.00	13.73	77.66	66.40	70.39	7.88	5.09	-109.5	-111.1
800.00	14.08	79.51	67.93	71.41	9.27	6.48	-108.7	-111.5
900.00	14.36	81.19	69.31	72.41	10.69	7.90	-109.0	-111.8
1000.00	14.59	82.71	70.57	73.36	12.14	9.35	-109.0	-112.1
1100.00	14.77	84.11	71.74	74.28	13.61	10.82	-109.1	-112.4
1200.00	14.93	85.40	72.83	75.15	15.09	12.30	-109.3	-112.7
1300.00	15.06	86.61	73.84	75.99	16.59	13.80	-109.5	-113.0
1400.00	15.17	87.73	74.79	76.79	18.10	15.31	-109.7	-113.2
1500.00	15.26	88.78	75.69	77.55	19.63	16.84	-110.0	-113.5
1600.00	15.34	89.76	76.54	78.28	21.16	18.37	-110.2	-113.7
1700.00	15.41	90.69	77.34	78.99	22.69	19.90	-111.3	-113.9
1800.00	15.47	91.58	78.11	79.66	24.24	21.45	-111.5	-114.0
1900.00	15.52	92.42	78.84	80.31	25.79	23.00	-111.8	-114.2
2000.00	15.56	93.21	79.54	80.94	27.34	24.55	-112.0	-114.3
2100.00	15.61	93.97	80.21	81.54	28.90	26.11	-115.8	-114.3
2200.00	15.64	94.70	80.85	82.12	30.46	27.67	-116.2	-114.2
2300.00	15.68	95.40	81.47	82.68	32.03	29.24	-116.7	-114.1
2400.00	15.70	96.06	82.06	83.23	33.60	30.81	-117.1	-114.0
2500.00	15.73	96.71	82.64	83.75	35.17	32.38	-117.6	-113.8
2600.00	15.76	97.32	83.19	84.26	36.74	33.96	-118.0	-113.7
2700.00	15.78	97.92	83.72	84.76	38.32	35.53	-118.5	-113.5
2800.00	15.80	98.49	84.24	85.24	39.90	37.11	-118.9	-113.3
2900.00	15.82	99.05	84.74	85.70	41.48	38.69	-119.4	-113.1
3000.00	15.84	99.58	85.23	86.16	43.06	40.27	-119.9	-112.8
3100.00	15.85	100.10	85.70	86.60	44.65	41.86	-120.4	-112.6
3200.00	15.87	100.61	86.16	87.03	46.24	43.45	-120.8	-112.3
3300.00	15.89	101.10	86.60	87.45	47.82	45.03	-121.3	-112.1
3400.00	15.90	101.57	87.04	87.86	49.41	46.62	-121.8	-111.8
3500.00	15.91	102.03	87.46	88.26	51.00	48.21	-122.3	-111.5
3600.00	15.93	102.48	87.87	88.64	52.60	49.81	-122.8	-111.2
3700.00	15.94	102.92	88.27	89.02	54.19	51.40	-123.2	-110.8
3800.00	15.95	103.34	88.66	89.40	55.78	53.00	-123.7	-110.5
3900.00	15.96	103.76	89.04	89.76	57.38	54.59	-124.2	-110.1
4000.00	15.97	104.16	89.42	90.11	58.98	56.19	-124.7	-109.8
4100.00	15.99	104.56	89.78	90.46	60.58	57.79	-125.2	-109.4
4200.00	16.00	104.94	90.14	90.80	62.17	59.39	-125.7	-109.0
4300.00	16.01	105.32	90.49	91.13	63.78	60.99	-126.2	-108.6
4400.00	16.02	105.69	90.83	91.46	65.38	62.59	-126.7	-108.2
4500.00	16.03	106.05	91.16	91.78	66.98	64.19	-127.2	-107.0
4600.00	16.04	106.40	91.49	92.09	68.58	65.79	-127.7	-107.3
4700.00	16.05	106.74	91.81	92.40	70.19	67.40	-128.2	-106.9
4800.00	16.06	107.08	92.12	92.70	71.79	69.00	-128.7	-106.4
4900.00	16.07	107.41	92.43	93.00	73.40	70.61	-129.2	-106.0
5000.00	16.07	107.74	92.74	93.29	75.01	72.22	-129.7	-105.7
5100.00	16.09	108.06	93.03	93.58	76.62	73.83	-265.3	-101.5
5200.00	16.09	108.37	93.32	93.86	78.23	75.44	-265.8	-98.3
5300.00	16.11	108.68	93.61	94.14	79.84	77.05	-266.3	-95.1
5400.00	16.11	108.98	93.89	94.41	81.45	78.66	-266.9	-91.8
5500.00	16.12	109.27	94.17	94.68	83.06	80.27	-267.4	-88.6
5600.00	16.13	109.56	94.44	94.94	84.67	81.88	-267.9	-85.3
5700.00	16.14	109.85	94.71	95.20	86.29	83.50	-268.4	-82.1
5800.00	16.15	110.13	94.97	95.45	87.90	85.11	-269.0	-78.8
5900.00	16.16	110.41	95.23	95.71	89.52	86.73	-269.5	-75.5
6000.00	16.17	110.68	95.49	95.95	91.14	88.35	-270.0	-72.2

Table 4. Thermodynamic Functions for $\text{UO}(\text{g})$; Units for Columns 2-5 Are $\text{cal K}^{-1} \text{mol}^{-1}$ and for Columns 6-9 Are kcal mol^{-1} .

T(K)	C_p°	S°	$-\left(\frac{G^\circ - H_0^\circ}{T}\right)$	$-\left(\frac{G^\circ - H_{298}^\circ}{T}\right)$	$H^\circ - H_0^\circ$	$H^\circ - H_{298}^\circ$	ΔH_f°	ΔG_f°
0.0	0.0	0.0	INF	INF	0.0	-2.15	5.2	5.2
298.15	8.06	57.59	50.38	57.59	2.15	0.0	4.8	-1.5
300.00	8.07	57.64	50.42	57.59	2.17	0.01	4.8	-1.6
400.00	8.84	60.07	52.54	57.92	3.01	0.86	4.6	-3.4
500.00	9.40	62.11	54.25	58.56	3.93	1.78	4.4	-5.7
600.00	9.79	63.86	55.71	59.30	4.89	2.74	4.2	-7.7
700.00	10.06	65.39	56.99	60.06	5.88	3.73	3.9	-9.6
800.00	10.25	66.75	58.12	60.81	6.90	4.75	3.6	-11.5
900.00	10.40	67.96	59.15	61.54	7.93	5.78	3.1	-13.4
1000.00	10.51	69.06	60.09	62.24	8.98	6.83	2.0	-15.2
1100.00	10.59	70.07	60.95	62.91	10.03	7.88	0.6	-16.8
1200.00	10.66	71.00	61.75	63.54	11.09	8.94	0.3	-18.4
1300.00	10.72	71.85	62.49	64.15	12.16	10.01	0.0	-19.9
1400.00	10.76	72.65	63.19	64.73	13.24	11.09	-0.3	-21.4
1500.00	10.80	73.39	63.85	65.28	14.32	12.17	-2.9	-22.8
1600.00	10.84	74.09	64.47	65.81	15.40	13.25	-3.5	-24.1
1700.00	10.87	74.75	65.05	66.32	16.49	14.33	-4.0	-25.4
1800.00	10.89	75.37	65.61	66.80	17.57	15.42	-4.5	-26.6
1900.00	10.92	75.96	66.14	67.27	18.66	16.51	-5.0	-27.8
2000.00	10.94	76.52	66.64	67.72	19.76	17.61	-5.5	-29.0
2100.00	10.96	77.06	67.13	68.15	20.85	18.70	-6.1	-30.2
2200.00	10.98	77.57	67.59	68.57	21.95	19.80	-6.6	-31.3
2300.00	10.99	78.06	68.03	68.97	23.05	20.90	-7.1	-32.4
2400.00	11.01	78.52	68.46	69.36	24.15	22.00	-7.6	-33.5
2500.00	11.03	78.97	68.87	69.73	25.25	23.10	-8.1	-34.6
2600.00	11.04	79.41	69.27	70.10	26.36	24.20	-8.7	-35.6
2700.00	11.06	79.82	69.65	70.45	27.46	25.31	-9.2	-36.7
2800.00	11.07	80.23	70.02	70.79	28.57	26.42	-9.7	-37.7
2900.00	11.09	80.62	70.38	71.12	29.68	27.53	-10.3	-38.6
3000.00	11.10	80.99	70.73	71.45	30.79	28.64	-10.8	-39.6
3100.00	11.11	81.36	71.07	71.76	31.90	29.75	-11.3	-40.6
3200.00	11.13	81.71	71.39	72.07	33.01	30.86	-11.8	-41.5
3300.00	11.14	82.05	71.71	72.36	34.12	31.97	-12.4	-42.4
3400.00	11.15	82.38	72.02	72.65	35.24	33.09	-12.9	-43.3
3500.00	11.17	82.71	72.32	72.94	36.36	34.21	-13.4	-44.2
3600.00	11.18	83.02	72.61	73.21	37.47	35.32	-14.0	-45.1
3700.00	11.20	83.33	72.90	73.48	38.59	36.44	-14.5	-45.9
3800.00	11.21	83.63	73.18	73.74	39.72	37.56	-15.0	-46.8
3900.00	11.23	83.92	73.45	74.00	40.84	38.69	-15.6	-47.6
4000.00	11.24	84.21	73.71	74.25	41.96	39.81	-16.1	-48.4
4100.00	11.26	84.48	73.97	74.50	43.09	40.94	-16.7	-49.2
4200.00	11.27	84.76	74.23	74.74	44.21	42.06	-17.2	-50.0
4300.00	11.29	85.02	74.48	74.98	45.34	43.19	-17.7	-50.8
4400.00	11.30	85.28	74.72	75.21	46.47	44.32	-18.3	-51.6
4500.00	11.32	85.54	74.96	75.43	47.61	45.46	-18.9	-52.4
4600.00	11.34	85.78	75.19	75.66	48.74	46.59	-19.6	-53.2
4700.00	11.36	86.03	75.42	75.87	49.88	47.73	-20.3	-54.0
4800.00	11.40	86.27	75.64	76.09	51.02	48.87	-21.0	-54.9
4900.00	11.42	86.51	75.86	76.30	52.16	50.01	-21.8	-55.8
5000.00	11.44	86.74	76.07	76.50	53.31	51.16	-22.6	-56.7
5100.00	11.46	86.96	76.29	76.71	54.45	52.30	-23.4	-57.6
5200.00	11.49	87.19	76.49	76.91	55.60	53.45	-24.2	-58.5
5300.00	11.51	87.41	76.70	77.10	56.75	54.60	-25.0	-59.4
5400.00	11.54	87.62	76.90	77.30	57.90	55.75	-25.8	-60.3
5500.00	11.56	87.83	77.09	77.49	59.06	56.91	-26.6	-61.2
5600.00	11.59	88.04	77.29	77.67	60.22	58.06	-27.4	-62.1
5700.00	11.62	88.25	77.48	77.86	61.38	59.22	-28.2	-63.0
5800.00	11.65	88.45	77.67	78.04	62.54	60.39	-29.0	-63.9
5900.00	11.68	88.65	77.85	78.21	63.71	61.55	-29.8	-64.8
6000.00	11.71	88.85	78.03	78.39	64.88	62.72	-30.6	-65.7

Table 5. Thermodynamic Functions for $\text{UO}_2(\text{g})$; Units for Columns 2-5 Are $\text{cal K}^{-1} \text{mol}^{-1}$ and for Columns 6-9 Are kcal mol^{-1} .

T(K)	C_p°	S°	$-\left(\frac{G^\circ - H_0^\circ}{T}\right) - \left(\frac{G^\circ - H_{298}^\circ}{T}\right)$	$H^\circ - H_0^\circ$	$H^\circ - H_{298}^\circ$	ΔH_f°	ΔG_f°
0.0	0.0	0.0	INF	INF	0.0	-3.13	-111.1
298.15	13.58	63.60	53.12	63.60	3.13	0.0	-111.6
300.00	13.60	63.69	53.18	63.60	3.15	0.03	-111.6
400.00	14.67	67.76	56.33	64.15	4.57	1.44	-111.6
500.00	15.33	71.11	58.97	65.22	6.07	2.95	-111.5
600.00	15.76	73.95	61.23	66.44	7.63	4.50	-111.5
700.00	16.04	76.40	63.23	67.69	9.22	6.09	-111.6
800.00	16.24	78.56	65.01	68.92	10.84	7.71	-111.7
900.00	16.39	80.48	66.63	70.10	12.47	9.34	-112.0
1000.00	16.49	82.21	68.10	71.23	14.11	10.98	-112.9
1100.00	16.57	83.79	69.45	72.30	15.77	12.64	-114.2
1200.00	16.64	85.23	70.71	73.32	17.43	14.30	-114.3
1300.00	16.69	86.57	71.88	74.28	19.09	15.97	-114.4
1400.00	16.74	87.81	72.97	75.21	20.77	17.64	-114.5
1500.00	16.78	88.96	74.00	76.09	22.44	19.32	-117.0
1600.00	16.81	90.05	74.97	76.92	24.12	21.00	-117.4
1700.00	16.84	91.07	75.89	77.73	25.81	22.68	-117.7
1800.00	16.86	92.03	76.76	78.49	27.49	24.36	-118.1
1900.00	16.88	92.94	77.59	79.23	29.18	26.05	-118.5
2000.00	16.90	93.81	78.38	79.94	30.87	27.74	-118.8
2100.00	16.92	94.64	79.13	80.62	32.56	29.43	-119.2
2200.00	16.94	95.42	79.85	81.27	34.25	31.13	-119.6
2300.00	16.96	96.18	80.55	81.91	35.95	32.82	-120.0
2400.00	16.97	96.90	81.21	82.52	37.65	34.52	-120.4
2500.00	16.99	97.59	81.85	83.11	39.35	36.22	-120.8
2600.00	17.00	98.26	82.47	83.68	41.05	37.92	-121.2
2700.00	17.02	98.90	83.07	84.23	42.75	39.62	-121.6
2800.00	17.03	99.52	83.65	84.76	44.45	41.33	-122.0
2900.00	17.05	100.12	84.20	85.28	46.16	43.03	-122.4
3000.00	17.06	100.70	84.74	85.79	47.86	44.74	-122.8
3100.00	17.07	101.26	85.27	86.28	49.57	46.44	-123.2
3200.00	17.09	101.80	85.78	86.75	51.20	48.15	-123.6
3300.00	17.10	102.33	86.27	87.22	52.99	49.86	-124.0
3400.00	17.11	102.84	86.75	87.67	54.70	51.58	-124.4
3500.00	17.13	103.34	87.22	88.11	56.42	53.29	-124.9
3600.00	17.14	103.82	87.67	88.54	58.13	55.00	-125.3
3700.00	17.16	104.29	88.11	88.96	59.85	56.72	-125.7
3800.00	17.17	104.75	88.55	89.37	61.56	58.44	-126.1
3900.00	17.18	105.19	88.97	89.77	63.28	60.16	-126.6
4000.00	17.20	105.63	89.38	90.16	65.00	61.88	-127.0
4100.00	17.21	106.05	89.78	90.54	66.73	63.60	-127.4
4200.00	17.23	106.47	90.17	90.92	68.45	65.32	-127.9
4300.00	17.24	106.88	90.56	91.28	70.18	67.05	-128.3
4400.00	17.26	107.27	90.93	91.64	71.90	68.78	-128.8
4500.00	17.28	107.66	91.30	91.99	73.63	70.50	-129.2
4600.00	17.29	108.04	91.66	92.34	75.36	72.23	-129.6
4700.00	17.31	108.41	92.01	92.68	77.09	73.97	-130.0
4800.00	17.33	108.78	92.36	93.01	78.83	75.70	-130.4
4900.00	17.35	109.14	92.70	93.33	80.56	77.44	-130.8
5000.00	17.37	109.49	93.03	93.65	82.30	79.18	-131.2
5100.00	17.45	109.84	93.36	93.97	84.07	80.94	-131.6
5200.00	17.48	110.18	93.68	94.28	85.82	82.69	-132.0
5300.00	17.51	110.51	93.99	94.58	87.57	84.44	-132.4
5400.00	17.54	110.84	94.30	94.88	89.32	86.19	-132.8
5500.00	17.57	111.16	94.60	95.17	91.08	87.95	-133.2
5600.00	17.61	111.48	94.90	95.46	92.83	89.71	-133.6
5700.00	17.64	111.79	95.19	95.74	94.60	91.47	-134.0
5800.00	17.68	112.10	95.48	96.02	96.36	93.24	-134.4
5900.00	17.72	112.40	95.77	96.30	98.13	95.01	-134.8
6000.00	17.76	112.70	96.05	96.57	99.91	96.78	-135.2

Table 6. Thermodynamic Functions for $\text{UO}_3(\text{g})$; Units for Columns 2-5 Are $\text{cal K}^{-1} \text{mol}^{-1}$ and for Columns 6-9 are kcal mol^{-1} .

T(K)	C_p°	S°	$-\left(\frac{G^\circ - H_0^\circ}{T}\right) - \left(\frac{G^\circ - H_{298}^\circ}{T}\right)$	$H^\circ - H_0^\circ$	$H^\circ - H_{298}^\circ$	ΔH_f°	ΔG_f°
0.0	0.0	0.0	INF	INF	0.0	-3.48	-191.1
298.15	15.21	72.70	61.04	72.70	3.48	0.0	-192.2
300.00	15.24	72.80	61.11	72.70	3.51	0.03	-192.2
400.00	16.69	77.39	64.63	73.32	5.11	1.63	-192.4
500.00	17.74	81.24	67.57	74.53	6.83	3.35	-192.5
600.00	18.52	84.54	70.13	75.93	8.65	5.17	-192.6
700.00	19.12	87.44	72.40	77.37	10.53	7.05	-192.8
800.00	19.58	90.03	74.45	78.79	12.47	8.99	-193.0
900.00	19.95	92.36	76.31	80.17	14.44	10.97	-193.3
1000.00	20.24	94.48	78.02	81.50	16.45	12.98	-194.2
1100.00	20.48	96.42	79.61	82.77	18.49	15.01	-195.6
1200.00	20.67	98.21	81.08	83.98	20.55	17.07	-195.7
1300.00	20.83	99.87	82.46	85.14	22.62	19.14	-195.8
1400.00	20.96	101.42	83.76	86.25	24.71	21.23	-195.9
1500.00	21.07	102.87	84.99	87.31	26.81	23.34	-198.5
1600.00	21.17	104.23	86.15	88.32	28.93	25.45	-198.8
1700.00	21.25	105.52	87.25	89.30	31.05	27.57	-199.2
1800.00	21.32	106.73	88.30	90.23	33.18	29.70	-199.6
1900.00	21.36	107.89	89.30	91.13	35.31	31.83	-199.9
2000.00	21.43	108.98	90.26	92.00	37.45	33.97	-200.3
2100.00	21.48	110.03	91.17	92.83	39.60	36.12	-200.7
2200.00	21.52	111.03	92.05	93.63	41.75	38.27	-201.1
2300.00	21.56	111.99	92.90	94.41	43.90	40.42	-201.4
2400.00	21.59	112.91	93.72	95.16	46.06	42.58	-201.8
2500.00	21.62	113.79	94.50	95.89	48.22	44.74	-202.2
2600.00	21.65	114.64	95.26	96.60	50.38	46.91	-202.6
2700.00	21.67	115.46	95.99	97.28	52.55	49.07	-203.0
2800.00	21.70	116.24	96.70	97.94	54.72	51.24	-203.4
2900.00	21.72	117.01	97.39	98.59	56.89	53.41	-203.9
3000.00	21.73	117.74	98.05	99.21	59.06	55.58	-204.3
3100.00	21.75	118.46	98.70	99.82	61.24	57.76	-204.7
3200.00	21.77	119.15	99.33	100.42	63.41	59.93	-205.1
3300.00	21.78	119.82	99.94	100.99	65.59	62.11	-205.6
3400.00	21.80	120.47	100.53	101.56	67.77	64.29	-206.0
3500.00	21.81	121.10	101.11	102.11	69.95	66.47	-206.4
3600.00	21.83	121.71	101.68	102.64	72.13	68.66	-206.9
3700.00	21.84	122.31	102.23	103.17	74.32	70.84	-207.3
3800.00	21.85	122.89	102.76	103.68	76.50	73.02	-207.8
3900.00	21.86	123.46	103.29	104.18	78.69	75.21	-208.3
4000.00	21.87	124.02	103.80	104.67	80.87	77.40	-208.7
4100.00	21.89	124.56	104.30	105.14	83.06	79.59	-209.2
4200.00	21.90	125.08	104.79	105.61	85.25	81.78	-209.7
4300.00	21.90	125.60	105.26	106.07	87.44	83.97	-210.1
4400.00	21.92	126.10	105.73	106.52	89.63	86.16	-210.6
4500.00	21.92	126.60	106.19	106.96	91.83	88.35	-328.1
4600.00	21.93	127.08	106.64	107.39	94.02	90.54	-328.7
4700.00	21.94	127.55	107.08	107.82	96.21	92.74	-329.3
4800.00	21.95	128.01	107.51	108.23	98.41	94.93	-329.9
4900.00	21.96	128.47	107.93	108.64	100.61	97.13	-330.4
5000.00	21.97	128.91	108.35	109.04	102.80	99.32	-331.0
5100.00	21.97	129.34	108.76	109.44	105.00	101.52	-331.6
5200.00	21.98	129.77	109.16	109.82	107.20	103.72	-332.1
5300.00	21.99	130.19	109.55	110.20	109.40	105.92	-332.7
5400.00	22.00	130.60	109.93	110.58	111.60	108.12	-333.3
5500.00	22.01	131.01	110.31	110.95	113.80	110.32	-333.8
5600.00	22.01	131.40	110.69	111.31	116.00	112.52	-334.3
5700.00	22.02	131.79	111.05	111.66	118.20	114.73	-334.9
5800.00	22.03	132.18	111.41	112.01	120.40	116.93	-335.4
5900.00	22.04	132.55	111.77	112.36	122.61	119.13	-335.9
6000.00	22.05	132.92	112.12	112.70	124.81	121.34	-336.4

Table 7. Thermodynamic Functions for PuO(g); Units for Columns 2-5 Are cal K⁻¹ mol⁻¹ and for Columns 6-9 Are kcal mol⁻¹.

T(K)	C _p ^o	S ^o	$-\left(\frac{G^o-H_0^o}{T}\right)$	$-\left(\frac{G^o-H_{298}^o}{T}\right)$	H ^o -H ₀ ^o	H ^o -H ₂₉₈ ^o	ΔH _f ^o	ΔG _f ^o
0.0	0.0	0.0	INF	INF	0.0	-2.42	-21.4	-21.4
298.15	9.33	59.14	51.03	59.14	2.42	0.0	-21.7	-28.0
300.00	9.34	59.20	51.09	59.14	2.43	0.02	-21.7	-28.1
400.00	9.83	61.96	53.47	59.52	3.39	0.98	-22.8	-30.1
500.00	10.15	64.19	55.40	60.23	4.40	1.98	-23.1	-32.0
600.00	10.36	66.66	57.03	61.05	5.42	3.00	-23.5	-33.7
700.00	10.51	67.67	58.43	61.89	6.47	4.05	-23.7	-35.4
800.00	10.61	69.08	59.68	62.70	7.52	5.11	-23.9	-37.0
900.00	10.69	70.34	60.79	63.48	8.49	6.17	-24.2	-38.6
1000.00	10.75	71.47	61.81	64.22	9.66	7.24	-25.5	-40.1
1100.00	10.79	72.49	62.73	64.93	10.74	8.32	-25.9	-41.5
1200.00	10.83	73.44	63.59	65.60	11.82	9.40	-26.2	-42.9
1300.00	10.86	74.30	64.38	66.24	12.90	10.49	-26.6	-44.3
1400.00	10.89	75.11	65.12	66.84	13.99	11.58	-26.9	-45.6
1500.00	10.91	75.86	65.81	67.42	15.08	12.67	-27.3	-47.0
1600.00	10.93	76.57	66.46	67.97	16.18	13.76	-27.7	-48.3
1700.00	10.95	77.23	67.07	68.49	17.27	14.85	-28.0	-49.5
1800.00	10.96	77.86	67.65	69.00	18.37	15.95	-28.4	-50.8
1900.00	10.98	78.45	68.21	69.48	19.46	17.05	-28.7	-52.0
2000.00	10.99	79.02	68.73	69.94	20.56	18.15	-29.1	-53.2
2100.00	11.00	79.55	69.24	70.39	21.66	19.25	-29.4	-54.4
2200.00	11.02	80.07	69.72	70.82	22.77	20.35	-29.8	-55.6
2300.00	11.03	80.56	70.18	71.23	23.87	21.45	-30.2	-56.8
2400.00	11.04	81.03	70.62	71.63	24.97	22.56	-30.5	-57.9
2500.00	11.05	81.48	71.04	72.01	26.08	23.66	-30.9	-59.1
2600.00	11.06	81.91	71.45	72.38	27.19	24.77	-31.3	-60.2
2700.00	11.07	82.33	71.85	72.75	28.29	25.88	-31.7	-61.3
2800.00	11.09	82.73	72.23	73.09	29.40	26.99	-32.0	-62.4
2900.00	11.10	83.12	72.60	73.43	30.51	28.10	-32.4	-63.5
3000.00	11.11	83.50	72.96	73.76	31.63	29.21	-32.8	-64.5
3100.00	11.12	83.86	73.30	74.08	32.74	30.32	-33.1	-65.6
3200.00	11.13	84.22	73.64	74.39	33.85	31.43	-33.5	-66.6
3300.00	11.14	84.56	73.96	74.70	34.97	32.55	-33.9	-67.7
3400.00	11.15	84.89	74.28	74.99	36.08	33.67	-34.3	-68.7
3500.00	11.16	85.22	74.59	75.29	37.20	34.78	-34.7	-69.7
3600.00	11.17	85.53	74.89	75.56	38.32	35.90	-35.0	-70.7
3700.00	11.18	85.84	75.18	75.83	39.44	37.02	-119.1	-69.5
3800.00	11.20	86.14	75.47	76.10	40.56	38.14	-119.9	-68.1
3900.00	11.21	86.43	75.74	76.36	41.68	39.26	-120.7	-66.8
4000.00	11.22	86.72	76.01	76.62	42.80	40.39	-121.5	-65.4
4100.00	11.23	86.99	76.28	76.87	43.93	41.51	-122.4	-63.9
4200.00	11.25	87.26	76.54	77.11	45.06	42.64	-123.2	-62.5
4300.00	11.26	87.53	76.79	77.35	46.18	43.77	-124.1	-61.1
4400.00	11.27	87.79	77.04	77.59	47.31	44.89	-124.9	-59.6
4500.00	11.29	88.04	77.28	77.82	48.44	46.03	-125.8	-58.1
4600.00	11.30	88.29	77.51	78.04	49.57	47.16	-126.6	-56.6
4700.00	11.32	88.54	77.75	78.26	50.71	48.29	-127.5	-55.0
4800.00	11.33	88.78	77.97	78.48	51.84	49.43	-128.3	-53.5
4900.00	11.35	89.01	78.20	78.69	52.98	50.56	-129.2	-51.9
5000.00	11.37	89.24	78.42	78.90	54.12	51.70	-130.0	-50.3
5100.00	11.39	89.47	78.63	79.10	55.26	52.84	-130.8	-48.7
5200.00	11.40	89.69	78.84	79.31	56.40	53.98	-131.6	-47.1
5300.00	11.42	89.91	79.05	79.50	57.55	55.13	-132.4	-45.5
5400.00	11.45	90.12	79.25	79.70	58.70	56.28	-133.1	-43.8
5500.00	11.47	90.33	79.45	79.89	59.85	57.43	-133.9	-42.2
5600.00	11.57	90.55	79.65	80.08	61.04	58.62	-134.6	-40.5
5700.00	11.60	90.75	79.84	80.26	62.20	59.79	-135.3	-38.8
5800.00	11.63	90.96	80.03	80.45	63.36	60.94	-136.0	-37.1
5900.00	11.66	91.15	80.22	80.63	64.53	62.11	-136.7	-35.4
6000.00	11.70	91.35	80.40	80.80	65.70	63.28	-137.3	-33.7

Table 8. Thermodynamic Functions for $\text{PuO}_2(\text{g})$; Units for Columns 2-5 Are $\text{cal K}^{-1} \text{mol}^{-1}$ and for Columns 6-9 Are kcal mol^{-1} .

T(K)	C_p°	S°	$-\left(\frac{G^\circ - H_0^\circ}{T}\right)$	$-\left(\frac{G^\circ - H_{298}^\circ}{T}\right)$	$H^\circ - H_0^\circ$	$H^\circ - H_{298}^\circ$	ΔH_F°	ΔG_F°
0.0	0.0	0.0	INF	INF	0.0	-3.00	-110.1	-110.1
298.15	12.98	62.89	52.83	62.89	3.00	0.0	-110.9	-111.0
300.00	13.01	62.97	52.89	62.89	3.02	0.02	-110.9	-111.0
400.00	14.23	66.89	55.91	63.42	4.39	1.39	-111.9	-111.0
500.00	15.00	70.16	58.45	64.45	5.86	2.85	-112.2	-110.8
600.00	15.51	72.94	60.63	65.64	7.38	4.38	-112.4	-110.5
700.00	15.85	75.36	62.57	66.86	8.95	5.95	-112.5	-110.2
800.00	16.08	77.49	64.30	68.05	10.55	7.55	-112.6	-109.8
900.00	16.25	79.39	65.88	69.21	12.17	9.17	-112.7	-109.5
1000.00	16.37	81.11	67.32	70.32	13.80	10.80	-113.9	-109.0
1100.00	16.47	82.68	68.64	71.37	15.44	12.44	-114.1	-108.5
1200.00	16.54	84.11	69.87	72.37	17.09	14.09	-114.3	-108.0
1300.00	16.60	85.44	71.02	73.33	18.75	15.75	-114.5	-107.4
1400.00	16.65	86.67	72.09	74.24	20.41	17.41	-114.7	-106.9
1500.00	16.69	87.82	73.11	75.11	22.08	19.08	-114.9	-106.3
1600.00	16.73	88.90	74.06	75.93	23.75	20.75	-115.2	-105.7
1700.00	16.75	89.92	74.96	76.73	25.42	22.42	-115.4	-105.1
1800.00	16.78	90.88	75.82	77.49	27.10	24.10	-115.6	-104.5
1900.00	16.80	91.78	76.64	78.22	28.78	25.78	-115.8	-103.9
2000.00	16.82	92.65	77.42	78.92	30.46	27.46	-116.0	-103.3
2100.00	16.84	93.47	78.16	79.59	32.15	29.14	-116.3	-102.6
2200.00	16.85	94.25	78.87	80.24	33.83	30.83	-116.5	-102.0
2300.00	16.87	95.00	79.56	80.86	35.52	32.52	-116.8	-101.3
2400.00	16.88	95.72	80.22	81.47	37.20	34.20	-117.0	-100.6
2500.00	16.89	96.41	80.85	82.05	38.89	35.89	-117.2	-99.9
2600.00	16.90	97.07	81.46	82.62	40.58	37.58	-117.5	-99.2
2700.00	16.91	97.71	82.05	83.16	42.28	39.28	-117.8	-98.5
2800.00	16.92	98.33	82.62	83.70	43.97	40.97	-118.0	-97.8
2900.00	16.93	98.92	83.18	84.21	45.66	42.66	-118.3	-97.1
3000.00	16.94	99.50	83.71	84.71	47.36	44.36	-118.5	-96.3
3100.00	16.95	100.05	84.23	85.20	49.05	46.05	-118.8	-95.6
3200.00	16.96	100.59	84.73	85.67	50.75	47.75	-119.1	-94.8
3300.00	16.97	101.11	85.22	86.13	52.45	49.44	-119.4	-94.1
3400.00	16.98	101.62	85.69	86.58	54.14	51.14	-119.7	-93.3
3500.00	16.99	102.11	86.16	87.01	55.84	52.84	-119.9	-92.5
3600.00	16.99	102.59	86.61	87.44	57.54	54.54	-120.2	-91.7
3700.00	17.00	103.06	87.04	87.86	59.24	56.24	-204.2	-6.3
3800.00	17.01	103.51	87.47	88.26	60.94	57.94	-204.9	-3.1
3900.00	17.01	103.95	87.89	88.66	62.65	59.65	-205.6	0.0
4000.00	17.02	104.38	88.30	89.05	64.35	61.35	-206.4	3.2
4100.00	17.03	104.80	88.69	89.43	66.05	63.05	-207.1	6.4
4200.00	17.04	105.22	89.08	89.80	67.76	64.75	-207.9	9.6
4300.00	17.04	105.62	89.46	90.16	69.46	66.46	-208.7	12.8
4400.00	17.05	106.01	89.83	90.52	71.17	68.16	-209.5	16.0
4500.00	17.06	106.39	90.20	90.86	72.87	69.87	-210.2	19.3
4600.00	17.06	106.77	90.55	91.21	74.58	71.58	-211.0	22.6
4700.00	17.07	107.13	90.90	91.54	76.29	73.29	-211.8	25.9
4800.00	17.08	107.49	91.24	91.87	77.99	74.99	-212.6	29.2
4900.00	17.08	107.85	91.58	92.19	79.70	76.70	-213.3	32.5
5000.00	17.09	108.19	91.91	92.51	81.41	78.41	-214.1	35.8
5100.00	17.10	108.53	92.23	92.82	83.12	80.12	-214.8	39.2
5200.00	17.10	108.86	92.55	93.12	84.83	81.83	-215.6	42.6
5300.00	17.11	109.19	92.86	93.42	86.55	83.55	-216.3	45.9
5400.00	17.12	109.51	93.16	93.72	88.26	85.26	-217.0	49.3
5500.00	17.13	109.82	93.46	94.01	89.97	86.97	-217.7	52.8
5600.00	17.13	110.13	93.76	94.29	91.69	88.69	-218.4	56.2
5700.00	17.14	110.44	94.05	94.58	93.40	90.40	-219.1	59.6
5800.00	17.15	110.73	94.33	94.85	95.12	92.12	-219.7	63.1
5900.00	17.15	111.03	94.61	95.12	96.83	93.83	-220.4	66.5
6000.00	17.16	111.32	94.89	95.39	98.55	95.55	-221.0	70.0

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Table 9. Thermodynamic Functions for ThO(g); Units for Columns 2-5 Are $\text{J K}^{-1} \text{mol}^{-1}$ and for Columns 6-9 Are kJ mol^{-1} .

T(K)	C_p°	S°	$-\left(\frac{G^\circ - H_0^\circ}{T}\right)$	$-\left(\frac{G^\circ - H_{298}^\circ}{T}\right)$	$H^\circ - H_0^\circ$	$H^\circ - H_{298}^\circ$	ΔH_f°	ΔG_f°
0.0	0.0	0.0	INF	INF	0.0	-9.6	-23.5	-20.5
298.15	37.18	243.5	211.4	243.5	9.6	0.0	-21.8	-47.9
300.00	37.24	243.8	211.6	243.5	9.6	0.1	-21.8	-48.0
400.00	39.79	254.8	221.1	245.0	13.5	3.9	-22.2	-56.7
500.00	41.48	263.9	228.8	247.9	17.6	8.0	-22.5	-65.3
600.00	42.60	271.6	235.3	251.2	21.8	12.2	-22.8	-73.9
700.00	43.38	278.2	241.0	254.6	26.1	16.5	-23.2	-82.4
800.00	43.94	284.1	246.0	258.0	30.4	20.9	-23.6	-90.8
900.00	44.34	289.3	250.5	261.1	34.9	25.3	-24.1	-99.1
1000.00	44.65	293.9	254.6	264.2	39.3	29.7	-24.7	-107.5
1100.00	44.89	298.2	258.4	267.1	43.8	34.2	-25.3	-115.7
1200.00	45.08	302.1	261.9	269.9	48.3	38.7	-26.0	-123.9
1300.00	45.24	305.7	265.1	272.5	52.8	43.2	-26.8	-132.0
1400.00	45.37	309.1	268.1	275.0	57.3	47.8	-27.7	-140.1
1500.00	45.48	312.2	271.0	277.4	61.9	52.3	-28.7	-148.0
1600.00	45.59	315.2	273.7	279.6	66.4	56.9	-29.7	-156.0
1700.00	45.68	317.9	276.2	281.8	71.0	61.4	-30.2	-163.7
1800.00	45.75	320.6	278.6	283.9	75.6	66.0	-35.2	-171.3
1900.00	45.82	323.0	280.9	285.9	80.2	70.6	-36.3	-178.8
2000.00	45.89	325.4	283.0	287.8	84.8	75.2	-37.5	-186.3
2100.00	45.95	327.6	285.1	289.6	89.3	79.8	-53.0	-193.2
2200.00	46.01	329.8	287.1	291.4	93.9	84.4	-54.9	-199.8
2300.00	46.06	331.8	289.0	293.1	98.6	89.0	-56.8	-206.3
2400.00	46.12	333.8	290.8	294.8	103.2	93.6	-58.8	-212.8
2500.00	46.17	335.7	292.6	296.4	107.8	98.2	-60.7	-219.2
2600.00	46.22	337.5	294.2	297.9	112.4	102.8	-62.6	-225.5
2700.00	46.27	339.2	295.9	299.4	117.0	107.5	-64.6	-231.7
2800.00	46.32	340.9	297.5	300.9	121.7	112.1	-66.5	-237.8
2900.00	46.36	342.5	299.0	302.3	126.3	116.7	-68.5	-243.9
3000.00	46.41	344.1	300.5	303.7	130.9	121.4	-70.4	-249.9
3100.00	46.45	345.6	301.9	305.0	135.6	126.0	-72.4	-255.9
3200.00	46.50	347.1	303.3	306.3	140.2	130.7	-74.3	-261.8
3300.00	46.55	348.6	304.6	307.5	144.9	135.3	-76.3	-267.6
3400.00	46.59	349.9	306.0	308.8	149.6	140.0	-78.3	-273.4
3500.00	46.64	351.3	307.2	310.0	154.2	144.7	-80.2	-279.1
3600.00	46.69	352.6	308.5	311.1	158.9	149.3	-82.2	-284.7
3700.00	46.74	353.9	309.7	312.3	163.6	154.0	-84.2	-290.3
3800.00	46.78	355.1	310.9	313.4	168.3	158.7	-86.2	-295.9
3900.00	46.83	356.4	312.0	314.5	172.9	163.4	-88.2	-301.4
4000.00	46.88	357.5	313.1	315.5	177.6	168.1	-90.1	-306.8
4100.00	46.93	358.7	314.2	316.6	182.3	172.8	-92.1	-312.2
4200.00	46.98	359.8	315.3	317.6	187.0	177.5	-94.1	-317.6
4300.00	47.03	360.9	316.4	318.6	191.7	182.2	-96.1	-322.9
4400.00	47.09	362.0	317.4	319.6	196.4	186.9	-98.1	-328.1
4500.00	47.14	363.1	318.4	320.5	201.2	191.6	-100.1	-333.3
4600.00	47.20	364.1	319.4	321.4	205.9	196.3	-102.1	-338.5
4700.00	47.26	365.1	320.3	322.4	210.6	201.1	-104.1	-343.6
4800.00	47.32	366.1	321.3	323.3	215.4	205.8	-106.0	-348.7
4900.00	47.38	367.1	322.2	324.2	220.1	210.5	-108.0	-353.7
5000.00	47.45	368.1	323.1	325.0	224.9	215.3	-674.9	-355.5
5100.00	47.51	369.0	324.0	325.9	229.6	220.0	-677.0	-349.1
5200.00	47.59	370.0	324.9	326.7	234.4	224.8	-679.0	-342.7
5300.00	47.66	370.9	325.7	327.5	239.1	229.6	-681.0	-336.2
5400.00	47.74	371.8	326.6	328.4	243.9	234.4	-683.0	-329.7
5500.00	47.85	372.6	327.4	329.1	248.7	239.2	-685.0	-323.1
5600.00	48.11	373.5	328.2	329.9	253.6	244.1	-686.9	-316.5
5700.00	48.21	374.4	329.0	330.7	258.4	248.9	-688.9	-309.9
5800.00	48.31	375.2	329.8	331.5	263.3	253.7	-690.9	-303.2
5900.00	48.42	376.0	330.6	332.2	268.1	258.5	-692.8	-296.5
6000.00	48.53	376.9	331.4	333.0	272.9	263.4	-694.7	-289.8

Table 10. Thermodynamic Functions for $\text{ThO}_2(\text{g})$; Units for Columns 2-5 Are $\text{J K}^{-1} \text{mol}^{-1}$ and for Columns 6-9 Are kJ mol^{-1} .

T(K)	C_p°	S°	$-\left(\frac{G^\circ - H_0^\circ}{T}\right)$	$-\left(\frac{G^\circ - H_{298}^\circ}{T}\right)$	$H^\circ - H_0^\circ$	$H^\circ - H_{298}^\circ$	ΔH_f°	ΔG_f°
0.0	0.0	0.0	INF	INF	0.0	-11.7	-447.5	-447.5
298.15	46.68	280.3	241.2	280.3	11.7	0.0	-451.0	-457.6
300.00	46.77	280.6	241.4	280.3	11.8	0.1	-451.1	-457.6
400.00	50.58	294.6	253.1	282.2	16.6	5.0	-451.9	-459.7
500.00	53.43	306.2	262.6	285.9	21.8	10.2	-452.7	-461.5
600.00	55.66	316.2	270.7	290.1	27.3	15.6	-453.3	-463.2
700.00	57.45	324.9	277.8	294.5	33.0	21.3	-454.0	-464.8
800.00	58.90	332.7	284.2	298.8	38.8	27.1	-454.6	-466.3
900.00	60.07	339.7	290.0	303.0	44.7	33.1	-455.3	-467.7
1000.00	61.03	346.1	295.3	306.9	50.0	39.1	-455.9	-469.1
1100.00	61.82	351.9	300.2	310.8	56.9	45.3	-456.7	-470.4
1200.00	62.46	357.3	304.7	314.4	63.1	51.5	-457.5	-471.6
1300.00	63.01	362.4	309.0	317.9	69.4	57.8	-458.3	-472.8
1400.00	63.47	367.0	312.9	321.3	75.7	64.1	-459.2	-473.8
1500.00	63.86	371.4	316.7	324.5	82.1	70.4	-460.2	-474.8
1600.00	64.19	375.6	320.2	327.5	88.5	76.8	-461.2	-475.8
1700.00	64.47	379.5	323.6	330.5	94.9	83.3	-465.7	-476.5
1800.00	64.72	383.2	326.8	333.3	101.4	89.7	-466.6	-477.1
1900.00	64.93	386.7	329.9	336.0	107.9	96.2	-467.6	-477.7
2000.00	65.12	390.0	332.8	338.6	114.4	102.7	-468.8	-478.2
2100.00	65.30	393.2	335.6	341.2	120.9	109.2	-484.3	-478.1
2200.00	65.44	396.2	338.3	343.6	127.5	115.8	-486.2	-477.7
2300.00	65.58	399.1	340.9	345.9	134.0	122.3	-488.1	-477.3
2400.00	65.70	401.9	343.4	348.2	140.6	128.9	-490.0	-476.8
2500.00	65.81	404.6	345.8	350.4	147.1	135.5	-491.9	-476.2
2600.00	65.92	407.2	348.1	352.6	153.7	142.1	-493.8	-475.5
2700.00	66.01	409.7	350.3	354.6	160.3	148.7	-495.7	-474.8
2800.00	66.10	412.1	352.5	356.6	166.9	155.3	-497.7	-474.0
2900.00	66.18	414.4	354.6	358.6	173.6	161.9	-499.6	-473.1
3000.00	66.25	416.7	356.6	360.5	180.2	168.5	-501.6	-472.1
3100.00	66.33	418.8	358.6	362.3	186.8	175.1	-503.6	-471.1
3200.00	66.40	420.9	360.5	364.1	193.4	181.8	-505.6	-470.1
3300.00	66.46	423.0	362.3	365.9	200.1	188.4	-507.6	-468.9
3400.00	66.52	425.0	364.2	367.6	206.7	195.1	-509.6	-467.7
3500.00	66.57	426.9	365.9	369.3	213.4	201.7	-511.6	-466.5
3600.00	66.64	428.8	367.6	370.9	220.1	208.4	-513.6	-465.1
3700.00	66.68	430.6	369.3	372.5	226.7	215.1	-515.7	-463.8
3800.00	66.74	432.4	371.0	374.0	233.4	221.7	-517.7	-462.3
3900.00	66.79	434.1	372.6	375.5	240.1	228.4	-519.8	-460.9
4000.00	66.83	435.8	374.1	377.0	246.8	235.1	-521.9	-459.3
4100.00	66.88	437.5	375.6	378.5	253.4	241.8	-523.9	-457.7
4200.00	66.92	439.1	377.1	379.9	260.1	248.5	-526.0	-456.1
4300.00	66.97	440.7	378.6	381.3	266.8	255.2	-528.1	-454.4
4400.00	67.01	442.2	380.0	382.7	273.5	261.9	-530.2	-452.7
4500.00	67.05	443.7	381.4	384.0	280.2	268.6	-532.3	-450.9
4600.00	67.10	445.2	382.8	385.3	287.0	275.3	-534.4	-449.1
4700.00	67.14	446.6	384.1	386.6	293.7	282.0	-536.5	-447.2
4800.00	67.18	448.0	385.4	387.9	300.4	288.7	-538.6	-445.3
4900.00	67.22	449.4	386.7	389.1	307.1	295.4	-540.8	-443.3
5000.00	67.26	450.8	388.0	390.3	313.8	302.2	-542.9	-441.1
5100.00	67.30	452.1	389.2	391.5	320.6	308.9	-544.9	-438.1
5200.00	67.34	453.4	390.5	392.7	327.3	315.6	-546.9	-434.7
5300.00	67.38	454.7	391.7	393.9	334.0	322.4	-548.8	-430.8
5400.00	67.42	456.0	392.8	395.0	340.8	329.1	-550.7	-426.4
5500.00	67.47	457.2	394.0	396.1	347.5	335.9	-552.6	-421.5
5600.00	67.50	458.4	395.1	397.2	354.3	342.6	-554.5	-416.1
5700.00	67.54	459.6	396.3	398.3	361.0	349.4	-556.4	-410.2
5800.00	67.58	460.8	397.4	399.4	367.8	356.1	-558.3	-403.8
5900.00	67.62	461.9	398.5	400.4	374.5	362.9	-560.2	-396.9
6000.00	67.67	463.1	399.5	401.5	381.3	369.6	-562.1	-389.5

Table 11. Thermodynamic Functions for $\text{UO}(\text{g})$; Units for Columns 2-5 Are $\text{J K}^{-1} \text{mol}^{-1}$ and for Columns 6-9 Are kJ mol^{-1} .

T(K)	C_p°	S°	$-\left(\frac{G^\circ - H_0^\circ}{T}\right)$	$-\left(\frac{G^\circ - H_{298}^\circ}{T}\right)$	$H^\circ - H_0^\circ$	$H^\circ - H_{298}^\circ$	ΔH_f°	ΔG_f°
0.0	0.0	0.0	INF	INF	0.0	-9.0	21.6	21.6
298.15	33.70	241.0	210.8	241.0	9.0	0.0	19.9	-6.4
300.00	33.77	241.2	211.0	241.0	9.1	0.1	19.9	-6.6
400.00	36.98	251.3	219.8	242.3	12.6	3.6	19.1	-15.2
500.00	39.32	259.9	227.0	245.0	16.4	7.4	18.3	-23.7
600.00	40.95	267.2	233.1	248.1	20.4	11.4	17.4	-32.1
700.00	42.09	273.6	238.4	251.3	24.6	15.6	16.3	-40.2
800.00	42.90	279.3	243.2	254.4	28.9	19.9	14.9	-48.2
900.00	43.51	284.4	247.5	257.5	33.2	24.2	13.2	-56.0
1000.00	43.97	289.0	251.4	260.4	37.6	28.6	8.5	-63.4
1100.00	44.33	293.2	255.0	263.2	42.0	33.0	2.4	-70.3
1200.00	44.62	297.0	258.4	265.9	46.4	37.4	1.2	-76.9
1300.00	44.85	300.6	261.5	268.4	50.9	41.9	0.1	-83.3
1400.00	45.03	304.0	264.4	270.8	55.4	46.4	-1.1	-89.7
1500.00	45.20	307.1	267.1	273.1	59.9	50.9	-12.3	-95.3
1600.00	45.34	310.0	269.7	275.3	64.4	55.4	-14.5	-100.8
1700.00	45.47	312.6	272.2	277.5	69.0	60.0	-16.6	-106.1
1800.00	45.58	315.4	274.5	279.5	73.5	64.5	-18.8	-111.3
1900.00	45.68	317.8	276.7	281.5	78.1	69.1	-21.0	-116.4
2000.00	45.76	320.2	278.8	283.3	82.7	73.7	-23.2	-121.4
2100.00	45.85	322.4	280.9	285.1	87.2	78.2	-25.3	-126.3
2200.00	45.93	324.5	282.8	286.9	91.8	82.8	-27.5	-131.0
2300.00	46.00	326.6	284.7	288.6	96.4	87.4	-29.7	-135.7
2400.00	46.07	328.5	286.4	290.2	101.0	92.0	-31.9	-140.2
2500.00	46.14	330.4	288.2	291.8	105.7	96.7	-34.1	-144.7
2600.00	46.20	332.2	289.8	293.3	110.3	101.3	-36.3	-149.1
2700.00	46.26	334.0	291.4	294.8	114.9	105.9	-38.5	-153.4
2800.00	46.32	335.7	293.0	296.2	119.5	110.5	-40.7	-157.6
2900.00	46.38	337.3	294.5	297.6	124.2	115.2	-42.9	-161.7
3000.00	46.44	338.9	295.9	298.9	128.8	119.8	-45.1	-165.8
3100.00	46.50	340.4	297.3	300.2	133.5	124.5	-47.4	-169.7
3200.00	46.56	341.9	298.7	301.5	138.1	129.1	-49.6	-173.7
3300.00	46.61	343.3	300.0	302.8	142.8	133.8	-51.8	-177.5
3400.00	46.67	344.7	301.3	304.0	147.4	138.4	-54.0	-181.3
3500.00	46.73	346.1	302.6	305.2	152.1	143.1	-56.3	-185.0
3600.00	46.79	347.4	303.8	306.3	156.8	147.8	-58.5	-188.6
3700.00	46.84	348.7	305.0	307.4	161.5	152.5	-60.7	-192.2
3800.00	46.91	349.9	306.2	308.5	166.2	157.2	-63.0	-195.7
3900.00	46.97	351.1	307.3	309.6	170.9	161.9	-65.2	-199.2
4000.00	47.03	352.3	308.4	310.7	175.6	166.6	-67.4	-202.6
4100.00	47.09	353.5	309.5	311.7	180.3	171.3	-69.7	-206.0
4200.00	47.16	354.6	310.6	312.7	185.0	176.0	-71.9	-209.3
4300.00	47.22	355.7	311.6	313.7	189.7	180.7	-74.2	-212.5
4400.00	47.29	356.8	312.6	314.7	194.4	185.4	-76.4	-215.7
4500.00	47.37	357.9	313.6	315.6	199.2	190.2	-78.6	-218.9
4600.00	47.45	358.9	314.6	316.5	203.9	194.9	-80.8	-222.1
4700.00	47.54	359.9	315.5	317.5	208.7	199.7	-83.0	-225.3
4800.00	47.63	361.0	316.5	318.4	213.5	204.5	-85.2	-228.5
4900.00	47.78	361.9	317.4	319.2	218.3	209.3	-87.4	-231.7
5000.00	47.87	362.9	318.3	320.1	223.0	214.0	-89.6	-234.9
5100.00	47.97	363.9	319.2	320.9	227.8	218.8	-91.8	-238.1
5200.00	48.07	364.8	320.0	321.8	232.6	223.6	-94.0	-241.3
5300.00	48.17	365.7	320.9	322.6	237.4	228.4	-96.2	-244.5
5400.00	48.28	366.6	321.7	323.4	242.3	233.3	-98.4	-247.7
5500.00	48.39	367.5	322.6	324.2	247.1	238.1	-100.6	-250.9
5600.00	48.50	368.4	323.4	325.0	251.9	242.9	-102.8	-254.1
5700.00	48.62	369.2	324.2	325.7	256.8	247.8	-105.0	-257.3
5800.00	48.74	370.1	325.0	326.5	261.7	252.7	-107.2	-260.5
5900.00	48.87	370.9	325.7	327.3	266.5	257.5	-109.4	-263.7
6000.00	49.00	371.7	326.5	328.0	271.4	262.4	-111.6	-266.9

Table 12. Thermodynamic Functions for $\text{UO}_2(\text{g})$; Units for Columns 2-5 Are $\text{J K}^{-1} \text{mol}^{-1}$ and for Columns 6-9 Are kJ mol^{-1} .

T(K)	C_p°	S°	$-\left(\frac{G^\circ - H_0^\circ}{T}\right)$	$-\left(\frac{G^\circ - H_{298}^\circ}{T}\right)$	$H^\circ - H_0^\circ$	$H^\circ - H_{298}^\circ$	ΔH_f°	ΔG_f°
0.0	0.0	0.0	INF	INF	0.0	-13.1	-465.0	-465.0
298.15	56.81	266.1	222.2	266.1	13.1	0.0	-466.9	-470.2
300.00	56.92	266.5	222.5	266.1	13.2	0.1	-466.9	-470.2
400.00	61.37	283.5	235.7	268.4	19.1	6.0	-466.8	-471.3
500.00	64.15	297.5	246.7	272.9	25.4	12.3	-466.7	-472.4
600.00	65.93	309.4	256.2	278.0	31.9	18.8	-466.7	-473.6
700.00	67.12	319.7	264.5	283.2	38.6	25.5	-466.9	-474.7
800.00	67.95	328.7	272.0	288.4	45.3	32.3	-467.5	-475.8
900.00	68.56	336.7	278.8	293.3	52.2	39.1	-468.4	-476.8
1000.00	69.00	344.0	284.9	298.0	59.0	46.0	-472.3	-477.5
1100.00	69.35	350.6	290.6	302.5	66.0	52.9	-477.7	-477.7
1200.00	69.63	356.6	295.8	306.8	72.9	59.8	-478.1	-477.7
1300.00	69.85	362.2	300.7	310.8	79.9	66.8	-478.5	-477.7
1400.00	70.03	367.4	305.3	314.7	86.9	73.8	-479.0	-477.6
1500.00	70.19	372.2	309.6	318.3	93.9	80.8	-489.6	-476.8
1600.00	70.33	376.8	313.7	321.9	100.9	87.9	-491.1	-475.9
1700.00	70.45	381.0	317.5	325.2	108.0	94.9	-492.6	-474.9
1800.00	70.55	385.1	321.2	328.4	115.0	101.9	-494.1	-473.9
1900.00	70.64	388.9	324.6	331.5	122.1	109.0	-495.6	-472.7
2000.00	70.73	392.5	327.9	334.5	129.2	116.1	-497.2	-471.5
2100.00	70.81	396.0	331.1	337.3	136.2	123.2	-498.8	-470.1
2200.00	70.88	399.3	334.1	340.1	143.3	130.2	-500.4	-468.7
2300.00	70.95	402.4	337.0	342.7	150.4	137.3	-502.0	-467.3
2400.00	71.02	405.4	339.8	345.2	157.5	144.4	-503.6	-465.7
2500.00	71.09	408.3	342.5	347.7	164.6	151.5	-505.2	-464.1
2600.00	71.14	411.1	345.1	350.1	171.7	158.7	-506.9	-462.4
2700.00	71.20	413.8	347.6	352.4	178.9	165.8	-508.6	-460.7
2800.00	71.26	416.4	350.0	354.6	186.0	172.9	-510.3	-458.9
2900.00	71.32	418.9	352.3	356.8	193.1	180.0	-512.0	-457.0
3000.00	71.38	421.3	354.6	358.9	200.3	187.2	-513.7	-455.1
3100.00	71.43	423.7	356.8	361.0	207.4	194.3	-515.4	-453.1
3200.00	71.49	425.9	358.9	363.0	214.6	201.5	-517.1	-451.0
3300.00	71.55	428.1	361.0	364.9	221.7	208.6	-518.9	-448.9
3400.00	71.60	430.3	363.0	366.8	228.9	215.8	-520.6	-446.8
3500.00	71.66	432.4	364.9	368.7	236.0	223.0	-522.4	-444.6
3600.00	71.72	434.4	366.8	370.4	243.2	230.1	-524.2	-442.4
3700.00	71.78	436.3	368.7	372.2	250.4	237.3	-526.0	-440.1
3800.00	71.83	438.3	370.5	373.9	257.6	244.5	-527.8	-437.7
3900.00	71.89	440.1	372.2	375.6	264.8	251.7	-529.6	-435.3
4000.00	71.95	442.0	374.0	377.2	272.0	258.9	-531.4	-432.9
4100.00	72.01	443.7	375.6	378.8	279.2	266.1	-533.2	-430.4
4200.00	72.07	445.5	377.3	380.4	286.4	273.3	-535.1	-427.9
4300.00	72.15	447.2	378.9	381.9	293.6	280.5	-536.9	-425.3
4400.00	72.21	448.8	380.5	383.4	300.8	287.8	-538.7	-422.7
4500.00	72.28	450.5	382.0	384.9	308.1	295.0	-1030.1	-412.9
4600.00	72.35	452.0	383.5	386.3	315.3	302.2	-1032.4	-399.2
4700.00	72.43	453.6	385.0	387.8	322.6	309.5	-1034.7	-385.4
4800.00	72.41	455.1	386.4	389.1	329.8	316.7	-1037.0	-371.6
4900.00	72.60	456.6	387.8	390.5	337.1	324.0	-1039.2	-357.7
5000.00	72.70	458.1	389.2	391.8	344.4	331.3	-1041.4	-343.7
5100.00	73.02	459.6	390.6	393.2	351.8	338.7	-1043.5	-329.8
5200.00	73.14	461.0	391.9	394.5	359.1	346.0	-1045.6	-315.8
5300.00	73.26	462.4	393.3	395.7	366.4	353.3	-1047.7	-301.7
5400.00	73.39	463.8	394.5	397.0	373.7	360.6	-1049.7	-287.6
5500.00	73.53	465.1	395.8	398.2	381.1	368.0	-1051.7	-273.5
5600.00	73.67	466.4	397.1	399.4	388.4	375.3	-1053.7	-259.3
5700.00	73.82	467.7	398.3	400.6	395.8	382.7	-1055.6	-245.1
5800.00	73.97	469.0	399.5	401.8	403.2	390.1	-1057.5	-230.8
5900.00	74.13	470.3	400.7	402.9	410.6	397.5	-1059.3	-216.5
6000.00	74.30	471.5	401.9	404.0	418.0	404.9	-1061.0	-202.2

Table 13. Thermodynamic Functions for $\text{UO}_3(\text{g})$; Units for Columns 2-5 Are $\text{J K}^{-1} \text{mol}^{-1}$ and for Columns 6-9 Are kJ mol^{-1} .

T(K)	C_p°	S°	$-\left(\frac{G^\circ - H_0^\circ}{T}\right)$	$-\left(\frac{G^\circ - H_{298}^\circ}{T}\right)$	$H^\circ - H_0^\circ$	$H^\circ - H_{298}^\circ$	ΔH_f°	ΔG_f°
0.0	0.0	0.0	INF	INF	0.0	-14.5	-799.5	-799.5
298.15	63.62	304.2	255.4	304.2	14.5	0.0	-804.3	-788.3
300.00	63.75	304.6	255.7	304.2	14.7	0.1	-804.3	-788.2
400.00	69.85	323.8	270.4	306.8	21.4	6.8	-804.9	-782.8
500.00	74.24	339.9	282.7	311.8	28.6	14.0	-805.4	-777.2
600.00	77.50	353.7	293.4	317.7	36.2	21.6	-805.9	-771.5
700.00	79.99	365.9	302.9	323.7	44.1	29.5	-806.5	-765.7
800.00	81.93	376.7	311.5	329.7	52.2	37.6	-807.4	-759.8
900.00	83.46	386.4	319.3	335.4	60.4	45.9	-808.6	-753.8
1000.00	84.69	395.3	326.4	341.0	68.8	54.3	-812.7	-747.4
1100.00	85.68	403.4	333.1	346.3	77.4	62.8	-818.2	-740.6
1200.00	86.48	410.9	339.3	351.4	86.0	71.4	-818.8	-733.6
1300.00	87.15	417.8	345.0	356.2	94.7	80.1	-819.3	-726.5
1400.00	87.70	424.3	350.5	360.9	103.4	88.8	-819.8	-719.3
1500.00	88.16	430.4	355.6	365.3	112.2	97.6	-830.4	-711.4
1600.00	88.56	436.1	360.5	369.5	121.0	106.5	-831.9	-703.5
1700.00	88.90	441.5	365.1	373.6	129.9	115.4	-833.4	-695.4
1800.00	89.19	446.6	369.4	377.5	138.8	124.3	-835.0	-687.2
1900.00	89.44	451.4	373.6	381.3	147.7	133.2	-836.5	-679.0
2000.00	89.66	456.0	377.6	384.9	156.7	142.1	-838.1	-670.7
2100.00	89.86	460.4	381.5	388.4	165.7	151.1	-839.7	-662.3
2200.00	90.03	464.6	385.2	391.8	174.7	160.1	-841.2	-653.8
2300.00	90.19	468.6	388.7	395.0	183.7	169.1	-842.9	-645.2
2400.00	90.33	472.4	392.1	398.2	192.7	178.2	-844.5	-636.6
2500.00	90.45	476.1	395.4	401.2	201.7	187.2	-846.1	-627.9
2600.00	90.57	479.6	398.6	404.2	210.8	196.3	-847.8	-619.1
2700.00	90.67	483.1	401.6	407.0	219.9	205.3	-849.5	-610.3
2800.00	90.77	486.4	404.6	409.8	228.9	214.4	-851.2	-601.4
2900.00	90.86	489.6	407.5	412.5	238.0	223.5	-852.9	-592.4
3000.00	90.94	492.6	410.3	415.1	247.1	232.6	-854.7	-583.4
3100.00	91.02	495.6	413.0	417.7	256.2	241.7	-856.5	-574.3
3200.00	91.08	498.5	415.6	420.1	265.3	250.8	-858.3	-565.2
3300.00	91.15	501.3	418.1	422.6	274.4	259.9	-860.1	-556.0
3400.00	91.21	504.0	420.6	424.9	283.5	269.0	-861.9	-546.8
3500.00	91.27	506.7	423.1	427.2	292.7	278.1	-863.8	-537.5
3600.00	91.33	509.3	425.4	429.5	301.8	287.3	-865.6	-528.1
3700.00	91.38	511.8	427.7	431.6	310.9	296.4	-867.5	-518.7
3800.00	91.43	514.2	430.0	433.8	320.1	305.5	-869.4	-509.3
3900.00	91.48	516.6	432.1	435.9	329.2	314.7	-871.4	-499.8
4000.00	91.52	518.9	434.3	437.9	338.4	323.8	-873.3	-490.2
4100.00	91.57	521.1	436.4	439.9	347.5	333.0	-875.2	-480.6
4200.00	91.61	523.4	438.4	441.9	356.7	342.1	-877.2	-471.0
4300.00	91.65	525.5	440.4	443.8	365.9	351.3	-879.2	-461.3
4400.00	91.70	527.6	442.4	445.7	375.0	360.5	-881.2	-451.6
4500.00	91.73	529.7	444.3	447.5	384.2	369.7	-1372.7	-434.7
4600.00	91.77	531.7	446.2	449.3	393.4	378.8	-1375.2	-413.8
4700.00	91.81	533.7	448.0	451.1	402.6	388.0	-1377.7	-392.9
4800.00	91.84	535.6	449.8	452.9	411.7	397.2	-1380.1	-371.9
4900.00	91.88	537.5	451.6	454.6	420.9	406.4	-1382.5	-350.9
5000.00	91.91	539.4	453.3	456.2	430.1	415.6	-1384.9	-329.8
5100.00	91.94	541.2	455.0	457.9	439.3	424.8	-1387.3	-308.6
5200.00	91.98	543.0	456.7	459.5	448.5	434.0	-1389.7	-287.5
5300.00	92.01	544.7	458.3	461.1	457.7	443.2	-1392.1	-266.2
5400.00	92.05	546.4	460.0	462.7	466.9	452.4	-1394.4	-245.0
5500.00	92.08	548.1	461.6	464.2	476.1	461.6	-1396.6	-223.7
5600.00	92.11	549.8	463.1	465.7	485.3	470.8	-1398.9	-202.3
5700.00	92.14	551.4	464.6	467.2	494.6	480.0	-1401.1	-180.9
5800.00	92.17	553.0	466.2	468.7	503.8	489.2	-1403.3	-159.4
5900.00	92.21	554.6	467.6	470.1	513.0	498.4	-1405.4	-138.0
6000.00	92.24	556.1	469.1	471.5	522.2	507.7	-1407.5	-116.4

Table 14. Thermodynamic Functions for PuO(g); Units for Columns 2-5 Are J K⁻¹ mol⁻¹ and for Columns 6-9 Are kJ mol⁻¹.

T(K)	C _p ^o	S ^o	$-\left(\frac{G^o-H_0^o}{T}\right)$	$-\left(\frac{G^o-H_{298}^o}{T}\right)$	H ^o -H ₀ ^o	H ^o -H ₂₉₈ ^o	ΔH _f ^o	ΔG _f ^o
0.0	0.0	0.0	INF	INF	0.0	-10.1	-89.6	-89.6
298.15	39.03	247.5	213.5	247.5	10.1	0.0	-91.0	-117.5
300.00	39.09	247.7	213.7	247.5	10.2	0.1	-91.0	-117.6
400.00	41.12	259.2	223.7	249.0	14.2	4.1	-95.5	-126.3
500.00	42.47	268.6	231.8	252.0	18.4	8.3	-96.9	-133.9
600.00	43.36	276.4	238.6	255.5	22.7	12.6	-98.4	-141.2
700.00	43.97	283.1	244.5	258.9	27.1	16.9	-99.4	-148.3
800.00	44.40	289.0	249.7	262.3	31.5	21.4	-100.4	-155.1
900.00	44.72	294.3	254.4	265.6	35.9	25.8	-101.3	-161.7
1000.00	44.96	299.0	258.6	268.7	40.4	30.3	-107.0	-167.9
1100.00	45.15	303.3	262.5	271.7	44.9	34.8	-108.5	-173.9
1200.00	45.31	307.3	266.0	274.5	49.5	39.3	-110.0	-179.8
1300.00	45.43	310.9	269.4	277.1	54.0	43.9	-111.4	-185.5
1400.00	45.54	314.2	272.4	279.7	58.5	48.4	-112.9	-191.1
1500.00	45.64	317.4	275.2	282.1	63.1	53.0	-114.4	-196.7
1600.00	45.72	320.4	278.1	284.4	67.7	57.6	-115.9	-202.1
1700.00	45.80	323.1	280.6	286.6	72.3	62.1	-117.4	-207.5
1800.00	45.86	325.8	283.1	288.7	76.8	66.7	-118.9	-212.7
1900.00	45.93	328.2	285.4	290.7	81.4	71.3	-120.4	-217.9
2000.00	45.98	330.6	287.6	292.6	86.0	75.9	-121.9	-223.0
2100.00	46.04	332.8	289.7	294.5	90.6	80.5	-123.4	-228.0
2200.00	46.09	335.0	291.7	296.3	95.3	85.1	-124.9	-233.0
2300.00	46.14	337.0	293.6	298.0	99.9	89.8	-126.5	-237.8
2400.00	46.20	339.0	295.5	299.7	104.5	94.4	-128.0	-242.6
2500.00	46.24	340.9	297.3	301.3	109.1	99.0	-129.5	-247.4
2600.00	46.29	342.7	299.0	302.9	113.7	103.6	-131.1	-252.1
2700.00	46.33	344.5	300.6	304.4	118.4	108.3	-132.6	-256.7
2800.00	46.38	346.2	302.2	305.8	123.0	112.9	-134.2	-261.2
2900.00	46.42	347.8	303.8	307.2	127.7	117.6	-135.8	-265.8
3000.00	46.47	349.4	305.3	308.6	132.3	122.2	-137.3	-270.2
3100.00	46.52	350.9	306.7	310.0	137.0	126.9	-138.9	-274.6
3200.00	46.56	352.4	308.1	311.3	141.6	131.5	-140.5	-279.0
3300.00	46.61	353.8	309.5	312.5	146.3	136.2	-142.1	-283.3
3400.00	46.65	355.2	310.8	313.8	151.0	140.9	-143.7	-287.5
3500.00	46.70	356.6	312.1	315.0	155.6	145.5	-145.2	-291.7
3600.00	46.75	357.9	313.3	316.1	160.3	150.2	-146.8	-295.9
3700.00	46.80	359.2	314.6	317.3	165.0	154.9	-148.4	-299.9
3800.00	46.85	360.4	315.7	318.4	169.7	159.6	-150.7	-303.2
3900.00	46.90	361.6	316.9	319.5	174.4	164.3	-152.2	-306.5
4000.00	46.95	362.8	318.0	320.6	179.1	169.0	-153.7	-309.7
4100.00	47.00	364.0	319.1	321.6	183.8	173.7	-155.2	-312.9
4200.00	47.06	365.1	320.2	322.6	188.5	178.4	-156.7	-316.1
4300.00	47.11	366.2	321.3	323.6	193.2	183.1	-158.2	-319.3
4400.00	47.17	367.3	322.3	324.6	198.0	187.8	-159.7	-322.5
4500.00	47.23	368.4	323.3	325.6	202.7	192.6	-161.2	-325.7
4600.00	47.29	369.4	324.3	326.5	207.4	197.3	-162.7	-328.9
4700.00	47.35	370.4	325.3	327.4	212.2	202.0	-164.2	-332.1
4800.00	47.42	371.4	326.2	328.4	216.9	206.8	-165.7	-335.3
4900.00	47.49	372.4	327.2	329.2	221.7	211.6	-167.2	-338.5
5000.00	47.56	373.4	328.1	330.1	226.4	216.3	-168.7	-341.7
5100.00	47.64	374.3	329.0	331.0	231.2	221.1	-170.2	-344.9
5200.00	47.71	375.3	329.9	331.8	236.0	225.9	-171.7	-348.1
5300.00	47.80	376.2	330.7	332.6	240.8	230.7	-173.2	-351.3
5400.00	47.89	377.1	331.6	333.5	245.6	235.5	-174.7	-354.5
5500.00	48.01	378.0	332.4	334.3	250.4	240.3	-176.2	-357.7
5600.00	48.42	378.9	333.2	335.1	255.4	245.3	-177.7	-360.9
5700.00	48.54	379.7	334.1	335.8	260.2	250.1	-179.2	-364.1
5800.00	48.67	380.6	334.8	336.6	265.1	255.0	-180.7	-367.3
5900.00	48.80	381.4	335.6	337.3	270.0	259.9	-182.2	-370.5
6000.00	48.94	382.2	336.4	338.1	274.9	264.8	-183.7	-373.7

Table 15. Thermodynamic Functions for $\text{PuO}_2(\text{g})$; Units for Columns 2-5 Are $\text{J K}^{-1} \text{mol}^{-1}$ and for Columns 6-9 Are kJ mol^{-1} .

T(K)	C_p°	S°	$-\left(\frac{G^\circ - H^\circ}{T}\right)$	$-\left(\frac{G^\circ - H_{298}^\circ}{T}\right)$	$H^\circ - H_0^\circ$	$H^\circ - H_{298}^\circ$	ΔH_f°	ΔG_f°
0.0	0.0	0.0	INF	INF	0.0	-12.6	-460.7	-460.7
298.15	54.30	263.1	221.0	263.1	12.6	0.0	-464.0	-464.6
300.00	54.42	263.5	221.3	263.1	12.7	0.1	-464.0	-464.6
400.00	59.52	279.9	233.9	265.3	18.4	5.8	-469.2	-464.6
500.00	62.78	293.5	244.5	269.6	24.5	11.9	-469.2	-463.6
600.00	64.89	305.2	253.7	274.6	30.9	18.3	-470.3	-462.5
700.00	66.30	315.3	261.8	279.7	37.5	24.9	-470.7	-461.1
800.00	67.27	324.2	269.0	284.7	44.1	31.6	-471.1	-459.6
900.00	67.98	332.2	275.6	289.6	50.9	38.3	-471.4	-457.9
1000.00	68.50	339.4	281.6	294.2	57.7	45.2	-476.5	-456.0
1100.00	68.90	345.9	287.2	298.6	64.6	52.0	-477.4	-453.9
1200.00	69.21	351.5	292.3	302.8	71.5	59.0	-478.2	-451.7
1300.00	69.46	357.5	297.1	306.8	78.4	65.9	-479.1	-449.5
1400.00	69.66	362.6	301.6	310.6	85.4	72.8	-480.0	-447.1
1500.00	69.83	367.5	305.9	314.2	92.4	79.8	-480.9	-444.7
1600.00	69.98	372.0	309.9	317.7	99.4	86.8	-481.8	-442.3
1700.00	70.10	376.2	313.6	321.0	106.4	93.8	-482.7	-439.8
1800.00	70.21	380.2	317.2	324.2	113.4	100.8	-483.6	-437.3
1900.00	70.30	384.0	320.6	327.3	120.4	107.9	-484.6	-434.7
2000.00	70.38	387.6	323.9	330.2	127.5	114.9	-485.5	-432.0
2100.00	70.45	391.1	327.0	333.0	134.5	121.9	-486.5	-429.3
2200.00	70.52	394.4	330.0	335.7	141.5	129.0	-487.5	-426.6
2300.00	70.58	397.5	332.9	338.3	148.6	136.0	-488.5	-423.8
2400.00	70.63	400.5	335.6	340.9	155.7	143.1	-489.5	-421.0
2500.00	70.68	403.4	338.3	343.3	162.7	150.2	-490.6	-418.1
2600.00	70.73	406.2	340.8	345.7	169.8	157.3	-491.6	-415.2
2700.00	70.77	408.8	343.3	348.0	176.9	164.3	-492.7	-412.2
2800.00	70.81	411.4	345.7	350.2	184.0	171.4	-493.8	-409.2
2900.00	70.85	413.9	348.0	352.3	191.0	178.5	-494.9	-406.1
3000.00	70.89	416.3	350.2	354.4	198.1	185.6	-496.0	-403.1
3100.00	70.93	418.6	352.4	356.5	205.2	192.7	-497.1	-400.0
3200.00	70.96	420.9	354.5	358.4	212.3	199.8	-498.3	-396.8
3300.00	71.00	423.1	356.6	360.4	219.4	206.9	-499.5	-393.6
3400.00	71.03	425.2	358.5	362.2	226.5	214.0	-500.6	-390.4
3500.00	71.07	427.2	360.5	364.1	233.6	221.1	-501.8	-387.1
3600.00	71.10	429.2	362.4	365.8	240.8	228.2	-503.0	-383.8
3700.00	71.13	431.2	364.2	367.6	247.9	235.3	-504.2	-380.2
3800.00	71.16	433.1	366.0	369.3	255.0	242.4	-505.2	-376.1
3900.00	71.19	434.9	367.7	370.9	262.1	249.6	-506.3	-371.1
4000.00	71.22	436.7	369.4	372.6	269.2	256.7	-507.5	-366.1
4100.00	71.25	438.5	371.1	374.2	276.4	263.8	-508.6	-361.1
4200.00	71.28	440.2	372.7	375.7	283.5	270.9	-509.7	-356.1
4300.00	71.31	441.9	374.3	377.2	290.6	278.1	-510.8	-351.1
4400.00	71.33	443.5	375.9	378.7	297.8	285.2	-511.9	-346.1
4500.00	71.36	445.1	377.4	380.2	304.9	292.3	-513.0	-341.1
4600.00	71.39	446.7	378.9	381.6	312.0	299.5	-514.1	-336.1
4700.00	71.42	448.2	380.3	383.0	319.2	306.6	-515.2	-331.1
4800.00	71.45	449.8	381.8	384.4	326.3	313.8	-516.3	-326.1
4900.00	71.47	451.2	383.2	385.7	333.5	320.9	-517.4	-321.1
5000.00	71.50	452.7	384.5	387.1	340.6	328.1	-518.5	-316.1
5100.00	71.53	454.1	385.9	388.4	347.8	335.2	-519.6	-311.1
5200.00	71.57	455.5	387.2	389.6	354.9	342.4	-520.7	-306.1
5300.00	71.60	456.8	388.5	390.9	362.1	349.6	-521.8	-301.1
5400.00	71.62	458.2	389.8	392.1	369.3	356.7	-522.9	-296.1
5500.00	71.65	459.5	391.1	393.3	376.4	363.9	-524.0	-291.1
5600.00	71.68	460.8	392.3	394.5	383.6	371.1	-525.1	-286.1
5700.00	71.71	462.1	393.5	395.7	390.8	378.2	-526.2	-281.1
5800.00	71.74	463.3	394.7	396.9	398.0	385.4	-527.3	-276.1
5900.00	71.77	464.5	395.9	398.0	405.1	392.6	-528.4	-271.1
6000.00	71.80	465.7	397.0	399.1	412.3	399.8	-529.5	-266.1

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