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DISSOCIATION ENERGIES OF GASEOUS OXIDES

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DISSOCIATION ENERGIES OF GASEOUS OXIDES

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ABSTRACT

Thermodynamic data for gaseous oxides are tabulated.

Thermodynamic data for a number of gaseous compounds of interest in high temperature systems are being critically evaluated and will ultimately be published in formal papers with complete references. As a rather lengthy period is required for ultimate appearance of the final paper, the preliminary tabulations are presented in this brief paper as these results might prove to be of immediate use to many people. However, it is requested that this preliminary paper not be quoted as the complete evaluation of the data has not been completed and some of the results presented here are based on unpublished data of other workers. If it should be desired to quote any of these results, please contact the author and the original references can be provided or the name of the original worker provided, so that permission can be obtained for quoting of the results.

In order to maintain thermodynamic consistency, these values should be used in conjunction with the thermodynamic data of the elements tabulated by Stull and Sinke along with the corrections listed below Table I of this paper. Except for a few instances of later data, the thermodynamic data for the condensed oxide phases has been obtained from Coughlan, Bureau of Mines Bulletin 542 (1954).

This work was performed under the auspices of the U.S. Atomic Energy Commission.

$$\Delta H_{\text{O}}^{\circ} \text{ for } \text{MO}_2(\text{g}) = \text{M}(\text{g}) + 2\text{O}(\text{g}) \text{ in kcal}$$

CO_2	NO_2	O_3	FO_2			
381.5 ± 0.5	221.8 ± 0.1	142.3 ± 1	< 100			
SiO_2	PO_2	SO_2	ClO_2			
304 ± 8	$(265) \pm 15$	245.0 ± 1	121.0 ± 2			
TiO_2	VO_2	CrO_2	MnO_2	FeO_2		
309 ± 5	286 ± 5	$(265) \pm 20$	$(230) \pm 25$	$(180) \pm 30$		
ZrO_2	NbO_2	MoO_2	TcO_2	RuO_2	RhO_2	PdO_2
338 ± 5	$(320) \pm 15$	$(300) \pm 15$	$(265) \pm 20$	223 ± 15	201 ± 20	$(168) \pm 25$
HfO_2	TaO_2	WO_2	ReO_2	OsO_2	IrO_2	PtO_2
$(350) \pm 20$	345 ± 12	$(325) \pm 20$	$(300) \pm 20$	$(265) \pm 20$	226 ± 15	208 ± 8
ThO_2	PaO_2	UO_2	NpO_2	PuO_2		
357 ± 10	$(350) \pm 15$	338 ± 10	$(315) \pm 15$	289 ± 10		
NaO_2	SeO_2					
158 ± 10	201 ± 5					
	TeO_2					
	215 ± 7					

The values given in Tables I and II are consistent with the heats of sublimation of elements given by Stull and Sinke, "Thermodynamic Properties of the Elements" Advances in Chemistry Series 18. Published November, 1956, by American Chemical Society, 1155 16th St., N. W., Washington 6, D. C., with the following exceptions: For $\text{M}(\text{s}) = \text{M}(\text{g})$ $\Delta H_{\text{O}}^{\circ} = 138$ kcal for B,

49.6 "	for Bi	187 kcal	for Re
99.0 "	" Fe	56.7 "	" S
112.5 "	" N	112 "	" Si
170 "	" Nb	92 "	" Sc
102.3 "	" Ni	127 "	" Th
		122 "	" U

Table II

$$\Delta H_o^{\circ} \text{ in kcal}$$

HO
101.3 $\pm$ 0.3

LiO BeO BO
<83 104 $\pm$ 8 184 $\pm$ 12

NaO MgO AlO
71 < 92 119 $\pm$ 8

CaO ScO TiO VO CrO MnO FeO NiO CuO ZnO GaO
90 $\pm$ 12 130 $\pm$ 20 160 $\pm$ 2 147.5 $\pm$ 4 122 $\pm$ 9 92 $\pm$ 9 99 $\pm$ 11 < 90 < 113 (< 60) 58 $\pm$ 12

SrO YO ZrO CbO MoO AgO CdO InO SnO SbO TeO IO
83 $\pm$ 5 160 $\pm$ 20 179 $\pm$ 5 (172 $\pm$ 15) (140 $\pm$ 20) 32 $\pm$ 9 (30 $\pm$ 10) 25 $\pm$ 5 134 $\pm$ 1 74 $\pm$ 9 63 or 44?
79

BaO LaO HfO TaO WO PbO BiO
130 $\pm$ 5 181 $\pm$ 12 (195) 193 $\pm$ 12 (160 $\pm$ 20) 98 $\pm$ 2 92 $\pm$ 23
+12

ThO
(200)
+20

UO
171 $\pm$ 10

CO NO O₂ FO
255.8 150 $\pm$ 1 117.96 < 40
+0.4 +0.04

SiO PO SO ClO
192 $\pm$ 5 124-143 116 $\pm$ 1 44 $\pm$ 5

GeO AsO SeO BrO
157 $\pm$ 4 115 $\pm$ 3 81 $\pm$ 23 51?

SnO SbO TeO IO
134 $\pm$ 1 74 $\pm$ 9 63 or 44?
79

PbO BiO
98 $\pm$ 2 92 $\pm$ 23