ANL-CEN-RSD-80-3

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THERMODYNAMIC PROPERTIES OF URANIUM DIOXIDE

by

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and L. Leibowitz

ARGONNE NATIONAL LABORATORY

ARGONNE NATIONAL LABORATORY, ARGONNE, ILLINOIS

Prepared for the U. S. DEPARTMENT OF ENERGY
under Contract W-31-109-Eng-38

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Printed in the United States of America
Available from
National Technical Information Service
U. S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161

NTIS price codes
Printed copy: A09
Microfiche copy: A01

Distribution Category:
General, Miscellaneous, and
Progress Reports (Nuclear)
(UC-2)

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THERMODYNAMIC PROPERTIES OF URANIUM DIOXIDE

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Chemical Engineering Division

April 1981

PREFACE

Thermodynamic Properties of Uranium Dioxide

In order to provide reliable and consistent data on the thermophysical properties of reactor materials for reactor safety studies, we have prepared this revision of the thermodynamic properties of the uranium dioxide portion of the fuel property section of the report "Properties for LMFBR Safety Analysis." Since the original report was issued in 1976, there has been international agreement on a vapor pressure equation for the total pressure over UO_2, new methods have been suggested for the calculation of enthalpy and heat capacity,[1,2] and a phase change at 2670 K has been proposed.[3] In this report, an electronic term is used in place of the Frenkel defect term in the enthalpy and heat capacity equations and the phase transition is accepted. The sections on density and thermal expansion have been completely revised to contain exact relations between the various thermal expansion coefficients and the density. In addition, new experimental measurements of surface tension have been included. The use of mechanical properties to calculate compressibility has made it possible to include calculated estimates of values of properties not included in the original report. The present report comprises part of the UO_2 portion of section A of the planned complete revision of "Properties for LMFBR Safety Analysis."

As much as possible, we have attempted to have each section independent of the others. Although this has entailed considerable repetition, we believe this will be helpful to users of this handbook. A user not needing great detail regarding the basis for the calculations will be able to read only the section of interest. Tables giving estimated standard deviations (1σ) have been included. These have been given as percents and it should

be understood that a value of 100% means a standard deviation of a factor of two. We have also included a set of tables of closely spaced values. Comments from users of this material regarding errors, format, and utility would be appreciated.

J. K. Fink

L. Leibowitz

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Acknowledgments

The authors are indebted to R. L. Gibby and O. D. Slagle (Hanford Engineering Development Laboratory) for their contributions on density and thermal expansion. We are also appreciative of the valuable comments of M. G. Adamson (General Electric Corp.), J. Belle (Westinghouse Electric Corp.), and R. A. Young (University of Arizona). We also thank Peggy McBride and Stefanie Chapman for their assistance in the preparation and typing of this report.

SECTION A: FUEL

1. UO_2 PROPERTIES

SUMMARY OF THERMODYNAMIC PROPERTIES

Property	Temperature, K					
	1000	2000	3120 (m.p.)	4000	5000	6000
Enthalpy, H(T) - H(298), $kJ \cdot mol^{-1}$	54.59	144.4	302.8 (s) 377.7 (ℓ)	(493)	(624)	(755)
Heat Capacity, C_P, $J \cdot mol^{-1} \cdot K^{-1}$	84.21	98.68	167 (s) 131 (ℓ)	(131)	(131)	(131)
Vapor Pressure P, MPa	3.09×10^{-24}	1.35×10^{-8}	5.59×10^{-3}	0.40	6.3	(33)
Density, ρ, $kg \cdot m^{-3}$	10763	10326	9651 (s) 8739 (ℓ)	(7948)	(7049)	(6151)
Instantaneous Volumetric expansion coefficient, $\alpha_P \times 10^5$, K^{-1}	3.29	5.01	7.06 (s) 10.5 (ℓ)	(10.2)	(9.9)	(9.5)
Adiabatic Compressibility, $\beta_S \times 10^5$, MPa^{-1}	0.533	-	3.31 (ℓ)	(6.16)	(11.8)	(24.6)
Surface Tension, $N \cdot m^{-1}$	-	-	.494 (ℓ)	-	-	-

(s) indicates solid
(ℓ) indicates liquid

Values in parenthesis were obtained by extrapolation beyond the range of available data.

Melting Point, T_m = 3120 K

Heat of Fusion, ΔH_f = 75.7 $kJ \cdot mol^{-1}$

Boiling Point, T_B = 3660 K

Heat of Vaporization, ΔH_g = 497 $kJ \cdot mol^{-1}$ at T_B

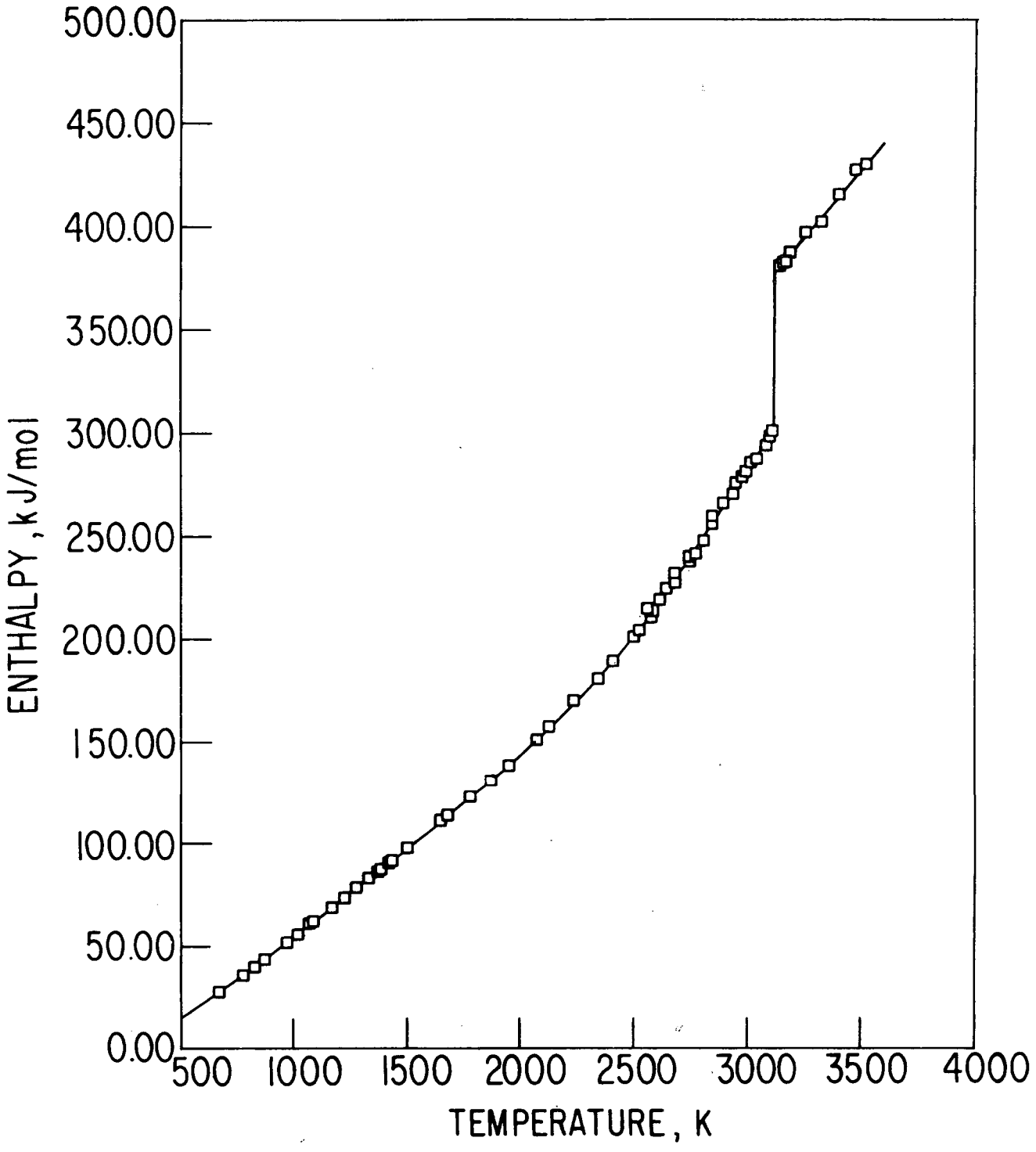
Solid Enthalpy ($kJ \cdot mol^{-1}$)

T,K	H(T)-H(298.15)
298.15	0.0
300	0.1178
400	6.914
500	14.27
600	21.96
700	29.88
800	37.98
900	46.22
1000	54.59
1100	63.06
1200	71.64
1300	80.32
1400	89.10
1500	97.96
1600	106.9
1700	116.0
1800	125.3
1900	134.7
2000	144.4
2100	154.5
2200	165.1
2300	176.3
2400	188.3
2500	201.5
2600	216.1
2670 (α)	227.3
2670 (β)	227.6
2700	232.7
2800	249.4
2900	266.1
3000	282.8
3100	299.5
3120 (s)	302.8

Liquid Enthalpy ($kJ \cdot mol^{-1}$)

T,K	H(T)-H(298.15)
3120	377.7
3200	388.1
3300	401.2
3400	414.3
3500	427.4
3600	(440.5)*
3700	(453.6)
3800	(466.7)
3900	(479.8)
4000	(492.9)
4100	(506.0)
4200	(519.1)
4300	(532.2)
4400	(545.3)
4500	(558.4)
4600	(571.5)
4700	(584.6)
4800	(597.6)
4900	(610.7)
5000	(623.8)
5100	(636.9)
5200	(650.0)
5300	(663.1)
5400	(676.2)
5500	(689.3)
5600	(702.4)
5700	(715.5)
5800	(728.6)
5900	(741.7)
6000	(754.8)

* Parentheses indicate extrapolated beyond range of data.



A comparison of the recommended enthalpy functions for UO_2 with experimental enthalpy data.

Enthalpy

Temperature Range T,K	H(T) - H(298.15), $J \cdot mol^{-1}$	Error σ,%
298.15 - 2670 (solid)	$(78.212)(516.11)\ [\exp(516.11/T) - 1]^{-1}$ $- [\exp(516.11/298.15) - 1]^{-1}$ $+ 3.8616 \times 10^{-3}\ (T^2 - 88893)$ $+ (3.3993 \times 10^{8})(8.6144 \times 10^{-5})\ (T-298.15)$ $\exp\ -1.8815/(8.6144 \times 10^{-5}\ T)$	1
2670 - 3120 (solid)	167.04 T - 218342	1
3120 - 3500 (liquid)		1
3500 - 5000	130.95 T - 30911	10
5000 - 6000		20

Enthalpy

Experimental data[1-13] from 298 to 3120 K for the enthalpy and heat capacity of solid UO_2 have been reported in the literature. To correlate these data, a modified Einstein relationship was used by Kerrisk and Clifton[14] for the solid, while a simple linear equation proved satisfactory for the liquid region data. Rand et al.[15] have further analyzed the enthalpy and heat capacity data for the solid, and concluded that the Bredig[16] proposal of a diffuse phase transition in UO_2 at 2670 K is reasonably supported. They then employed the Kerrisk and Clifton-type equation to fit the enthalpy data[1,2,4-7,12,13] below 2670 K and a linear equation to fit the data for solid UO_2 above that temperature.

The Kerrisk-Clifton equation used to fit the enthalpy data consists of three terms.

$$\begin{aligned} H(T) - H(298) = {} & C_1\theta \left[(e^{\theta/T} - 1)^{-1} - (e^{\theta/298} - 1)^{-1}\right] \\ & + C_2 \left[T^2 - (298)^2\right] \\ & + C_3\, e^{-E_d/RT} \end{aligned} \qquad (1)$$

The first term which dominates at low temperature is due to the phonon contribution. The second term is a contribution due to volumetric thermal expansion. The third term contains the anomalous contribution not included in the first two. The form chosen for this last term in the Kerrisk-Clifton treatment was that due to Frenkel defects. Here E_d/R is the activation temperature for formation of an anion Frenkel defect.

Young,[17] Harding, et al. [18] and MacInnes and Catlow[19] have pointed out that it is more appropriate to attribute this anomalous contribution to electron effects. Young suggests that the third term should be of the form:

$$C_3\ kT\ e^{-E_a/kT} \tag{2}$$

where k is the Boltzmann constant and E_a is the energy gap between conduction and valence bands.

The enthalpy and heat capacity data for UO_2[1-13] have been reexamined by us. Comparisons were made with fits using (1) a Kerrisk-Clifton equation over the entire temperature range, (2) a Kerrisk-Clifton formulation for the first two terms and an electronic term for the anomalous contribution, (3) the Rand formulation using two equations, and (4) the Rand formulation with an electronic term. We found that the data were best fit by (4) with a transition temperature of 2670 K as proposed by Rand.

The recommended equations for enthalpy are:

for $298 \leq T \leq 2670$ K

$$H(T) - H(298.15) = C_1\theta[(e^{\theta/T} - 1)^{-1} - (e^{\theta/T^*} - 1)^{-1}] \tag{3}$$

$$+ C_2[T^2 - (T^*)^2]$$

$$+ C_3\ k\ (T-T^*)e^{-E_a/kT}$$

where $T^* = 298.15$ K,

$C_1 = 78.212$ J·mol^{-1}·K^{-1},

$C_2 = 3.8616 \times 10^{-3}$ J·mol^{-1}·K^{-2},

$C_3 = 3.3993 \times 10^{8}$ J·mol^{-1}·eV^{-1},

$E_a = 1.8815$ eV,

$\theta = 516.11$ K,

and $k = 8.6144 \times 10^{-5}$ eV/K is the Boltzmann constant;

for $2670 \leq T \leq 3120$,

$$H(T) - H(298.15) = 167.04\ T - 218342. \qquad (4)$$

In Eqs. (3-4), H is in J/mol and T is in kelvins. The factor (T-298.15) is used in the third term of Eq. (3) to satisfy the constraint that H(T) - H(298.15) is zero at T = 298.15 K. The condition $\frac{dH}{dT}$ (T = 298.15) = 15.20 $\frac{cal}{mol \cdot K}$ was used to constrain the five parameters C_1, C_2, C_3, E_a, and θ. Thus, while five parameters are given, only four of them are independent.

In examining the experimental data, we have chosen not to include some measurements in the fit. The data of Affortit[8,9] seem to be clearly at variance with those of several other workers and has not been included. In the region from about room temperature to 1500 K the measurements of Moore and Kelley[3] and those of Ogard and Leary[2] do not agree well with those of Fredrickson and Chasanov.[7] Because of the good agreement of Fredrickson and Chasanov[7] with Hein and Flagella[6] who in turn agree well at high temperatures with Leibowitz et al.,[1] we have

selected the data of Fredrickson and Chasanov[7] for use in the moderate temperature range. The recommended set of values would not change very much if we had included all the enthalpy data.

Not only does this final equation give a better fit to the data but it also eliminates discontinuities that existed using the two equations proposed by Rand. Using Rand's equations, the change in enthalpy at the 2670 K phase transition is 1.82 kJ/mol (0.8%) and the change in the derivative of enthalpy (heat capacity) is 16.88 J/mol or a change of 10%. No discontinuity is seen experimentally at 2670 K for other properties such as thermal diffusivity, density, or thermal conductivity. Consequently, the use of enthalpy and heat capacity equations containing a discontinuity creates consistency problems in the calculation of other thermodynamic and transport properties. Our recommended equations give a +0.3 kJ/mol (0.13%) change in enthalpy at 2670 K and a +0.6 J/mol·K or 0.36% change in its temperature derivative at 2670 K. These differences are within the relative standard deviation of the fit (0.61%).

For the liquid range of UO_2, Rand *et al.*[15] fitted the data from 3120 to 3531 K to a linear equation, which we have accepted, and obtained: for 3120 K $\leq$ T $\leq$ 3530 K,

$$H(T) - H(298.15) = 130.95\ T - 30911 \qquad (5)$$

where H is in J/mol and T is in kelvins.

The enthalpy of melting, determined from these equations for solid and liquid UO_2 at the melting point (3120 K), is 74830 J/mol. Above the maximum experimental temperature (3531 K), the enthalpy of UO_2 was calculated assuming a constant heat capacity of 130.95 J/mol·K.

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The liquid enthalpy data of Hein et al.[6] and of Leibowitz et al.[20] are fit with a relative standard deviation of 0.41% by Eq. (5).

Interestingly, the enthalpies obtained using Eq. (5) from 3500 K to 6000 K are within 2% of the values predicted by Booth[21] in 1969 using Hirshfelder's generalized equation-of-state.[22]

In the temperature range 298 to 2670 K, the estimated error (1σ) is $\pm 0.6\%$ and is based on a least squares analysis. From 2670 K to the melting point, the error in the fit is $\pm 1\%$. Above the melting point, the estimated error is temperature dependent ranging from $\pm 1\%$ below 3500 K to 20% above 5000 K.

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Heat Capacity at Constant Pressure

T,K	C_p, $J \cdot mol^{-1} \cdot K^{-1}$
298.15	63.60
300	63.79
400	71.30
500	75.48
600	78.20
700	80.17
800	81.73
900	83.05
1000	84.22
1100	85.29
1200	86.29
1300	87.25
1400	88.21
1500	89.21
1600	90.31
1700	91.64
1800	93.33
1900	95.59
2000	98.68
2100	102.9
2200	108.5
2300	116.0
2400	125.8
2500	138.1
2600	153.6
2670 (α)	166.4
2670 (β)	167.0
2700	167.0
2800	167.0
2900	167.0
3000	167.0
3100	167.0
3120 (s)	167.0
3120 (ℓ)	131.0
3500	131.0
4000	(131.0)*
4500	(131.0)
5000	(131.0)
5500	(131.0)
6000	(131.0)

*Parentheses indicate extrapolation beyond the range of experimental data.

Heat Capacity at Constant Volume

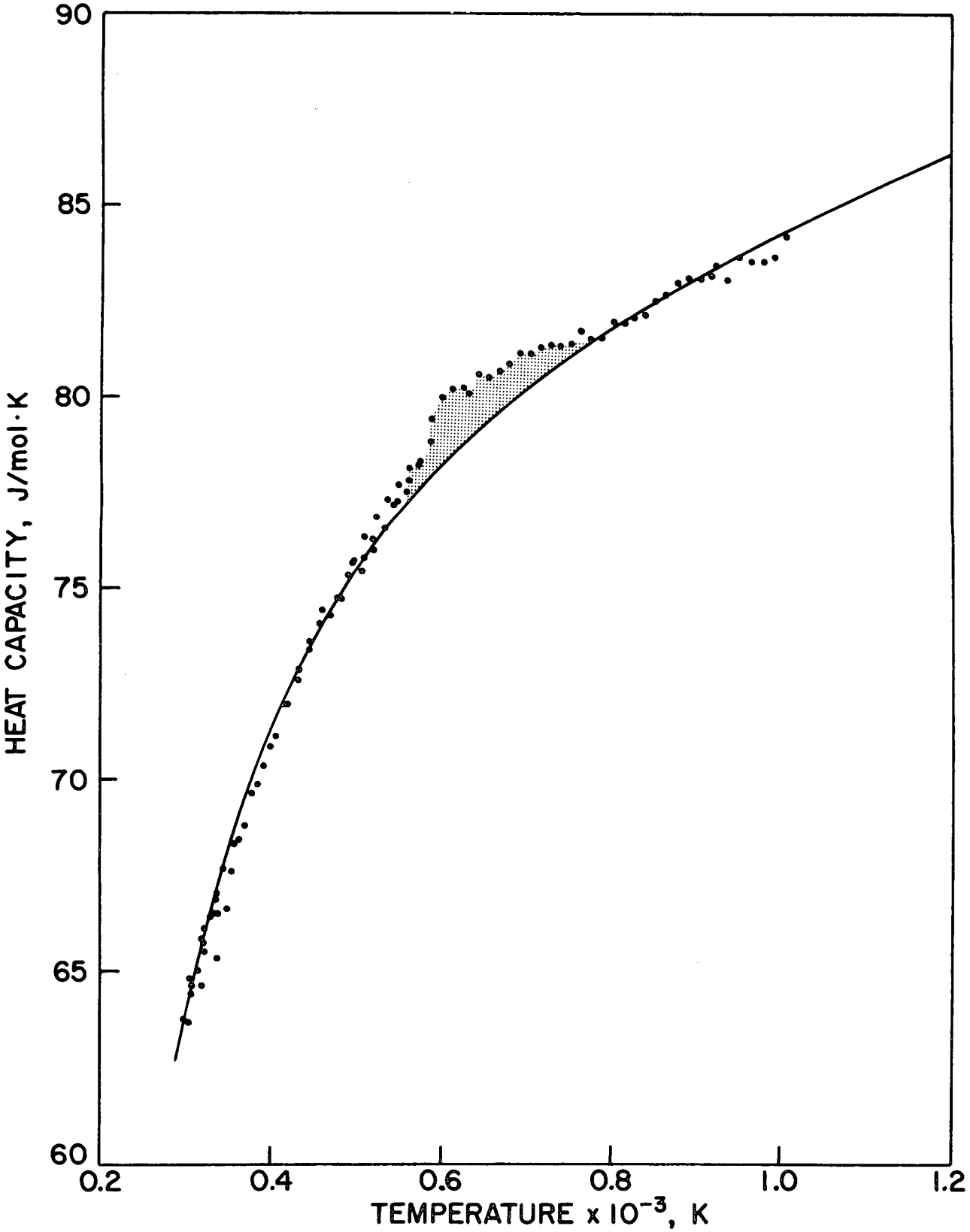
T,K	C_V, $J \cdot mol^{-1} \cdot K^{-1}$
298.15	62.90
300	63.09
400	70.23
500	73.99
600	76.20
700	77.59
800	78.49
900	79.07
1000	79.41
1100	79.56
1200	79.56
1300	79.44
1400	79.23
1500	78.98
1600	78.75

12/80 URANIUM DIOXIDE C_V

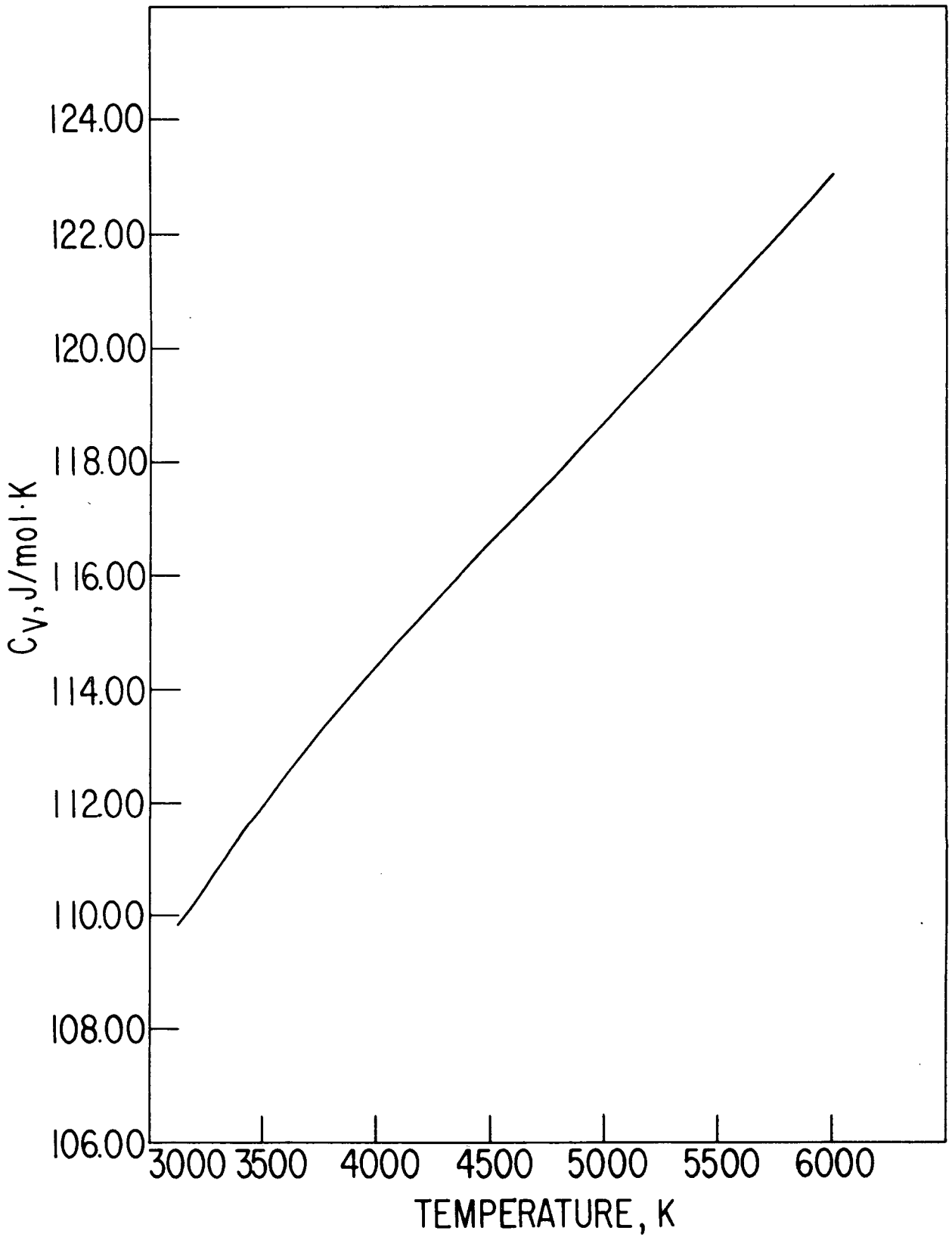
Heat Capacity at Constant Volume

T,K	C_V, $J \cdot mol^{-1} \cdot K^{-1}$
3120 (ℓ)	105.2
3200	(105.8)*
3300	(106.6)
3400	(107.4)
3500	(108.2)
3600	(108.9)
3700	(109.6)
3800	(110.2)
3900	(110.9)
4000	(111.5)
4100	(112.0)
4200	(112.6)
4300	(113.2)
4400	(113.7)
4500	(114.3)
4600	(114.8)
4700	(115.3)
4800	(115.8)
4900	(116.4)
5000	(116.9)
5100	(117.4)
5200	(117.9)
5300	(118.4)
5400	(118.9)
5500	(119.4)
5600	(119.9)
5700	(120.4)
5800	(120.9)
5900	(121.4)
6000	(121.9)

* Parentheses indicate the parameters used in the calculation of C_V have been extrapolated beyond the range of experimental data.



A comparison of the recommended heat capacity functions for UO_2 with experimental data. The data points above the shaded area are due to high contamination of the UO_2 by U_4O_9.



Heat capacity at constant volume of liquid UO_2

Heat Capacity at Constant Pressure

Temperature Range T,K	C_P, $J \cdot mol^{-1} \cdot K^{-1}$	Error σ,%
298 - 2670 (solid)	$\frac{(78.212)(516.11)^2 \exp\left(\frac{516.11}{T}\right)}{T^2\left[\exp\left(\frac{516.11}{T} - 1\right)\right]^2} + 2.0\,(3.8616 \times 10^{-3})\,T + 3.3993 \times 10^{8}\,(8.6144 \times 10^{-5}) \exp\left(\frac{-1.8815}{8.6144 \times 10^{-5}\,T}\right)\left(1 + \frac{[T-298.15]\,1.8815}{8.6144 \times 10^{-5}\,T^2}\right)$	1
2670 - 3120 (solid)	167.0	1
3120 - 3500 (liquid)	131.0	1
3500 - 5000		10
5000 - 6000		20

Heat Capacity at Constant Volume

Temperature Range T,K	C_V, $J \cdot mol^{-1} \cdot K^{-1}$	Error σ,%
298 - 1600 (solid)		4
3120 - 3400 (liquid)		20
3400 - 4000	$\frac{C_P \beta_S}{\beta_T}$*	25
4000 - 5000		65
5000 - 6000		120 (factor of 2.2)

*The methods used for the calculation of β_S and β_T are given in Section A 1.1.11.

8/80 URANIUM DIOXIDE C_P

Heat Capacity

Data[1-14] over the range 298 to 3531 K can be used to obtain heat capacities for UO_2. A selected set of these data[1,2,4-7,12,13] were fit by Rand et al.[15] to a Kerrisk and Clifton-type equation[16] (a modified Einstein term is included) from 298 to 2670 K. From 2670 K to the melting point of UO_2, a constant C_P was obtained; similarly, a constant C_P was also found for the liquid UO_2 region.

The Kerrisk-Clifton equation used to fit the heat capacity consists of three terms.

$$C_P = \frac{C_1\theta^2 \, e^{\theta/T}}{T^2(e^{\theta/T} - 1)^2} + 2C_2T + \frac{C_3E_d}{RT^2} \, e^{-E_d/RT} \qquad (1)$$

The first term which dominates at low temperature is due to the phonon contribution. The second term is a contribution due to volumetric thermal expansion. The third term contains the anomalous contribution not included in the first two. The form chosen for this last term in the Kerrisk-Clifton treatment was that due to Frenkel defects. Here E_d/R is the activation temperature for formation of an anion Frenkel defect.

Young,[17] MacInnes and Catlow,[18] and Harding et al.[19] have pointed out that it is more appropriate to attribute this anomalous contribution to electron effects. Young suggests that the third term should be of the form:

$$C_3 \, k \left(1 + \frac{E_a}{kT}\right) e^{-E_a/kT} \qquad (2)$$

where k is the Boltzmann constant and E_a is the energy gap between the conduction and valence bands.

The enthalpy and heat capacity data for solid UO_2[1-13] have been reexamined by us. Comparisons were made with fits using (1) a Kerrisk-Clifton equation over the entire temperature range, (2) a Kerrisk-Clifton formulation for the first two terms and an electronic term for the anomalous contribution, (3) the Rand formulation using two equations, and (4) the Rand formulation with an electronic term. We found that the data were best fit by (4) with a transition temperature of 2670 as proposed by Rand.

The recommended equations for heat capacity in J/(mol·K) are:

for 298 K $\leq$ T $\leq$ 2670 K

$$C_P = \frac{C_1 \theta^2 e^{\theta/T}}{T^2(e^{\theta/T} - 1)^2} + 2C_2T + C_3k\, e^{-E_a/kT}\left[1 + \frac{(T-298.15)\, E_a}{kT^2}\right] \quad (3)$$

where $C_1 = 78.212$ J·mol^{-1}·K,$^{-1}$

$C_2 = 3.8616 \times 10^{-3}$ J·mol^{-1}·K^{-2},

$C_3 = 3.3993 \times 10^{8}$ J·mol^{-1}·eV^{-1},

$E_a = 1.8815$ eV,

$\theta = 516.11$ K,

and $k = 8.6144 \times 10^{-5}$ eV/K is the Boltzmann constant;

for 2670 K $\leq$ T $\leq$ 3120 K

$$C_P = 167.04 \quad (4)$$

In Eqs. (3-4), T is in kelvins. The slight deviation in form of the third term from that suggested by Young is due to the inclusion of the factor (T-298.15) in the corresponding enthalpy equation to satisfy the constraint that H(T) - H(298.15) is zero at T = 298.15 K. The condition dH/dT (T = 298.15) = 15.20 cal/mol·K was used to constrain the five parameters, C_1, C_2, C_3, E_a, and θ. Thus while five parameters are given, only four of them are independent.

In our fit to the enthalpy and heat capacity data, we first obtained a fit of the enthalpy data and then evaluated the corresponding equation for heat capacity with respect to the heat capacity data. In examining the experimental data we have chosen not to include some measurements in the fit. Of the five separate sets of enthalpy data examined, two sets were not included in the final fit of experimental data. In the region from about room temperature to 1500 K the measurements of Moore and Kelley[3] and those of Ogard and Leary[2] do not agree well with those of Fredrickson and Chasanov[7]. Because of the agreement of Fredrickson and Chasanov[7] with Hein and Flagella[6] who in turn agree well at higher temperatures with Leibowitz et al.,[1] we have selected the data of Fredrickson and Chasanov for use in the moderate temperature range. The heat capacity of Affortit[8,9] seem to be clearly at variance with those of several other experimenters and has not been included. Because the data of Popov et al.[11] are high and that of Engel[10] appear to have a systematic error, (it differs from data of other experimenters by a normalization) these two sets of data have not been included in the final assessment of the equation obtained from the fit to the enthalpy

data. The recommended set of values would not change very much if we had included all the data.

In the figure comparing the recommended equation with experimental data, the data of Grønvold et al.[12] in the temperature region 500 to 800 K are high. Grønvold stated that this was due to contamination of his sample of UO_2 by U_4O_9 creating an excess of oxygen in his sample. The shaded area of the figure shows the contribution due to the solution of U_4O_9 in the sample.

For liquid UO_2, the constant value obtained from Rand's[14] fit to the liquid enthalpy and heat capacity data is recommended.

For 3120 K $\leq$ T $\leq$ 3530 K,

$$C_P = 130.95 \tag{5}$$

Above 3530 K, it is assumed that C_P is constant. Equations (3) through (5) define C_P to be equal to $\left(\frac{\partial H}{\partial T}\right)_{SAT}$ which is not thermodynamically accurate. Thermodynamically C_P is defined as $\left(\frac{\partial H}{\partial T}\right)_P$ or

$$C_P = \left(\frac{\partial H}{\partial T}\right)_{SAT} - V\ \gamma_{SAT} + V\ T\ \alpha_P\ \gamma_{SAT} \tag{6}$$

where H is the enthalpy,

V is the volume,

α_P is the instantaneous volumetric thermal expansion coefficient,

and $\gamma_{SAT} = \left(\frac{\partial P}{\partial T}\right)_{SAT}$ (7)

However, for UO_2 the terms $V\ \gamma_{SAT}$ and $V\ T\ \alpha_P\ \gamma_{SAT}$ which distinguish C_P from $\left(\frac{\partial H}{\partial T}\right)_{SAT}$ are so small that they give no contribution to the order of significant figures quoted here. For the solid $V\ \gamma_{SAT}$ ranges from 4×10^{-73}

J/mol•K at 400 K to 1 x 10^{-6} J/mol•K at 3120 K and V T α_P γ_{SAT} ranges from 4 x 10^{-75} J/mol•K at 400 K to 2 x 10^{-7} J/mol•K at 3120 K so they are insignificant compared to $\left(\frac{\partial H}{\partial T}\right)_{SAT}$.

For liquid UO_2, V γ_{SAT} α_P T ranges from 3.2 x 10^{-7} J/mol•K at 3120 K to 9.0 x 10^{-4} J/mol•K at 6000 K and V γ_{SAT} ranges from 1.1 x 10^{-6} J/mol•K. In this temperature range, $\left(\frac{\partial H}{\partial T}\right)_{SAT}$ = 130.95 J/mol•K. Thus, even though V γ_{SAT} α_P T and V γ_{SAT} are of the order of 1 x 10^{-3} J/mol•K at 6000 K, these values are still smaller than the number of significant figures being retained in the calculation, and thus, make no significant contribution to C_P in the temperature range 3120 to 6000 K. Thus, for the temperature range 298 - 6000 K, C_P may be approximated as

$$C_P \triangleq \left(\frac{\partial H}{\partial T}\right)_{SAT} \tag{8}$$

with no additional error within 10^{-2}.

The heat capacity of UO_2 is not expected to vary markedly with oxygen stoichiometry. Moreover, the data which are available are insufficient for recommending a quantitative relationship containing the effect of oxygen stoichiometry.[8]

The use of two equations for the solid phase heat capacity is based on physical observations[20] of changes in UO_2 texture close to 2700 K, Bredig's arguments[21] that there is a high probability of a phase transition in UO_2 below the melting point (as is found in other compounds with a fluorite structure), and analysis of the experimental data which indicates a better fit above 2700 K using a constant C_P. The transition postulated by Bredig[21] at 2670 K is equivalent to a "melting" of the

anion lattice while the uranium lattice remains until the melting point at 3120 K. This behavior corresponds to a second-order or a lambda transition; however, the UO_2 experimental data have here for simplicity been treated as though the transition were first order.

For solid UO_2 in the temperature range 298 to 2670 K, the standard deviation (1σ) in the UO_2 heat capacity data and that from a least squares fit to that data is ±.6%. Between 2670 K and the melting point (3120 K), the error is estimated as ±1%. For molten UO_2, the error (1σ) is estimated as 1% in the temperature interval 3120 to 3500 K, 10% in the temperature interval 4000 to 5000 K, and 20% in the temperature interval 5000 to 6000 K.

12/80 URANIUM DIOXIDE C_V

Heat Capacity at Constant Volume

The heat capacity at constant volume, C_V, may be calculated from the heat capacity at constant pressure, C_P, using the thermodynamic relation[22]

$$C_V = C_P \frac{\beta_S}{\beta_T} \tag{9}$$

where β_T is the isothermal compressibility and β_S is the adiabatic compressibility.

The isothermal compressibility, β_T of UO_2, was evaluated using the relation[20]

$$\beta_T = \beta_S + \frac{\alpha_P^2 \, VT}{C_P} . \tag{10}$$

The volumetric thermal expansion coefficient for solid UO_2 in K^{-1} is given by the equation[23,24]

$$\alpha_P = \frac{1.7169 \times 10^{-5} + 1.4928 \times 10^{-8} \, T + 1.0260 \times 10^{-12} \, T^2}{0.9989695 + 5.723 \times 10^{-6} \, T + 2.488 \times 10^{-9} \, T^2 + 1.140 \times 10^{-13} \, T^3} \tag{11}$$

The volumetric expansion coefficient for liquid UO_2 is[23,24]

$$\alpha_P = \frac{1.05 \times 10^{-4}}{1 + 3.5 \times 10^{-5} \, (T-3120)} \, K^{-1} . \tag{12}$$

The adiabatic compressibility for solid UO_2 was calculated from Young's modulus (E) and Poisson's ratio (σ) using the relation

$$\beta_S = \frac{3(1 - 2\sigma)}{E} . \tag{13}$$

Below 1600 K, Young's modulus is given by the equation[25]

$$E = 2.26 \times 10^{11} \left[1-1.31 \times 10^{-4} (T-273.15)\right] \left[1-2.62 (1-D)\right] \quad (14)$$

where

E = Young's modulus in pascals,

T = temperature in K,

and D = fraction of theoretical density.

The value used for Poisson's ratio[26] is 0.316.

Above 1600 K, there is no recommended equation for Young's modulus because of insufficient data. Thus, C_V for solid UO_2 is not calculated above 1600 K. From 3120 through 3200 K, β_S may be calculated from the speed of sound (v) using a fit to the Slagle-Nelson data[27] and from the density (ρ) of Christensen[23,24] using the relations

$$\beta_S = \frac{1}{\rho v^2} \quad (15)$$

$$\rho = 10970 \ (1.0522 - 8.192 \times 10^{-5} \ T) \quad (16)$$

$$v = 3660 - 0.5769 \ T \quad (17)$$

where T is in kelvins, ρ is in kg/m^3, v is in m/s, and β_S is in Pa^{-1}. Above 3200 K, β_S may be approximated using the Grosse[28] technique

$$\beta_S = \frac{\beta_{S,m}}{\frac{a}{\theta + b} - b} \quad (18)$$

where

$$\beta_{S,m} = 3.3 \times 10^{-11} \ Pa^{-1} \quad (19)$$

is the adiabatic compressibility at the melting point. θ is the reduced temperature defined by

$$\theta = \frac{T - T_m}{T_C - T_m} \tag{20}$$

where T_m = 3120 K, is the melting point and T_C is the critical point (estimated as 7560 K).[29]

The parameters a and b determined using the Grosse equilateral hyperbola method with the existing data are

$$\begin{aligned} a &= 0.5633 \\ b &= 0.4018 \end{aligned} \tag{21}$$

Because of the uncertainty of the value of the critical temperature, the limited data (4 points), and limited temperature range 3120-3200 K upon which this extrapolation technique is based, it is expected to be unreliable at high temperatures. Consequently, values of C_V above 3200 K should be taken only as estimates. The large estimated errors reflect this uncertainty.

The standard deviations (σ) expressed as a percent for the heat capacity at constant volume, C_V, have been calculated from the standard deviations of the dependent parameters of Eq. (9) namely C_P, β_S, and β_T. Because of the large uncertainty in the calculation of β_S and β_T above 3400 K, there is also a large uncertainty in the estimated values for C_V above 3400 K. The estimated standard deviation of recommended values of C_V for solid UO_2 is 4%. For liquid UO_2 between 3120 and 3400 K, the estimated standard deviation is 20%. From 3400 to 4000 K,

this standard deviation increases to 25%. The error in the values of C_V in the temperature range 4000-5000 K is estimated as a factor of 1.3 or equivalently the standard deviation is 60%. Above 5000 K, the values are estimated to be correct within a factor of 2.20, i.e., they have a standard deviations of 120%.

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Melting Point*

Rand et al.[1] have recently analyzed fourteen experimental studies (spanning a period of 20 years) dealing with the melting temperature of UO_2; they note that the range of these values has decreased with time. The value recommended by Rand et al.[1] is:

$$T_m = 3120 \pm 30 \text{ K}$$

This value has been accepted as the melting point by international agreement. The work completed prior to 1965 has been summarized by Hausner[2]; more recent data have been reported by Latta and Fryxell[3], Lyon and Baily[4], and Bates[5]. Measurements have been made using "V" filament and thermal arrest methods. The data from the latter method are generally more reliable since the sample is encapsulated and vaporization is not a problem. Bates[5] used the "V" filament method since his work was aimed at irradiated materials. Of the data from thermal arrest measurements, the data of Latta and Fryxell[3] appear to be the best. Their value agrees within experimental errors with the value reported earlier by Lyon and Bailey[4], who used the same methods. Latta and Fryxell[3] also report reasonably reliable data for the effect of oxygen stoichiometry on melting temperature in the range $-0.50 < X < 0.20$ for UO_{2+X}.

Some of the values reported for T_m are given below:

	T_m, K
Hausner[2]	3078±15
Lyon and Baily[4]	3113±20
Latta and Fryxell[3]	3138±15

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* Parts of this section have been contributed by R. Gibby, Hanford Engineering Development Laboratory, Richland, WA.

The uncertainty in the recommended melting temperatures is ±1% (1σ). The experimental results of Latta and Fryxell[3] and that of Lyon and Bailey[4] are well within this error estimate.

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12/80 URANIUM DIOXIDE ΔH_F

Heat of Fusion*

74.8 ± 1 kJ·mol^{-1}

The heat of fusion for UO_2 was calculated using equations[1,2] for the enthalpy of UO_2:

$$2670 \leq T \leq 3120 \text{ K}, \quad H(T)-H(298.15) = 167.04\ T - 218342; \tag{1}$$

$$3120 \leq T \leq 3530 \text{ K}, \quad H(T)-H(298.15) = 130.95\ T - 30911. \tag{2}$$

In Eqs. (1) and (2) enthalpy is in J·mol^{-1} and temperature in kelvins. Evaluation of these expressions at 3120 K provides a value of 74.8 kJ·mol^{-1} for the enthalpy of fusion with a standard deviation of 1%.

This recommended value for the heat of fusion is consistent with the recommended enthalpy data for UO_2 and with experimental results of enthalpy measurements of Chikalla,[3] Leibowitz et al.,[4] and Hein and Flagella.[5]

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* Parts of this section were contributed by R. Gibby, Hanford Engineering Development Laboratory, Richland, WA.

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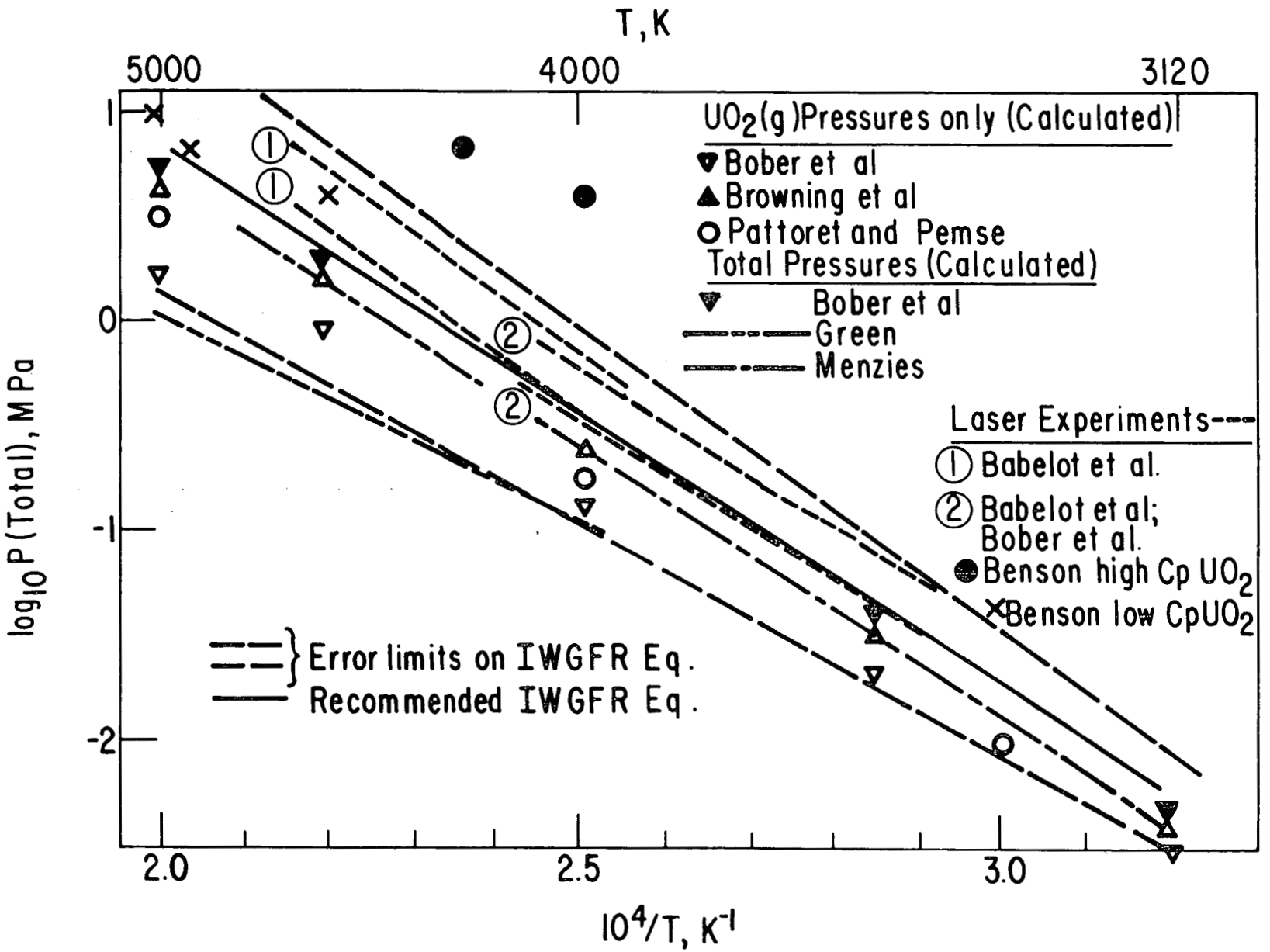
Vapor Pressure over Solid Uranium Dioxide

T, K	P, MPa	P, atm
1500	8.27×10^{-14}	8.17×10^{-13}
1600	1.66×10^{-12}	1.64×10^{-11}
1700	2.35×10^{-11}	2.32×10^{-10}
1800	2.48×10^{-10}	2.44×10^{-9}
1900	2.03×10^{-9}	2.01×10^{-8}
2000	1.35×10^{-8}	1.34×10^{-7}
2100	7.53×10^{-8}	7.43×10^{-7}
2200	3.58×10^{-7}	3.53×10^{-6}
2300	1.49×10^{-6}	1.47×10^{-5}
2400	5.48×10^{-6}	5.41×10^{-5}
2500	1.82×10^{-5}	1.80×10^{-4}
2600	5.51×10^{-5}	5.44×10^{-4}
2700	1.54×10^{-4}	1.52×10^{-3}
2800	3.99×10^{-4}	3.94×10^{-3}
2900	9.69×10^{-4}	9.56×10^{-3}
3000	2.22×10^{-3}	2.19×10^{-2}
3100	4.81×10^{-3}	4.75×10^{-2}
3120	5.59×10^{-3}	5.52×10^{-2}

Vapor Pressure over Liquid Uranium Dioxide

T, K	P, MPa	P, atm
3120	0.00559	0.0552
3200	0.00923	0.0911
3300	0.0166	0.164
3400	0.0288	0.284
3500	0.0480	0.474
3600	0.0776	0.766
3700	0.122	1.20
3800	0.185	1.83
3900	0.275	2.72
4000	0.400	3.95
4100	0.568	5.61
4200	0.791	7.81
4300	1.08	10.7
4400	1.45	14.3
4500	1.92	19.0
4600	2.50	24.7
4700	3.22	31.7
4800	4.08	40.3
4900	5.11	50.5
5000	6.34	62.5
5100	(7.77)*	(76.7)*
5200	(9.43)	(93.0)
5300	(11.3)	(112)
5400	(13.5)	(133)
5500	(16.0)	(158)
5600	(18.7)	(185)
5700	(21.8)	(215)
5800	(25.2)	(249)
5900	(29.0)	(286)
6000	(33.1)	(326)

*Extrapolated values using Eq. (2)



The total vapor pressure over UO_2. The figure was adapted from reference 16 with data from references 7, 8, 10, 13, and 16 through 22.

Vapor Pressure

Temperature Range T,K	log(P), P in MPa	Error in log P σ,	Error in P σ,%
below 3120	$\frac{-31284}{T} + 7.774$	0.4	60
3120 - 4000	$28.65\ \frac{-34930}{T} - 5.64 \log T$	0.2	60
4000 - 5000		0.6	300 (factor of 4)
5000 - 6000		1.0	900 (factor of 10)

Vapor Pressure

There have been many experimental determinations of the vapor pressure over solid UO_2, notably the work of Ackermann, et al.,[1] Ohse,[2] Tetenbaum and Hunt,[3] and Pattoret et al.[4] The pressures over liquid UO_2 have been measured by Reedy and Chasanov,[5] Ohse, et al.,[6] Bober, et al.,[7] and Benson.[8] These experimental measurements have extended to about 6000 K. In addition to these direct determinations of UO_2 vapor pressures there have been many indirect estimates of the pressures. Gabelnick[9] and Green[10,11] have calculated pressures over UO_2 based on matrix-isolation spectroscopic study of gas phase uranium oxides. UO_2 vapor pressures have also been calculated using corresponding states theory,[12,13] significant structures theory,[14] and oxygen potential thermodynamics.[15] At a recent meeting[16] of specialists at Harwell, the available uranium dioxide pressure data were reviewed and an equation for the pressures over liquid UO_2 was recommended for use up to 5000 K. This equation is given below, along with a slightly modified version of the equation of Tetenbaum and Hunt[3] for pressures over solid UO_2.

These equations for the base 10 logarithm of the total vapor pressure over UO_2 are:

below 3120 K (solid),

$$\log P = - \frac{31284}{T} + 7.774; \qquad (1)$$

3120 - 5000 K (liquid),

$$\log P = 28.65 - \frac{34930}{T} - 5.64 \log T. \qquad (2)$$

where P is in MPa and T is in kelvins.

Above 5000 K, the situation is unresolved; the table below presents calculated values at 5000 and 6000 K based on the work of various investigators.

Table I. Calculated Vapor Pressure

Source	Reference	P at 5000 K, atm	P at 6000 K, atm
Eq. (2)	16	62.5	327
Ohse	6	13.0	1120
Gabelnick	9	29.1	171
Booth	12	98.9	554
Menzies	13	46.5	272
Breitung	15	150.	---
Gillan	14	33.1	151
Benson	8	86.1	404
Green	10	21.5	137

The mean of the tabulated values at 5000 K [excluding Eq. (2)] is 60 atm with a standard deviation of 45 atm; this is comparable to the 62.5 atm predicted by Eq. (2). At 6000 K, the mean of the various investigators' estimates is 403 atm with a standard deviation of about 324 atm; this is in reasonable agreement with the value calculated using Eq. (2).

Most of these studies have not allowed for the fact that the vapor in equilibrium with UO_2 does not simply consist of UO_2 molecules but is a complex mixture of O, O_2, U, UO, UO_2, and UO_3 molecules. The vapor composition and pressure both depend on the condensed phase composition and temperature. Vapor pressures have been calculated by Gabelnick[9] and by Green and Leibowitz[11] which take this variation into account.

The error (1σ) in the values for the logarithm of the vapor pressure above solid UO_2 (Eq. (1)) is 0.4. The standard deviation (1σ) for the logarithm of the vapor pressure over liquid UO_2 (Eq. (2)) ranges from ±0.2 at 3120 K to 0.6 at 5000 K. Between 5000 K and 6000 K, the standard deviation is estimated as 1.0. These standard deviations for the logarithm of the pressure correspond to large errors in the calculated values of the vapor pressure. For Eq. (1), the error (1σ) in the pressure is 60%. For Eq. (2), below 4000 K, the error in the vapor pressure values is 60%, between 4000 and 5000 K, it rises to 300% (a factor of 4) and to 900% (a factor of 10) at 6000 K.

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12/80 URANIUM DIOXIDE T_B

Boiling Point

3660±20 K

The boiling point was calculated from the equation[1] proposed by the International Working Group on Fast Reactors for the vapor pressure of liquid UO_2:

$$\log P = 28.65 - 34930/T - 5.64 \log T \quad (1)$$

where P is in MPa and T is in kelvins. The temperature corresponding to 1 atm (0.1013 MPa) was calculated to be 3660 K with a standard deviation of 5.5%.

References

1. International Working Group on Fast Reactors, "Summary Report, Specialists Meeting on Equations of State of Materials of Relevance to the Analysis of Hypothetical Fast Breeder Reactor Accidents," Harwell, June 19-23, 1978, IWGFR/26.

Heat of Vaporization

T,K	ΔH_g, kJ mol^{-1}
3120	522
3200	519
3300	514
3400	509
3500	505
3600	500
3700	495
3800	490
3900	486
4000	481
4100	476
4200	472
4300	467
4400	462
4500	458
4600	453
4700	448
4800	444
4900	439
5000	434
5100	(430)*
5200	(425)
5300	(420)
5400	(416)
5500	(411)
5600	(406)
5700	(401)
5800	(397)
5900	(392)
6000	(387)

* Extrapolated beyond range of Eq. (1).

Heat of Vaporization

T,K	ΔH_g	Error σ %
3120 - 4000		5
4000 - 5000	$RT^2 \frac{d\ln P}{dT}$	20
5000 - 6000		85

12/80 URANIUM DIOXIDE ΔH_g

Heat of Vaporization

The heat of vaporization was calculated by application of the Clausius-Clapeyron equation:

$$\frac{d\ln P}{dT} = \frac{\Delta H_g}{RT^2} \quad (1)$$

to the equation for the total vapor pressure over liquid UO_2:

$$\log P = 28.65 - 34930/T - 5.64 \log T \quad (2)$$

In Eq. (2) P is in MPa and T is in kelvins. The value obtained at 3660 K (the calculated boiling point of liquid UO_2) was 497 kJ/mole. Tabulated values over the temperature range of interest are given in the preceding table.

The estimated error (1σ) in the calculation of the heat of vaporization using the Clausius-Clapeyron equation and Eq. (2) for the vapor pressure has been calculated based on the error in the vapor pressure. The standard deviation in the temperature range 3120 to 4000 K is only 5% but increases to 20% in the temperature range 4000 to 5000 K and to 85% above 5000 K.

References

1. International Working Group on Fast Reactors, "Summary Report, Specialists Meeting on Equations of State of Materials of Relevance to the Analysis of Hypothetical Fast Breeder Reactor Accidents," Harwell, June 19-23, 1978, IWGFR/26.

URANIUM DIOXIDE

σ

Surface Tension

T,K	σ, N/m	Errors,%
∿3120	0.494	15

12/80 URANIUM DIOXIDE σ

Surface Tension

.494 ± .074 N/m

The surface tension of solid UO_2 has been measured or calculated for a range of temperatures. Matzke, Inoue, and Warren[1] have tabulated the available data. Because of large scatter in the data, no temperature correlation of the data has been made and no values are recommended.

Recent measurements of the surface tension of solid UO_2 by Matzke, Inoue, and Warren[1] at room temperature using an Hertzian indextation fracture method show a sensitivity to O/m ratio. Their results range from 1.65 N/m for $UO_{1.989}$ and 1.8 N/m for UO_2 to 2.20 N/m for $UO_{2.052}$.

The table below shows the available data on the surface tension of UO_2 at the melting point. The mean value of these data is 0.494 N/m. The error, 1σ, is estimated at 15%. This value should be used in the neighborhood of the melting point of UO_2.

Surface Tension of UO_2 at the Melting Point

Surface Tension	Method Determined	Experiments	Reference
0.445 ± .210	droplet photographs	Christensen	2
0.550 ± .210	droplet photographs	Christensen	2
0.441 ± .035	liquid meniscus shape measurements	Bates	3
0.420	shape of frozen menisci	Chasanov	4
0.615 ± .180	liquid drop measurements	Schins	5

Nikolopoulos and Schulz[6] estimate the temperature dependence of the surface tension of liquid UO_2 from the melting point to 3225 K using compressibility data. They give the temperature dependence as

$$\frac{d\sigma}{dT} = -0.19 \times 10^{-3} \text{ N}\cdot\text{m}^{-1}\cdot\text{K}^{-1} \quad .$$

Using this temperature dependence, the surface tension may be estimated as a function of temperature in the temperature range 3120 to 3225 K from

$$\sigma = 0.494 - 0.19 \times 10^{-3} \, (T-3120)$$

where T is in kelvins and σ is in N/m.

References

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6. P. Nikolopoulos and B. Schulz, J. Nucl. Mat. 82, 172 (1979).

12/80 URANIUM DIOXIDE ρ

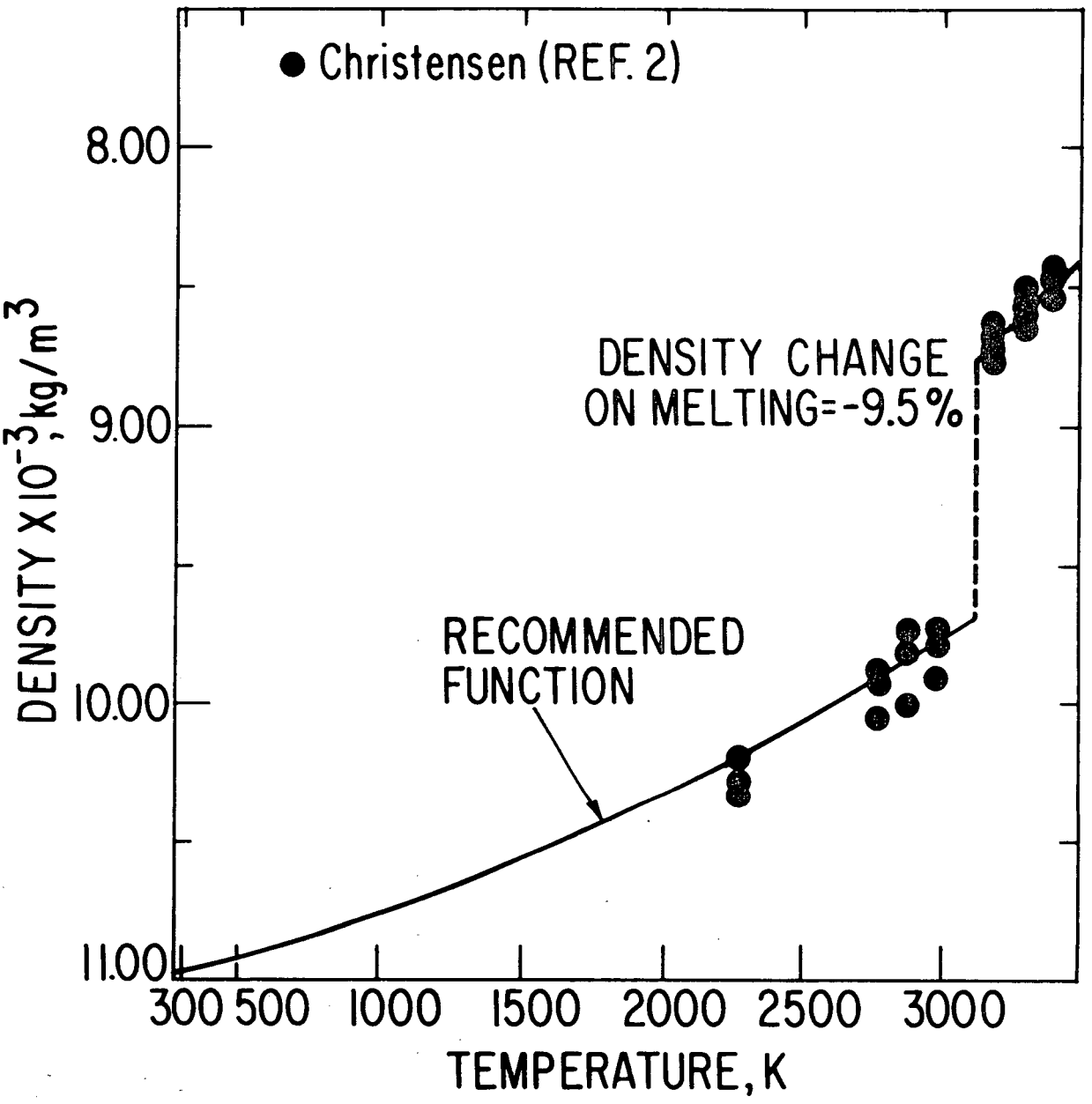
Density

T,K	$\rho \times 10^{-3}$, $kg \cdot m^{-3}$
298.15	10.97
300	10.97
400	10.94
500	10.92
600	10.89
700	10.86
800	10.83
900	10.80
1000	10.76
1100	10.73
1200	10.69
1300	10.65
1400	10.61
1500	10.56
1600	10.52
1700	10.47
1800	10.43
1900	10.38
2000	10.33
2100	10.27
2200	10.22
2300	10.16
2400	10.11
2500	10.05
2600	9.987
2700	9.925
2800	9.862
2900	9.798
3000	9.732
3100	9.664
3120	9.651

Density

T,K	$\rho \times 10^{-3}$, $kg \cdot m^{-3}$
3120	8.739
3200	8.667
3300	8.577
3400	8.487
3500	(8.397)*
3600	(8.307)
3700	(8.218)
3800	(8.128)
3900	(8.038)
4000	(7.948)
4100	(7.858)
4200	(7.768)
4300	(7.678)
4400	(7.589)
4500	(7.499)
4600	(7.409)
4700	(7.319)
4800	(7.229)
4900	(7.139)
5000	(7.049)
5100	(6.959)
5200	(6.870)
5300	(6.690)
5400	(6.690)
5500	(6.600)
5600	(6.510)
5700	(6.420)
5800	(6.330)
5900	(6.241)
6000	(6.151)

*Parentheses indicate extrapolation beyond the range of experimental data.



A comparison of the recommended function for the density of UO_2 with experimental data.

Density

T,K	ρ, $kg \cdot m^{-3}$	Error in σ,%
298 - 2000 (solid)	$10970\ (1.0056 - 1.6324 \times 10^{-5}T - 8.3281 \times 10^{-9}T^2$	1
2000 - 3120 (solid)	$+ 2.0176 \times 10^{-13}T^3)$	2
3120 - 3400 (liquid)	$10970\ (1.0522 - 8.192 \times 10^{-5}T)$	9
3400 - 4000 (liquid)		13
4000 - 6000 (liquid)		20

Density*

O. D. Slagle[1] has analysed the UO_2 thermal expansion data of Christensen[2] in the temperature range 1550 to 3420 K and of Conway et al.[3] from 1300 to 2500 K. Using the analysis of Olsen[4], Slagle recommends equations for the fractional change of length as a function of temperature. From these equations, he calculates the density of UO_2 as a function of temperature and then fits these values to a polynomial.

The recommended equation for the density of solid UO_2 is

$$\rho = \rho_0 (1.0056 - 1.6324 \times 10^{-5} T - 8.3281 \times 10^{-9} T^2 + 2.0176 \times 10^{-13} T^3) \quad (1)$$

where $\rho_0 = 10970$ kg/m^3, the density of the solid at 298.15 K. The density of liquid UO_2 in the temperature range 3120 to 3420 K is given by

$$\rho = \rho_0 (1.0522 - 8.192 \times 10^{-5} T) \quad (2)$$

where $\rho_0 = 10970$ kg/m^3, the density of the solid at 298.15 K.
At the melting point, 3120 K, the density of the solid given by Eq. (1) is 9660 kg/m^3. The density of the liquid at 3120 K is 8740 kg/m^3 from Eq. (2). The density change at melting defined as $100 (\rho_\ell - \rho_s)/\rho_s$ is -9.5%. This is within experimental error of the experimental value of -9.6% given by Christensen.[1]

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* The data analysis on which this section is based was contributed by O. D. Slagle, Hanford Engineering and Development Laboratory, Richland, WA.

In the accompanying figure, the density functions as a function of temperature are compared with the high temperature density data for Christensen[1] for single crystal UO_2. The data agree with the functions to better than ±2% at all temperatures in the range of comparison.

Above 3420 K, we recommend using Eq. (2) for liquid UO_2. Comparisons have been made with the liquid densities of UO_2 calculated via the law of rectilinear diameters from the vapor density of Green[5] and from the vapor density derived from the IWGFR vapor pressure equation[6] using the relative composition given by Green.[5] In both cases, agreement between the extrapolation of Eq. (2) and the liquid densities calculated via the law of rectilinear diameters from the vapor densities was within 5% through 6000 K.

Care must be taken in applying Eq. (1) above the sintering temperature of the sample. Since further densification can occur above the sintering temperature, Eq. (1) will not give accurate results unless the extent of densification is taken into account by adjusting ρ_0. Radiography of molten UO_2 and ceramographic examinations of once molten UO_2 samples indicate that the use of the theoretical density for ρ_0 may not always be valid. Thus, one has the option of adjusting ρ_0 for porosity in Eq. (2) when experimental data so indicates.

Insufficient data currently exist to evaluate how density is affected by oxygen stoichiometry and fission product accumulations during irradiation.

The density is related to the experimental quantity fractional linear expansion by the following equations. The fractional change in density relative to the density ρ_0 at temperature T_0(T_0 = 298.15 K) is given by

$$\frac{\Delta\rho}{\rho_0} = \frac{\rho-\rho_0}{\rho_0} \qquad (3)$$

Density at temperature T_0 is

$$\rho_0 = \frac{m}{V_0} \tag{4}$$

where V_0 is the volume at T_0 and m is the sample mass. Thus, the density at temperature T is just

$$\rho = \frac{m}{V} \tag{5}$$

Since $V = V_0 + \Delta V$,

$$\rho = \frac{m}{V_0\left(1 + \frac{\Delta V}{V_0}\right)} \tag{6}$$

Substituting Eq. (6) in Eq. (3), the fractional change in density in terms of the fraction change in volume is

$$\frac{\Delta\rho}{\rho_0} = \frac{1 - \left(1 + \frac{\Delta V}{V_0}\right)}{\left(1 + \frac{\Delta V}{V_0}\right)} \tag{7}$$

The fractional change in volume is related to the fraction change in length by

$$\frac{\Delta V}{V_0} = \left(1 + \frac{\Delta L}{L_0}\right)^3 - 1 \tag{8}$$

Therefore,

$$1 + \frac{\Delta V}{V_0} = \left(1 + \frac{\Delta L}{L_0}\right)^3 \tag{9}$$

Substituting Eq. (9) in Eq. (7) gives the fractional change in density in terms of the fractional change in length.

$$\frac{\Delta\rho}{\rho_0} = \frac{1 - \left(1 + \frac{\Delta L}{L_0}\right)^3}{\left(1 + \frac{\Delta L}{L_0}\right)} \tag{10}$$

The fractional change in length relative to the length at T_0 (298.15 K) is based on experimental data. For solid UO_2 in the temperature range 298.15 to 3210 K, the data is fit by

$$\frac{\Delta L}{L_0} = -1.9305 \times 10^{-3} + 5.723 \times 10^{-6}\, T + 2.488 \times 10^{-9}\, T^2 + 1.140 \times 10^{-3}\, T^3 \tag{11}$$

For liquid UO_2 in the temperature range 3120 to 3420 K, the fractional change in length relative to the length of the solid at 298.15 K is

$$\frac{\Delta L}{L_0} = 7.87 \times 10^{-2} + 3.775 \times 10^{-5}\,(T - 3120) \tag{12}$$

This equation for the change of length of liquid UO_2 relative to the length of the solid takes into account the change in length of the solid from 298.15 K to the melting point 3120 K, a linear expansion of 0.0436, and the equivalent expansion at 3120 K due to melting which is 0.0351. Thus, the total fractional change in length from a solid at 298.15 K to a liquid at 3120 K is 0.0787. It is this factor that is multiplied by the mean thermal expansion coefficient, 3.5×10^{-5}, in the second term of Eq. (12) to give 3.775×10^{-5}. Values from Eqs. (11) and (12) were fit by O. D. Slagle[1] to obtain the recommended equations for density [Eqs. (1) and (2)].

The estimated errors are those associated with the thermal expansion data and not with the polynomial fit to the calculated densities. The R factor for both fits was greater than 0.9999999 (R = 1 is a perfect fit) indicating that any error in fitting the density values is insignificant compared to the experimental error. For solid UO_2, the recommended equation has an estimated uncertainty (1 σ) of ±1% to 2000 K and an uncertainty of ±2% from 2000 K to the melting point (3120 K). The estimated error (1 σ) for the equation for the density of molten UO_2 is ±9% from 3120 to 3420 K. From 3420 to 4000 K, the estimated error is ±13%; from 4000 to 6000 K, the estimated error is ±20%.

References

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5. D. W. Green, private communication (April 1980).

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Instantaneous Thermal Expansion Coefficient (Solid)

T, K	Linear $(\alpha_P)_\ell \times 10^6$, K^{-1}	Volumetric* $(\alpha_P) \times 10^5$, K^{-1}
298.15	7.24	2.171
300	7.25	2.174
400	7.76	2.329
500	8.28	2.485
600	8.81	2.643
700	9.34	2.803
800	9.88	2.964
900	10.42	3.127
1000	10.97	3.291
1100	11.52	3.457
1200	12.08	3.624
1300	12.64	3.793
1400	13.21	3.963
1500	13.78	4.135
1600	14.36	4.307
1700	14.94	4.482
1800	15.52	4.657
1900	16.11	4.833
2000	16.70	5.011
2100	17.30	5.190
2200	17.90	5.369
2300	18.50	5.550
2400	19.11	5.732
2500	19.71	5.914
2600	20.33	6.098
2700	20.94	6.282
2800	21.56	6.468
2900	22.18	6.654
3000	22.80	6.840
3100	23.43	7.028
3120	23.55	7.065

* The recommended values in this column are not always precisely 3 times the values given in the preceeding column due to round-off to the number of justified significant figures.

Instantaneous Thermal Expansion Coefficient (Liquid)

T, K	Linear $(\alpha_P)_\ell \times 10^5$, K^{-1}	Volumetric* $(\alpha_P) \times 10^5$, K^{-1}
3120	3.5	10.5
3200	3.5	10.5
3300	3.5	10.4
3400	3.5	10.4
3500	(3.5)†	(10.5)†
3600	(3.4)	(10.3)
3700	(3.4)	(10.3)
3800	(3.4)	(10.4)
3900	(3.4)	(10.2)
4000	(3.4)	(10.2)
4100	(3.4)	(10.2)
4200	(3.4)	(10.1)
4300	(3.4)	(10.1)
4400	(3.3)	(10.0)
4500	(3.3)	(10.0)
4600	(3.3)	(10.0)
4700	(3.3)	(9.9)
4800	(3.3)	(9.9)
4900	(3.3)	(9.9)
5000	(3.3)	(9.9)
5100	(3.3)	(9.8)
5200	(3.3)	(9.8)
5300	(3.3)	(9.8)
5400	(3.2)	(9.7)
5500	(3.2)	(9.7)
5600	(3.2)	(9.7)
5700	(3.2)	(9.6)
5800	(3.2)	(9.6)
5900	(3.2)	(9.6)
6000	(3.2)	(9.5)

* The recommended values in this column are not always precisely 3 times the values given in the preceding column due to round-off to the number of justified significant figures.

† Parentheses indicate extrapolation beyond range of experimental data.

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URANIUM DIOXIDE

α_P

Mean Thermal Expansion Coefficient (Solid)

T, K	Linear $(\bar{\alpha}_P)_\ell \times 10^6$, K^{-1}	Volumetric $(\bar{\alpha}_P) \times 10^5$, K^{-1}
298.15	7.24	2.171
300	7.24	2.173
400	7.50	2.252
500	7.76	2.333
600	8.03	2.415
700	8.30	2.497
800	8.57	2.581
900	8.84	2.665
1000	9.11	2.751
1100	9.39	2.837
1200	9.67	2.925
1300	9.95	3.014
1400	10.23	3.103
1500	10.51	3.194
1600	10.80	3.286
1700	11.09	3.380
1800	11.38	3.474
1900	11.68	3.569
2000	11.98	3.666
2100	12.27	3.764
2200	12.58	3.863
2300	12.88	3.964
2400	13.18	4.066
2500	13.49	4.169
2600	13.80	4.274
2700	14.12	4.380
2800	14.43	4.487
2900	14.75	4.596
3000	15.07	4.707
3100	15.39	4.818
3120	15.45	4.841

Mean Thermal Expansion Coefficient (Liquid)

T, K	Linear $(\bar{\alpha}_P)_\ell$ x 10^5, K^{-1}	Volumetric $(\bar{\alpha}_P)$ x 10^5, K^{-1}
3120	3.5	10.5
3200	3.5	10.5
3300	3.5	10.6
3400	(3.5)*	(10.6)*
3500	(3.5)	(10.6)
3600	(3.5)	(10.7)
3700	(3.5)	(10.7)
3800	(3.5)	(10.8)
3900	(3.5)	(10.8)
4000	(3.5)	(10.8)
4100	(3.5)	(10.9)
4200	(3.5)	(10.9)
4300	(3.5)	(10.9)
4400	(3.5)	(11.0)
4500	(3.5)	(11.0)
4600	(3.5)	(11.1)
4700	(3.5)	(11.1)
4800	(3.5)	(11.1)
4900	(3.5)	(11.2)
5000	(3.5)	(11.2)
5100	(3.5)	(11.2)
5200	(3.5)	(11.3)
5300	(3.5)	(11.3)
5400	(3.5)	(11.4)
5500	(3.5)	(11.4)
5600	(3.5)	(11.4)
5700	(3.5)	(11.5)
5800	(3.5)	(11.5)
5900	(3.5)	(11.6)
6000	(3.5)	(11.6)

* Parentheses indicate extrapolation beyond range of experimental data.

12/80 URANIUM DIOXIDE α_P

Fractional Thermal Expansion (Solid)

T, K	$\frac{L-L(298.15)}{L(298.15)} \times 10^2$	$\frac{V-V(298.15)}{V(298.15)} \times 10^2$
298.15	0.0	0.0
300	0.001	0.004
400	0.076	0.229
500	0.157	0.471
600	0.242	0.729
700	0.333	1.003
800	0.430	1.295
900	0.532	1.604
1000	0.639	1.931
1100	0.753	2.275
1200	0.872	2.638
1300	0.996	3.019
1400	1.127	3.420
1500	1.264	3.839
1600	1.406	4.278
1700	1.555	4.738
1800	1.710	5.217
1900	1.871	5.718
2000	2.038	6.239
2100	2.212	6.782
2200	2.392	7.348
2300	2.578	7.935
2400	2.771	8.546
2500	2.971	9.180
2600	3.177	9.838
2700	3.390	10.52
2800	3.610	11.23
2900	3.837	11.96
3000	4.071	12.72
3100	4.312	13.50
3120	4.361	13.66

Fractional Thermal Expansion (Liquid)

T, K	$\frac{L-L(298.15)}{L(298.15)} \times 10^2$	$\frac{V-V(298.15)}{V(298.15)} \times 10^2$
3120	7.87	25.52
3200	8.17	26.57
3300	8.54	27.90
3400	8.93	29.24
3500	(9.30)*	(30.59)*
3600	(9.68)	(31.95)
3700	(10.06)	(33.32)
3800	(10.44)	(34.69)
3900	(10.81)	(36.08)
4000	(11.19)	(37.47)
4100	(11.57)	(38.88)
4200	(11.95)	(40.29)
4300	(12.32)	(41.72)
4400	(12.72)	(43.15)
4500	(13.08)	(44.59)
4600	(13.46)	(46.05)
4700	(13.83)	(47.51)
4800	(14.21)	(48.98)
4900	(14.59)	(50.46)
5000	(14.97)	(51.96)
5100	(15.34)	(53.46)
5200	(15.72)	(54.97)
5300	(16.10)	(56.49)
5400	(16.48)	(58.02)
5500	(16.85)	(59.56)
5600	(17.23)	(61.12)
5700	(17.61)	(62.68)
5800	(17.99)	(64.25)
5900	(18.36)	(65.83)
6000	(18.74)	(67.42)

* Parentheses indicate extrapolation beyond range of experimental data.

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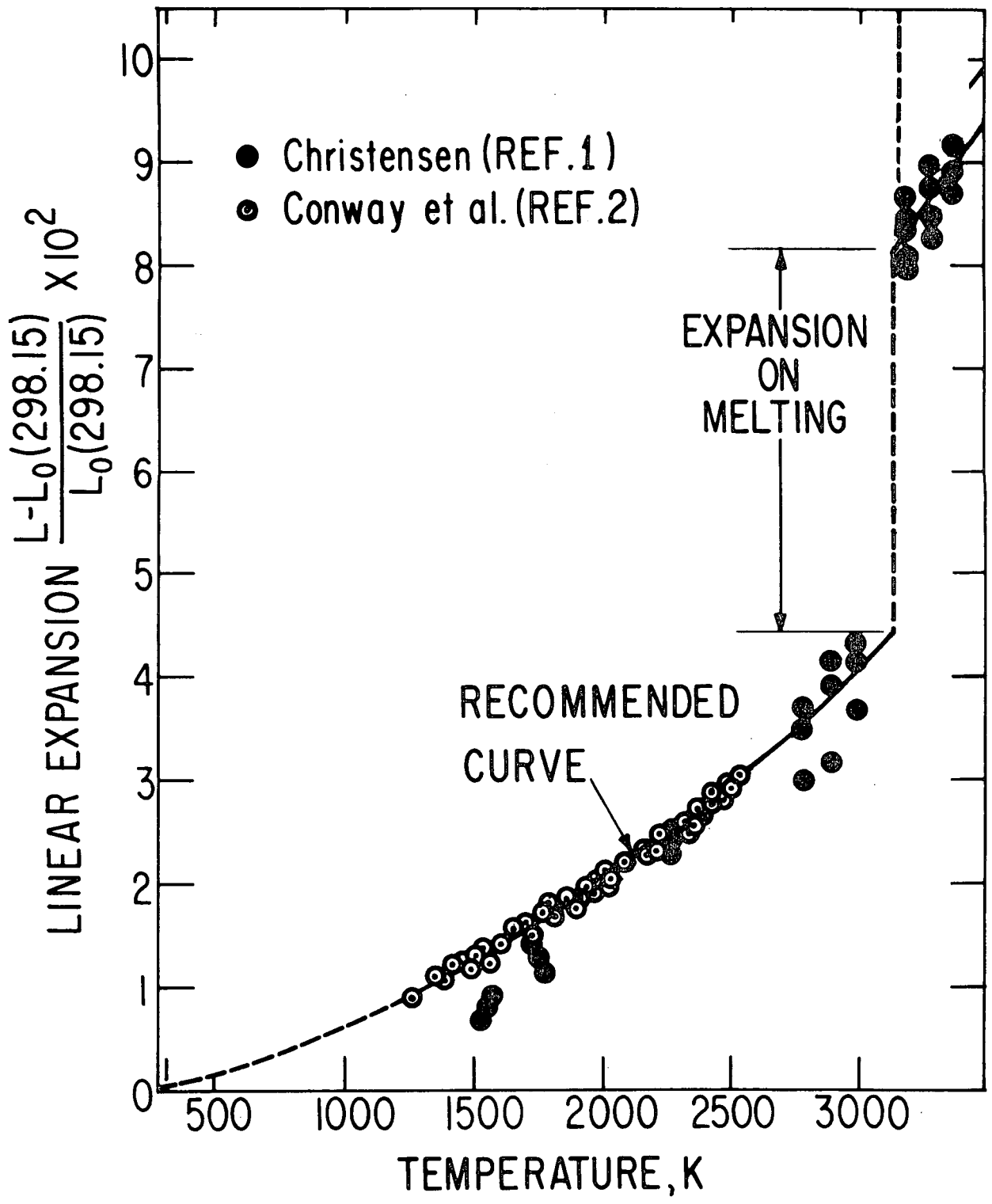
Fractional Thermal Expansion (Liquid)

T, K	$\frac{L-L(3120)}{L(3120)} \times 10^2$	$\frac{V-V(3120)}{V(3120)} \times 10^2$
3120	0.0	0.0
3200	0.28	0.84
3300	0.63	1.90
3400	0.98	2.97
3500	(1.33)*	(4.04)*
3600	(1.68)	(5.13)
3700	(2.03)	(6.21)
3800	(2.38)	(7.31)
3900	(2.73)	(8.42)
4000	(3.08)	(9.53)
4100	(3.43)	(10.65)
4200	(3.78)	(11.77)
4300	(4.13)	(12.91)
4400	(4.48)	(14.05)
4500	(4.83)	(15.20)
4600	(5.18)	(16.36)
4700	(5.53)	(17.52)
4800	(5.88)	(18.70)
4900	(6.23)	(19.88)
5000	(6.58)	(21.07)
5100	(6.93)	(22.26)
5200	(7.28)	(23.47)
5300	(7.63)	(24.68)
5400	(7.98)	(25.90)
5500	(8.33)	(27.13)
5600	(8.68)	(28.37)
5700	(9.03)	(29.61)
5800	(9.38)	(30.86)
5900	(9.73)	(32.12)
6000	(10.08)	(33.39)

* Parentheses indicate extrapolation beyond range of experimental data.



A comparison of the recommended function for the thermal expansion of UO_2 with experimental data.

URANIUM DIOXIDE

α_P

Volumetric Instantaneous Thermal Expansion Coefficient

T,K	α_P, K^{-1}	Error in σ, %
298 - 2000 (solid) 2000 - 3120 (solid)	$\dfrac{1.7169 \times 10^{-5} + 1.4928 \times 10^{8}\ T + 1.0260 \times 10^{-12}\ T^2}{0.9980695 + 5.723 \times 10^{-6}\ T + 2.488 \times 10^{-9}\ T^2 + 1.140 \times 10^{-13}\ T^3}$	1 2
3120 - 3400 (liquid) 3400 - 4000 (liquid) 4000 - 6000 (liquid)	$\dfrac{1.05 \times 10^{-4}}{1 + 3.5 \times 10^{-5}\ (T - 3120)}$	9 13 20

12/80 URANIUM DIOXIDE α_P

Thermal Expansion Coefficient*

Thermal expansion measurements have been made in the temperature range 1470 to 3420 K by Christensen[1] and in the range 1300 to 2500 K by Conway et al.[2] Recent measurements of the thermal expansion of liquid UO_2 by Drotning[3] agree reasonably well with the results of Christensen. Drotning's preliminary results for the density at the melting point are 4% higher than the value reported by Christensen and his coefficient of volumetric thermal expansion for molten UO_2 is 10% larger than Christensen's. The recommended equations for thermal expansion of UO_2 derived by O. D. Slagle[4] are based on the analysis of solid UO_2 by Olsen[5] and on the experimental results of Christensen[1] for liquid UO_2.

For solid UO_2, the recommended equation which is derived from experimental data is for fractional change in length ($\Delta L/L_0$) and is

$$\frac{\Delta L}{L_0} = -1.9305 \times 10^{-3} + 5.723 \times 10^{-6}\, T + 2.488 \times 10^{-9}\, T^2 + 1.140 \times 10^{-13}\, T^3 \qquad (1)$$

where L_0 is the length of the sample at 298.15 K, L is the length at T (in kelvins), and $\Delta L = L - L_0$. Equation (1) differs from that given by Olsen,[4] in that Slagle has normalized the Olsen expression to give $\frac{\Delta L}{L_0} = 0$ at 298.15 K. The mean linear thermal expansion coefficient is defined as

$$(\bar{\alpha}_P)_{\ell} = \frac{1}{L_0}\left(\frac{L-L_0}{T-T_0}\right). \qquad (2)$$

---

* The data analysis on which this section is based was contributed by O. D. Slagle, Hanford Engineering & Development Laboratory, Richland, WA.

As a function of (T - 298.15), the mean linear thermal expansion coefficient for solid UO_2 in units 1/K is

$$(\bar{\alpha}_P)_\ell = 7.237 \times 10^{-6} + 2.590 \times 10^{-9} (T - 298.15) + 1.140 \times 10^{-13} (T - 298.15)^2. \quad (3)$$

From Eq. (2), it is clear that Eq. (1) is simply given by

$$\frac{\Delta L}{L_0} = (\bar{\alpha}_P)_\ell (T - 298.15). \quad (4)$$

The instantaneous linear thermal expansion coefficient is defined as

$$(\alpha_P)_\ell = \frac{1}{L} \left(\frac{\partial L}{\partial T}\right)_P. \quad (5)$$

The instantaneous linear thermal expansion coefficient is related to the mean linear thermal expansion coefficient $(\bar{\alpha}_P)_\ell$ by

$$(\alpha_P)_\ell = \frac{\frac{d(\bar{\alpha}_P)_\ell}{dT} (T - T_0) + (\bar{\alpha}_P)_\ell}{1 + (\bar{\alpha}_P)_\ell (T - T_0)} \quad (6)$$

where $(\alpha_P)_\ell$ is in 1/K.

In terms of the fractional change in length given in Eq. (1), the instantaneous linear thermal expansion coefficient is

$$(\alpha_P)_\ell = \frac{\frac{d}{dT}\left(\frac{\Delta L}{L_0}\right)}{\left(1 + \frac{\Delta L}{L_0}\right)} \quad (7)$$

which expressed in terms of temperature is

$$(\alpha_P)_\ell = \frac{5.723 \times 10^{-6} + 4.976 \times 10^{-9} T + 3.420 \times 10^{-13} T^2}{0.9980695 + 5.723 \times 10^{-6} T + 2.487 \times 10^{-9} T^2 + 1.140 \times 10^{-13} T^3} \quad (8)$$

12/80 URANIUM DIOXIDE α_P

The volumetric thermal expansion coefficients are related to the linear ones through the relation of the linear and volumetric fractional change with temperature. The volumetric fractional change with temperature from volume V_0 at temperature T_0 to volume V at temperature T is given by

$$\frac{\Delta V}{V_0} = \frac{V - V0}{V_0} = \frac{(L_0 + \Delta L)^3 - {L_0}^3}{{L_0}^3} \tag{9}$$

and

$$\frac{\Delta V}{V_0} = \left(1 + \frac{\Delta L}{L_0}\right)^3 - 1 \tag{10}$$

$$= 3\left(\frac{\Delta L}{L_0}\right) + 3\left(\frac{\Delta L}{L_0}\right)^2 + \left(\frac{\Delta L}{L_0}\right)^3 . \tag{11}$$

Using Eq. (1) for $\Delta L/L_0$ in Eq. (9), the fractional change in volume with temperature is

$$\frac{\Delta V}{V_0} = (0.9980695 + 5.723 \times 10^{-6}\ T + 2.488 \times 10^{-9}\ T^2 + 1.140 \times 10^{-13}\ T^3)^3 - 1 \tag{12}$$

where V_0 is the volume at 298.15 K.

The mean volumetric thermal expansion coefficient is defined as

$$\alpha_P = \frac{1}{V_0}\left(\frac{V - V_0}{T - T_0}\right) \tag{13}$$

In terms of the linear fractional change, the mean volumetric thermal expansion coefficient is

$$\bar{\alpha}_P = \frac{1}{T - T_0} \left[\left(1 + \frac{\Delta L}{L_0} \right)^3 - 1 \right] \tag{14}$$

which may be written as

$$\bar{\alpha}_P = \frac{1}{T-T_0} \left[3 \left(\frac{\Delta L}{L_0} \right) + 3 \left(\frac{\Delta L}{L_0} \right)^2 + \left(\frac{\Delta L}{L_0} \right)^3 \right]. \tag{15}$$

The mean volumetric thermal expansion coefficient is related to the mean linear thermal expansion coefficient by the equation

$$\bar{\alpha}_P = 3 \, (\bar{\alpha}_P)_\ell + 3 \, (T - T_0) \, (\bar{\alpha}_P)_\ell^{\,2} + (T - T_0)^2 \, (\bar{\alpha}_P)_\ell^{\,3}. \tag{16}$$

The instantaneous volumetric thermal expansion coefficient defined as

$$\alpha_P = \frac{1}{V} \left(\frac{\partial V}{\partial T} \right)_P \tag{17}$$

is the thermal expansion coefficient most commonly used in thermodynamic relations. It is related to the mean volumetric thermal expansion coefficient by the equation

$$\alpha_P = \frac{\frac{d \, \bar{\alpha}_P}{dT} (T - T_0) + \bar{\alpha}_P}{1 + \bar{\alpha}_P \, (T - T_0)} \tag{18}$$

Using Eq. (14) in Eq. (18), the instantaneous volumetric thermal expansion coefficient may be expressed in terms of linear fractional change $\Delta L/L_0$

$$\alpha_P = \frac{3 \, \frac{d}{dT} \left(\frac{\Delta L}{L_0} \right)}{\left(1 + \frac{\Delta L}{L_0} \right)} \tag{19}$$

which is three times the instantaneous linear thermal expansion coefficient,

$$\alpha_P = 3\ (\alpha_P)_\ell . \tag{20}$$

Using Eq. (8) in Eq. (20), the instantaneous volumetric thermal expansion coefficient of solid UO_2 expressed as a function of temperature is

$$\alpha_P = \frac{1.7169 \times 10^{-5} + 1.4928 \times 10^{-8}\ T + 1.0260 \times 10^{-12}\ T^2}{0.9980695 + 5.723 \times 10^{-6}\ T + 2.488 \times 10^{-9}\ T^2 + 1.140 \times 10^{-13}\ T^3} \tag{21}$$

From his analysis of Christensen's[1] experimental data on the thermal expansion of liquid UO_2, O. D. Slagle[4] recommends using 3.5×10^{-5} K for the linear thermal expansion coefficient for liquid UO_2. He expresses the fractional change in length relative to L_0, the length of the solid at 298.15 K as

$$\frac{\Delta L}{L_0} = 7.87 \times 10^{-2} + 3.775 \times 10^{-5}\ (T - 3120). \tag{22}$$

The constant term, 7.87×10^{-2}, comes from the expansion of the solid from 298.15 K to the melting point 3120 K plus the fractional change on melting. The factor 3.775×10^{-5} is the thermal expansion coefficient 3.5×10^{-5} times 1.0787, the length of the molten sample at 3120 K. The fractional change of the liquid UO_2 relative to the length of molten liquid UO_2 at 3120 K is

$$\frac{\Delta L}{L_m} = 3.5 \times 10^{-5}\ (T - 3120) \tag{23}$$

where L_m is the length of the liquid at the melting point, 3120 K.

Equation (22) is for a theoretically dense sample. If the material is not theoretically dense, upon melting there will be a densification due to the change in porosity. This effect may be accounted for in the fractional linear expansion relative to the solid at 298.15 K by the addition of the term:

$$\left(\frac{\Delta L}{L_0}\right)_X = -(1 - X^{1/3}) \tag{24}$$

where X is the ratio of the sample density to the theoretical density.

The mean linear thermal expansion coefficient for liquid UO_2 is

$$(\alpha_P)_\ell = 3.5 \times 10^{-5}\ K^{-1}. \tag{25}$$

The instantaneous linear thermal expansion coefficient defined as:

$$(\alpha_P)_\ell = \frac{1}{L}\left(\frac{\partial L}{\partial T}\right)_P \tag{26}$$

in terms of the mean linear thermal expansion coefficient is:

$$(\alpha_P)_\ell = \frac{3.5 \times 10^{-5}}{1 + 3.5 \times 10^{-5}\ (T - 3120)} \tag{27}$$

for liquid UO_2.

The fractional change in volume of liquid UO_2 relative to the volume of solid UO_2 at 298.15 K,

$$\frac{\Delta V}{V_0} = \frac{V - V_0}{V_0} \tag{28}$$

is given by

$$\frac{\Delta V}{V_0} = [1.0787 + 3.775 \times 10^{-5}\ (T - 3120)]^3 - 1. \tag{29}$$

Equations (10) and (22) were used to obtain the above equation. The fractional change in volume of liquid UO_2 relative to the volume of liquid UO_2 at the melting point, V_m,

$$\frac{\Delta V}{V_m} = \frac{V - V_m}{V_m} \tag{30}$$

is given by

$$\frac{\Delta V}{V_m} = [1 + 3.5 \times 10^{-5} (T - 3120)]^3 - 1 \tag{31}$$

The mean volumetric thermal expansion coefficient of liquid UO_2 is defined as

$$\bar{\alpha}_P = \frac{1}{V_m}\left(\frac{V - V_m}{T - T_m}\right) \tag{32}$$

where V = volume of the liquid at temperature T,

V_m = volume of the liquid at temperature T_m, and

T_m = melting point of UO_2, 3120 K.

Equation (16) relates the mean volumetric thermal expansion coefficient to the mean linear thermal expansion coefficient. Using Eq. (16) with $T_O = T_m$ and Eq. (32), the mean volumetric thermal expansion coefficient of liquid UO_2 is

$$\bar{\alpha}_P = 1.05 \times 10^{-4} + 3.675 \times 10^{-9} (T - 3120) + 4.2875 \times 10^{-4} (T - 3120)^2. \tag{33}$$

The instantaneous volumetric thermal expansion coefficient, defined as

$$\alpha_P = \frac{1}{V}\left(\frac{\partial V}{\partial T}\right)_P \tag{34}$$

has been shown, Eq. (20) to be equal to three times the instantaneous linear thermal expansion coefficient. Thus, using Eqs. (20) and (27), the instantaneous volumetric thermal expansion coefficient of liquid UO_2 is

$$\alpha_P = \frac{1.05 \times 10^{-4}}{1 + 3.5 \times 10^{-5} (T - 3120)} \tag{35}$$

Equations (22) through (35) are for liquid UO_2 in the temperature range 3120 to 3420 K. Above 3420 K, no experimental data exist. As an estimate, the recommended functions for the liquid range 3120 to 3420 K may be used but since this function is based only on a 300 K temperature range, large errors may be introduced.

In the above discussion, expressions are given for the linear fractional change with temperature, volumetric fractional change with temperature, and the linear and volumetric mean and instantaneous thermal expansion coefficients. Note that the frequently used factor of three to relate volumetric and linear thermal expansion coefficients or fractional changes holds only for instantaneous thermal expansion coefficients. In general, the relation for mean thermal expansion coefficients is more complicated and the factor of three is just the first term of a series. While the instantaneous volumetric thermal expansion coefficient is the significant thermodynamic quantity, it is usually the mean thermal expansion coefficient (either linear or volumetric) that is measured experimentally. The instantaneous thermal expansion coefficient is a differential quantity. It is related to the mean thermal expansion coefficient by

$$\alpha = \frac{\frac{d\overline{\alpha}}{dT}\left(T - T_0\right) + \overline{\alpha}}{1 + \overline{\alpha}\,(T - T_0)} \qquad (36)$$

where α = instantaneous thermal expansion coefficient

and $\overline{\alpha}$ = mean thermal expansion coefficient.

The following figure also illustrates their relation.

No data exist on the effects of O/M and irradiation on the thermal expansion coefficients of solid or liquid UO_2.

The thermal expansion data of Conway et al.[2] vary about the fit by ±2% (2 σ). Christensen's data[1] have a reported uncertainty (2 σ) of ±13% for the solid and ±18% for the liquid up to 3420 K. The good agreement between the data of Conway et al. and that of Christensen in the solid region seems to indicate that Christensen's data in this region are better than he estimates. The estimated error (1 σ) is ±1% for the solid below 2000 K and ±2% from 2000 K to the melting point (3120 K). For liquid UO_2 in the temperature range 3120 to 3400 K, the estimated uncertainty (1 σ) is ±9%. Above 3400 K, we estimate the uncertainty to be ±13% to 4000 K and ±20% above 4000 K. These values are consistent with the estimated uncertainties in the density in these temperature ranges.

(12/80) URANIUM DIOXIDE α_p

Note Added In Proof

The values of α_p for liquid UO_2 calculated from the definition

$$\alpha_p = -\frac{1}{\rho}\left(\frac{\partial \rho}{\partial T}\right)_p$$

where ρ is replaced by the liquid density given by

$$\rho = \rho_o\,[1{,}0522 - 8.192 \times 10^{-5}\ T]$$

where $\rho_o = 10970\ kg/m^3$

are not the same as the values calculated from

$$\alpha_p = \frac{1}{V}\left(\frac{\partial V}{\partial T}\right)_p$$

where $V = L^3$ and

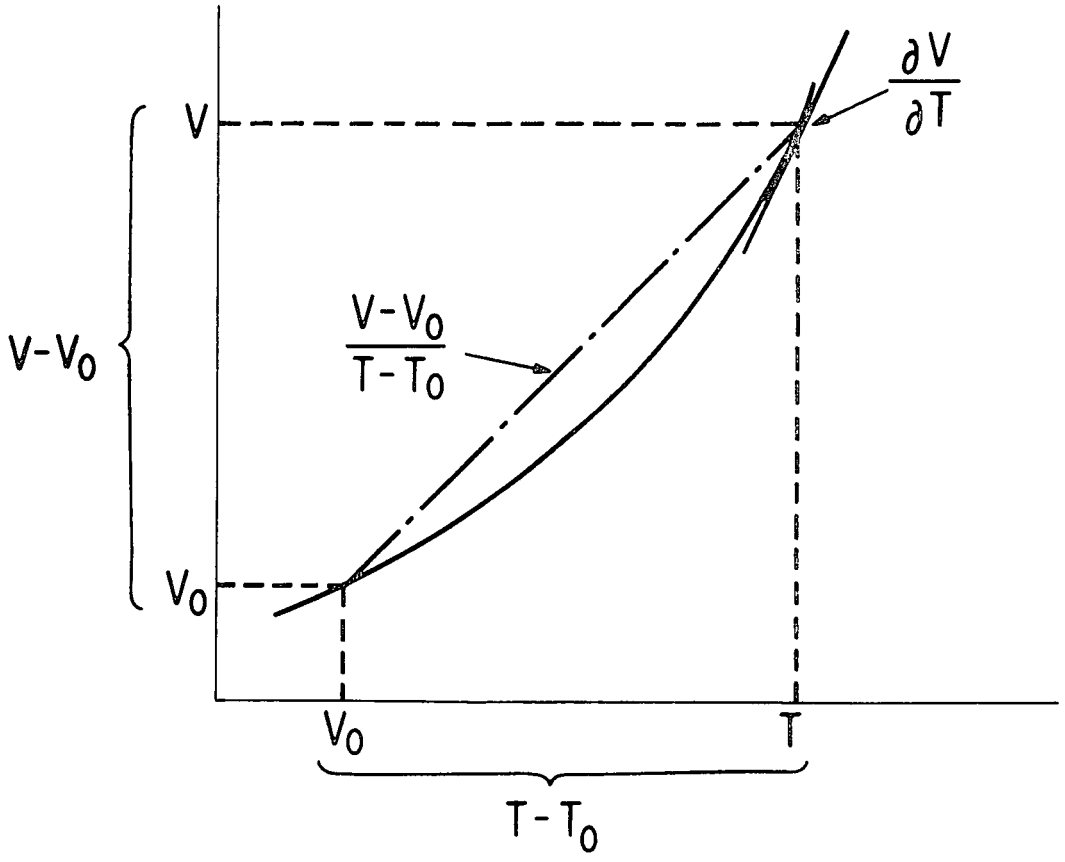
$$\frac{\Delta L}{L_m} = (\bar{\alpha}_p)_\ell\ (T - T_m) = 3.5 \times 10^{-5}\ (T - T_m).$$

The source of the difference is from the linearization of the density, i.e.,

$$\rho = \frac{\rho_m}{[1 + (\bar{\alpha}_p)_\ell\ (T - T_m)]^3} \approx \rho_m\,[1 - 3(\bar{\alpha}_p)_\ell\ (T - T_m)]$$

$$= \rho_o\,[1{,}0522 - 8{,}192 \times 10^{-5}\ T]$$

This approximation is only valid for $(\bar{\alpha}_p)_\ell\ (T - T_m) \ll 1$. At large T (around 6000 K), $(\bar{\alpha}_p)_\ell\ (T - T_m)$ is of order 0.1 and the approximation is not valid.



$$\alpha_P = \frac{1}{V}\left(\frac{\partial V}{\partial T}\right)_P$$

$$\overline{\alpha_P} = \frac{1}{V_0}\left(\frac{V-V_0}{T-T_0}\right)$$

Relationship of instantaneous volumetric thermal expansion coefficient, α_P, and mean volumetric thermal expansion coefficient, $\overline{\alpha}_P$.

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1. J. A. Christensen, J. Am. Ceram. Soc., 40, 607 (1963).

2. J. B. Conway, R. M. Fencil, and R. A. Hein, Trans. Am. Nucl. Soc., 6, 153 (1963).

3. W. D. Drotning, private communication.

4. O. D. Slagle, private communication (December 1980).

5. C. S. Olsen "Fuel Thermal Expansion (FTHEXP)" in MATPRO - Version 11: A Handbook of Materials Properties for Use in the Analysis of Light Water Reactor Fuel Rod Behavior, edited by Donald L. Hagrman and Gregory A. Reymann, NUREG/CR-0497, TREE-1280 (February 1979).

12/80 URANIUM DIOXIDE β_S

Adiabatic Compressibility

T, K	$\beta_S \times 10^6$, MPa^{-1}	$\beta_S \times 10^7$, atm^{-1}
3120 (ℓ)	33.07	33.51
3200	(35.07)*	(35.53)*
3300	(37.80)	(38.30)
3400	(40.84)	(41.38)
3500	(43.87)	(44.45)
3600	(47.06)	(47.68)
3700	(50.41)	(51.08)
3800	(53.94)	(54.66)
3900	(57.66)	(58.43)
4000	(61.59)	(62.41)
4100	(65.75)	(66.62)
4200	(70.16)	(71.09)
4300	(74.84)	(75.83)
4400	(79.81)	(80.87)
4500	(85.11)	(86.24)
4600	(90.76)	(91.97)
4700	(96.81)	(98.10)
4800	(103.3)	(104.7)
4900	(110.3)	(111.7)
5000	(117.8)	(119.4)
5100	(125.9)	(127.6)
5200	(134.8)	(136.6)
5300	(144.4)	(146.3)
5400	(154.9)	(156.9)
5500	(166.4)	(168.6)
5600	(179.1)	(181.4)
5700	(193.1)	(195.7)
5800	(208.8)	(211.5)
5900	(226.3)	(229.3)
6000	(246.1)	(249.3)

* Parentheses indicate extrapolation beyond the range of experimental data.

12/80 URANIUM DIOXIDE β_S

Adiabatic Compressibility

T, K	$\beta_S \times 10^6$, MPa^{-1}	$\beta_S \times 10^7$, atm^{-1}
298.15	4.899	4.964
300	4.900	4.965
400	4.956	5.022
500	5.014	5.178
600	5.072	5.140
700	5.133	5.201
800	5.194	5.263
900	5.258	5.327
1000	5.322	5.393
1100	5.389	5.460
1200	5.457	5.529
1300	5.527	5.600
1400	5.598	5.673
1500	5.672	5.747
1600	5.748	5.824

12/80 URANIUM DIOXIDE β_T

Isothermal Compressibility

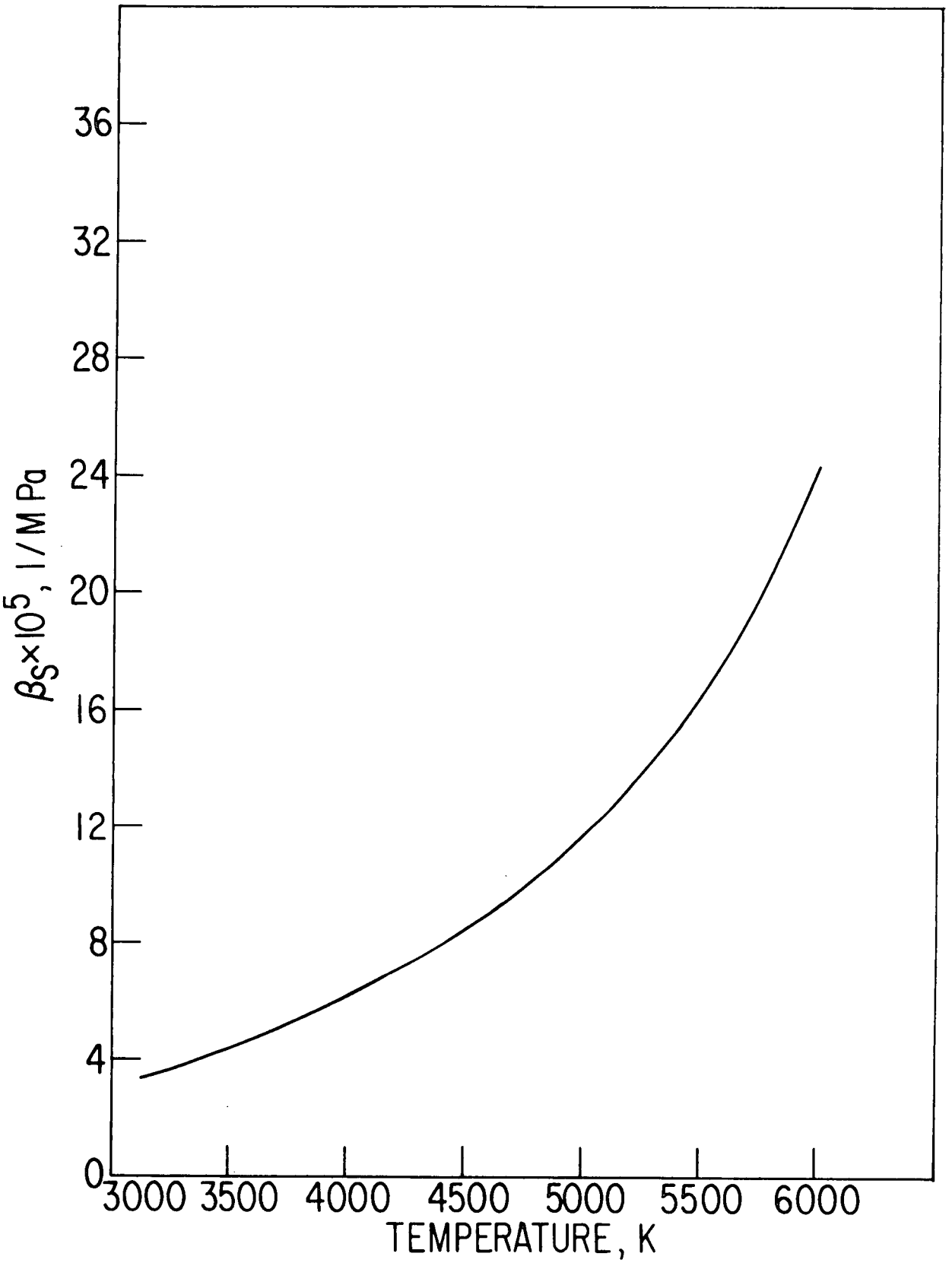
T, K	$\beta_T \times 10^6$, MPa^{-1}	$\beta_T \times 10^7$, atm^{-1}
298.15	4.953	5.019
300	4.954	5.020
400	5.031	5.098
500	5.115	5.182
600	5.205	5.274
700	5.303	5.374
800	5.409	5.480
900	5.523	5.596
1000	5.645	5.720
1100	5.777	5.854
1200	5.918	5.997
1300	6.070	6.151
1400	6.233	6.316
1500	6.407	6.492
1600	5.748	6.678

12/80 URANIUM DIOXIDE β_T

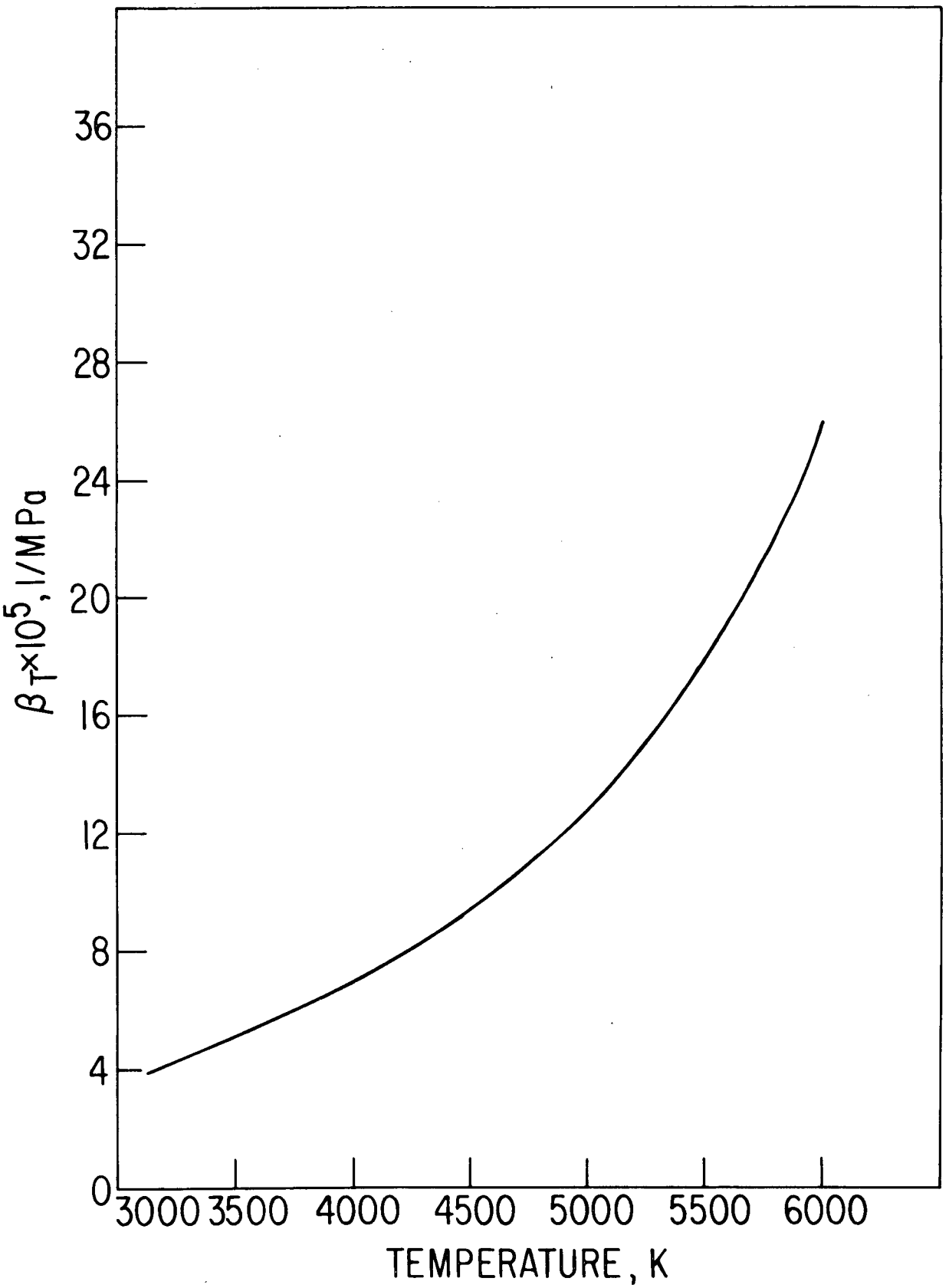
Isothermal Compressibility

T, K	$\beta_T \times 10^6$, MPa^{-1}	$\beta_T \times 10^7$, atm^{-1}
3120 (ℓ)	41.19	41.74
3200	(43.41)*	(43.99)*
3300	(46.44)	(47.05)
3400	(49.77)	(50.43)
3500	(53.10)	(53.80)
3600	(56.59)	(57.34)
3700	(60.24)	(61.04)
3800	(64.08)	(64.93)
3900	(68.12)	(69.02)
4000	(72.36)	(73.32)
4100	(76.84)	(77.86)
4200	(81.57)	(82.65)
4300	(86.58)	(87.72)
4400	(91.88)	(93.10)
4500	(97.52)	(98.81)
4600	(103.5)	(104.9)
4700	(109.9)	(111.4)
4800	(116.8)	(118.3)
4900	(124.1)	(125.8)
5000	(132.0)	(133.8)
5100	(140.5)	(142.4)
5200	(149.7)	(151.7)
5300	(159.7)	(161.8)
5400	(170.6)	(172.9)
5500	(182.5)	(184.9)
5600	(195.6)	(198.2)
5700	(210.1)	(212.9)
5800	(226.2)	(229.2)
5900	(244.2)	(247.4)
6000	(264.4)	(267.9)

* Parentheses indicate that the parameters used in the calculation of β_T have been extrapolated beyong the range of experimental data.



The adiabatic compressibility of liquid UO_2.



The isothermal compressibility of liquid UO_2.

Adiabatic Compressibility

Temperature Range T,K	β_S, Pa^{-1}	Error σ,%
298-1600 (solid)	$\dfrac{1.104}{2.26 \times 10^{11}\ [1-1.131 \times 10^{-4}\ (T-273.15)][1-2.62(1-D)]}$	2
3120-3400	$[10970\ (1.0522 - 8.192 \times 10^{-5}\ T)\ (3660 - 0.5769\ T)^2]^{-1}$	8
3400-4000	(Grosse approximation)	10
4000-5000		35
5000-6000		75

Isothermal Compressibility

Temperature Range T,K	β_T, Pa^{-1}	Error σ,%
298-1600 (solid)	$\beta_S + \frac{\alpha_P^2 VT}{C_P}$	3
3120-3400		15
3400-4000		20
4000-5000		50
5000-6000		85

Adiabatic Compressibility

The adiabatic compressibility has been calculated from data on Young's modulus and Poisson's ratio using the expression:

$$\beta_S = \frac{3(1-2\sigma)}{E} \quad (1)$$

where σ = Poisson's ratio and E = Young's modulus of elasticity.

The equation used to calculate Young's modulus and the value used for Poisson's ratio have been taken from MATPRO-VERSION 11: A Handbook of Material Properties for Use in the Analysis of Light Water Reactor Fuel Rod Behavior.[1] In the temperature range $0 < T < 1600$ K, Young's modulus is calculated from the relation:

$$E = 2.26 \times 10^{11} [1 - 1.131 \times 10^{-4} (T - 273.15)][1 - 2.62 (1 - D)] \quad (2)$$

where E = Young's modulus in pascals,

T = temperature in K,

and D = fraction of theoretical density.

This equation is based on a least-squares fit to the data for stoichiometric UO_2 at room temperature of Marlowe and Kaznoff,[2] Belle and Lustman,[3] Lambertson and Handwerk,[4] and Roberts and Ueda,[5] and to temperature dependent data of Padel and Novion,[6] Wachtman et al.,[7] and Belle and Lustman.[3] The UO_2 data have a standard deviation with respect to Eq. (2) of 0.037×10^{11}. At high temperatures, sliding occurs at grain boundaries in UO_2 and in other ceramics. In other ceramics with this phenomena, the elastic modulus exhibits abrupt changes with temperature when sliding occurs. Because abrupt changes with temperature are also

expected for UO_2, and since there is a scarcity of data as a function of temperature and porosity above 1600 K, no equation for Young's modulus above 1600 K is available and Eq. (2) should not be extrapolated above 1600 K.

The value recommended in MATPRO-VERSION 11 for Poisson's ratio is 0.316.[1] This value is based on measurements of Young's modulus and the shear modulus on single crystal UO_2 at 25°C by Wachtman et al..[7] From directional measurements on single crystal UO_2, Wachtman et al.[7] calculate the Reuss and Voigt averages of Young's modulus and the shear modulus. The values for nonporous polycrystalline UO_2 are assumed to lie between these averages. These midvalues for Young's modulus and the shear modulus are used to determine the recommended value for Poisson's ratio.

No direct measurement of the compressibility of molten UO_2 has been reported. The speed of sound in molten UO_2 was measured by Slagle and Nelson[8] at 4 points between 3138 and 3196 K. These data can be represented by the equation:

$$v = 3660 - 0.5769\ T \qquad (3)$$

where v is in m/s and T is in kelvins. Equation (3) differs from the original Slagle-Nelsen equation[8] which had a square root of T dependence. It was felt that 4 points were insufficient data to justify assuming the square root of T dependence particularly since it is not evident in the speed of sound of other materals. The adiabatic compresssibility of molten UO_2, β_S, can be calculated using the relation:

$$\beta_S = \frac{1}{\rho v^2} \qquad (4)$$

where ρ is the density of molten UO_2 and v is the speed of sound. The density data of Christensen[9] can be used in conjunction with the Slagle and Nelson values to obtain the adiabatic compressibility in the range of their experimentation. The recommended equation for density[10] is

$$\rho = 10970\ (1.0522 - 8.192 \times 10^{-5}\ T) \tag{5}$$

where ρ is in kg/m^3 and T is in kelvins.

Extrapolation of the speed of sound data to temperatures above 3200 K is not reliable enough to permit their use in calculation of adiabatic compressibility much beyond that temperature. One finds, however, that simple extrapolation using Eqs. (1-3) for temperatures up to 6000 K yields results similar to those obtained by using the Grosse method[11] of fitting the reduced compressibility to reduced temperature via an equilateral hyperbola; however, the reliability of values obtained from either method is questionable at this time.

In order to provide a rough estimate of compressibility values above 3400 K, the Grosse equilateral hyperbola method[11] has been used. A two parameter equation due to Grosse was used.

$$(\beta' + b)\ (\theta + b) = a \tag{6}$$

where β' is the reduced adiabatic compressibility

$$\beta' = \frac{\beta_{S,m}}{\beta_{S,T}} \tag{7}$$

$$\beta_{S,m} = 3.3 \times 10^{-11}\ \ Pa^{-1} \tag{8}$$

and θ is the fractional liquid temperature between the melting point (3120 K) and the critical point (estimated as 7560 K):[12]

$$\theta = (T-T_m)/(T_c-T_m) \tag{9}$$

By plotting experimental data from 3120 to 3400 K, the parameters a and b were determined as

$$a = 0.5633$$

$$b = 0.4018$$

Solving for $\beta_{S,T}$

$$\beta_{S,T} = \beta_{S,m} / \left(\frac{a}{\theta + b} - b\right) \tag{10}$$

This extrapolation above 3400 K is clearly conjectural due to the uncertainty in the value of the critical point and the limited data ($\sim$58 K temperature range) on which it is based. The estimated values[13] for the critical point range from a low value of 6250 K to a high value of 9332 K. The chosen value 7560 K of Fischer et al.[12] is a reasonable mid-value and is also close to other estimates. Comparisons were made of values of β_S calculated via extrapolation of Eqs. (3-5) and of values of β_S calculated with the Grosse method for critical temperatures 6250 K, 9332 K, and 7560 K. Below 5500 K, differences in the values calculated by the Grosse method using different critical temperatures were small compared to the difference between the values calculated using the Grosse method and those calculated with the extrapolated equations. From 5500 K through 6000 K, the differences due to method and choice of critical temperature were of similar magnitude. The estimated errors are based on the largest differences.

The estimated error (1σ) in the recommended values of adiabatic compressibility of solid UO_2 below 1600 K is 2%. This is based on the standard deviation in Young's modulus and the estimated error in the value of Poisson's ratio. Between 3120 and 3400 K where Eqs. (3-5) are used, the estimated error (1σ) is 8% based on the errors in the speed of sound equation and the density equation. In the temperature range 3400 through 4000 K, the estimated error (1σ) is 10%. Between 4000 and 5000 K, the error is estimated as 35%. Above 5000 K, the error is estimated as 75%.

Isothermal Compressibility

The isothermal compressibility of solid and liquid UO_2, β_T was calculated using the relation

$$\beta_T = \beta_S + \frac{\alpha_P^2 VT}{C_P} \tag{11}$$

where β_S is the adiabatic compressibility α_P is the volumetric expansion coefficient of UO_2, V is the molar volume, and C_P is the heat capacity. α_P and ρ are available from Christensen's work[9] and C_P from the fits of Fink and Leibowitz[14] and of Rand et al.[15] The volumetric expansion coefficient for solid UO_2 is given by:[9,10]

$$\alpha_P = \frac{1.7169 \times 10^{-5} + 1.4928 \times 10^{-8}\ T + 1.0260 \times 10^{-12}\ T^2}{0.9980695 + 5.723 \times 10^{-6}\ T + 2.488 \times 10^{-9}\ T^2 + 1.140 \times 10^{-13}\ T^3} \tag{12}$$

where α_P is in 1/K and T is in kelvins. The volumetric expansion coefficient for molten UO_2 is[9,10]

$$\alpha_P = \frac{1.05 \times 10^{-4}}{1 + 3.5 \times 10^{-5}\ (T - 3120)} \tag{13}$$

The density for UO_2 in kg/m^3 is given by the equations:[9,10]

$298 \leq T \leq 3120$ K

$$\rho = 10970\ (1.0056 - 1.6324 \times 10^{-5}\ T - 8.3281 \times 10^{-9}\ T^2 + 2.0176 \times 10^{-13}\ T^3) \tag{14}$$

$T \geq 3120$

$$\rho = 10970\ (1.0522 - 8.192 \times 10^{-5}\ T) \tag{15}$$

The heat capacity at constant pressure is 167 J/(mol•K) for solid UO_2 and is 131 J/(mol•K) throughout the liquid range. The reliable range for β_T is the same as β_S.

The estimated error (1σ) in the calculated values for the isothermal compressibility have been calculated from the error or estimated error in the dependent parameters C_P, β_S, α_P, and ρ. Below 1600 K, the calculated standard deviation is 3%. From 3120 through 3400 K, the standard deviation is 15%. Between 3400 and 4000 K, it increased to 20%. From estimated errors, the standard deviation has been calculated to be about 50% in the 4000 to 5000 K temperature range and 85% in the 5000 to 6000 K range.

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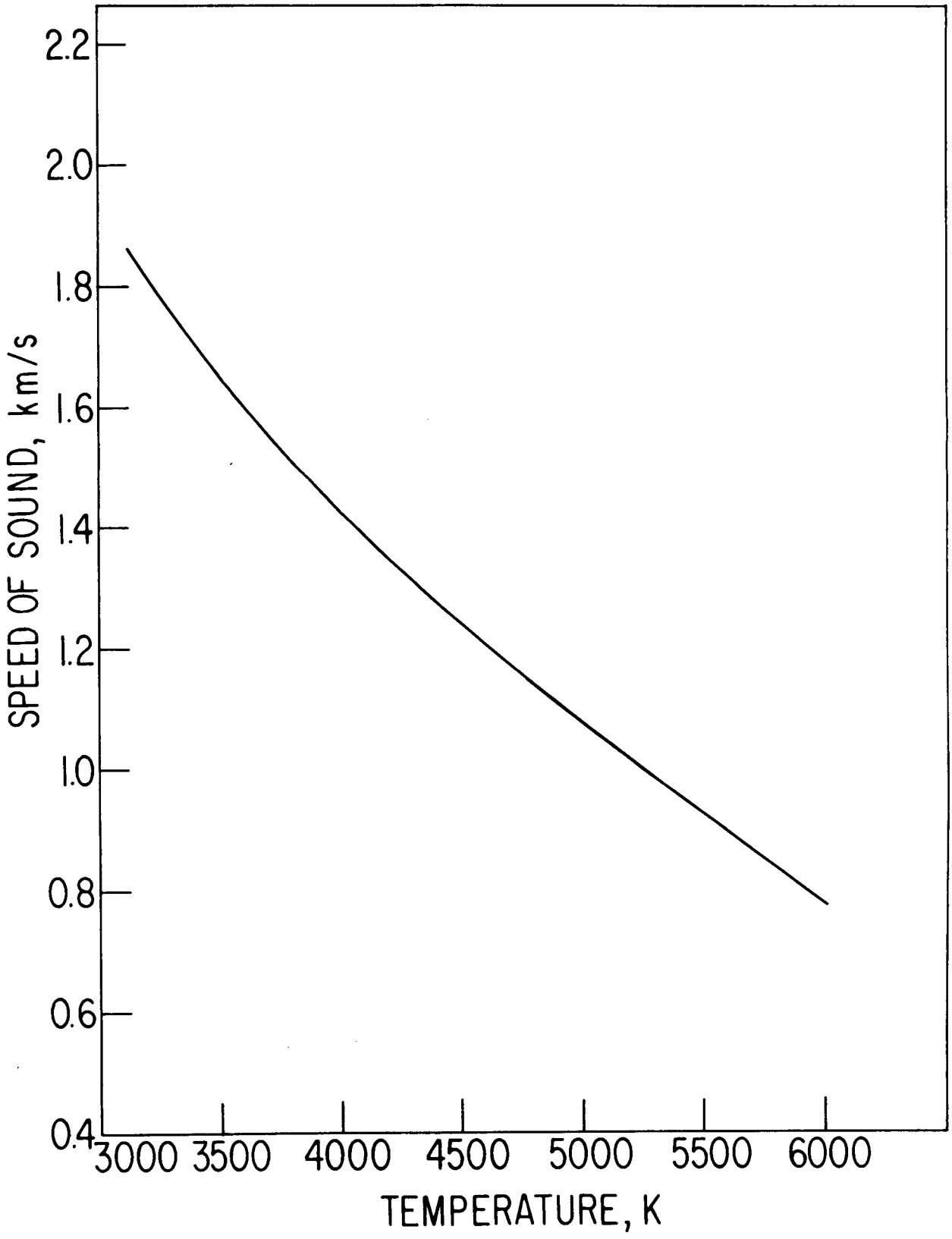
Speed of Sound

T,K	v, km·s^{-1}
3120 (ℓ)	1.860
3200	(1.814)*
3300	(1.756)
3400	(1.698)
3500	(1.648)
3600	(1.599)
3700	(1.554)
3800	(1.510)
3900	(1.469)
4000	(1.429)
4100	(1.391)
4200	(1.354)
4300	(1.319)
4400	(1.285)
4500	(1.252)
4600	(1.220)
4700	(1.188)
4800	(1.157)
4900	(1.127)
5000	(1.097)
5100	(1.068)
5200	(1.039)
5300	(1.011)
5400	(0.9825)
5500	(0.9543)
5600	(0.9262)
5700	(0.8981)
5800	(0.8699)
5900	(0.8415)
6000	(0.8128)

* Parentheses indicate extrapolation beyond the range of experimental data.



The speed of sound in liquid UO_2

Speed of Sound

Temperature Range T,K	v, $m \cdot s^{-1}$	Error σ,%
3120–3400	3660 - 0.5769 T	4
3400–4000	$\frac{1}{\sqrt{\rho\beta_S}}$	15
4000–5000		40
5000–6000		80

Speed of Sound

The speed of sound in molten UO_2 was measured by Slagle and Nelson[1]. Their data consists of four points between 3138 and 3196 K. These data may be represented by the equation

$$v = 3660 - 0.5769\ T \tag{1}$$

where v is in m/s and T is in kelvins. This equation differs from the Slagle-Nelson equation which is

$$v = 5268 - 61.98\ T^{1/2} \tag{2}$$

where v is in m/s and T is in kelvins. Eq. (1) was selected over Eq. (2) because there is not sufficient data to justify the square root of T dependence and from measurements of the speed of sound in other materials there appears no reason to expect a square root of temperature dependence.

Below 3400 K, the speed of sound has been calculated using Eq. (1). Above 3400 K, the speed of sound was calculated from the adiabatic compressibility using the thermodynamic relation

$$v = \frac{1}{\sqrt{\rho \beta_S}} \tag{3}$$

where ρ is the density given by Christensen's[2,3] equation.

$$\rho = 10970\ (1.0522 - 8.192 \times 10^{-5}\ T) \tag{4}$$

where ρ is in kg/m^3 and T is in kelvins. The adiabatic compressibility, β_S, was extrapolated to the 3400-6000 K temperature range using the Grosse method[4] of fitting the reduced compressibility to the reduced temperature via an equilateral hyperbola. Such an extrapolation based on

the limited data (4 points from 3138 to 3196 K) are open to question. Thus the results should only be used as rough estimates and have large errors associated with them. Using the Grosse method,

$$\beta_S = \beta_{S,m} / \left(\frac{a}{\theta + b} - b \right) \tag{5}$$

where $\beta_{S,m}$ is the adiabatic compressibility at the melting point, θ is the reduced temperature, and a and b are parameters determined by the fit to the equilateral hyperbola. The reduced temperature is defined as

$$\theta = \frac{T - T_m}{T_c - T_m} \tag{6}$$

where T_m = 3120 K, the melting point,

and T_c = 7560 K, the critical point.

The values used for the adiabatic compressibility at the melting point and the parameters a and b are

$$\begin{aligned} \beta_{S,m} &= 3.3 \times 10^{-11} \ \text{Pa}^{-1} \\ a &= 0.5633 \\ b &= 0.4018 \end{aligned} \tag{7}$$

The standard deviation in the fit to the data is 0.2% but because of the limited amount of data, the estimated error (σ) below 3400 K is estimated as 4%. Above 3400 K, the estimated error is calculated from the errors in the density and the adiabatic compressibility. Since the estimated errors in the adiabatic compressibility are very large, the corresponding errors in the speed of sound are large. Between 3400 and 4000 K, the error in the speed of sound is estimated as 15%. It increases to 40% in the temperature range 4000-5000 K and to 80% above 5000 K.

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12/80 URANIUM DIOXIDE T_C, P_C, ρ_C

Critical Constants

Constant	Value (CGS)	Value (SI)	Range of Estimates (%)
Critical Pressure	1210 atm	122.6 MPa	65
Critical Temperature	7560 K	7560 K	23
Critical Density	1.66 $g \cdot cm^{-3}$	1660 $kg \cdot m^{-3}$	97
Critical Compressibility Factor	0.317	0.317	23

12/80 URANIUM DIOXIDE T_C, P_C, ρ_C

Critical Constants

A large number of calculations of the critical constants of UO_2 have been made.[1-10] Results of these calculations are tabulated by date along with a comment on the method of calculation. Three main methods were used: the Grosse method of rectilinear diameters,[11,12] the law of corresponding states,[13,14] and the significant structures theory.[15]

The recommended critical constants are values calculated by Fischer, Kinsman, and Ohse[7] using the significant structures theory. The values were chosen by selecting a critical temperature near the mean of the various estimates that range from 6150 through 9332 K. The range of estimate expressed as a percent based on the deviation of the other estimated values of the critical parameters from the recommended value. In calculation of the estimated error of the critical pressure, the value 6958 atm was not included since it is so far from the other values. Similarly, the value 1.0 was not included in the calculation of error of the critical coefficient of compressibility and the value 31.8 g/cc was dropped from the values of critical density used in estimating the error.

T_C K	V_C cc/mole	P_C g/cc	P_C atm	Z_C	Year	Reference	Method
7300	8.5	31.8	1900		1964	Meyer and Wolf (1)	Corresponding states
9115	170.	1.59	1230		1965	Miller (2)	Law of rectilinear diameters
8000	89.9	3.01	2000	0.27	1966	Menzies (3)	Corresponding states, assuming, Z_C, using vapor pressure of Ackermann et al., (Ref. 16)
5500-10,000	--	--	--	--	1966	Robbins (4)	Corresponding states
6723	98.9	2.73	1404	0.2513	1968	Booth (5)	Corresponding states
6960	165.	1.64	1070	0.308	1975	Gillan (6)	Significant structures theory with bent molecule and vapor pressure of Ohse (Ref. 17)
9332	166.	1.63	1450	0.308	1975	Gillan (6)	Significant structures theory with bent molecule and vapor pressure of Tetenbaum and Hunt (Ref. 18)
7560	163.	1.66	1210	0.317	1976	Fischer et al. (7)	Significant structures theory
6744	98.5	2.74	1404	0.25	1976	Kapil (8)	Corresponding states using data of Ohse (Ref. 17) and of Ackermann (Ref. 16)
6723	98.7	2.74	1404	0.2513	1978	Browning et al. (9)	Corresponding states using vapor pressure of Ohse (Ref. 17)
6820	98.4	2.74	1380	0.2126	1978	Browning et al. (9)	Corresponding states using vapor pressure of Tetenbaum and Hunt (Ref. 18)
7200	93.1	2.90	--	--	1978	Browning et al. (9)	Law of rectilinear diameters using vapor pressure of Ohse (Ref. 17)
6250	84.3	3.20	--	--	1978	Browning et al. (9)	Law of rectilinear diameters using vapor pressure of Tetenbaum and Hunt (Ref. 18)
7320	152.	1.78	1256	0.318	1978	Browning et al. (9)	Significant structures theory using vapor pressure of Ohse (Ref. 17)
8840	158.	1.71	1424	0.310	1978	Browning et al. (9)	Significant structures theory using vapor pressure of Tetenbaum and Hunt (Ref. 18)
6960	165.	1.64	1070	0.309	1978	Browning et al. (9)	Significant structures theory using Gillan's bent molecule and vapor pressure of Ohse (Ref. 17)
9332	166.	1.63	1450	0.314	1978	Browning et al. (9)	Significant structures theory using Gillan's bent molecule and vapor pressure of Tetenbaum and Hunt (Ref. 18)
7365	90.4	2.99	6958	1.00	1979	Finn et al. (10)	Law of rectilinear diameters using vapor pressure of Tetenbaum and Hunt with $Z_C = 1.0$ (Ref. 18)
6464	82.6	3.27	1734	0.27	1979	Finn et al. (10)	Law of rectilinear diameters using vapor pressure of Tetenbaum and Hunt (Ref. 18)

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TABULATED THERMODYNAMIC PROPERTIES
IN SI UNITS

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (PA/K)
298	0.0	6.3596D+01	6.2897D+01	0.0	1.0970D+04	2.1711D-05	4.8988D-12	4.9532D-12	4.3832D+06
300	1.1783D+02	6.3790D+01	6.3085D+01	0.0	1.0970D+04	2.1739D-05	4.8998D-12	4.9545D-12	4.3878D+06
310	7.6081D+02	6.4793D+01	6.4056D+01	0.0	1.0967D+04	2.1893D-05	4.9054D-12	4.9619D-12	4.4123D+06
320	1.4135D+03	6.5726D+01	6.4955D+01	0.0	1.0965D+04	2.2048D-05	4.9110D-12	4.9693D-12	4.4368D+06
330	2.0751D+03	6.6594D+01	6.5789D+01	0.0	1.0962D+04	2.2202D-05	4.9166D-12	4.9767D-12	4.4611D+06
340	2.7451D+03	6.7404D+01	6.6564D+01	0.0	1.0960D+04	2.2356D-05	4.9222D-12	4.9843D-12	4.4853D+06
350	3.4230D+03	6.8160D+01	6.7285D+01	0.0	1.0958D+04	2.2511D-05	4.9278D-12	4.9919D-12	4.5095D+06
360	4.1082D+03	6.8868D+01	6.7957D+01	0.0	1.0955D+04	2.2666D-05	4.9334D-12	4.9996D-12	4.5335D+06
370	4.8002D+03	6.9533D+01	6.8584D+01	0.0	1.0953D+04	2.2821D-05	4.9391D-12	5.0074D-12	4.5574D+06
380	5.4987D+03	7.0157D+01	6.9170D+01	0.0	1.0950D+04	2.2976D-05	4.9447D-12	5.0152D-12	4.5812D+06
390	6.2032D+03	7.0744D+01	6.9719D+01	0.0	1.0948D+04	2.3131D-05	4.9504D-12	5.0231D-12	4.6049D+06
400	6.9135D+03	7.1297D+01	7.0234D+01	3.6620D-71	1.0945D+04	2.3287D-05	4.9561D-12	5.0311D-12	4.6285D+06
410	7.6291D+03	7.1820D+01	7.0717D+01	2.9599D-69	1.0943D+04	2.3442D-05	4.9618D-12	5.0392D-12	4.6520D+06
420	8.3498D+03	7.2315D+01	7.1171D+01	1.9409D-67	1.0940D+04	2.3598D-05	4.9675D-12	5.0473D-12	4.6754D+06
430	9.0753D+03	7.2783D+01	7.1598D+01	1.0477D-65	1.0938D+04	2.3754D-05	4.9732D-12	5.0555D-12	4.6987D+06
440	9.8054D+03	7.3227D+01	7.2001D+01	4.7176D-64	1.0935D+04	2.3910D-05	4.9789D-12	5.0637D-12	4.7218D+06
450	1.0540D+04	7.3650D+01	7.2381D+01	1.7936D-62	1.0933D+04	2.4066D-05	4.9847D-12	5.0721D-12	4.7449D+06
460	1.1278D+04	7.4052D+01	7.2739D+01	5.8213D-61	1.0930D+04	2.4223D-05	4.9904D-12	5.0805D-12	4.7679D+06
470	1.2021D+04	7.4435D+01	7.3078D+01	1.6294D-59	1.0927D+04	2.4380D-05	4.9962D-12	5.0889D-12	4.7907D+06
480	1.2767D+04	7.4800D+01	7.3399D+01	3.9693D-58	1.0925D+04	2.4536D-05	5.0020D-12	5.0975D-12	4.8135D+06
490	1.3517D+04	7.5150D+01	7.3703D+01	8.4883D-57	1.0922D+04	2.4693D-05	5.0078D-12	5.1061D-12	4.8361D+06
500	1.4270D+04	7.5484D+01	7.3991D+01	1.6059D-55	1.0919D+04	2.4851D-05	5.0136D-12	5.1147D-12	4.8586D+06
510	1.5026D+04	7.5804D+01	7.4265D+01	2.7073D-54	1.0917D+04	2.5008D-05	5.0194D-12	5.1235D-12	4.8810D+06
520	1.5786D+04	7.6112D+01	7.4524D+01	4.0943D-53	1.0914D+04	2.5165D-05	5.0253D-12	5.1323D-12	4.9033D+06
530	1.6549D+04	7.6407D+01	7.4771D+01	5.5886D-52	1.0911D+04	2.5323D-05	5.0311D-12	5.1412D-12	4.9255D+06
540	1.7314D+04	7.6691D+01	7.5006D+01	6.9244D-51	1.0908D+04	2.5481D-05	5.0370D-12	5.1501D-12	4.9476D+06

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (PA/K)
550	1.8082D+04	7.6965D+01	7.5230D+01	7.8292D-50	1.0906D+04	2.5639D-05	5.0429D-12	5.1592D-12	4.9696D+06
560	1.8853D+04	7.7228D+01	7.5442D+01	8.1177D-49	1.0903D+04	2.5797D-05	5.0488D-12	5.1683D-12	4.9914D+06
570	1.9627D+04	7.7483D+01	7.5645D+01	7.7536D-48	1.0900D+04	2.5955D-05	5.0547D-12	5.1774D-12	5.0131D+06
580	2.0403D+04	7.7729D+01	7.5839D+01	6.8515D-47	1.0897D+04	2.6114D-05	5.0606D-12	5.1867D-12	5.0348D+06
590	2.1181D+04	7.7966D+01	7.6024D+01	5.6233D-46	1.0894D+04	2.6272D-05	5.0665D-12	5.1960D-12	5.0563D+06
600	2.1962D+04	7.8197D+01	7.6200D+01	4.3025D-45	1.0892D+04	2.6431D-05	5.0725D-12	5.2054D-12	5.0777D+06
610	2.2745D+04	7.8420D+01	7.6369D+01	3.0794D-44	1.0889D+04	2.6590D-05	5.0784D-12	5.2148D-12	5.0989D+06
620	2.3531D+04	7.8636D+01	7.6530D+01	2.0685D-43	1.0886D+04	2.6749D-05	5.0844D-12	5.2243D-12	5.1201D+06
630	2.4318D+04	7.8846D+01	7.6684D+01	1.3079D-42	1.0883D+04	2.6908D-05	5.0904D-12	5.2340D-12	5.1411D+06
640	2.5107D+04	7.9051D+01	7.6831D+01	7.8067D-42	1.0880D+04	2.7068D-05	5.0964D-12	5.2436D-12	5.1621D+06
650	2.5899D+04	7.9249D+01	7.6972D+01	4.4105D-41	1.0877D+04	2.7227D-05	5.1024D-12	5.2534D-12	5.1829D+06
660	2.6692D+04	7.9443D+01	7.7107D+01	2.3644D-40	1.0874D+04	2.7387D-05	5.1085D-12	5.2632D-12	5.2035D+06
670	2.7488D+04	7.9631D+01	7.7236D+01	1.2055D-39	1.0871D+04	2.7547D-05	5.1145D-12	5.2731D-12	5.2241D+06
680	2.8285D+04	7.9815D+01	7.7360D+01	5.8591D-39	1.0868D+04	2.7707D-05	5.1206D-12	5.2831D-12	5.2445D+06
690	2.9084D+04	7.9994D+01	7.7478D+01	2.7201D-38	1.0865D+04	2.7867D-05	5.1267D-12	5.2931D-12	5.2648D+06
700	2.9885D+04	8.0169D+01	7.7592D+01	1.2086D-37	1.0862D+04	2.8028D-05	5.1327D-12	5.3033D-12	5.2850D+06
710	3.0687D+04	8.0341D+01	7.7700D+01	5.1493D-37	1.0859D+04	2.8188D-05	5.1389D-12	5.3135D-12	5.3051D+06
720	3.1492D+04	8.0508D+01	7.7804D+01	2.1073D-36	1.0856D+04	2.8349D-05	5.1450D-12	5.3238D-12	5.3250D+06
730	3.2298D+04	8.0672D+01	7.7904D+01	8.2970D-36	1.0853D+04	2.8510D-05	5.1511D-12	5.3341D-12	5.3449D+06
740	3.3105D+04	8.0832D+01	7.8000D+01	3.1480D-35	1.0850D+04	2.8671D-05	5.1573D-12	5.3446D-12	5.3645D+06
750	3.3914D+04	8.0990D+01	7.8091D+01	1.1527D-34	1.0847D+04	2.8832D-05	5.1634D-12	5.3551D-12	5.3841D+06
760	3.4725D+04	8.1144D+01	7.8179D+01	4.0790D-34	1.0844D+04	2.8994D-05	5.1696D-12	5.3657D-12	5.4035D+06
770	3.5537D+04	8.1295D+01	7.8263D+01	1.3968D-33	1.0840D+04	2.9155D-05	5.1758D-12	5.3764D-12	5.4229D+06
780	3.6351D+04	8.1444D+01	7.8343D+01	4.6347D-33	1.0837D+04	2.9317D-05	5.1820D-12	5.3871D-12	5.4420D+06
790	3.7166D+04	8.1590D+01	7.8420D+01	1.4918D-32	1.0834D+04	2.9479D-05	5.1882D-12	5.3980D-12	5.4611D+06
800	3.7983D+04	8.1733D+01	7.8494D+01	4.6635D-32	1.0831D+04	2.9641D-05	5.1945D-12	5.4089D-12	5.4800D+06

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (PA/K)
810	3.8801D+04	8.1875D+01	7.8564D+01	1.4174D-31	1.0828D+04	2.9803D-05	5.2007D-12	5.4199D-12	5.4988D+06
820	3.9620D+04	8.2013D+01	7.8631D+01	4.1927D-31	1.0824D+04	2.9965D-05	5.2070D-12	5.4310D-12	5.5175D+06
830	4.0441D+04	8.2150D+01	7.8696D+01	1.2082D-30	1.0821D+04	3.0128D-05	5.2133D-12	5.4421D-12	5.5360D+06
840	4.1263D+04	8.2285D+01	7.8757D+01	3.3952D-30	1.0818D+04	3.0290D-05	5.2196D-12	5.4534D-12	5.5544D+06
850	4.2087D+04	8.2417D+01	7.8816D+01	9.3113D-30	1.0815D+04	3.0453D-05	5.2259D-12	5.4647D-12	5.5726D+06
860	4.2911D+04	8.2548D+01	7.8872D+01	2.4944D-29	1.0811D+04	3.0616D-05	5.2322D-12	5.4761D-12	5.5908D+06
870	4.3738D+04	8.2677D+01	7.8925D+01	6.5327D-29	1.0808D+04	3.0779D-05	5.2386D-12	5.4876D-12	5.6088D+06
880	4.4565D+04	8.2805D+01	7.8976D+01	1.6739D-28	1.0805D+04	3.0942D-05	5.2449D-12	5.4992D-12	5.6266D+06
890	4.5394D+04	8.2930D+01	7.9024D+01	4.1991D-28	1.0801D+04	3.1105D-05	5.2513D-12	5.5109D-12	5.6443D+06
900	4.6224D+04	8.3054D+01	7.9070D+01	1.0321D-27	1.0798D+04	3.1269D-05	5.2577D-12	5.5227D-12	5.6619D+06
910	4.7055D+04	8.3177D+01	7.9113D+01	2.4871D-27	1.0794D+04	3.1433D-05	5.2641D-12	5.5345D-12	5.6794D+06
920	4.7887D+04	8.3298D+01	7.9154D+01	5.8799D-27	1.0791D+04	3.1596D-05	5.2705D-12	5.5465D-12	5.6967D+06
930	4.8721D+04	8.3418D+01	7.9193D+01	1.3646D-26	1.0788D+04	3.1760D-05	5.2770D-12	5.5585D-12	5.7139D+06
940	4.9555D+04	8.3536D+01	7.9230D+01	3.1108D-26	1.0784D+04	3.1925D-05	5.2834D-12	5.5706D-12	5.7309D+06
950	5.0391D+04	8.3653D+01	7.9265D+01	6.9693D-26	1.0781D+04	3.2089D-05	5.2899D-12	5.5828D-12	5.7478D+06
960	5.1229D+04	8.3769D+01	7.9297D+01	1.5354D-25	1.0777D+04	3.2253D-05	5.2964D-12	5.5951D-12	5.7646D+06
970	5.2067D+04	8.3884D+01	7.9328D+01	3.3279D-25	1.0774D+04	3.2418D-05	5.3029D-12	5.6075D-12	5.7812D+06
980	5.2906D+04	8.3998D+01	7.9357D+01	7.1002D-25	1.0770D+04	3.2583D-05	5.3094D-12	5.6200D-12	5.7977D+06
990	5.3747D+04	8.4111D+01	7.9383D+01	1.4918D-24	1.0767D+04	3.2748D-05	5.3160D-12	5.6325D-12	5.8140D+06
1000	5.4589D+04	8.4222D+01	7.9408D+01	3.0883D-24	1.0763D+04	3.2913D-05	5.3225D-12	5.6452D-12	5.8302D+06
1010	5.5431D+04	8.4333D+01	7.9431D+01	6.3017D-24	1.0760D+04	3.3078D-05	5.3291D-12	5.6579D-12	5.8463D+06
1020	5.6275D+04	8.4442D+01	7.9452D+01	1.2680D-23	1.0756D+04	3.3243D-05	5.3357D-12	5.6708D-12	5.8622D+06
1030	5.7120D+04	8.4551D+01	7.9472D+01	2.5171D-23	1.0752D+04	3.3409D-05	5.3423D-12	5.6837D-12	5.8779D+06
1040	5.7966D+04	8.4659D+01	7.9489D+01	4.9311D-23	1.0749D+04	3.3574D-05	5.3489D-12	5.6967D-12	5.8936D+06
1050	5.8813D+04	8.4766D+01	7.9505D+01	9.5374D-23	1.0745D+04	3.3740D-05	5.3555D-12	5.7099D-12	5.9091D+06
1060	5.9661D+04	8.4872D+01	7.9520D+01	1.8218D-22	1.0742D+04	3.3906D-05	5.3621D-12	5.7231D-12	5.9244D+06

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (PA/K)
1070	6.0511D+04	8.4978D+01	7.9532D+01	3.4382D-22	1.0738D+04	3.4072D-05	5.3688D-12	5.7364D-12	5.9396D+06
1080	6.1361D+04	8.5082D+01	7.9543D+01	6.4128D-22	1.0734D+04	3.4238D-05	5.3755D-12	5.7498D-12	5.9547D+06
1090	6.2212D+04	8.5186D+01	7.9553D+01	1.1825D-21	1.0731D+04	3.4405D-05	5.3822D-12	5.7633D-12	5.9696D+06
1100	6.3065D+04	8.5289D+01	7.9561D+01	2.1563D-21	1.0727D+04	3.4571D-05	5.3889D-12	5.7769D-12	5.9843D+06
1110	6.3918D+04	8.5392D+01	7.9567D+01	3.8898D-21	1.0723D+04	3.4738D-05	5.3956D-12	5.7906D-12	5.9989D+06
1120	6.4773D+04	8.5494D+01	7.9572D+01	6.9434D-21	1.0719D+04	3.4905D-05	5.4024D-12	5.8044D-12	6.0134D+06
1130	6.5628D+04	8.5595D+01	7.9576D+01	1.2268D-20	1.0716D+04	3.5071D-05	5.4092D-12	5.8183D-12	6.0277D+06
1140	6.6484D+04	8.5696D+01	7.9578D+01	2.1459D-20	1.0712D+04	3.5239D-05	5.4159D-12	5.8324D-12	6.0419D+06
1150	6.7342D+04	8.5797D+01	7.9578D+01	3.7174D-20	1.0708D+04	3.5406D-05	5.4227D-12	5.8465D-12	6.0559D+06
1160	6.8200D+04	8.5896D+01	7.9578D+01	6.3790D-20	1.0704D+04	3.5573D-05	5.4296D-12	5.8607D-12	6.0698D+06
1170	6.9060D+04	8.5996D+01	7.9576D+01	1.0846D-19	1.0700D+04	3.5741D-05	5.4364D-12	5.8750D-12	6.0836D+06
1180	6.9920D+04	8.6094D+01	7.9573D+01	1.8275D-19	1.0697D+04	3.5908D-05	5.4432D-12	5.8894D-12	6.0971D+06
1190	7.0782D+04	8.6193D+01	7.9568D+01	3.0524D-19	1.0693D+04	3.6076D-05	5.4501D-12	5.9039D-12	6.1106D+06
1200	7.1644D+04	8.6291D+01	7.9562D+01	5.0549D-19	1.0689D+04	3.6244D-05	5.4570D-12	5.9185D-12	6.1239D+06
1210	7.2508D+04	8.6388D+01	7.9555D+01	8.3018D-19	1.0685D+04	3.6412D-05	5.4639D-12	5.9332D-12	6.1370D+06
1220	7.3372D+04	8.6485D+01	7.9547D+01	1.3524D-18	1.0681D+04	3.6580D-05	5.4708D-12	5.9480D-12	6.1500D+06
1230	7.4237D+04	8.6582D+01	7.9537D+01	2.1856D-18	1.0677D+04	3.6749D-05	5.4778D-12	5.9630D-12	6.1629D+06
1240	7.5104D+04	8.6679D+01	7.9527D+01	3.5050D-18	1.0673D+04	3.6917D-05	5.4847D-12	5.9780D-12	6.1755D+06
1250	7.5971D+04	8.6775D+01	7.9515D+01	5.5785D-18	1.0669D+04	3.7086D-05	5.4917D-12	5.9931D-12	6.1881D+06
1260	7.6839D+04	8.6871D+01	7.9502D+01	8.8134D-18	1.0665D+04	3.7255D-05	5.4987D-12	6.0084D-12	6.2005D+06
1270	7.7708D+04	8.6967D+01	7.9488D+01	1.3824D-17	1.0661D+04	3.7424D-05	5.5057D-12	6.0237D-12	6.2127D+06
1280	7.8576D+04	8.7063D+01	7.9473D+01	2.1532D-17	1.0657D+04	3.7593D-05	5.5127D-12	6.0392D-12	6.2248D+06
1290	7.9449D+04	8.7158D+01	7.9457D+01	3.3308D-17	1.0653D+04	3.7762D-05	5.5198D-12	6.0547D-12	6.2368D+06
1300	8.0322D+04	8.7254D+01	7.9441D+01	5.1180D-17	1.0649D+04	3.7931D-05	5.5268D-12	6.0704D-12	6.2486D+06
1310	8.1195D+04	8.7349D+01	7.9423D+01	7.8127D-17	1.0645D+04	3.8101D-05	5.5339D-12	6.0862D-12	6.2602D+06
1320	8.2069D+04	8.7444D+01	7.9404D+01	1.1850D-16	1.0641D+04	3.8270D-05	5.5410D-12	6.1021D-12	6.2717D+06

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (PA/K)
1330	8.2943D+04	8.7539D+01	7.9385D+01	1.7861D-16	1.0637D+04	3.8440D-05	5.5481D-12	6.1180D-12	6.2831D+06
1340	8.3819D+04	8.7635D+01	7.9365D+01	2.6758D-16	1.0633D+04	3.8610D-05	5.5553D-12	6.1341D-12	6.2943D+06
1350	8.4696D+04	8.7730D+01	7.9344D+01	3.9846D-16	1.0629D+04	3.8780D-05	5.5624D-12	6.1504D-12	6.3054D+06
1360	8.5574D+04	8.7826D+01	7.9322D+01	5.8990D-16	1.0624D+04	3.8950D-05	5.5696D-12	6.1667D-12	6.3163D+06
1370	8.6453D+04	8.7921D+01	7.9300D+01	8.6832D-16	1.0620D+04	3.9121D-05	5.5768D-12	6.1831D-12	6.3270D+06
1380	8.7332D+04	8.8017D+01	7.9277D+01	1.2710D-15	1.0616D+04	3.9291D-05	5.5840D-12	6.1997D-12	6.3376D+06
1390	8.8213D+04	8.8113D+01	7.9253D+01	1.8503D-15	1.0612D+04	3.9462D-05	5.5912D-12	6.2163D-12	6.3481D+06
1400	8.9095D+04	8.8210D+01	7.9229D+01	2.6792D-15	1.0608D+04	3.9632D-05	5.5985D-12	6.2331D-12	6.3584D+06
1410	8.9977D+04	8.8307D+01	7.9205D+01	3.8591D-15	1.0604D+04	3.9803D-05	5.6057D-12	6.2499D-12	6.3686D+06
1420	9.0861D+04	8.8404D+01	7.9180D+01	5.5301D-15	1.0599D+04	3.9974D-05	5.6130D-12	6.2669D-12	6.3786D+06
1430	9.1745D+04	8.8502D+01	7.9155D+01	7.8849D-15	1.0595D+04	4.0145D-05	5.6203D-12	6.2840D-12	6.3885D+06
1440	9.2631D+04	8.8600D+01	7.9129D+01	1.1187D-14	1.0591D+04	4.0317D-05	5.6276D-12	6.3012D-12	6.3982D+06
1450	9.3517D+04	8.8699D+01	7.9104D+01	1.5796D-14	1.0586D+04	4.0488D-05	5.6350D-12	6.3185D-12	6.4078D+06
1460	9.4405D+04	8.8799D+01	7.9078D+01	2.2198D-14	1.0582D+04	4.0660D-05	5.6423D-12	6.3359D-12	6.4173D+06
1470	9.5293D+04	8.8899D+01	7.9052D+01	3.1052D-14	1.0578D+04	4.0831D-05	5.6497D-12	6.3535D-12	6.4266D+06
1480	9.6183D+04	8.9000D+01	7.9026D+01	4.3239D-14	1.0573D+04	4.1003D-05	5.6571D-12	6.3711D-12	6.4358D+06
1490	9.7073D+04	8.9103D+01	7.9001D+01	5.9944D-14	1.0569D+04	4.1175D-05	5.6645D-12	6.3889D-12	6.4448D+06
1500	9.7965D+04	8.9206D+01	7.8975D+01	8.2740D-14	1.0565D+04	4.1347D-05	5.6720D-12	6.4067D-12	6.4537D+06
1510	9.8857D+04	8.9310D+01	7.8950D+01	1.1372D-13	1.0560D+04	4.1519D-05	5.6794D-12	6.4247D-12	6.4624D+06
1520	9.9751D+04	8.9415D+01	7.8925D+01	1.5565D-13	1.0556D+04	4.1691D-05	5.6869D-12	6.4428D-12	6.4710D+06
1530	1.0065D+05	8.9522D+01	7.8901D+01	2.1216D-13	1.0552D+04	4.1864D-05	5.6944D-12	6.4610D-12	6.4795D+06
1540	1.0154D+05	8.9630D+01	7.8877D+01	2.8803D-13	1.0547D+04	4.2037D-05	5.7019D-12	6.4793D-12	6.4879D+06
1550	1.0244D+05	8.9740D+01	7.8854D+01	3.8949D-13	1.0543D+04	4.2209D-05	5.7095D-12	6.4976D-12	6.4961D+06
1560	1.0334D+05	8.9851D+01	7.8832D+01	5.2465D-13	1.0538D+04	4.2382D-05	5.7170D-12	6.5161D-12	6.5042D+06
1570	1.0424D+05	8.9963D+01	7.8810D+01	7.0405D-13	1.0534D+04	4.2555D-05	5.7246D-12	6.5348D-12	6.5121D+06
1580	1.0514D+05	9.0078D+01	7.8789D+01	9.4128D-13	1.0529D+04	4.2728D-05	5.7322D-12	6.5535D-12	6.5199D+06

THERMODYNAMIC PROPZETIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (PA/K)
1590	1.0604D+05	9.0194D+01	7.8770D+01	1.2538D-12	1.0525D+04	4.2901D-05	5.7398D-12	6.5723D-12	6.5276D+06
1600	1.0694D+05	9.0312D+01	7.8752D+01	1.6642D-12	1.0520D+04	4.3075D-05	5.7475D-12	6.5912D-12	6.5352D+06
1610	1.0784D+05	9.0433D+01		2.2012D-12	1.0516D+04	4.3248D-05			
1620	1.0875D+05	9.0556D+01		2.9014D-12	1.0511D+04	4.3422D-05			
1630	1.0965D+05	9.0681D+01		3.8113D-12	1.0506D+04	4.3595D-05			
1640	1.1056D+05	9.0809D+01		4.9901D-12	1.0502D+04	4.3769D-05			
1650	1.1147D+05	9.0939D+01		6.5120D-12	1.0497D+04	4.3943D-05			
1660	1.1238D+05	9.1072D+01		8.4710D-12	1.0493D+04	4.4117D-05			
1670	1.1329D+05	9.1209D+01		1.0985D-11	1.0488D+04	4.4292D-05			
1680	1.1420D+05	9.1348D+01		1.4200D-11	1.0483D+04	4.4466D-05			
1690	1.1512D+05	9.1491D+01		1.8301D-11	1.0479D+04	4.4640D-05			
1700	1.1603D+05	9.1637D+01		2.3516D-11	1.0474D+04	4.4815D-05			
1710	1.1695D+05	9.1787D+01		3.0129D-11	1.0469D+04	4.4990D-05			
1720	1.1787D+05	9.1941D+01		3.8490D-11	1.0464D+04	4.5164D-05			
1730	1.1879D+05	9.2098D+01		4.9032D-11	1.0460D+04	4.5339D-05			
1740	1.1971D+05	9.2260D+01		6.2288D-11	1.0455D+04	4.5514D-05			
1750	1.2064D+05	9.2426D+01		7.8912D-11	1.0450D+04	4.5690D-05			
1760	1.2156D+05	9.2597D+01		9.9705D-11	1.0445D+04	4.5865D-05			
1770	1.2249D+05	9.2773D+01		1.2564D-10	1.0441D+04	4.6040D-05			
1780	1.2342D+05	9.2953D+01		1.5792D-10	1.0436D+04	4.6216D-05			
1790	1.2435D+05	9.3139D+01		1.9798D-10	1.0431D+04	4.6392D-05			
1800	1.2528D+05	9.3331D+01		2.4758D-10	1.0426D+04	4.6567D-05			
1810	1.2621D+05	9.3527D+01		3.0884D-10	1.0421D+04	4.6743D-05			
1820	1.2715D+05	9.3730D+01		3.8433D-10	1.0416D+04	4.6919D-05			
1830	1.2809D+05	9.3939D+01		4.7713D-10	1.0411D+04	4.7096D-05			
1840	1.2903D+05	9.4154D+01		5.9094D-10	1.0406D+04	4.7272D-05			

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (PA/K)
1850	1.2997D+05	9.4376D+01		7.3021D-10	1.0401D+04	4.7448D-05			
1860	1.3092D+05	9.4605D+01		9.0025D-10	1.0397D+04	4.7625D-05			
1870	1.3186D+05	9.4841D+01		1.1074D-09	1.0392D+04	4.7801D-05			
1880	1.3281D+05	9.5084D+01		1.3592D-09	1.0387D+04	4.7978D-05			
1890	1.3376D+05	9.5334D+01		1.6647D-09	1.0382D+04	4.8155D-05			
1900	1.3472D+05	9.5593D+01		2.0345D-09	1.0377D+04	4.8332D-05			
1910	1.3568D+05	9.5860D+01		2.4812D-09	1.0372D+04	4.8509D-05			
1920	1.3664D+05	9.6135D+01		3.0197D-09	1.0366D+04	4.8686D-05			
1930	1.3760D+05	9.6419D+01		3.6677D-09	1.0361D+04	4.8864D-05			
1940	1.3857D+05	9.6712D+01		4.4457D-09	1.0356D+04	4.9041D-05			
1950	1.3953D+05	9.7014D+01		5.3782D-09	1.0351D+04	4.9218D-05			
1960	1.4051D+05	9.7326D+01		6.4937D-09	1.0346D+04	4.9396D-05			
1970	1.4148D+05	9.7648D+01		7.8255D-09	1.0341D+04	4.9574D-05			
1980	1.4246D+05	9.7980D+01		9.4128D-09	1.0336D+04	4.9752D-05			
1990	1.4344D+05	9.8322D+01		1.1301D-08	1.0331D+04	4.9930D-05			
2000	1.4442D+05	9.8675D+01		1.3543D-08	1.0326D+04	5.0108D-05			
2010	1.4541D+05	9.9040D+01		1.6201D-08	1.0320D+04	5.0286D-05			
2020	1.4641D+05	9.9416D+01		1.9346D-08	1.0315D+04	5.0464D-05			
2030	1.4740D+05	9.9804D+01		2.3061D-08	1.0310D+04	5.0643D-05			
2040	1.4840D+05	1.0020D+02		2.7442D-08	1.0305D+04	5.0821D-05			
2050	1.4941D+05	1.0062D+02		3.2601D-08	1.0299D+04	5.1000D-05			
2060	1.5041D+05	1.0104D+02		3.8664D-08	1.0294D+04	5.1179D-05			
2070	1.5143D+05	1.0148D+02		4.5780D-08	1.0289D+04	5.1358D-05			
2080	1.5244D+05	1.0193D+02		5.4117D-08	1.0284D+04	5.1537D-05			
2090	1.5347D+05	1.0240D+02		6.3870D-08	1.0278D+04	5.1716D-05			
2100	1.5449D+05	1.0288D+02		7.5262D-08	1.0273D+04	5.1895D-05			

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (PA/K)
2110	1.5552D+05	1.0337D+02		8.8548D-08	1.0268D+04	5.2074D-05			
2120	1.5656D+05	1.0388D+02		1.0402D-07	1.0262D+04	5.2253D-05			
2130	1.5760D+05	1.0441D+02		1.2201D-07	1.0257D+04	5.2433D-05			
2140	1.5865D+05	1.0495D+02		1.4290D-07	1.0252D+04	5.2613D-05			
2150	1.5970D+05	1.0550D+02		1.6712D-07	1.0246D+04	5.2792D-05			
2160	1.6076D+05	1.0607D+02		1.9516D-07	1.0241D+04	5.2972D-05			
2170	1.6182D+05	1.0666D+02		2.2758D-07	1.0235D+04	5.3152D-05			
2180	1.6289D+05	1.0727D+02		2.6501D-07	1.0230D+04	5.3332D-05			
2190	1.6397D+05	1.0790D+02		3.0817D-07	1.0224D+04	5.3512D-05			
2200	1.6505D+05	1.0854D+02		3.5786D-07	1.0219D+04	5.3692D-05			
2210	1.6614D+05	1.0920D+02		4.1501D-07	1.0213D+04	5.3873D-05			
2220	1.6723D+05	1.0988D+02		4.8065D-07	1.0208D+04	5.4053D-05			
2230	1.6834D+05	1.1058D+02		5.5593D-07	1.0202D+04	5.4234D-05			
2240	1.6944D+05	1.1129D+02		6.4216D-07	1.0197D+04	5.4414D-05			
2250	1.7056D+05	1.1203D+02		7.4083D-07	1.0191D+04	5.4595D-05			
2260	1.7169D+05	1.1279D+02		8.5357D-07	1.0186D+04	5.4776D-05			
2270	1.7282D+05	1.1357D+02		9.8224D-07	1.0180D+04	5.4957D-05			
2280	1.7396D+05	1.1437D+02		1.1289D-06	1.0174D+04	5.5138D-05			
2290	1.7510D+05	1.1519D+02		1.2959D-06	1.0169D+04	5.5319D-05			
2300	1.7626D+05	1.1603D+02		1.4859D-06	1.0163D+04	5.5500D-05			
2310	1.7743D+05	1.1690D+02		1.7016D-06	1.0158D+04	5.5681D-05			
2320	1.7860D+05	1.1779D+02		1.9464D-06	1.0152D+04	5.5863D-05			
2330	1.7978D+05	1.1870D+02		2.2239D-06	1.0146D+04	5.6044D-05			
2340	1.8097D+05	1.1963D+02		2.5380D-06	1.0141D+04	5.6226D-05			
2350	1.8217D+05	1.2059D+02		2.8932D-06	1.0135D+04	5.6408D-05			
2360	1.8338D+05	1.2158D+02		3.2945D-06	1.0129D+04	5.6589D-05			

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (PA/K)
2370	1.8461D+05	1.2258D+02		3.7473D-06	1.0123D+04	5.6771D-05			
2380	1.8584D+05	1.2362D+02		4.2577D-06	1.0118D+04	5.6953D-05			
2390	1.8708D+05	1.2468D+02		4.8326D-06	1.0112D+04	5.7135D-05			
2400	1.8833D+05	1.2576D+02		5.4792D-06	1.0106D+04	5.7318D-05			
2410	1.8959D+05	1.2687D+02		6.2059D-06	1.0100D+04	5.7500D-05			
2420	1.9087D+05	1.2801D+02		7.0217D-06	1.0094D+04	5.7682D-05			
2430	1.9215D+05	1.2918D+02		7.9367D-06	1.0089D+04	5.7865D-05			
2440	1.9345D+05	1.3037D+02		8.9620D-06	1.0083D+04	5.8047D-05			
2450	1.9476D+05	1.3159D+02		1.0110D-05	1.0077D+04	5.8230D-05			
2460	1.9608D+05	1.3284D+02		1.1393D-05	1.0071D+04	5.8413D-05			
2470	1.9742D+05	1.3412D+02		1.2827D-05	1.0065D+04	5.8595D-05			
2480	1.9877D+05	1.3543D+02		1.4428D-05	1.0059D+04	5.8778D-05			
2490	2.0013D+05	1.3677D+02		1.6213D-05	1.0053D+04	5.8961D-05			
2500	2.0150D+05	1.3814D+02		1.8202D-05	1.0047D+04	5.9144D-05			
2510	2.0289D+05	1.3953D+02		2.0416D-05	1.0041D+04	5.9328D-05			
2520	2.0429D+05	1.4096D+02		2.2879D-05	1.0035D+04	5.9511D-05			
2530	2.0571D+05	1.4242D+02		2.5615D-05	1.0029D+04	5.9694D-05			
2540	2.0714D+05	1.4392D+02		2.8654D-05	1.0023D+04	5.9878D-05			
2550	2.0859D+05	1.4544D+02		3.2024D-05	1.0017D+04	6.0061D-05			
2560	2.1005D+05	1.4700D+02		3.5761D-05	1.0011D+04	6.0245D-05			
2570	2.1153D+05	1.4859D+02		3.9898D-05	1.0005D+04	6.0428D-05			
2580	2.1302D+05	1.5022D+02		4.4477D-05	9.9993D+03	6.0612D-05			
2590	2.1453D+05	1.5187D+02		4.9540D-05	9.9932D+03	6.0796D-05			
2600	2.1606D+05	1.5357D+02		5.5133D-05	9.9872D+03	6.0980D-05			
2610	2.1760D+05	1.5529D+02		6.1307D-05	9.9811D+03	6.1164D-05			
2620	2.1916D+05	1.5705D+02		6.8117D-05	9.9749D+03	6.1348D-05			

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (PA/K)
2630	2.2074D+05	1.5885D+02		7.5624D-05	9.9688D+03	6.1532D-05			
2640	2.2234D+05	1.6068D+02		8.3891D-05	9.9627D+03	6.1717D-05			
2650	2.2396D+05	1.6255D+02		9.2989D-05	9.9565D+03	6.1901D-05			
2660	2.2559D+05	1.6446D+02		1.0299D-04	9.9503D+03	6.2086D-05			
2670	2.2725D+05	1.6640D+02		1.1399D-04	9.9441D+03	6.2270D-05			
2680	2.2933D+05	1.6704D+02		1.2606D-04	9.9379D+03	6.2455D-05			
2690	2.3100D+05	1.6704D+02		1.3931D-04	9.9317D+03	6.2639D-05			
2700	2.3267D+05	1.6704D+02		1.5383D-04	9.9255D+03	6.2824D-05			
2710	2.3434D+05	1.6704D+02		1.6975D-04	9.9192D+03	6.3009D-05			
2720	2.3601D+05	1.6704D+02		1.8717D-04	9.9130D+03	6.3194D-05			
2730	2.3768D+05	1.6704D+02		2.0624D-04	9.9067D+03	6.3379D-05			
2740	2.3935D+05	1.6704D+02		2.2709D-04	9.9004D+03	6.3564D-05			
2750	2.4102D+05	1.6704D+02		2.4987D-04	9.8941D+03	6.3749D-05			
2760	2.4269D+05	1.6704D+02		2.7475D-04	9.8878D+03	6.3935D-05			
2770	2.4436D+05	1.6704D+02		3.0189D-04	9.8814D+03	6.4120D-05			
2780	2.4603D+05	1.6704D+02		3.3150D-04	9.8751D+03	6.4305D-05			
2790	2.4770D+05	1.6704D+02		3.6376D-04	9.8687D+03	6.4491D-05			
2800	2.4937D+05	1.6704D+02		3.9890D-04	9.8624D+03	6.4676D-05			
2810	2.5104D+05	1.6704D+02		4.3714D-04	9.8560D+03	6.4862D-05			
2820	2.5271D+05	1.6704D+02		4.7874D-04	9.8496D+03	6.5048D-05			
2830	2.5438D+05	1.6704D+02		5.2396D-04	9.8431D+03	6.5233D-05			
2840	2.5605D+05	1.6704D+02		5.7309D-04	9.8367D+03	6.5419D-05			
2850	2.5772D+05	1.6704D+02		6.2643D-04	9.8302D+03	6.5605D-05			
2860	2.5939D+05	1.6704D+02		6.8431D-04	9.8238D+03	6.5791D-05			
2870	2.6106D+05	1.6704D+02		7.4708D-04	9.8173D+03	6.5977D-05			
2880	2.6273D+05	1.6704D+02		8.1511D-04	9.8108D+03	6.6163D-05			

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (PA/K)
2890	2.6440D+05	1.6704D+02		8.8880D-04	9.8043D+03	6.6350D-05			
2900	2.6607D+05	1.6704D+02		9.6857D-04	9.7978D+03	6.6536D-05			
2910	2.6774D+05	1.6704D+02		1.0549D-03	9.7912D+03	6.6722D-05			
2920	2.6941D+05	1.6704D+02		1.1482D-03	9.7847D+03	6.6909D-05			
2930	2.7109D+05	1.6704D+02		1.2491D-03	9.7781D+03	6.7095D-05			
2940	2.7276D+05	1.6704D+02		1.3580D-03	9.7715D+03	6.7282D-05			
2950	2.7443D+05	1.6704D+02		1.4756D-03	9.7649D+03	6.7468D-05			
2960	2.7610D+05	1.6704D+02		1.6025D-03	9.7583D+03	6.7655D-05			
2970	2.7777D+05	1.6704D+02		1.7393D-03	9.7517D+03	6.7842D-05			
2980	2.7944D+05	1.6704D+02		1.8868D-03	9.7451D+03	6.8029D-05			
2990	2.8111D+05	1.6704D+02		2.0457D-03	9.7384D+03	6.8215D-05			
3000	2.8278D+05	1.6704D+02		2.2167D-03	9.7317D+03	6.8402D-05			
3010	2.8445D+05	1.6704D+02		2.4008D-03	9.7251D+03	6.8589D-05			
3020	2.8612D+05	1.6704D+02		2.5988D-03	9.7184D+03	6.8777D-05			
3030	2.8779D+05	1.6704D+02		2.8117D-03	9.7116D+03	6.8964D-05			
3040	2.8946D+05	1.6704D+02		3.0404D-03	9.7049D+03	6.9151D-05			
3050	2.9113D+05	1.6704D+02		3.2860D-03	9.6982D+03	6.9338D-05			
3060	2.9280D+05	1.6704D+02		3.5497D-03	9.6914D+03	6.9526D-05			
3070	2.9447D+05	1.6704D+02		3.8326D-03	9.6847D+03	6.9713D-05			
3080	2.9614D+05	1.6704D+02		4.1359D-03	9.6779D+03	6.9900D-05			
3090	2.9781D+05	1.6704D+02		4.4611D-03	9.6711D+03	7.0088D-05			
3100	2.9948D+05	1.6704D+02		4.8095D-03	9.6643D+03	7.0276D-05			
3110	3.0115D+05	1.6704D+02		5.1827D-03	9.6575D+03	7.0463D-05			
3120	3.0282D+05	1.6704D+02		5.5820D-03	9.6506D+03	7.0651D-05			

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	DH (J/MOL)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (1/PA)
3120	3.7765D+05	1.3095D+02	1.0515D+02	5.5906D-03	5.2242D+05	8.7388D+03	1.0500D-04	3.3074D-11	4.1191D-11	2.5491D+06
3130	3.7896D+05	1.3095D+02	1.0522D+02	5.9619D-03	5.2195D+05	8.7298D+03	1.0496D-04	3.3314D-11	4.1460D-11	2.5317D+06
3140	3.8027D+05	1.3095D+02	1.0530D+02	6.3550D-03	5.2148D+05	8.7208D+03	1.0493D-04	3.3557D-11	4.1732D-11	2.5143D+06
3150	3.8158D+05	1.3095D+02	1.0538D+02	6.7708D-03	5.2101D+05	8.7118D+03	1.0489D-04	3.3803D-11	4.2006D-11	2.4970D+06
3160	3.8289D+05	1.3095D+02	1.0546D+02	7.2105D-03	5.2054D+05	8.7029D+03	1.0485D-04	3.4050D-11	4.2282D-11	2.4798D+06
3170	3.8420D+05	1.3095D+02	1.0553D+02	7.6754D-03	5.2008D+05	8.6939D+03	1.0482D-04	3.4301D-11	4.2561D-11	2.4627D+06
3180	3.8551D+05	1.3095D+02	1.0561D+02	8.1665D-03	5.1961D+05	8.6849D+03	1.0478D-04	3.4554D-11	4.2843D-11	2.4457D+06
3190	3.8682D+05	1.3095D+02	1.0569D+02	8.6851D-03	5.1914D+05	8.6759D+03	1.0474D-04	3.4809D-11	4.3127D-11	2.4287D+06
3200	3.8813D+05	1.3095D+02	1.0577D+02	9.2327D-03	5.1867D+05	8.6669D+03	1.0471D-04	3.5067D-11	4.3414D-11	2.4118D+06
3210	3.8944D+05	1.3095D+02	1.0585D+02	9.8105D-03	5.1820D+05	8.6579D+03	1.0467D-04	3.5328D-11	4.3704D-11	2.3950D+06
3220	3.9075D+05	1.3095D+02	1.0593D+02	1.0420D-02	5.1773D+05	8.6489D+03	1.0463D-04	3.5591D-11	4.3996D-11	2.3782D+06
3230	3.9206D+05	1.3095D+02	1.0601D+02	1.1063D-02	5.1726D+05	8.6400D+03	1.0460D-04	3.5857D-11	4.4292D-11	2.3616D+06
3240	3.9337D+05	1.3095D+02	1.0610D+02	1.1740D-02	5.1679D+05	8.6310D+03	1.0456D-04	3.6126D-11	4.4590D-11	2.3450D+06
3250	3.9468D+05	1.3095D+02	1.0618D+02	1.2453D-02	5.1632D+05	8.6220D+03	1.0452D-04	3.6398D-11	4.4890D-11	2.3284D+06
3260	3.9599D+05	1.3095D+02	1.0626D+02	1.3205D-02	5.1585D+05	8.6130D+03	1.0449D-04	3.6673D-11	4.5194D-11	2.3120D+06
3270	3.9730D+05	1.3095D+02	1.0634D+02	1.3996D-02	5.1539D+05	8.6040D+03	1.0445D-04	3.6950D-11	4.5501D-11	2.2956D+06
3280	3.9860D+05	1.3095D+02	1.0643D+02	1.4828D-02	5.1492D+05	8.5950D+03	1.0442D-04	3.7231D-11	4.5810D-11	2.2793D+06
3290	3.9991D+05	1.3095D+02	1.0651D+02	1.5703D-02	5.1445D+05	8.5860D+03	1.0438D-04	3.7514D-11	4.6123D-11	2.2631D+06
3300	4.0122D+05	1.3095D+02	1.0659D+02	1.6624D-02	5.1398D+05	8.5770D+03	1.0434D-04	3.7801D-11	4.6438D-11	2.2469D+06
3310	4.0253D+05	1.3095D+02	1.0668D+02	1.7591D-02	5.1351D+05	8.5681D+03	1.0431D-04	3.8090D-11	4.6757D-11	2.2308D+06
3320	4.0384D+05	1.3095D+02	1.0676D+02	1.8608D-02	5.1304D+05	8.5591D+03	1.0427D-04	3.8383D-11	4.7079D-11	2.2148D+06
3330	4.0515D+05	1.3095D+02	1.0685D+02	1.9675D-02	5.1257D+05	8.5501D+03	1.0423D-04	3.8678D-11	4.7404D-11	2.1988D+06
3340	4.0646D+05	1.3095D+02	1.0693D+02	2.0796D-02	5.1210D+05	8.5411D+03	1.0420D-04	3.8977D-11	4.7732D-11	2.1830D+06
3350	4.0777D+05	1.3095D+02	1.0702D+02	2.1973D-02	5.1163D+05	8.5321D+03	1.0416D-04	3.9279D-11	4.8064D-11	2.1672D+06
3360	4.0908D+05	1.3095D+02	1.0710D+02	2.3207D-02	5.1117D+05	8.5231D+03	1.0413D-04	3.9585D-11	4.8398D-11	2.1514D+06
3370	4.1039D+05	1.3095D+02	1.0719D+02	2.4501D-02	5.1070D+05	8.5141D+03	1.0409D-04	3.9893D-11	4.8737D-11	2.1358D+06

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	DH (J/MOL)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (1/PA)
3380	4.1170D+05	1.3095D+02	1.0728D+02	2.5858D-02	5.1023D+05	8.5052D+03	1.0405D-04	4.0206D-11	4.9078D-11	2.1202D+06
3390	4.1311D+05	1.3095D+02	1.0736D+02	2.7280D-02	5.0976D+05	8.4962D+03	1.0402D-04	4.0521D-11	4.9423D-11	2.1046D+06
3400	4.1432D+05	1.3095D+02	1.0745D+02	2.8769D-02	5.0929D+05	8.4872D+03	1.0398D-04	4.0840D-11	4.9771D-11	2.0892D+06
3410	4.1563D+05	1.3095D+02	1.0753D+02	3.0329D-02	5.0882D+05	8.4782D+03	1.0394D-04	4.1137D-11	5.0098D-11	2.0748D+06
3420	4.1694D+05	1.3095D+02	1.0760D+02	3.1963D-02	5.0835D+05	8.4692D+03	1.0391D-04	4.1435D-11	5.0426D-11	2.0606D+06
3430	4.1825D+05	1.3095D+02	1.0768D+02	3.3672D-02	5.0788D+05	8.4602D+03	1.0387D-04	4.1734D-11	5.0755D-11	2.0466D+06
3440	4.1956D+05	1.3095D+02	1.0775D+02	3.5460D-02	5.0741D+05	8.4512D+03	1.0384D-04	4.2035D-11	5.1085D-11	2.0326D+06
3450	4.2087D+05	1.3095D+02	1.0783D+02	3.7330D-02	5.0694D+05	8.4422D+03	1.0380D-04	4.2338D-11	5.1418D-11	2.0188D+06
3460	4.2218D+05	1.3095D+02	1.0790D+02	3.9286D-02	5.0648D+05	8.4333D+03	1.0377D-04	4.2642D-11	5.1751D-11	2.0051D+06
3470	4.2349D+05	1.3095D+02	1.0797D+02	4.1329D-02	5.0601D+05	8.4243D+03	1.0373D-04	4.2948D-11	5.2087D-11	1.9915D+06
3480	4.2479D+05	1.3095D+02	1.0805D+02	4.3465D-02	5.0554D+05	8.4153D+03	1.0369D-04	4.3255D-11	5.2423D-11	1.9780D+06
3490	4.2610D+05	1.3095D+02	1.0812D+02	4.5695D-02	5.0507D+05	8.4063D+03	1.0366D-04	4.3563D-11	5.2762D-11	1.9646D+06
3500	4.2741D+05	1.3095D+02	1.0819D+02	4.8024D-02	5.0460D+05	8.3973D+03	1.0362D-04	4.3873D-11	5.3102D-11	1.9514D+06
3510	4.2872D+05	1.3095D+02	1.0826D+02	5.0455D-02	5.0413D+05	8.3883D+03	1.0359D-04	4.4185D-11	5.3443D-11	1.9383D+06
3520	4.3003D+05	1.3095D+02	1.0834D+02	5.2991D-02	5.0366D+05	8.3793D+03	1.0355D-04	4.4498D-11	5.3786D-11	1.9252D+06
3530	4.3134D+05	1.3095D+02	1.0841D+02	5.5637D-02	5.0319D+05	8.3704D+03	1.0351D-04	4.4812D-11	5.4131D-11	1.9123D+06
3540	4.3265D+05	1.3095D+02	1.0848D+02	5.8397D-02	5.0272D+05	8.3614D+03	1.0348D-04	4.5129D-11	5.4477D-11	1.8995D+06
3550	4.3396D+05	1.3095D+02	1.0855D+02	6.1274D-02	5.0226D+05	8.3524D+03	1.0344D-04	4.5446D-11	5.4825D-11	1.8868D+06
3560	4.3527D+05	1.3095D+02	1.0862D+02	6.4272D-02	5.0179D+05	8.3434D+03	1.0341D-04	4.5766D-11	5.5174D-11	1.8742D+06
3570	4.3658D+05	1.3095D+02	1.0869D+02	6.7397D-02	5.0132D+05	8.3344D+03	1.0337D-04	4.6087D-11	5.5525D-11	1.8617D+06
3580	4.3789D+05	1.3095D+02	1.0876D+02	7.0651D-02	5.0085D+05	8.3254D+03	1.0334D-04	4.6409D-11	5.5878D-11	1.8493D+06
3590	4.3920D+05	1.3095D+02	1.0883D+02	7.4039D-02	5.0038D+05	8.3164D+03	1.0330D-04	4.6733D-11	5.6232D-11	1.8370D+06
3600	4.4051D+05	1.3095D+02	1.0890D+02	7.7567D-02	4.9991D+05	8.3074D+03	1.0327D-04	4.7059D-11	5.6588D-11	1.8248D+06
3610	4.4182D+05	1.3095D+02	1.0897D+02	8.1238D-02	4.9944D+05	8.2985D+03	1.0323D-04	4.7387D-11	5.6946D-11	1.8128D+06
3620	4.4313D+05	1.3095D+02	1.0904D+02	8.5057D-02	4.9897D+05	8.2895D+03	1.0319D-04	4.7716D-11	5.7305D-11	1.8008D+06
3630	4.4444D+05	1.3095D+02	1.0911D+02	8.9030D-02	4.9850D+05	8.2805D+03	1.0316D-04	4.8047D-11	5.7667D-11	1.7889D+06

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	DH (J/MOL)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (1/PA)
3640	4.4575D+05	1.3095D+02	1.0917D+02	9.3161D-02	4.9804D+05	8.2715D+03	1.0312D-04	4.8379D-11	5.8029D-11	1.7771D+06
3650	4.4706D+05	1.3095D+02	1.0924D+02	9.7455D-02	4.9757D+05	8.2625D+03	1.0309D-04	4.8714D-11	5.8394D-11	1.7654D+06
3660	4.4837D+05	1.3095D+02	1.0931D+02	1.0192D-01	4.9710D+05	8.2535D+03	1.0305D-04	4.9050D-11	5.8760D-11	1.7538D+06
3670	4.4968D+05	1.3095D+02	1.0938D+02	1.0655D-01	4.9663D+05	8.2445D+03	1.0302D-04	4.9387D-11	5.9129D-11	1.7423D+06
3680	4.5098D+05	1.3095D+02	1.0944D+02	1.1137D-01	4.9616D+05	8.2356D+03	1.0298D-04	4.9727D-11	5.9498D-11	1.7308D+06
3690	4.5229D+05	1.3095D+02	1.0951D+02	1.1637D-01	4.9569D+05	8.2266D+03	1.0295D-04	5.0068D-11	5.9870D-11	1.7195D+06
3700	4.5360D+05	1.3095D+02	1.0958D+02	1.2156D-01	4.9522D+05	8.2176D+03	1.0291D-04	5.0411D-11	6.0244D-11	1.7082D+06
3710	4.5491D+05	1.3095D+02	1.0964D+02	1.2695D-01	4.9475D+05	8.2086D+03	1.0288D-04	5.0755D-11	6.0619D-11	1.6971D+06
3720	4.5622D+05	1.3095D+02	1.0971D+02	1.3254D-01	4.9428D+05	8.1996D+03	1.0284D-04	5.1102D-11	6.0996D-11	1.6860D+06
3730	4.5753D+05	1.3095D+02	1.0977D+02	1.3834D-01	4.9381D+05	8.1906D+03	1.0281D-04	5.1450D-11	6.1375D-11	1.6750D+06
3740	4.5884D+05	1.3095D+02	1.0984D+02	1.4436D-01	4.9335D+05	8.1816D+03	1.0277D-04	5.1800D-11	6.1756D-11	1.6641D+06
3750	4.6015D+05	1.3095D+02	1.0990D+02	1.5059D-01	4.9288D+05	8.1726D+03	1.0273D-04	5.2152D-11	6.2139D-11	1.6533D+06
3760	4.6146D+05	1.3095D+02	1.0997D+02	1.5705D-01	4.9241D+05	8.1637D+03	1.0270D-04	5.2506D-11	6.2523D-11	1.6426D+06
3770	4.6277D+05	1.3095D+02	1.1003D+02	1.6375D-01	4.9194D+05	8.1547D+03	1.0266D-04	5.2862D-11	6.2910D-11	1.6319D+06
3780	4.6408D+05	1.3095D+02	1.1010D+02	1.7069D-01	4.9147D+05	8.1457D+03	1.0263D-04	5.3219D-11	6.3298D-11	1.6214D+06
3790	4.6539D+05	1.3095D+02	1.1016D+02	1.7788D-01	4.9100D+05	8.1367D+03	1.0259D-04	5.3579D-11	6.3689D-11	1.6109D+06
3800	4.6670D+05	1.3095D+02	1.1023D+02	1.8532D-01	4.9053D+05	8.1277D+03	1.0256D-04	5.3940D-11	6.4081D-11	1.6005D+06
3810	4.6801D+05	1.3095D+02	1.1029D+02	1.9302D-01	4.9006D+05	8.1187D+03	1.0252D-04	5.4304D-11	6.4475D-11	1.5901D+06
3820	4.6932D+05	1.3095D+02	1.1035D+02	2.0099D-01	4.8959D+05	8.1097D+03	1.0249D-04	5.4669D-11	6.4872D-11	1.5799D+06
3830	4.7063D+05	1.3095D+02	1.1042D+02	2.0924D-01	4.8913D+05	8.1008D+03	1.0245D-04	5.5036D-11	6.5270D-11	1.5697D+06
3840	4.7194D+05	1.3095D+02	1.1048D+02	2.1778D-01	4.8866D+05	8.0918D+03	1.0242D-04	5.5405D-11	6.5670D-11	1.5596D+06
3850	4.7325D+05	1.3095D+02	1.1054D+02	2.2661D-01	4.8819D+05	8.0828D+03	1.0238D-04	5.5776D-11	6.6073D-11	1.5496D+06
3860	4.7456D+05	1.3095D+02	1.1061D+02	2.3574D-01	4.8772D+05	8.0738D+03	1.0235D-04	5.6150D-11	6.6477D-11	1.5396D+06
3870	4.7587D+05	1.3095D+02	1.1067D+02	2.4517D-01	4.8725D+05	8.0648D+03	1.0231D-04	5.6525D-11	6.6883D-11	1.5297D+06
3880	4.7717D+05	1.3095D+02	1.1073D+02	2.5492D-01	4.8678D+05	8.0558D+03	1.0228D-04	5.6902D-11	6.7292D-11	1.5199D+06
3890	4.7848D+05	1.3095D+02	1.1079D+02	2.6500D-01	4.8631D+05	8.0468D+03	1.0224D-04	5.7281D-11	6.7702D-11	1.5102D+06

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	DH (J/MOL)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (1/PA)
3900	4.7979D+05	1.3095D+02	1.1086D+02	2.7541D-01	4.8584D+05	8.0379D+03	1.0221D-04	5.7663D-11	6.8115D-11	1.5005D+06
3910	4.8110D+05	1.3095D+02	1.1092D+02	2.8617D-01	4.8537D+05	8.0289D+03	1.0217D-04	5.8046D-11	6.8530D-11	1.4910D+06
3920	4.8241D+05	1.3095D+02	1.1098D+02	2.9727D-01	4.8491D+05	8.0199D+03	1.0214D-04	5.8432D-11	6.8947D-11	1.4814D+06
3930	4.8372D+05	1.3095D+02	1.1104D+02	3.0873D-01	4.8444D+05	8.0109D+03	1.0211D-04	5.8820D-11	6.9366D-11	1.4720D+06
3940	4.8503D+05	1.3095D+02	1.1110D+02	3.2057D-01	4.8397D+05	8.0019D+03	1.0207D-04	5.9209D-11	6.9788D-11	1.4626D+06
3950	4.8634D+05	1.3095D+02	1.1116D+02	3.3278D-01	4.8350D+05	7.9929D+03	1.0204D-04	5.9601D-11	7.0211D-11	1.4533D+06
3960	4.8765D+05	1.3095D+02	1.1122D+02	3.4538D-01	4.8303D+05	7.9839D+03	1.0200D-04	5.9996D-11	7.0637D-11	1.4440D+06
3970	4.8896D+05	1.3095D+02	1.1128D+02	3.5837D-01	4.8256D+05	7.9749D+03	1.0197D-04	6.0392D-11	7.1065D-11	1.4348D+06
3980	4.9027D+05	1.3095D+02	1.1134D+02	3.7177D-01	4.8209D+05	7.9660D+03	1.0193D-04	6.0791D-11	7.1495D-11	1.4257D+06
3990	4.9158D+05	1.3095D+02	1.1140D+02	3.8559D-01	4.8162D+05	7.9570D+03	1.0190D-04	6.1191D-11	7.1928D-11	1.4167D+06
4000	4.9289D+05	1.3095D+02	1.1146D+02	3.9984D-01	4.8115D+05	7.9480D+03	1.0186D-04	6.1594D-11	7.2363D-11	1.4077D+06
4010	4.9420D+05	1.3095D+02	1.1152D+02	4.1452D-01	4.8068D+05	7.9390D+03	1.0183D-04	6.2000D-11	7.2800D-11	1.3987D+06
4020	4.9551D+05	1.3095D+02	1.1158D+02	4.2965D-01	4.8022D+05	7.9300D+03	1.0179D-04	6.2407D-11	7.3239D-11	1.3899D+06
4030	4.9682D+05	1.3095D+02	1.1164D+02	4.4523D-01	4.7975D+05	7.9210D+03	1.0176D-04	6.2817D-11	7.3681D-11	1.3811D+06
4040	4.9813D+05	1.3095D+02	1.1170D+02	4.6129D-01	4.7928D+05	7.9120D+03	1.0172D-04	6.3230D-11	7.4125D-11	1.3723D+06
4050	4.9944D+05	1.3095D+02	1.1176D+02	4.7782D-01	4.7881D+05	7.9031D+03	1.0169D-04	6.3644D-11	7.4572D-11	1.3637D+06
4060	5.0075D+05	1.3095D+02	1.1182D+02	4.9484D-01	4.7834D+05	7.8941D+03	1.0166D-04	6.4061D-11	7.5021D-11	1.3550D+06
4070	5.0206D+05	1.3095D+02	1.1188D+02	5.1236D-01	4.7787D+05	7.8851D+03	1.0162D-04	6.4481D-11	7.5472D-11	1.3465D+06
4080	5.0336D+05	1.3095D+02	1.1194D+02	5.3040D-01	4.7740D+05	7.8761D+03	1.0159D-04	6.4902D-11	7.5926D-11	1.3380D+06
4090	5.0467D+05	1.3095D+02	1.1200D+02	5.4896D-01	4.7693D+05	7.8671D+03	1.0155D-04	6.5327D-11	7.6383D-11	1.3295D+06
4100	5.0598D+05	1.3095D+02	1.1205D+02	5.6805D-01	4.7646D+05	7.8581D+03	1.0152D-04	6.5753D-11	7.6841D-11	1.3211D+06
4110	5.0729D+05	1.3095D+02	1.1211D+02	5.8769D-01	4.7600D+05	7.8491D+03	1.0148D-04	6.6183D-11	7.7303D-11	1.3128D+06
4120	5.0860D+05	1.3095D+02	1.1217D+02	6.0789D-01	4.7553D+05	7.8401D+03	1.0145D-04	6.6614D-11	7.7767D-11	1.3045D+06
4130	5.0991D+05	1.3095D+02	1.1223D+02	6.2866D-01	4.7506D+05	7.8312D+03	1.0141D-04	6.7048D-11	7.8233D-11	1.2963D+06
4140	5.1122D+05	1.3095D+02	1.1229D+02	6.5001D-01	4.7459D+05	7.8222D+03	1.0138D-04	6.7485D-11	7.8702D-11	1.2882D+06
4150	5.1253D+05	1.3095D+02	1.1234D+02	6.7196D-01	4.7412D+05	7.8132D+03	1.0135D-04	6.7924D-11	7.9174D-11	1.2800D+06

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	DH (J/MOL)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (1/PA)
4160	5.1384D+05	1.3095D+02	1.1240D+02	6.9451D-01	4.7365D+05	7.8042D+03	1.0131D-04	6.8366D-11	7.9648D-11	1.2720D+06
4170	5.1515D+05	1.3095D+02	1.1246D+02	7.1768D-01	4.7318D+05	7.7952D+03	1.0128D-04	6.8811D-11	8.0125D-11	1.2640D+06
4180	5.1646D+05	1.3095D+02	1.1252D+02	7.4149D-01	4.7271D+05	7.7862D+03	1.0124D-04	6.9258D-11	8.0605D-11	1.2560D+06
4190	5.1777D+05	1.3095D+02	1.1257D+02	7.6594D-01	4.7224D+05	7.7772D+03	1.0121D-04	6.9707D-11	8.1087D-11	1.2482D+06
4200	5.1908D+05	1.3095D+02	1.1263D+02	7.9106D-01	4.7178D+05	7.7683D+03	1.0118D-04	7.0160D-11	8.1572D-11	1.2403D+06
4210	5.2039D+05	1.3095D+02	1.1269D+02	8.1684D-01	4.7131D+05	7.7593D+03	1.0114D-04	7.0615D-11	8.2060D-11	1.2325D+06
4220	5.2170D+05	1.3095D+02	1.1274D+02	8.4331D-01	4.7084D+05	7.7503D+03	1.0111D-04	7.1073D-11	8.2551D-11	1.2248D+06
4230	5.2301D+05	1.3095D+02	1.1280D+02	8.7048D-01	4.7037D+05	7.7413D+03	1.0107D-04	7.1533D-11	8.3044D-11	1.2171D+06
4240	5.2432D+05	1.3095D+02	1.1286D+02	8.9836D-01	4.6990D+05	7.7323D+03	1.0104D-04	7.1997D-11	8.3540D-11	1.2095D+06
4250	5.2563D+05	1.3095D+02	1.1291D+02	9.2696D-01	4.6943D+05	7.7233D+03	1.0101D-04	7.2463D-11	8.4039D-11	1.2019D+06
4260	5.2694D+05	1.3095D+02	1.1297D+02	9.5631D-01	4.6896D+05	7.7143D+03	1.0097D-04	7.2932D-11	8.4541D-11	1.1943D+06
4270	5.2825D+05	1.3095D+02	1.1302D+02	9.8641D-01	4.6849D+05	7.7053D+03	1.0094D-04	7.3404D-11	8.5046D-11	1.1869D+06
4280	5.2955D+05	1.3095D+02	1.1308D+02	1.0173D+00	4.6802D+05	7.6964D+03	1.0090D-04	7.3878D-11	8.5554D-11	1.1794D+06
4290	5.3086D+05	1.3095D+02	1.1314D+02	1.0489D+00	4.6755D+05	7.6874D+03	1.0087D-04	7.4356D-11	8.6065D-11	1.1720D+06
4300	5.3217D+05	1.3095D+02	1.1319D+02	1.0814D+00	4.6709D+05	7.6784D+03	1.0084D-04	7.4837D-11	8.6578D-11	1.1647D+06
4310	5.3348D+05	1.3095D+02	1.1325D+02	1.1147D+00	4.6662D+05	7.6694D+03	1.0080D-04	7.5320D-11	8.7095D-11	1.1574D+06
4320	5.3479D+05	1.3095D+02	1.1330D+02	1.1487D+00	4.6615D+05	7.6604D+03	1.0077D-04	7.5807D-11	8.7615D-11	1.1501D+06
4330	5.3610D+05	1.3095D+02	1.1336D+02	1.1837D+00	4.6568D+05	7.6514D+03	1.0073D-04	7.6296D-11	8.8138D-11	1.1429D+06
4340	5.3741D+05	1.3095D+02	1.1341D+02	1.2195D+00	4.6521D+05	7.6424D+03	1.0070D-04	7.6789D-11	8.8663D-11	1.1358D+06
4350	5.3872D+05	1.3095D+02	1.1347D+02	1.2561D+00	4.6474D+05	7.6335D+03	1.0067D-04	7.7284D-11	8.9192D-11	1.1286D+06
4360	5.4003D+05	1.3095D+02	1.1352D+02	1.2937D+00	4.6427D+05	7.6245D+03	1.0063D-04	7.7783D-11	8.9725D-11	1.1216D+06
4370	5.4134D+05	1.3095D+02	1.1358D+02	1.3321D+00	4.6380D+05	7.6155D+03	1.0060D-04	7.8285D-11	9.0260D-11	1.1145D+06
4380	5.4265D+05	1.3095D+02	1.1363D+02	1.3715D+00	4.6333D+05	7.6065D+03	1.0057D-04	7.8790D-11	9.0798D-11	1.1076D+06
4390	5.4396D+05	1.3095D+02	1.1369D+02	1.4118D+00	4.6287D+05	7.5975D+03	1.0053D-04	7.9298D-11	9.1340D-11	1.1006D+06
4400	5.4527D+05	1.3095D+02	1.1374D+02	1.4531D+00	4.6240D+05	7.5885D+03	1.0050D-04	7.9809D-11	9.1885D-11	1.0937D+06
4410	5.4658D+05	1.3095D+02	1.1379D+02	1.4953D+00	4.6193D+05	7.5795D+03	1.0046D-04	8.0324D-11	9.2433D-11	1.0869D+06

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	DH (J/MOL)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (1/PA)
4420	5.4789D+05	1.3095D+02	1.1385D+02	1.5385D+00	4.6146D+05	7.5705D+03	1.0043D-04	8.0842D-11	9.2985D-11	1.0801D+06
4430	5.4920D+05	1.3095D+02	1.1390D+02	1.5827D+00	4.6099D+05	7.5616D+03	1.0040D-04	8.1363D-11	9.3540D-11	1.0733D+06
4440	5.5051D+05	1.3095D+02	1.1396D+02	1.6280D+00	4.6052D+05	7.5526D+03	1.0036D-04	8.1898D-11	9.4099D-11	1.0666D+06
4450	5.5182D+05	1.3095D+02	1.1401D+02	1.6742D+00	4.6005D+05	7.5436D+03	1.0033D-04	8.2416D-11	9.4660D-11	1.0599D+06
4460	5.5313D+05	1.3095D+02	1.1406D+02	1.7215D+00	4.5958D+05	7.5346D+03	1.0030D-04	8.2947D-11	9.5226D-11	1.0532D+06
4470	5.5444D+05	1.3095D+02	1.1412D+02	1.7699D+00	4.5911D+05	7.5256D+03	1.0026D-04	8.3482D-11	9.5794D-11	1.0466D+06
4480	5.5574D+05	1.3095D+02	1.1417D+02	1.8194D+00	4.5865D+05	7.5166D+03	1.0023D-04	8.4020D-11	9.6367D-11	1.0401D+06
4490	5.5705D+05	1.3095D+02	1.1423D+02	1.8699D+00	4.5818D+05	7.5076D+03	1.0020D-04	8.4562D-11	9.6943D-11	1.0336D+06
4500	5.5836D+05	1.3095D+02	1.1428D+02	1.9216D+00	4.5771D+05	7.4987D+03	1.0016D-04	8.5107D-11	9.7522D-11	1.0271D+06
4510	5.5967D+05	1.3095D+02	1.1433D+02	1.9744D+00	4.5724D+05	7.4897D+03	1.0013D-04	8.5656D-11	9.8105D-11	1.0206D+06
4520	5.6098D+05	1.3095D+02	1.1439D+02	2.0284D+00	4.5677D+05	7.4807D+03	1.0010D-04	8.6209D-11	9.8692D-11	1.0142D+06
4530	5.6229D+05	1.3095D+02	1.1444D+02	2.0835D+00	4.5630D+05	7.4717D+03	1.0006D-04	8.6765D-11	9.9282D-11	1.0079D+06
4540	5.6360D+05	1.3095D+02	1.1449D+02	2.1398D+00	4.5583D+05	7.4627D+03	1.0003D-04	8.7325D-11	9.9877D-11	1.0015D+06
4550	5.6491D+05	1.3095D+02	1.1455D+02	2.1973D+00	4.5536D+05	7.4537D+03	9.9995D-05	8.7888D-11	1.0047D-10	9.9523D+05
4560	5.6622D+05	1.3095D+02	1.1460D+02	2.2561D+00	4.5489D+05	7.4447D+03	9.9962D-05	8.8455D-11	1.0108D-10	9.8897D+05
4570	5.6753D+05	1.3095D+02	1.1465D+02	2.3160D+00	4.5442D+05	7.4357D+03	9.9929D-05	8.9027D-11	1.0168D-10	9.8276D+05
4580	5.6884D+05	1.3095D+02	1.1470D+02	2.3773D+00	4.5396D+05	7.4268D+03	9.9895D-05	8.9602D-11	1.0229D-10	9.7658D+05
4590	5.7015D+05	1.3095D+02	1.1476D+02	2.4398D+00	4.5349D+05	7.4178D+03	9.9862D-05	9.0180D-11	1.0290D-10	9.7043D+05
4600	5.7146D+05	1.3095D+02	1.1481D+02	2.5036D+00	4.5302D+05	7.4088D+03	9.9829D-05	9.0763D-11	1.0352D-10	9.6432D+05
4610	5.7277D+05	1.3095D+02	1.1486D+02	2.5687D+00	4.5255D+05	7.3998D+03	9.9796D-05	9.1350D-11	1.0414D-10	9.5825D+05
4620	5.7408D+05	1.3095D+02	1.1492D+02	2.6352D+00	4.5208D+05	7.3908D+03	9.9762D-05	9.1940D-11	1.0477D-10	9.5221D+05
4630	5.7539D+05	1.3095D+02	1.1497D+02	2.7030D+00	4.5161D+05	7.3818D+03	9.9729D-05	9.2535D-11	1.0540D-10	9.4621D+05
4640	5.7670D+05	1.3095D+02	1.1502D+02	2.7722D+00	4.5114D+05	7.3728D+03	9.9696D-05	9.3134D-11	1.0603D-10	9.4024D+05
4650	5.7801D+05	1.3095D+02	1.1507D+02	2.8427D+00	4.5067D+05	7.3639D+03	9.9663D-05	9.3737D-11	1.0667D-10	9.3431D+05
4660	5.7932D+05	1.3095D+02	1.1512D+02	2.9147D+00	4.5020D+05	7.3549D+03	9.9630D-05	9.4344D-11	1.0731D-10	9.2841D+05
4670	5.8063D+05	1.3095D+02	1.1518D+02	2.9881D+00	4.4974D+05	7.3459D+03	9.9597D-05	9.4955D-11	1.0796D-10	9.2255D+05

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	DH (J/MOL)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (1/PA)
4680	5.8193D+05	1.3095D+02	1.1523D+02	3.0629D+00	4.4927D+05	7.3369D+03	9.9564D-05	9.5570D-11	1.0861D-10	9.1671D+05
4690	5.8324D+05	1.3095D+02	1.1528D+02	3.1392D+00	4.4880D+05	7.3279D+03	9.9531D-05	9.6190D-11	1.0926D-10	9.1092D+05
4700	5.8455D+05	1.3095D+02	1.1533D+02	3.2170D+00	4.4833D+05	7.3189D+03	9.9498D-05	9.6814D-11	1.0992D-10	9.0515D+05
4710	5.8586D+05	1.3095D+02	1.1538D+02	3.2963D+00	4.4786D+05	7.3099D+03	9.9465D-05	9.7443D-11	1.1059D-10	8.9942D+05
4720	5.8717D+05	1.3095D+02	1.1544D+02	3.3771D+00	4.4739D+05	7.3009D+03	9.9432D-05	9.8076D-11	1.1126D-10	8.9372D+05
4730	5.8848D+05	1.3095D+02	1.1549D+02	3.4594D+00	4.4692D+05	7.2920D+03	9.9399D-05	9.8713D-11	1.1193D-10	8.8806D+05
4740	5.8979D+05	1.3095D+02	1.1554D+02	3.5433D+00	4.4645D+05	7.2830D+03	9.9366D-05	9.9355D-11	1.1261D-10	8.8242D+05
4750	5.9110D+05	1.3095D+02	1.1559D+02	3.6288D+00	4.4598D+05	7.2740D+03	9.9333D-05	1.0000D-10	1.1329D-10	8.7682D+05
4760	5.9241D+05	1.3095D+02	1.1564D+02	3.7159D+00	4.4551D+05	7.2650D+03	9.9300D-05	1.0065D-10	1.1397D-10	8.7125D+05
4770	5.9372D+05	1.3095D+02	1.1569D+02	3.8046D+00	4.4505D+05	7.2560D+03	9.9267D-05	1.0131D-10	1.1467D-10	8.6571D+05
4780	5.9503D+05	1.3095D+02	1.1575D+02	3.8949D+00	4.4458D+05	7.2470D+03	9.9234D-05	1.0197D-10	1.1536D-10	8.6020D+05
4790	5.9634D+05	1.3095D+02	1.1580D+02	3.9869D+00	4.4411D+05	7.2380D+03	9.9202D-05	1.0263D-10	1.1606D-10	8.5472D+05
4800	5.9765D+05	1.3095D+02	1.1585D+02	4.0805D+00	4.4364D+05	7.2291D+03	9.9169D-05	1.0330D-10	1.1677D-10	8.4927D+05
4810	5.9896D+05	1.3095D+02	1.1590D+02	4.1759D+00	4.4317D+05	7.2201D+03	9.9136D-05	1.0398D-10	1.1748D-10	8.4385D+05
4820	6.0027D+05	1.3095D+02	1.1595D+02	4.2729D+00	4.4270D+05	7.2111D+03	9.9103D-05	1.0466D-10	1.1820D-10	8.3847D+05
4830	6.0158D+05	1.3095D+02	1.1600D+02	4.3717D+00	4.4223D+05	7.2021D+03	9.9071D-05	1.0534D-10	1.1892D-10	8.3311D+05
4840	6.0289D+05	1.3095D+02	1.1605D+02	4.4723D+00	4.4176D+05	7.1931D+03	9.9038D-05	1.0603D-10	1.1964D-10	8.2778D+05
4850	6.0420D+05	1.3095D+02	1.1611D+02	4.5746D+00	4.4129D+05	7.1841D+03	9.9005D-05	1.0673D-10	1.2037D-10	8.2248D+05
4860	6.0551D+05	1.3095D+02	1.1616D+02	4.6787D+00	4.4083D+05	7.1751D+03	9.8973D-05	1.0743D-10	1.2111D-10	8.1721D+05
4870	6.0682D+05	1.3095D+02	1.1621D+02	4.7847D+00	4.4036D+05	7.1661D+03	9.8940D-05	1.0813D-10	1.2185D-10	8.1197D+05
4880	6.0812D+05	1.3095D+02	1.1626D+02	4.8924D+00	4.3989D+05	7.1572D+03	9.8907D-05	1.0884D-10	1.2260D-10	8.0675D+05
4890	6.0943D+05	1.3095D+02	1.1631D+02	5.0021D+00	4.3942D+05	7.1482D+03	9.8875D-05	1.0956D-10	1.2335D-10	8.0157D+05
4900	6.1074D+05	1.3095D+02	1.1636D+02	5.1136D+00	4.3895D+05	7.1392D+03	9.8842D-05	1.1028D-10	1.2411D-10	7.9641D+05
4910	6.1205D+05	1.3095D+02	1.1641D+02	5.2269D+00	4.3848D+05	7.1302D+03	9.8810D-05	1.1101D-10	1.2487D-10	7.9128D+05
4920	6.1336D+05	1.3095D+02	1.1646D+02	5.3422D+00	4.3801D+05	7.1212D+03	9.8777D-05	1.1174D-10	1.2564D-10	7.8618D+05
4930	6.1467D+05	1.3095D+02	1.1651D+02	5.4595D+00	4.3754D+05	7.1122D+03	9.8745D-05	1.1248D-10	1.2642D-10	7.8111D+05

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	DH (J/MOL)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (1/PA)
4940	6.1598D+05	1.3095D+02	1.1656D+02	5.5787D+00	4.3707D+05	7.1032D+03	9.8712D-05	1.1322D-10	1.2720D-10	7.7606D+05
4950	6.1729D+05	1.3095D+02	1.1661D+02	5.6998D+00	4.3661D+05	7.0943D+03	9.8680D-05	1.1397D-10	1.2798D-10	7.7104D+05
4960	6.1860D+05	1.3095D+02	1.1666D+02	5.8230D+00	4.3614D+05	7.0853D+03	9.8647D-05	1.1473D-10	1.2877D-10	7.6605D+05
4970	6.1991D+05	1.3095D+02	1.1672D+02	5.9481D+00	4.3567D+05	7.0763D+03	9.8615D-05	1.1549D-10	1.2957D-10	7.6108D+05
4980	6.2122D+05	1.3095D+02	1.1677D+02	6.0753D+00	4.3520D+05	7.0673D+03	9.8582D-05	1.1625D-10	1.3037D-10	7.5614D+05
4990	6.2253D+05	1.3095D+02	1.1682D+02	6.2046D+00	4.3473D+05	7.0583D+03	9.8550D-05	1.1703D-10	1.3118D-10	7.5123D+05
5000	6.2384D+05	1.3095D+02	1.1687D+02	6.3359D+00	4.3426D+05	7.0493D+03	9.8518D-05	1.1780D-10	1.3200D-10	7.4634D+05
5010	6.2515D+05	1.3095D+02	1.1692D+02	6.4693D+00	4.3379D+05	7.0403D+03	9.8485D-05	1.1859D-10	1.3282D-10	7.4148D+05
5020	6.2646D+05	1.3095D+02	1.1697D+02	6.6049D+00	4.3332D+05	7.0313D+03	9.8453D-05	1.1938D-10	1.3365D-10	7.3664D+05
5030	6.2777D+05	1.3095D+02	1.1702D+02	6.7425D+00	4.3285D+05	7.0224D+03	9.8421D-05	1.2018D-10	1.3448D-10	7.3183D+05
5040	6.2908D+05	1.3095D+02	1.1707D+02	6.8823D+00	4.3238D+05	7.0134D+03	9.8388D-05	1.2098D-10	1.3533D-10	7.2705D+05
5050	6.3039D+05	1.3095D+02	1.1712D+02	7.0243D+00	4.3192D+05	7.0044D+03	9.8356D-05	1.2179D-10	1.3617D-10	7.2229D+05
5060	6.3170D+05	1.3095D+02	1.1717D+02	7.1685D+00	4.3145D+05	6.9954D+03	9.8324D-05	1.2261D-10	1.3703D-10	7.1755D+05
5070	6.3301D+05	1.3095D+02	1.1722D+02	7.3149D+00	4.3098D+05	6.9864D+03	9.8292D-05	1.2343D-10	1.3789D-10	7.1284D+05
5080	6.3431D+05	1.3095D+02	1.1727D+02	7.4635D+00	4.3051D+05	6.9774D+03	9.8259D-05	1.2426D-10	1.3875D-10	7.0815D+05
5090	6.3562D+05	1.3095D+02	1.1732D+02	7.6144D+00	4.3004D+05	6.9684D+03	9.8227D-05	1.2510D-10	1.3963D-10	7.0349D+05
5100	6.3693D+05	1.3095D+02	1.1737D+02	7.7676D+00	4.2957D+05	6.9595D+03	9.8195D-05	1.2594D-10	1.4051D-10	6.9885D+05
5110	6.3824D+05	1.3095D+02	1.1742D+02	7.9230D+00	4.2910D+05	6.9505D+03	9.8163D-05	1.2679D-10	1.4140D-10	6.9423D+05
5120	6.3955D+05	1.3095D+02	1.1747D+02	8.0808D+00	4.2863D+05	6.9415D+03	9.8131D-05	1.2765D-10	1.4229D-10	6.8964D+05
5130	6.4086D+05	1.3095D+02	1.1752D+02	8.2408D+00	4.2816D+05	6.9325D+03	9.8099D-05	1.2851D-10	1.4319D-10	6.8507D+05
5140	6.4217D+05	1.3095D+02	1.1757D+02	8.4033D+00	4.2770D+05	6.9235D+03	9.8067D-05	1.2938D-10	1.4410D-10	6.8053D+05
5150	6.4348D+05	1.3095D+02	1.1762D+02	8.5681D+00	4.2723D+05	6.9145D+03	9.8035D-05	1.3026D-10	1.4502D-10	6.7601D+05
5160	6.4479D+05	1.3095D+02	1.1767D+02	8.7353D+00	4.2676D+05	6.9055D+03	9.8003D-05	1.3115D-10	1.4594D-10	6.7151D+05
5170	6.4610D+05	1.3095D+02	1.1772D+02	8.9049D+00	4.2629D+05	6.8965D+03	9.7971D-05	1.3204D-10	1.4688D-10	6.6703D+05
5180	6.4741D+05	1.3095D+02	1.1777D+02	9.0769D+00	4.2582D+05	6.8876D+03	9.7939D-05	1.3294D-10	1.4781D-10	6.6258D+05
5190	6.4872D+05	1.3095D+02	1.1782D+02	9.2514D+00	4.2535D+05	6.8786D+03	9.7907D-05	1.3385D-10	1.4876D-10	6.5815D+05

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	DH (J/MOL)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (1/PA)
5200	6.5003D+05	1.3095D+02	1.1787D+02	9.4283D+00	4.2488D+05	6.8696D+03	9.7875D-05	1.3476D-10	1.4972D-10	6.5374D+05
5210	6.5134D+05	1.3095D+02	1.1792D+02	9.6077D+00	4.2441D+05	6.8606D+03	9.7843D-05	1.3569D-10	1.5068D-10	6.4935D+05
5220	6.5265D+05	1.3095D+02	1.1797D+02	9.7897D+00	4.2394D+05	6.8516D+03	9.7811D-05	1.3662D-10	1.5165D-10	6.4499D+05
5230	6.5396D+05	1.3095D+02	1.1802D+02	9.9741D+00	4.2348D+05	6.8426D+03	9.7779D-05	1.3756D-10	1.5263D-10	6.4064D+05
5240	6.5527D+05	1.3095D+02	1.1807D+02	1.0161D+01	4.2301D+05	6.8336D+03	9.7747D-05	1.3851D-10	1.5361D-10	6.3632D+05
5250	6.5658D+05	1.3095D+02	1.1812D+02	1.0351D+01	4.2254D+05	6.8247D+03	9.7715D-05	1.3946D-10	1.5461D-10	6.3202D+05
5260	6.5789D+05	1.3095D+02	1.1817D+02	1.0543D+01	4.2207D+05	6.8157D+03	9.7684D-05	1.4043D-10	1.5561D-10	6.2774D+05
5270	6.5920D+05	1.3095D+02	1.1822D+02	1.0738D+01	4.2160D+05	6.8067D+03	9.7652D-05	1.4140D-10	1.5662D-10	6.2348D+05
5280	6.6050D+05	1.3095D+02	1.1827D+02	1.0935D+01	4.2113D+05	6.7977D+03	9.7620D-05	1.4238D-10	1.5764D-10	6.1925D+05
5290	6.6181D+05	1.3095D+02	1.1832D+02	1.1135D+01	4.2066D+05	6.7887D+03	9.7588D-05	1.4337D-10	1.5867D-10	6.1503D+05
5300	6.6312D+05	1.3095D+02	1.1837D+02	1.1338D+01	4.2019D+05	6.7797D+03	9.7556D-05	1.4437D-10	1.5971D-10	6.1084D+05
5310	6.6443D+05	1.3095D+02	1.1842D+02	1.1543D+01	4.1972D+05	6.7707D+03	9.7525D-05	1.4538D-10	1.6076D-10	6.0666D+05
5320	6.6574D+05	1.3095D+02	1.1847D+02	1.1751D+01	4.1925D+05	6.7618D+03	9.7493D-05	1.4639D-10	1.6181D-10	6.0251D+05
5330	6.6705D+05	1.3095D+02	1.1852D+02	1.1962D+01	4.1879D+05	6.7528D+03	9.7461D-05	1.4742D-10	1.6288D-10	5.9837D+05
5340	6.6836D+05	1.3095D+02	1.1857D+02	1.2175D+01	4.1832D+05	6.7438D+03	9.7430D-05	1.4845D-10	1.6395D-10	5.9426D+05
5350	6.6967D+05	1.3095D+02	1.1862D+02	1.2391D+01	4.1785D+05	6.7348D+03	9.7398D-05	1.4950D-10	1.6504D-10	5.9016D+05
5360	6.7098D+05	1.3095D+02	1.1867D+02	1.2610D+01	4.1738D+05	6.7258D+03	9.7366D-05	1.5055D-10	1.6613D-10	5.8609D+05
5370	6.7229D+05	1.3095D+02	1.1872D+02	1.2832D+01	4.1691D+05	6.7168D+03	9.7335D-05	1.5161D-10	1.6723D-10	5.8203D+05
5380	6.7360D+05	1.3095D+02	1.1877D+02	1.3056D+01	4.1644D+05	6.7078D+03	9.7303D-05	1.5269D-10	1.6834D-10	5.7800D+05
5390	6.7491D+05	1.3095D+02	1.1882D+02	1.3284D+01	4.1597D+05	6.6988D+03	9.7272D-05	1.5377D-10	1.6947D-10	5.7398D+05
5400	6.7622D+05	1.3095D+02	1.1887D+02	1.3514D+01	4.1550D+05	6.6899D+03	9.7240D-05	1.5486D-10	1.7060D-10	5.6999D+05
5410	6.7753D+05	1.3095D+02	1.1892D+02	1.3747D+01	4.1503D+05	6.6809D+03	9.7209D-05	1.5596D-10	1.7174D-10	5.6601D+05
5420	6.7884D+05	1.3095D+02	1.1897D+02	1.3983D+01	4.1457D+05	6.6719D+03	9.7177D-05	1.5708D-10	1.7290D-10	5.6205D+05
5430	6.8015D+05	1.3095D+02	1.1902D+02	1.4222D+01	4.1410D+05	6.6629D+03	9.7146D-05	1.5820D-10	1.7406D-10	5.5811D+05
5440	6.8146D+05	1.3095D+02	1.1907D+02	1.4463D+01	4.1363D+05	6.6539D+03	9.7114D-05	1.5934D-10	1.7524D-10	5.5419D+05
5450	6.8277D+05	1.3095D+02	1.1912D+02	1.4708D+01	4.1316D+05	6.6449D+03	9.7083D-05	1.6048D-10	1.7642D-10	5.5029D+05

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	DH (J/MOL)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (1/PA)
5460	6.8408D+05	1.3095D+02	1.1917D+02	1.4955D+01	4.1269D+05	6.6359D+03	9.7051D-05	1.6164D-10	1.7762D-10	5.4640D+05
5470	6.8539D+05	1.3095D+02	1.1922D+02	1.5206D+01	4.1222D+05	6.6270D+03	9.7020D-05	1.6281D-10	1.7883D-10	5.4254D+05
5480	6.8669D+05	1.3095D+02	1.1927D+02	1.5459D+01	4.1175D+05	6.6180D+03	9.6989D-05	1.6398D-10	1.8005D-10	5.3869D+05
5490	6.8800D+05	1.3095D+02	1.1932D+02	1.5716D+01	4.1128D+05	6.6090D+03	9.6957D-05	1.6517D-10	1.8128D-10	5.3486D+05
5500	6.8931D+05	1.3095D+02	1.1937D+02	1.5975D+01	4.1081D+05	6.6000D+03	9.6926D-05	1.6637D-10	1.8252D-10	5.3105D+05
5510	6.9062D+05	1.3095D+02	1.1942D+02	1.6238D+01	4.1035D+05	6.5910D+03	9.6895D-05	1.6759D-10	1.8377D-10	5.2725D+05
5520	6.9193D+05	1.3095D+02	1.1947D+02	1.6503D+01	4.0988D+05	6.5820D+03	9.6863D-05	1.6881D-10	1.8504D-10	5.2348D+05
5530	6.9324D+05	1.3095D+02	1.1952D+02	1.6772D+01	4.0941D+05	6.5730D+03	9.6832D-05	1.7005D-10	1.8632D-10	5.1972D+05
5540	6.9455D+05	1.3095D+02	1.1957D+02	1.7043D+01	4.0894D+05	6.5640D+03	9.6801D-05	1.7130D-10	1.8761D-10	5.1598D+05
5550	6.9586D+05	1.3095D+02	1.1962D+02	1.7318D+01	4.0847D+05	6.5551D+03	9.6770D-05	1.7256D-10	1.8891D-10	5.1225D+05
5560	6.9717D+05	1.3095D+02	1.1967D+02	1.7596D+01	4.0800D+05	6.5461D+03	9.6739D-05	1.7384D-10	1.9023D-10	5.0855D+05
5570	6.9848D+05	1.3095D+02	1.1972D+02	1.7876D+01	4.0753D+05	6.5371D+03	9.6707D-05	1.7512D-10	1.9155D-10	5.0486D+05
5580	6.9979D+05	1.3095D+02	1.1977D+02	1.8160D+01	4.0706D+05	6.5281D+03	9.6676D-05	1.7642D-10	1.9290D-10	5.0118D+05
5590	7.0110D+05	1.3095D+02	1.1982D+02	1.8448D+01	4.0659D+05	6.5191D+03	9.6645D-05	1.7774D-10	1.9425D-10	4.9753D+05
5600	7.0241D+05	1.3095D+02	1.1987D+02	1.8738D+01	4.0612D+05	6.5101D+03	9.6614D-05	1.7906D-10	1.9562D-10	4.9389D+05
5610	7.0372D+05	1.3095D+02	1.1992D+02	1.9031D+01	4.0566D+05	6.5011D+03	9.6583D-05	1.8040D-10	1.9700D-10	4.9026D+05
5620	7.0503D+05	1.3095D+02	1.1997D+02	1.9328D+01	4.0519D+05	6.4922D+03	9.6552D-05	1.8176D-10	1.9840D-10	4.8666D+05
5630	7.0634D+05	1.3095D+02	1.2002D+02	1.9628D+01	4.0472D+05	6.4832D+03	9.6521D-05	1.8313D-10	1.9981D-10	4.8307D+05
5640	7.0765D+05	1.3095D+02	1.2007D+02	1.9931D+01	4.0425D+05	6.4742D+03	9.6490D-05	1.8451D-10	2.0123D-10	4.7949D+05
5650	7.0896D+05	1.3095D+02	1.2012D+02	2.0237D+01	4.0378D+05	6.4652D+03	9.6459D-05	1.8590D-10	2.0267D-10	4.7594D+05
5660	7.1027D+05	1.3095D+02	1.2017D+02	2.0546D+01	4.0331D+05	6.4562D+03	9.6428D-05	1.8732D-10	2.0413D-10	4.7239D+05
5670	7.1158D+05	1.3095D+02	1.2022D+02	2.0859D+01	4.0284D+05	6.4472D+03	9.6397D-05	1.8874D-10	2.0559D-10	4.6887D+05
5680	7.1288D+05	1.3095D+02	1.2027D+02	2.1175D+01	4.0237D+05	6.4382D+03	9.6366D-05	1.9018D-10	2.0708D-10	4.6536D+05
5690	7.1419D+05	1.3095D+02	1.2032D+02	2.1494D+01	4.0190D+05	6.4292D+03	9.6335D-05	1.9164D-10	2.0858D-10	4.6186D+05
5700	7.1550D+05	1.3095D+02	1.2037D+02	2.1817D+01	4.0144D+05	6.4203D+03	9.6304D-05	1.9311D-10	2.1009D-10	4.5839D+05
5710	7.1681D+05	1.3095D+02	1.2042D+02	2.2143D+01	4.0097D+05	6.4113D+03	9.6273D-05	1.9460D-10	2.1162D-10	4.5492D+05

THERMODINAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	DH (J/MOL)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (1/PA)
5720	7.1812D+05	1.3095D+02	1.2047D+02	2.2472D+01	4.0050D+05	6.4023D+03	9.6242D-05	1.9611D-10	2.1317D-10	4.5147D+05
5730	7.1943D+05	1.3095D+02	1.2052D+02	2.2805D+01	4.0003D+05	6.3933D+03	9.6211D-05	1.9763D-10	2.1474D-10	4.4804D+05
5740	7.2074D+05	1.3095D+02	1.2057D+02	2.3140D+01	3.9956D+05	6.3843D+03	9.6180D-05	1.9917D-10	2.1632D-10	4.4462D+05
5750	7.2205D+05	1.3095D+02	1.2062D+02	2.3480D+01	3.9909D+05	6.3753D+03	9.6149D-05	2.0072D-10	2.1792D-10	4.4122D+05
5760	7.2336D+05	1.3095D+02	1.2067D+02	2.3822D+01	3.9862D+05	6.3663D+03	9.6119D-05	2.0229D-10	2.1953D-10	4.3783D+05
5770	7.2467D+05	1.3095D+02	1.2072D+02	2.4168D+01	3.9815D+05	6.3574D+03	9.6088D-05	2.0388D-10	2.2116D-10	4.3446D+05
5780	7.2598D+05	1.3095D+02	1.2077D+02	2.4517D+01	3.9768D+05	6.3484D+03	9.6057D-05	2.0549D-10	2.2282D-10	4.3110D+05
5790	7.2729D+05	1.3095D+02	1.2082D+02	2.4870D+01	3.9721D+05	6.3394D+03	9.6026D-05	2.0712D-10	2.2449D-10	4.2776D+05
5800	7.2860D+05	1.3095D+02	1.2087D+02	2.5226D+01	3.9675D+05	6.3304D+03	9.5996D-05	2.0876D-10	2.2617D-10	4.2443D+05
5810	7.2991D+05	1.3095D+02	1.2092D+02	2.5586D+01	3.9628D+05	6.3214D+03	9.5965D-05	2.1043D-10	2.2788D-10	4.2112D+05
5820	7.3122D+05	1.3095D+02	1.2097D+02	2.5949D+01	3.9581D+05	6.3124D+03	9.5934D-05	2.1211D-10	2.2961D-10	4.1782D+05
5830	7.3253D+05	1.3095D+02	1.2102D+02	2.6315D+01	3.9534D+05	6.3034D+03	9.5904D-05	2.1381D-10	2.3135D-10	4.1454D+05
5840	7.3384D+05	1.3095D+02	1.2107D+02	2.6685D+01	3.9487D+05	6.2944D+03	9.5873D-05	2.1553D-10	2.3312D-10	4.1126D+05
5850	7.3515D+05	1.3095D+02	1.2112D+02	2.7058D+01	3.9440D+05	6.2855D+03	9.5842D-05	2.1727D-10	2.3490D-10	4.0801D+05
5860	7.3646D+05	1.3095D+02	1.2117D+02	2.7435D+01	3.9393D+05	6.2765D+03	9.5812D-05	2.1904D-10	2.3671D-10	4.0476D+05
5870	7.3777D+05	1.3095D+02	1.2122D+02	2.7815D+01	3.9346D+05	6.2675D+03	9.5781D-05	2.2082D-10	2.3854D-10	4.0154D+05
5880	7.3907D+05	1.3095D+02	1.2127D+02	2.8199D+01	3.9299D+05	6.2585D+03	9.5751D-05	2.2262D-10	2.4039D-10	3.9832D+05
5890	7.4038D+05	1.3095D+02	1.2132D+02	2.8586D+01	3.9253D+05	6.2495D+03	9.5720D-05	2.2445D-10	2.4226D-10	3.9512D+05
5900	7.4169D+05	1.3095D+02	1.2137D+02	2.8977D+01	3.9206D+05	6.2405D+03	9.5689D-05	2.2630D-10	2.4415D-10	3.9193D+05
5910	7.4300D+05	1.3095D+02	1.2143D+02	2.9371D+01	3.9159D+05	6.2315D+03	9.5659D-05	2.2817D-10	2.4606D-10	3.8876D+05
5920	7.4431D+05	1.3095D+02	1.2148D+02	2.9769D+01	3.9112D+05	6.2226D+03	9.5628D-05	2.3006D-10	2.4800D-10	3.8560D+05
5930	7.4562D+05	1.3095D+02	1.2153D+02	3.0171D+01	3.9065D+05	6.2136D+03	9.5598D-05	2.3198D-10	2.4996D-10	3.8245D+05
5940	7.4693D+05	1.3095D+02	1.2158D+02	3.0575D+01	3.9018D+05	6.2046D+03	9.5567D-05	2.3392D-10	2.5195D-10	3.7932D+05
5950	7.4824D+05	1.3095D+02	1.2163D+02	3.0984D+01	3.8971D+05	6.1956D+03	9.5537D-05	2.3588D-10	2.5396D-10	3.7619D+05
5960	7.4955D+05	1.3095D+02	1.2168D+02	3.1396D+01	3.8924D+05	6.1866D+03	9.5507D-05	2.3787D-10	2.5599D-10	3.7309D+05
5970	7.5086D+05	1.3095D+02	1.2173D+02	3.1811D+01	3.8877D+05	6.1776D+03	9.5476D-05	2.3988D-10	2.5805D-10	3.6999D+05

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/MOL)	CP (J/MOL-K)	CV (J/MOL-K)	P (MPA)	DH (J/MOL)	RHO (KG/M**3)	ALPHAP (1/K)	BETAS (1/PA)	BETAT (1/PA)	GAMMAV (1/PA)
5980	7.5217D+05	1.3095D+02	1.2178D+02	3.2231D+01	3.8831D+05	6.1686D+03	9.5446D-05	2.4192D-10	2.6013D-10	3.6691D+05
5990	7.5348D+05	1.3095D+02	1.2183D+02	3.2653D+01	3.8784D+05	6.1596D+03	9.5416D-05	2.4399D-10	2.6224D-10	3.6384D+05
6000	7.5479D+05	1.3095D+02	1.2188D+02	3.3080D+01	3.8737D+05	6.1507D+03	9.5385D-05	2.4608D-10	2.6438D-10	3.6079D+05

TABULATED THERMODYNAMIC PROPERTIES
IN CGS UNITS

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (ATM/K)
298	0.0	2.3552D-01	2.3293D-01	0.0	1.0970D+01	2.1711D-05	4.9637D-07	5.0188D-07	4.3259D+01
300	4.3637D-01	2.3623D-01	2.3362D-01	0.0	1.0970D+01	2.1739D-05	4.9648D-07	5.0202D-07	4.3304D+01
310	2.8175D+00	2.3995D-01	2.3722D-01	0.0	1.0967D+01	2.1893D-05	4.9704D-07	5.0276D-07	4.3546D+01
320	5.2345D+00	2.4340D-01	2.4055D-01	0.0	1.0965D+01	2.2048D-05	4.9760D-07	5.0351D-07	4.3788D+01
330	7.6848D+00	2.4662D-01	2.4364D-01	0.0	1.0962D+01	2.2202D-05	4.9817D-07	5.0427D-07	4.4028D+01
340	1.0166D+01	2.4962D-01	2.4651D-01	0.0	1.0960D+01	2.2356D-05	4.9874D-07	5.0503D-07	4.4267D+01
350	1.2676D+01	2.5242D-01	2.4918D-01	0.0	1.0958D+01	2.2511D-05	4.9931D-07	5.0581D-07	4.4505D+01
360	1.5214D+01	2.5504D-01	2.5166D-01	0.0	1.0955D+01	2.2666D-05	4.9988D-07	5.0659D-07	4.4742D+01
370	1.7777D+01	2.5750D-01	2.5399D-01	0.0	1.0953D+01	2.2821D-05	5.0045D-07	5.0737D-07	4.4978D+01
380	2.0363D+01	2.5981D-01	2.5616D-01	0.0	1.0950D+01	2.2976D-05	5.0102D-07	5.0817D-07	4.5213D+01
390	2.2973D+01	2.6199D-01	2.5819D-01	0.0	1.0948D+01	2.3131D-05	5.0160D-07	5.0897D-07	4.5447D+01
400	2.5603D+01	2.6404D-01	2.6010D-01	3.6141D-70	1.0945D+01	2.3287D-05	5.0217D-07	5.0978D-07	4.5680D+01
410	2.8253D+01	2.6597D-01	2.6189D-01	2.9212D-68	1.0943D+01	2.3442D-05	5.0275D-07	5.1059D-07	4.5912D+01
420	3.0922D+01	2.6780D-01	2.6357D-01	1.9155D-66	1.0940D+01	2.3598D-05	5.0333D-07	5.1142D-07	4.6142D+01
430	3.3609D+01	2.6954D-01	2.6515D-01	1.0340D-64	1.0938D+01	2.3754D-05	5.0391D-07	5.1225D-07	4.6372D+01
440	3.6312D+01	2.7118D-01	2.6664D-01	4.6559D-63	1.0935D+01	2.3910D-05	5.0449D-07	5.1308D-07	4.6601D+01
450	3.9032D+01	2.7275D-01	2.6805D-01	1.7701D-61	1.0933D+01	2.4066D-05	5.0507D-07	5.1393D-07	4.6829D+01
460	4.1767D+01	2.7424D-01	2.6938D-01	5.7452D-60	1.0930D+01	2.4223D-05	5.0565D-07	5.1478D-07	4.7055D+01
470	4.4517D+01	2.7565D-01	2.7063D-01	1.6080D-58	1.0927D+01	2.4380D-05	5.0624D-07	5.1564D-07	4.7281D+01
480	4.7280D+01	2.7701D-01	2.7182D-01	3.9174D-57	1.0925D+01	2.4536D-05	5.0683D-07	5.1650D-07	4.7505D+01
490	5.0056D+01	2.7830D-01	2.7294D-01	8.3773D-56	1.0922D+01	2.4693D-05	5.0741D-07	5.1737D-07	4.7728D+01
500	5.2846D+01	2.7954D-01	2.7401D-01	1.5849D-54	1.0919D+01	2.4851D-05	5.0800D-07	5.1825D-07	4.7951D+01
510	5.5647D+01	2.8073D-01	2.7502D-01	2.6719D-53	1.0917D+01	2.5008D-05	5.0859D-07	5.1914D-07	4.8172D+01
520	5.8460D+01	2.8187D-01	2.7599D-01	4.0407D-52	1.0914D+01	2.5165D-05	5.0918D-07	5.2003D-07	4.8392D+01
530	6.1284D+01	2.8296D-01	2.7690D-01	5.5155D-51	1.0911D+01	2.5323D-05	5.0978D-07	5.2093D-07	4.8611D+01
540	6.4119D+01	2.8401D-01	2.7777D-01	6.8339D-50	1.0908D+01	2.5481D-05	5.1037D-07	5.2184D-07	4.8829D+01

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (ATM/K)
550	6.6964D+01	2.8502D-01	2.7860D-01	7.7268D-49	1.0906D+01	2.5639D-05	5.1097D-07	5.2275D-07	4.9046D+01
560	6.9820D+01	2.8600D-01	2.7939D-01	8.0115D-48	1.0903D+01	2.5797D-05	5.1156D-07	5.2367D-07	4.9261D+01
570	7.2684D+01	2.8694D-01	2.8014D-01	7.6523D-47	1.0900D+01	2.5955D-05	5.1216D-07	5.2460D-07	4.9476D+01
580	7.5558D+01	2.8785D-01	2.8086D-01	6.7619D-46	1.0897D+01	2.6114D-05	5.1276D-07	5.2554D-07	4.9689D+01
590	7.8441D+01	2.8873D-01	2.8154D-01	5.5497D-45	1.0894D+01	2.6272D-05	5.1336D-07	5.2648D-07	4.9902D+01
600	8.1333D+01	2.8959D-01	2.8219D-01	4.2462D-44	1.0892D+01	2.6431D-05	5.1397D-07	5.2743D-07	5.0113D+01
610	8.4233D+01	2.9041D-01	2.8282D-01	3.0392D-43	1.0889D+01	2.6590D-05	5.1457D-07	5.2839D-07	5.0323D+01
620	8.7141D+01	2.9121D-01	2.8341D-01	2.0414D-42	1.0886D+01	2.6749D-05	5.1518D-07	5.2936D-07	5.0531D+01
630	9.0057D+01	2.9199D-01	2.8398D-01	1.2908D-41	1.0883D+01	2.6908D-05	5.1579D-07	5.3033D-07	5.0739D+01
640	9.2981D+01	2.9275D-01	2.8453D-01	7.7046D-41	1.0880D+01	2.7068D-05	5.1639D-07	5.3131D-07	5.0945D+01
650	9.5912D+01	2.9348D-01	2.8505D-01	4.3528D-40	1.0877D+01	2.7227D-05	5.1700D-07	5.3230D-07	5.1151D+01
660	9.8850D+01	2.9420D-01	2.8555D-01	2.3335D-39	1.0874D+01	2.7387D-05	5.1762D-07	5.3329D-07	5.1355D+01
670	1.0180D+02	2.9490D-01	2.8603D-01	1.1898D-38	1.0871D+01	2.7547D-05	5.1823D-07	5.3430D-07	5.1558D+01
680	1.0475D+02	2.9558D-01	2.8649D-01	5.7825D-38	1.0868D+01	2.7707D-05	5.1884D-07	5.3531D-07	5.1759D+01
690	1.0771D+02	2.9624D-01	2.8693D-01	2.6845D-37	1.0865D+01	2.7867D-05	5.1946D-07	5.3633D-07	5.1960D+01
700	1.1067D+02	2.9689D-01	2.8735D-01	1.1928D-36	1.0862D+01	2.8028D-05	5.2008D-07	5.3735D-07	5.2159D+01
710	1.1365D+02	2.9753D-01	2.8775D-01	5.0819D-36	1.0859D+01	2.8188D-05	5.2069D-07	5.3839D-07	5.2357D+01
720	1.1662D+02	2.9815D-01	2.8813D-01	2.0797D-35	1.0856D+01	2.8349D-05	5.2131D-07	5.3943D-07	5.2554D+01
730	1.1961D+02	2.9875D-01	2.8850D-01	8.1885D-35	1.0853D+01	2.8510D-05	5.2194D-07	5.4048D-07	5.2750D+01
740	1.2260D+02	2.9935D-01	2.8886D-01	3.1069D-34	1.0850D+01	2.8671D-05	5.2256D-07	5.4154D-07	5.2944D+01
750	1.2560D+02	2.9993D-01	2.8920D-01	1.1376D-33	1.0847D+01	2.8832D-05	5.2318D-07	5.4260D-07	5.3137D+01
760	1.2860D+02	3.0050D-01	2.8952D-01	4.0257D-33	1.0844D+01	2.8994D-05	5.2381D-07	5.4368D-07	5.3329D+01
770	1.3161D+02	3.0106D-01	2.8983D-01	1.3786D-32	1.0840D+01	2.9155D-05	5.2444D-07	5.4476D-07	5.3519D+01
780	1.3462D+02	3.0161D-01	2.9013D-01	4.5741D-32	1.0837D+01	2.9317D-05	5.2507D-07	5.4585D-07	5.3709D+01
790	1.3764D+02	3.0215D-01	2.9041D-01	1.4723D-31	1.0834D+01	2.9479D-05	5.2570D-07	5.4695D-07	5.3897D+01
800	1.4066D+02	3.0268D-01	2.9069D-01	4.6026D-31	1.0831D+01	2.9641D-05	5.2633D-07	5.4805D-07	5.4083D+01

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (ATM/K)
810	1.4369D+02	3.0321D-01	2.9095D-01	1.3989D-30	1.0828D+01	2.9803D-05	5.2696D-07	5.4917D-07	5.4269D+01
820	1.4673D+02	3.0372D-01	2.9120D-01	4.1379D-30	1.0824D+01	2.9965D-05	5.2760D-07	5.5029D-07	5.4453D+01
830	1.4977D+02	3.0423D-01	2.9143D-01	1.1924D-29	1.0821D+01	3.0128D-05	5.2824D-07	5.5142D-07	5.4636D+01
840	1.5281D+02	3.0473D-01	2.9166D-01	3.3508D-29	1.0818D+01	3.0290D-05	5.2887D-07	5.5256D-07	5.4817D+01
850	1.5586D+02	3.0522D-01	2.9188D-01	9.1895D-29	1.0815D+01	3.0453D-05	5.2951D-07	5.5371D-07	5.4998D+01
860	1.5891D+02	3.0570D-01	2.9209D-01	2.4618D-28	1.0811D+01	3.0616D-05	5.3016D-07	5.5487D-07	5.5177D+01
870	1.6197D+02	3.0618D-01	2.9228D-01	6.4473D-28	1.0808D+01	3.0779D-05	5.3080D-07	5.5604D-07	5.5354D+01
880	1.6504D+02	3.0665D-01	2.9247D-01	1.6520D-27	1.0805D+01	3.0942D-05	5.3144D-07	5.5721D-07	5.5530D+01
890	1.6811D+02	3.0712D-01	2.9265D-01	4.1442D-27	1.0801D+01	3.1105D-05	5.3209D-07	5.5839D-07	5.5705D+01
900	1.7118D+02	3.0758D-01	2.9282D-01	1.0186D-26	1.0798D+01	3.1269D-05	5.3274D-07	5.5958D-07	5.5879D+01
910	1.7426D+02	3.0803D-01	2.9298D-01	2.4546D-26	1.0794D+01	3.1433D-05	5.3339D-07	5.6079D-07	5.6051D+01
920	1.7734D+02	3.0848D-01	2.9313D-01	5.8030D-26	1.0791D+01	3.1596D-05	5.3404D-07	5.6199D-07	5.6222D+01
930	1.8043D+02	3.0892D-01	2.9328D-01	1.3468D-25	1.0788D+01	3.1760D-05	5.3469D-07	5.6321D-07	5.6392D+01
940	1.8352D+02	3.0936D-01	2.9341D-01	3.0701D-25	1.0784D+01	3.1925D-05	5.3534D-07	5.6444D-07	5.6560D+01
950	1.8662D+02	3.0979D-01	2.9354D-01	6.8782D-25	1.0781D+01	3.2089D-05	5.3600D-07	5.6568D-07	5.6726D+01
960	1.8972D+02	3.1022D-01	2.9366D-01	1.5153D-24	1.0777D+01	3.2253D-05	5.3666D-07	5.6692D-07	5.6892D+01
970	1.9282D+02	3.1065D-01	2.9378D-01	3.2844D-24	1.0774D+01	3.2418D-05	5.3732D-07	5.6818D-07	5.7056D+01
980	1.9593D+02	3.1107D-01	2.9388D-01	7.0073D-24	1.0770D+01	3.2583D-05	5.3798D-07	5.6944D-07	5.7219D+01
990	1.9904D+02	3.1149D-01	2.9398D-01	1.4723D-23	1.0767D+01	3.2748D-05	5.3864D-07	5.7071D-07	5.7380D+01
1000	2.0216D+02	3.1190D-01	2.9407D-01	3.0479D-23	1.0763D+01	3.2913D-05	5.3930D-07	5.7200D-07	5.7540D+01
1010	2.0528D+02	3.1231D-01	2.9416D-01	6.2193D-23	1.0760D+01	3.3078D-05	5.3997D-07	5.7329D-07	5.7698D+01
1020	2.0840D+02	3.1272D-01	2.9424D-01	1.2514D-22	1.0756D+01	3.3243D-05	5.4063D-07	5.7459D-07	5.7855D+01
1030	2.1153D+02	3.1312D-01	2.9431D-01	2.4842D-22	1.0752D+01	3.3409D-05	5.4130D-07	5.7590D-07	5.8011D+01
1040	2.1467D+02	3.1352D-01	2.9437D-01	4.8667D-22	1.0749D+01	3.3574D-05	5.4197D-07	5.7722D-07	5.8165D+01
1050	2.1780D+02	3.1391D-01	2.9443D-01	9.4127D-22	1.0745D+01	3.3740D-05	5.4265D-07	5.7855D-07	5.8318D+01
1060	2.2094D+02	3.1431D-01	2.9449D-01	1.7980D-21	1.0742D+01	3.3906D-05	5.4332D-07	5.7989D-07	5.8469D+01

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (ATM/K)
1070	2.2409D+02	3.1470D-01	2.9453D-01	3.3933D-21	1.0738D+01	3.4072D-05	5.4400D-07	5.8124D-07	5.8619D+01
1080	2.2724D+02	3.1509D-01	2.9457D-01	6.3290D-21	1.0734D+01	3.4238D-05	5.4467D-07	5.8260D-07	5.8768D+01
1090	2.3039D+02	3.1547D-01	2.9461D-01	1.1670D-20	1.0731D+01	3.4405D-05	5.4535D-07	5.8397D-07	5.8915D+01
1100	2.3355D+02	3.1585D-01	2.9464D-01	2.1281D-20	1.0727D+01	3.4571D-05	5.4603D-07	5.8535D-07	5.9061D+01
1110	2.3671D+02	3.1623D-01	2.9466D-01	3.8390D-20	1.0723D+01	3.4738D-05	5.4671D-07	5.8674D-07	5.9205D+01
1120	2.3987D+02	3.1661D-01	2.9468D-01	6.8526D-20	1.0719D+01	3.4905D-05	5.4740D-07	5.8814D-07	5.9348D+01
1130	2.4304D+02	3.1699D-01	2.9469D-01	1.2107D-19	1.0716D+01	3.5071D-05	5.4808D-07	5.8954D-07	5.9489D+01
1140	2.4621D+02	3.1736D-01	2.9470D-01	2.1178D-19	1.0712D+01	3.5239D-05	5.4877D-07	5.9096D-07	5.9629D+01
1150	2.4939D+02	3.1773D-01	2.9470D-01	3.6688D-19	1.0708D+01	3.5406D-05	5.4946D-07	5.9239D-07	5.9767D+01
1160	2.5257D+02	3.1810D-01	2.9470D-01	6.2956D-19	1.0704D+01	3.5573D-05	5.5015D-07	5.9383D-07	5.9904D+01
1170	2.5575D+02	3.1847D-01	2.9469D-01	1.0704D-18	1.0700D+01	3.5741D-05	5.5084D-07	5.9528D-07	6.0040D+01
1180	2.5894D+02	3.1883D-01	2.9468D-01	1.8036D-18	1.0697D+01	3.5909D-05	5.5154D-07	5.9674D-07	6.0174D+01
1190	2.6213D+02	3.1920D-01	2.9466D-01	3.0125D-18	1.0693D+01	3.6076D-05	5.5223D-07	5.9821D-07	6.0307D+01
1200	2.6532D+02	3.1956D-01	2.9464D-01	4.9888D-18	1.0689D+01	3.6244D-05	5.5293D-07	5.9969D-07	6.0438D+01
1210	2.6852D+02	3.1992D-01	2.9462D-01	8.1932D-18	1.0685D+01	3.6412D-05	5.5363D-07	6.0118D-07	6.0568D+01
1220	2.7172D+02	3.2028D-01	2.9459D-01	1.3347D-17	1.0681D+01	3.6580D-05	5.5433D-07	6.0268D-07	6.0696D+01
1230	2.7492D+02	3.2064D-01	2.9455D-01	2.1570D-17	1.0677D+01	3.6749D-05	5.5503D-07	6.0420D-07	6.0823D+01
1240	2.7813D+02	3.2100D-01	2.9451D-01	3.4591D-17	1.0673D+01	3.6917D-05	5.5574D-07	6.0572D-07	6.0948D+01
1250	2.8134D+02	3.2135D-01	2.9447D-01	5.5055D-17	1.0669D+01	3.7086D-05	5.5645D-07	6.0725D-07	6.1072D+01
1260	2.8456D+02	3.2171D-01	2.9442D-01	8.6982D-17	1.0665D+01	3.7255D-05	5.5715D-07	6.0880D-07	6.1194D+01
1270	2.8778D+02	3.2207D-01	2.9437D-01	1.3644D-16	1.0661D+01	3.7424D-05	5.5786D-07	6.1035D-07	6.1315D+01
1280	2.9100D+02	3.2242D-01	2.9431D-01	2.1251D-16	1.0657D+01	3.7593D-05	5.5858D-07	6.1192D-07	6.1434D+01
1290	2.9423D+02	3.2277D-01	2.9425D-01	3.2873D-16	1.0653D+01	3.7762D-05	5.5929D-07	6.1349D-07	6.1552D+01
1300	2.9746D+02	3.2313D-01	2.9419D-01	5.0511D-16	1.0649D+01	3.7931D-05	5.6001D-07	6.1508D-07	6.1669D+01
1310	3.0069D+02	3.2348D-01	2.9413D-01	7.7105D-16	1.0645D+01	3.8101D-05	5.6072D-07	6.1668D-07	6.1784D+01
1320	3.0393D+02	3.2383D-01	2.9406D-01	1.1695D-15	1.0641D+01	3.8270D-05	5.6144D-07	6.1829D-07	6.1897D+01

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (ATM/K)
1330	3.0717D+02	3.2419D-01	2.9399D-01	1.7628D-15	1.0637D+01	3.8440D-05	5.6216D-07	6.1991D-07	6.2009D+01
1340	3.1041D+02	3.2454D-01	2.9391D-01	2.6408D-15	1.0633D+01	3.8610D-05	5.6289D-07	6.2154D-07	6.2120D+01
1350	3.1366D+02	3.2489D-01	2.9383D-01	3.9325D-15	1.0629D+01	3.8780D-05	5.6361D-07	6.2319D-07	6.2229D+01
1360	3.1691D+02	3.2525D-01	2.9375D-01	5.8218D-15	1.0624D+01	3.8950D-05	5.6434D-07	6.2484D-07	6.2337D+01
1370	3.2016D+02	3.2560D-01	2.9367D-01	8.5697D-15	1.0620D+01	3.9121D-05	5.6507D-07	6.2650D-07	6.2443D+01
1380	3.2342D+02	3.2596D-01	2.9359D-01	1.2544D-14	1.0616D+01	3.9291D-05	5.6580D-07	6.2818D-07	6.2548D+01
1390	3.2668D+02	3.2631D-01	2.9350D-01	1.8261D-14	1.0612D+01	3.9462D-05	5.6653D-07	6.2987D-07	6.2651D+01
1400	3.2994D+02	3.2667D-01	2.9341D-01	2.6441D-14	1.0608D+01	3.9632D-05	5.6726D-07	6.3156D-07	6.2753D+01
1410	3.3321D+02	3.2703D-01	2.9332D-01	3.8086D-14	1.0604D+01	3.9803D-05	5.6800D-07	6.3327D-07	6.2853D+01
1420	3.3649D+02	3.2739D-01	2.9323D-01	5.4578D-14	1.0599D+01	3.9974D-05	5.6874D-07	6.3500D-07	6.2952D+01
1430	3.3976D+02	3.2775D-01	2.9313D-01	7.7817D-14	1.0595D+01	4.0145D-05	5.6948D-07	6.3673D-07	6.3050D+01
1440	3.4304D+02	3.2811D-01	2.9304D-01	1.1041D-13	1.0591D+01	4.0317D-05	5.7022D-07	6.3847D-07	6.3146D+01
1450	3.4632D+02	3.2848D-01	2.9295D-01	1.5589D-13	1.0586D+01	4.0488D-05	5.7096D-07	6.4022D-07	6.3240D+01
1460	3.4961D+02	3.2885D-01	2.9285D-01	2.1908D-13	1.0582D+01	4.0660D-05	5.7171D-07	6.4199D-07	6.3334D+01
1470	3.5290D+02	3.2922D-01	2.9275D-01	3.0646D-13	1.0578D+01	4.0831D-05	5.7246D-07	6.4377D-07	6.3426D+01
1480	3.5619D+02	3.2960D-01	2.9266D-01	4.2674D-13	1.0573D+01	4.1003D-05	5.7321D-07	6.4555D-07	6.3516D+01
1490	3.5949D+02	3.2997D-01	2.9256D-01	5.9160D-13	1.0569D+01	4.1175D-05	5.7396D-07	6.4735D-07	6.3605D+01
1500	3.6279D+02	3.3036D-01	2.9247D-01	8.1658D-13	1.0565D+01	4.1347D-05	5.7471D-07	6.4916D-07	6.3693D+01
1510	3.6610D+02	3.3074D-01	2.9238D-01	1.1223D-12	1.0560D+01	4.1519D-05	5.7547D-07	6.5098D-07	6.3779D+01
1520	3.6941D+02	3.3113D-01	2.9228D-01	1.5361D-12	1.0556D+01	4.1691D-05	5.7623D-07	6.5281D-07	6.3864D+01
1530	3.7272D+02	3.3153D-01	2.9219D-01	2.0938D-12	1.0552D+01	4.1864D-05	5.7699D-07	6.5466D-07	6.3948D+01
1540	3.7604D+02	3.3193D-01	2.9211D-01	2.8426D-12	1.0547D+01	4.2037D-05	5.7775D-07	6.5651D-07	6.4030D+01
1550	3.7936D+02	3.3233D-01	2.9202D-01	3.8439D-12	1.0543D+01	4.2209D-05	5.7851D-07	6.5837D-07	6.4111D+01
1560	3.8269D+02	3.3274D-01	2.9194D-01	5.1779D-12	1.0538D+01	4.2382D-05	5.7928D-07	6.6025D-07	6.4191D+01
1570	3.8602D+02	3.3316D-01	2.9186D-01	6.9484D-12	1.0534D+01	4.2555D-05	5.8005D-07	6.6213D-07	6.4269D+01
1580	3.8935D+02	3.3359D-01	2.9178D-01	9.2897D-12	1.0529D+01	4.2728D-05	5.8082D-07	6.6403D-07	6.4347D+01

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (ATM/K)
1590	3.9269D+02	3.3402D-01	2.9171D-01	1.2375D-11	1.0525D+01	4.2901D-05	5.8159D-07	6.6594D-07	6.4423D+01
1600	3.9603D+02	3.3445D-01	2.9164D-01	1.6425D-11	1.0520D+01	4.3075D-05	5.8236D-07	6.6785D-07	6.4497D+01
1610	3.9938D+02	3.3490D-01		2.1724D-11	1.0516D+01	4.3248D-05			
1620	4.0273D+02	3.3536D-01		2.8634D-11	1.0511D+01	4.3422D-05			
1630	4.0608D+02	3.3582D-01		3.7615D-11	1.0506D+01	4.3595D-05			
1640	4.0944D+02	3.3629D-01		4.9248D-11	1.0502D+01	4.3769D-05			
1650	4.1281D+02	3.3678D-01		6.4269D-11	1.0497D+01	4.3943D-05			
1660	4.1618D+02	3.3727D-01		8.3602D-11	1.0493D+01	4.4117D-05			
1670	4.1955D+02	3.3777D-01		1.0841D-10	1.0488D+01	4.4292D-05			
1680	4.2294D+02	3.3829D-01		1.4014D-10	1.0483D+01	4.4466D-05			
1690	4.2632D+02	3.3882D-01		1.8062D-10	1.0479D+01	4.4640D-05			
1700	4.2971D+02	3.3936D-01		2.3208D-10	1.0474D+01	4.4815D-05			
1710	4.3311D+02	3.3992D-01		2.9735D-10	1.0469D+01	4.4990D-05			
1720	4.3651D+02	3.4048D-01		3.7986D-10	1.0464D+01	4.5164D-05			
1730	4.3992D+02	3.4107D-01		4.8391D-10	1.0460D+01	4.5339D-05			
1740	4.4333D+02	3.4167D-01		6.1474D-10	1.0455D+01	4.5514D-05			
1750	4.4675D+02	3.4228D-01		7.7880D-10	1.0450D+01	4.5690D-05			
1760	4.5018D+02	3.4292D-01		9.8401D-10	1.0445D+01	4.5865D-05			
1770	4.5361D+02	3.4357D-01		1.2400D-09	1.0441D+01	4.6040D-05			
1780	4.5705D+02	3.4424D-01		1.5585D-09	1.0436D+01	4.6216D-05			
1790	4.6049D+02	3.4492D-01		1.9539D-09	1.0431D+01	4.6392D-05			
1800	4.6395D+02	3.4563D-01		2.4434D-09	1.0426D+01	4.6567D-05			
1810	4.6741D+02	3.4636D-01		3.0481D-09	1.0421D+01	4.6743D-05			
1820	4.7087D+02	3.4711D-01		3.7931D-09	1.0416D+01	4.6919D-05			
1830	4.7435D+02	3.4789D-01		4.7089D-09	1.0411D+01	4.7096D-05			
1840	4.7783D+02	3.4868D-01		5.8321D-09	1.0406D+01	4.7272D-05			

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (ATM/K)
1850	4.8132D+02	3.4950D-01		7.2066D-09	1.0401D+01	4.7448D-05			
1860	4.8482D+02	3.5035D-01		8.8847D-09	1.0397D+01	4.7625D-05			
1870	4.8833D+02	3.5122D-01		1.0929D-08	1.0392D+01	4.7801D-05			
1880	4.9185D+02	3.5212D-01		1.3414D-08	1.0387D+01	4.7978D-05			
1890	4.9537D+02	3.5305D-01		1.6429D-08	1.0382D+01	4.8155D-05			
1900	4.9891D+02	3.5401D-01		2.0079D-08	1.0377D+01	4.8332D-05			
1910	5.0245D+02	3.5500D-01		2.4487D-08	1.0372D+01	4.8509D-05			
1920	5.0601D+02	3.5602D-01		2.9802D-08	1.0366D+01	4.8686D-05			
1930	5.0957D+02	3.5707D-01		3.6197D-08	1.0361D+01	4.8864D-05			
1940	5.1315D+02	3.5815D-01		4.3876D-08	1.0356D+01	4.9041D-05			
1950	5.1674D+02	3.5927D-01		5.3079D-08	1.0351D+01	4.9218D-05			
1960	5.2034D+02	3.6043D-01		6.4088D-08	1.0346D+01	4.9396D-05			
1970	5.2395D+02	3.6162D-01		7.7232D-08	1.0341D+01	4.9574D-05			
1980	5.2757D+02	3.6285D-01		9.2897D-08	1.0336D+01	4.9752D-05			
1990	5.3120D+02	3.6412D-01		1.1153D-07	1.0331D+01	4.9930D-05			
2000	5.3485D+02	3.6543D-01		1.3366D-07	1.0326D+01	5.0108D-05			
2010	5.3851D+02	3.6678D-01		1.5989D-07	1.0320D+01	5.0286D-05			
2020	5.4219D+02	3.6817D-01		1.9093D-07	1.0315D+01	5.0464D-05			
2030	5.4587D+02	3.6960D-01		2.2759D-07	1.0310D+01	5.0643D-05			
2040	5.4958D+02	3.7106D-01		2.7084D-07	1.0305D+01	5.0821D-05			
2050	5.5330D+02	3.7261D-01		3.2175D-07	1.0299D+01	5.1000D-05			
2060	5.5703D+02	3.7419D-01		3.8159D-07	1.0294D+01	5.1179D-05			
2070	5.6078D+02	3.7581D-01		4.5181D-07	1.0289D+01	5.1358D-05			
2080	5.6455D+02	3.7748D-01		5.3409D-07	1.0284D+01	5.1537D-05			
2090	5.6833D+02	3.7921D-01		6.3035D-07	1.0278D+01	5.1716D-05			
2100	5.7213D+02	3.8098D-01		7.4277D-07	1.0273D+01	5.1895D-05			

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (ATM/K)
2110	5.7595D+02	3.8281D-01		6.7390D-07	1.0268D+01	5.2074D-05			
2120	5.7979D+02	3.8470D-01		1.0266D-06	1.0262D+01	5.2253D-05			
2130	5.8364D+02	3.8664D-01		1.2041D-06	1.0257D+01	5.2433D-05			
2140	5.8752D+02	3.8865D-01		1.4103D-06	1.0252D+01	5.2613D-05			
2150	5.9142D+02	3.9071D-01		1.6493D-06	1.0246D+01	5.2792D-05			
2160	5.9534D+02	3.9283D-01		1.9260D-06	1.0241D+01	5.2972D-05			
2170	5.9927D+02	3.9501D-01		2.2460D-06	1.0235D+01	5.3152D-05			
2180	6.0324D+02	3.9726D-01		2.6154D-06	1.0230D+01	5.3332D-05			
2190	6.0722D+02	3.9957D-01		3.0414D-06	1.0224D+01	5.3512D-05			
2200	6.1123D+02	4.0195D-01		3.5318D-06	1.0219D+01	5.3692D-05			
2210	6.1526D+02	4.0439D-01		4.0958D-06	1.0213D+01	5.3873D-05			
2220	6.1932D+02	4.0691D-01		4.7436D-06	1.0208D+01	5.4053D-05			
2230	6.2340D+02	4.0950D-01		5.4866D-06	1.0202D+01	5.4234D-05			
2240	6.2751D+02	4.1216D-01		6.3377D-06	1.0197D+01	5.4414D-05			
2250	6.3164D+02	4.1489D-01		7.3114D-06	1.0191D+01	5.4595D-05			
2260	6.3580D+02	4.1770D-01		8.4241D-06	1.0186D+01	5.4776D-05			
2270	6.3999D+02	4.2058D-01		9.6940D-06	1.0180D+01	5.4957D-05			
2280	6.4422D+02	4.2354D-01		1.1142D-05	1.0174D+01	5.5138D-05			
2290	6.4847D+02	4.2658D-01		1.2790D-05	1.0169D+01	5.5319D-05			
2300	6.5275D+02	4.2971D-01		1.4664D-05	1.0163D+01	5.5500D-05			
2310	6.5706D+02	4.3291D-01		1.6794D-05	1.0158D+01	5.5681D-05			
2320	6.6141D+02	4.3620D-01		1.9210D-05	1.0152D+01	5.5863D-05			
2330	6.6578D+02	4.3958D-01		2.1948D-05	1.0146D+01	5.6044D-05			
2340	6.7020D+02	4.4304D-01		2.5048D-05	1.0141D+01	5.6226D-05			
2350	6.7465D+02	4.4659D-01		2.8554D-05	1.0135D+01	5.6408D-05			
2360	6.7913D+02	4.5024D-01		3.2514D-05	1.0129D+01	5.6589D-05			

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (ATM/K)
2370	6.8365D+02	4.5397D-01		3.6983D-05	1.0123D+01	5.6771D-05			
2380	6.8821D+02	4.5780D-01		4.2021D-05	1.0118D+01	5.6953D-05			
2390	6.9281D+02	4.6172D-01		4.7694D-05	1.0112D+01	5.7135D-05			
2400	6.9744D+02	4.6574D-01		5.4075D-05	1.0106D+01	5.7318D-05			
2410	7.0212D+02	4.6985D-01		6.1247D-05	1.0100D+01	5.7500D-05			
2420	7.0684D+02	4.7407D-01		6.9299D-05	1.0094D+01	5.7682D-05			
2430	7.1160D+02	4.7839D-01		7.8330D-05	1.0089D+01	5.7865D-05			
2440	7.1641D+02	4.8280D-01		8.8448D-05	1.0083D+01	5.8047D-05			
2450	7.2126D+02	4.8733D-01		9.9775D-05	1.0077D+01	5.8230D-05			
2460	7.2616D+02	4.9196D-01		1.1244D-04	1.0071D+01	5.8413D-05			
2470	7.3110D+02	4.9669D-01		1.2659D-04	1.0065D+01	5.8595D-05			
2480	7.3609D+02	5.0154D-01		1.4239D-04	1.0059D+01	5.8778D-05			
2490	7.4113D+02	5.0649D-01		1.6001D-04	1.0053D+01	5.8961D-05			
2500	7.4622D+02	5.1156D-01		1.7964D-04	1.0047D+01	5.9144D-05			
2510	7.5136D+02	5.1674D-01		2.0149D-04	1.0041D+01	5.9328D-05			
2520	7.5656D+02	5.2203D-01		2.2579D-04	1.0035D+01	5.9511D-05			
2530	7.6180D+02	5.2744D-01		2.5280D-04	1.0029D+01	5.9694D-05			
2540	7.6711D+02	5.3297D-01		2.8279D-04	1.0023D+01	5.9878D-05			
2550	7.7246D+02	5.3862D-01		3.1606D-04	1.0017D+01	6.0061D-05			
2560	7.7788D+02	5.4439D-01		3.5293D-04	1.0011D+01	6.0245D-05			
2570	7.8335D+02	5.5028D-01		3.9377D-04	1.0005D+01	6.0428D-05			
2580	7.8888D+02	5.5629D-01		4.3895D-04	9.9993D+00	6.0612D-05			
2590	7.9448D+02	5.6243D-01		4.8892D-04	9.9932D+00	6.0796D-05			
2600	8.0013D+02	5.6870D-01		5.4412D-04	9.9872D+00	6.0980D-05			
2610	8.0585D+02	5.7510D-01		6.0505D-04	9.9811D+00	6.1164D-05			
262	8.1164D+02	5.8162D-01		6.7227D-04	9.9749D+00	6.1348D-05			

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (ATM/K)
2630	8.1748D+02	5.8828D-01		7.4635D-04	9.9688D+00	6.1532D-05			
2640	8.2340D+02	5.9507D-01		8.2794D-04	9.9627D+00	6.1717D-05			
2650	8.2939D+02	6.0199D-01		9.1773D-04	9.9565D+00	6.1901D-05			
2660	8.3544D+02	6.0905D-01		1.0165D-03	9.9503D+00	6.2086D-05			
2670	8.4157D+02	6.1624D-01		1.1250D-03	9.9441D+00	6.2270D-05			
2680	8.4926D+02	6.1860D-01		1.2441D-03	9.9379D+00	6.2455D-05			
2690	8.5545D+02	6.1860D-01		1.3749D-03	9.9317D+00	6.2639D-05			
2700	8.6163D+02	6.1860D-01		1.5182D-03	9.9255D+00	6.2824D-05			
2710	8.6782D+02	6.1860D-01		1.6753D-03	9.9192D+00	6.3009D-05			
2720	8.7401D+02	6.1860D-01		1.8473D-03	9.9130D+00	6.3194D-05			
2730	8.8019D+02	6.1860D-01		2.0354D-03	9.9067D+00	6.3379D-05			
2740	8.8638D+02	6.1860D-01		2.2412D-03	9.9004D+00	6.3564D-05			
2750	8.9256D+02	6.1860D-01		2.4660D-03	9.8941D+00	6.3749D-05			
2760	8.9875D+02	6.1860D-01		2.7115D-03	9.8878D+00	6.3935D-05			
2770	9.0494D+02	6.1860D-01		2.9795D-03	9.8814D+00	6.4120D-05			
2780	9.1112D+02	6.1860D-01		3.2716D-03	9.8751D+00	6.4305D-05			
2790	9.1731D+02	6.1860D-01		3.5900D-03	9.8687D+00	6.4491D-05			
2800	9.2349D+02	6.1860D-01		3.9368D-03	9.8624D+00	6.4676D-05			
2810	9.2968D+02	6.1860D-01		4.3142D-03	9.8560D+00	6.4862D-05			
2820	9.3587D+02	6.1860D-01		4.7248D-03	9.8496D+00	6.5048D-05			
2830	9.4205D+02	6.1860D-01		5.1711D-03	9.8431D+00	6.5233D-05			
2640	9.4824D+02	6.1860D-01		5.6560D-03	9.8367D+00	6.5419D-05			
2650	9.5442D+02	6.1860D-01		6.1824D-03	9.8302D+00	6.5605D-05			
2860	9.6061D+02	6.1860D-01		6.7536D-03	9.8238D+00	6.5791D-05			
2870	9.6680D+02	6.1860D-01		7.3731D-03	9.8173D+00	6.5977D-05			
2880	9.7298D+02	6.1860D-01		8.0445D-03	9.8108D+00	6.6163D-05			

THERMODYNAMIC PROPERTIES OF SOLID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (ATM/K)
2890	9.7917D+02	6.1860D-01		8.7718D-03	9.8043D+00	6.6350D-05			
2900	9.8535D+02	6.1860D-01		9.5590D-03	9.7978D+00	6.6536D-05			
2910	9.9154D+02	6.1860D-01		1.0411D-02	9.7912D+00	6.6722D-05			
2920	9.9773D+02	6.1860D-01		1.1332D-02	9.7847D+00	6.6909D-05			
2930	1.0039D+03	6.1860D-01		1.2327D-02	9.7781D+00	6.7095D-05			
2940	1.0101D+03	6.1860D-01		1.3402D-02	9.7715D+00	6.7282D-05			
2950	1.0163D+03	6.1860D-01		1.4563D-02	9.7649D+00	6.7468D-05			
2960	1.0225D+03	6.1860D-01		1.5815D-02	9.7583D+00	6.7655D-05			
2970	1.0287D+03	6.1860D-01		1.7166D-02	9.7517D+00	6.7842D-05			
2980	1.0348D+03	6.1860D-01		1.8621D-02	9.7451D+00	6.8029D-05			
2990	1.0410D+03	6.1860D-01		2.0189D-02	9.7384D+00	6.8215D-05			
3000	1.0472D+03	6.1860D-01		2.1878D-02	9.7317D+00	6.8402D-05			
3010	1.0534D+03	6.1860D-01		2.3694D-02	9.7251D+00	6.8589D-05			
3020	1.0596D+03	6.1860D-01		2.5648D-02	9.7184D+00	6.8777D-05			
3030	1.0658D+03	6.1860D-01		2.7749D-02	9.7116D+00	6.8964D-05			
3040	1.0720D+03	6.1860D-01		3.0006D-02	9.7049D+00	6.9151D-05			
3050	1.0781D+03	6.1860D-01		3.2430D-02	9.6982D+00	6.9338D-05			
3060	1.0843D+03	6.1860D-01		3.5032D-02	9.6914D+00	6.9526D-05			
3070	1.0905D+03	6.1860D-01		3.7824D-02	9.6847D+00	6.9713D-05			
3080	1.0967D+03	6.1860D-01		4.0819D-02	9.6779D+00	6.9900D-05			
3090	1.1029D+03	6.1860D-01		4.4028D-02	9.6711D+00	7.0088D-05			
3100	1.1091D+03	6.1860D-01		4.7466D-02	9.6643D+00	7.0276D-05			
3110	1.1153D+03	6.1860D-01		5.1149D-02	9.6575D+00	7.0463D-05			
3120	1.1214D+03	6.1860D-01		5.5091D-02	9.6506D+00	7.0651D-05			

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	DH (J/G)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (1/ATM)
3120	1.3986D+03	4.8495D-01	3.8939D-01	5.5175D-02	1.9347D+03	8.7388D+00	1.0500D-04	3.3512D-06	4.1737D-06	2.5158D+01
3130	1.4034D+03	4.8495D-01	3.8967D-01	5.8839D-02	1.9329D+03	8.7298D+00	1.0496D-04	3.3756D-06	4.2009D-06	2.4986D+01
3140	1.4083D+03	4.8495D-01	3.8996D-01	6.2719D-02	1.9312D+03	8.7208D+00	1.0493D-04	3.4002D-06	4.2284D-06	2.4814D+01
3150	1.4131D+03	4.8495D-01	3.9025D-01	6.6823D-02	1.9295D+03	8.7118D+00	1.0489D-04	3.4250D-06	4.2562D-06	2.4644D+01
3160	1.4180D+03	4.8495D-01	3.9054D-01	7.1162D-02	1.9277D+03	8.7029D+00	1.0485D-04	3.4502D-06	4.2842D-06	2.4474D+01
3170	1.4228D+03	4.8495D-01	3.9083D-01	7.5750D-02	1.9260D+03	8.6939D+00	1.0482D-04	3.4755D-06	4.3125D-06	2.4305D+01
3180	1.4277D+03	4.8495D-01	3.9112D-01	8.0597D-02	1.9243D+03	8.6849D+00	1.0478D-04	3.5011D-06	4.3411D-06	2.4137D+01
3190	1.4325D+03	4.8495D-01	3.9141D-01	8.5716D-02	1.9225D+03	8.6759D+00	1.0474D-04	3.5270D-06	4.3699D-06	2.3969D+01
3200	1.4374D+03	4.8495D-01	3.9171D-01	9.1120D-02	1.9208D+03	8.6669D+00	1.0471D-04	3.5532D-06	4.3989D-06	2.3803D+01
3210	1.4422D+03	4.8495D-01	3.9201D-01	9.6822D-02	1.9191D+03	8.6579D+00	1.0467D-04	3.5796D-06	4.4283D-06	2.3637D+01
3220	1.4471D+03	4.8495D-01	3.9230D-01	1.0284D-01	1.9173D+03	8.6489D+00	1.0463D-04	3.6063D-06	4.4579D-06	2.3471D+01
3230	1.4519D+03	4.8495D-01	3.9260D-01	1.0918D-01	1.9156D+03	8.6400D+00	1.0460D-04	3.6333D-06	4.4878D-06	2.3307D+01
3240	1.4568D+03	4.8495D-01	3.9291D-01	1.1586D-01	1.9138D+03	8.6310D+00	1.0456D-04	3.6605D-06	4.5180D-06	2.3143D+01
3250	1.4616D+03	4.8495D-01	3.9321D-01	1.2290D-01	1.9121D+03	8.6220D+00	1.0452D-04	3.6880D-06	4.5485D-06	2.2980D+01
3260	1.4665D+03	4.8495D-01	3.9351D-01	1.3032D-01	1.9104D+03	8.6130D+00	1.0449D-04	3.7159D-06	4.5793D-06	2.2818D+01
3270	1.4713D+03	4.8495D-01	3.9382D-01	1.3813D-01	1.9086D+03	8.6040D+00	1.0445D-04	3.7440D-06	4.6104D-06	2.2656D+01
3280	1.4762D+03	4.8495D-01	3.9413D-01	1.4634D-01	1.9069D+03	8.5950D+00	1.0442D-04	3.7724D-06	4.6417D-06	2.2495D+01
3290	1.4810D+03	4.8495D-01	3.9443D-01	1.5498D-01	1.9052D+03	8.5860D+00	1.0438D-04	3.8011D-06	4.6734D-06	2.2335D+01
3300	1.4859D+03	4.8495D-01	3.9475D-01	1.6407D-01	1.9034D+03	8.5770D+00	1.0434D-04	3.8302D-06	4.7054D-06	2.2175D+01
3310	1.4907D+03	4.8495D-01	3.9506D-01	1.7361D-01	1.9017D+03	8.5681D+00	1.0431D-04	3.8595D-06	4.7377D-06	2.2016D+01
3320	1.4956D+03	4.8495D-01	3.9537D-01	1.8365D-01	1.8999D+03	8.5591D+00	1.0427D-04	3.8891D-06	4.7703D-06	2.1858D+01
3330	1.5004D+03	4.8495D-01	3.9568D-01	1.9418D-01	1.8982D+03	8.5501D+00	1.0423D-04	3.9191D-06	4.8032D-06	2.1701D+01
3340	1.5053D+03	4.8495D-01	3.9600D-01	2.0524D-01	1.8965D+03	8.5411D+00	1.0420D-04	3.9494D-06	4.8365D-06	2.1544D+01
3350	1.5101D+03	4.8495D-01	3.9632D-01	2.1685D-01	1.8947D+03	8.5321D+00	1.0416D-04	3.9800D-06	4.8701D-06	2.1388D+01
3360	1.5150D+03	4.8495D-01	3.9664D-01	2.2903D-01	1.8930D+03	8.5231D+00	1.0413D-04	4.0109D-06	4.9040D-06	2.1233D+01
3370	1.5198D+03	4.8495D-01	3.9696D-01	2.4181D-01	1.8913D+03	8.5141D+00	1.0409D-04	4.0422D-06	4.9382D-06	2.1078D+01

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	DH (J/G)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (1/ATM)
3380	1.5247D+03	4.8495D-01	3.9728D-01	2.5520D-01	1.8895D+03	8.5052D+00	1.0405D-04	4.0738D-06	4.9728D-06	2.0924D+01
3390	1.5295D+03	4.8495D-01	3.9760D-01	2.6923D-01	1.8878D+03	8.4962D+00	1.0402D-04	4.1058D-06	5.0078D-06	2.0771D+01
3400	1.5344D+03	4.8495D-01	3.9792D-01	2.8393D-01	1.8861D+03	8.4872D+00	1.0398D-04	4.1381D-06	5.0431D-06	2.0618D+01
3410	1.5392D+03	4.8495D-01	3.9820D-01	2.9933D-01	1.8843D+03	8.4782D+00	1.0394D-04	4.1682D-06	5.0762D-06	2.0477D+01
3420	1.5441D+03	4.8495D-01	3.9848D-01	3.1545D-01	1.8826D+03	8.4692D+00	1.0391D-04	4.1984D-06	5.1094D-06	2.0337D+01
3430	1.5489D+03	4.8495D-01	3.9876D-01	3.3232D-01	1.8808D+03	8.4602D+00	1.0387D-04	4.2287D-06	5.1427D-06	2.0198D+01
3440	1.5537D+03	4.8495D-01	3.9904D-01	3.4996D-01	1.8791D+03	8.4512D+00	1.0384D-04	4.2592D-06	5.1762D-06	2.0060D+01
3450	1.5586D+03	4.8495D-01	3.9931D-01	3.6842D-01	1.8774D+03	8.4422D+00	1.0380D-04	4.2899D-06	5.2099D-06	1.9924D+01
3460	1.5634D+03	4.8495D-01	3.9959D-01	3.8772D-01	1.8756D+03	8.4333D+00	1.0377D-04	4.3207D-06	5.2437D-06	1.9789D+01
3470	1.5683D+03	4.8495D-01	3.9986D-01	4.0789D-01	1.8739D+03	8.4243D+00	1.0373D-04	4.3517D-06	5.2777D-06	1.9654D+01
3480	1.5731D+03	4.8495D-01	4.0013D-01	4.2896D-01	1.8722D+03	8.4153D+00	1.0369D-04	4.3828D-06	5.3118D-06	1.9521D+01
3490	1.5780D+03	4.8495D-01	4.0040D-01	4.5097D-01	1.8704D+03	8.4063D+00	1.0366D-04	4.4140D-06	5.3461D-06	1.9389D+01
3500	1.5828D+03	4.8495D-01	4.0067D-01	4.7396D-01	1.8687D+03	8.3973D+00	1.0362D-04	4.4454D-06	5.3805D-06	1.9259D+01
3510	1.5877D+03	4.8495D-01	4.0094D-01	4.9795D-01	1.8670D+03	8.3883D+00	1.0359D-04	4.4770D-06	5.4151D-06	1.9129D+01
3520	1.5925D+03	4.8495D-01	4.0120D-01	5.2298D-01	1.8652D+03	8.3793D+00	1.0355D-04	4.5087D-06	5.4499D-06	1.9001D+01
3530	1.5974D+03	4.8495D-01	4.0147D-01	5.4910D-01	1.8635D+03	8.3704D+00	1.0351D-04	4.5406D-06	5.4848D-06	1.8873D+01
3540	1.6022D+03	4.8495D-01	4.0173D-01	5.7633D-01	1.8617D+03	8.3614D+00	1.0348D-04	4.5726D-06	5.5199D-06	1.8747D+01
3550	1.6071D+03	4.8495D-01	4.0199D-01	6.0473D-01	1.8600D+03	8.3524D+00	1.0344D-04	4.6048D-06	5.5551D-06	1.8621D+01
3560	1.6119D+03	4.8495D-01	4.0225D-01	6.3432D-01	1.8583D+03	8.3434D+00	1.0341D-04	4.6372D-06	5.5905D-06	1.8497D+01
3570	1.6168D+03	4.8495D-01	4.0251D-01	6.6515D-01	1.8565D+03	8.3344D+00	1.0337D-04	4.6697D-06	5.6261D-06	1.8374D+01
3580	1.6216D+03	4.8495D-01	4.0277D-01	6.9727D-01	1.8548D+03	8.3254D+00	1.0334D-04	4.7024D-06	5.6618D-06	1.8251D+01
3590	1.6265D+03	4.8495D-01	4.0303D-01	7.3071D-01	1.8531D+03	8.3164D+00	1.0330D-04	4.7353D-06	5.6977D-06	1.8130D+01
3600	1.6313D+03	4.8495D-01	4.0329D-01	7.6553D-01	1.8513D+03	8.3074D+00	1.0327D-04	4.7683D-06	5.7338D-06	1.8010D+01
3610	1.6362D+03	4.8495D-01	4.0354D-01	8.0176D-01	1.8496D+03	8.2985D+00	1.0323D-04	4.8015D-06	5.7701D-06	1.7891D+01
3620	1.6410D+03	4.8495D-01	4.0380D-01	8.3945D-01	1.8479D+03	8.2895D+00	1.0319D-04	4.8348D-06	5.8065D-06	1.7772D+01
3630	1.6459D+03	4.8495D-01	4.0405D-01	8.7866D-01	1.8461D+03	8.2805D+00	1.0316D-04	4.8683D-06	5.8431D-06	1.7655D+01

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

I (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	DH (J/G)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (1/ATM)
3640	1.6507D+03	4.8495D-01	4.0430D-01	9.1943D-01	1.8444D+03	8.2715D+00	1.0312D-04	4.9020D-06	5.8798D-06	1.7538D+01
3650	1.6556D+03	4.8495D-01	4.0455D-01	9.6181D-01	1.8426D+03	8.2625D+00	1.0309D-04	4.9359D-06	5.9168D-06	1.7423D+01
3660	1.6604D+03	4.8495D-01	4.0480D-01	1.0059D+00	1.8409D+03	8.2535D+00	1.0305D-04	4.9699D-06	5.9539D-06	1.7308D+01
3670	1.6653D+03	4.8495D-01	4.0505D-01	1.0516D+00	1.8392D+03	8.2445D+00	1.0302D-04	5.0042D-06	5.9912D-06	1.7195D+01
3680	1.6701D+03	4.8495D-01	4.0530D-01	1.0991D+00	1.8374D+03	8.2356D+00	1.0298D-04	5.0385D-06	6.0287D-06	1.7082D+01
3690	1.6750D+03	4.8495D-01	4.0555D-01	1.1485D+00	1.8357D+03	8.2266D+00	1.0295D-04	5.0731D-06	6.0663D-06	1.6970D+01
3700	1.6798D+03	4.8495D-01	4.0579D-01	1.1997D+00	1.8340D+03	8.2176D+00	1.0291D-04	5.1079D-06	6.1042D-06	1.6859D+01
3710	1.6847D+03	4.8495D-01	4.0604D-01	1.2529D+00	1.8322D+03	8.2086D+00	1.0288D-04	5.1428D-06	6.1422D-06	1.6749D+01
3720	1.6895D+03	4.8495D-01	4.0628D-01	1.3081D+00	1.8305D+03	8.1996D+00	1.0284D-04	5.1779D-06	6.1804D-06	1.6640D+01
3730	1.6944D+03	4.8495D-01	4.0653D-01	1.3653D+00	1.8287D+03	8.1906D+00	1.0281D-04	5.2132D-06	6.2188D-06	1.6531D+01
3740	1.6992D+03	4.8495D-01	4.0677D-01	1.4247D+00	1.8270D+03	8.1816D+00	1.0277D-04	5.2487D-06	6.2574D-06	1.6424D+01
3750	1.7041D+03	4.8495D-01	4.0701D-01	1.4862D+00	1.8253D+03	8.1727D+00	1.0273D-04	5.2843D-06	6.2962D-06	1.6317D+01
3760	1.7089D+03	4.8495D-01	4.0725D-01	1.5500D+00	1.8235D+03	8.1637D+00	1.0270D-04	5.3202D-06	6.3352D-06	1.6211D+01
3770	1.7138D+03	4.8495D-01	4.0749D-01	1.6161D+00	1.8218D+03	8.1547D+00	1.0266D-04	5.3562D-06	6.3743D-06	1.6106D+01
3780	1.7186D+03	4.8495D-01	4.0773D-01	1.6846D+00	1.8201D+03	8.1457D+00	1.0263D-04	5.3925D-06	6.4137D-06	1.6002D+01
3790	1.7235D+03	4.8495D-01	4.0797D-01	1.7555D+00	1.8183D+03	8.1367D+00	1.0259D-04	5.4289D-06	6.4533D-06	1.5898D+01
3800	1.7283D+03	4.8495D-01	4.0821D-01	1.8289D+00	1.8166D+03	8.1277D+00	1.0256D-04	5.4655D-06	6.4930D-06	1.5795D+01
3810	1.7332D+03	4.8495D-01	4.0844D-01	1.9050D+00	1.8149D+03	8.1187D+00	1.0252D-04	5.5023D-06	6.5330D-06	1.5693D+01
3820	1.7380D+03	4.8495D-01	4.0868D-01	1.9837D+00	1.8131D+03	8.1097D+00	1.0249D-04	5.5393D-06	6.5731D-06	1.5592D+01
3830	1.7429D+03	4.8495D-01	4.0891D-01	2.0651D+00	1.8114D+03	8.1008D+00	1.0245D-04	5.5765D-06	6.6135D-06	1.5492D+01
3840	1.7477D+03	4.8495D-01	4.0915D-01	2.1493D+00	1.8096D+03	8.0918D+00	1.0242D-04	5.6139D-06	6.6540D-06	1.5392D+01
3850	1.7526D+03	4.8495D-01	4.0938D-01	2.2364D+00	1.8079D+03	8.0828D+00	1.0238D-04	5.6516D-06	6.6948D-06	1.5293D+01
3860	1.7574D+03	4.8495D-01	4.0961D-01	2.3265D+00	1.8062D+03	8.0738D+00	1.0235D-04	5.6894D-06	6.7358D-06	1.5195D+01
3870	1.7623D+03	4.8495D-01	4.0984D-01	2.4197D+00	1.8044D+03	8.0648D+00	1.0231D-04	5.7274D-06	6.7770D-06	1.5097D+01
3880	1.7671D+03	4.8495D-01	4.1007D-01	2.5159D+00	1.8027D+03	8.0558D+00	1.0228D-04	5.7656D-06	6.8183D-06	1.5001D+01
3890	1.7720D+03	4.8495D-01	4.1030D-01	2.6154D+00	1.8010D+03	8.0468D+00	1.0224D-04	5.8040D-06	6.8599D-06	1.4905D+01

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	DH (J/G)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (1/ATM)
3900	1.7768D+03	4.8495D-01	4.1053D-01	2.7181D+00	1.7992D+03	8.0379D+00	1.0221D-04	5.8427D-06	6.9018D-06	1.4809D+01
3910	1.7817D+03	4.8495D-01	4.1076D-01	2.8242D+00	1.7975D+03	8.0289D+00	1.0217D-04	5.8815D-06	6.9438D-06	1.4715D+01
3920	1.7865D+03	4.8495D-01	4.1099D-01	2.9338D+00	1.7958D+03	8.0199D+00	1.0214D-04	5.9206D-06	6.9861D-06	1.4621D+01
3930	1.7914D+03	4.8495D-01	4.1122D-01	3.0470D+00	1.7940D+03	8.0109D+00	1.0211D-04	5.9599D-06	7.0285D-06	1.4527D+01
3940	1.7962D+03	4.8495D-01	4.1144D-01	3.1638D+00	1.7923D+03	8.0019D+00	1.0207D-04	5.9994D-06	7.0712D-06	1.4435D+01
3950	1.8011D+03	4.8495D-01	4.1167D-01	3.2843D+00	1.7905D+03	7.9929D+00	1.0204D-04	6.0391D-06	7.1141D-06	1.4343D+01
3960	1.8059D+03	4.8495D-01	4.1189D-01	3.4086D+00	1.7888D+03	7.9839D+00	1.0200D-04	6.0791D-06	7.1573D-06	1.4251D+01
3970	1.8108D+03	4.8495D-01	4.1212D-01	3.5368D+00	1.7871D+03	7.9749D+00	1.0197D-04	6.1192D-06	7.2006D-06	1.4161D+01
3980	1.8156D+03	4.8495D-01	4.1234D-01	3.6691D+00	1.7853D+03	7.9660D+00	1.0193D-04	6.1596D-06	7.2442D-06	1.4071D+01
3990	1.8205D+03	4.8495D-01	4.1256D-01	3.8055D+00	1.7836D+03	7.9570D+00	1.0190D-04	6.2002D-06	7.2881D-06	1.3981D+01
4000	1.8253D+03	4.8495D-01	4.1278D-01	3.9461D+00	1.7819D+03	7.9480D+00	1.0186D-04	6.2411D-06	7.3321D-06	1.3893D+01
4010	1.8302D+03	4.8495D-01	4.1301D-01	4.0910D+00	1.7801D+03	7.9390D+00	1.0183D-04	6.2821D-06	7.3764D-06	1.3805D+01
4020	1.8350D+03	4.8495D-01	4.1323D-01	4.2403D+00	1.7784D+03	7.9300D+00	1.0179D-04	6.3234D-06	7.4210D-06	1.3717D+01
4030	1.8399D+03	4.8495D-01	4.1345D-01	4.3941D+00	1.7767D+03	7.9210D+00	1.0176D-04	6.3650D-06	7.4657D-06	1.3630D+01
4040	1.8447D+03	4.8495D-01	4.1367D-01	4.5525D+00	1.7749D+03	7.9120D+00	1.0172D-04	6.4067D-06	7.5107D-06	1.3544D+01
4050	1.8496D+03	4.8495D-01	4.1389D-01	4.7157D+00	1.7732D+03	7.9031D+00	1.0169D-04	6.4488D-06	7.5560D-06	1.3458D+01
4060	1.8544D+03	4.8495D-01	4.1410D-01	4.8837D+00	1.7714D+03	7.8941D+00	1.0166D-04	6.4910D-06	7.6015D-06	1.3373D+01
4070	1.8593D+03	4.8495D-01	4.1432D-01	5.0566D+00	1.7697D+03	7.8851D+00	1.0162D-04	6.5335D-06	7.6472D-06	1.3289D+01
4080	1.8641D+03	4.8495D-01	4.1454D-01	5.2346D+00	1.7680D+03	7.8761D+00	1.0159D-04	6.5762D-06	7.6932D-06	1.3205D+01
4090	1.8690D+03	4.8495D-01	4.1476D-01	5.4178D+00	1.7662D+03	7.8671D+00	1.0155D-04	6.6192D-06	7.7395D-06	1.3121D+01
4100	1.8738D+03	4.8495D-01	4.1497D-01	5.6062D+00	1.7645D+03	7.8581D+00	1.0152D-04	6.6625D-06	7.7860D-06	1.3039D+01
4110	1.8787D+03	4.8495D-01	4.1519D-01	5.8001D+00	1.7628D+03	7.8491D+00	1.0148D-04	6.7059D-06	7.8327D-06	1.2956D+01
4120	1.8835D+03	4.8495D-01	4.1540D-01	5.9994D+00	1.7610D+03	7.8401D+00	1.0145D-04	6.7497D-06	7.8797D-06	1.2875D+01
4130	1.8884D+03	4.8495D-01	4.1562D-01	6.2044D+00	1.7593D+03	7.8312D+00	1.0141D-04	6.7937D-06	7.9270D-06	1.2794D+01
4140	1.8932D+03	4.8495D-01	4.1583D-01	6.4151D+00	1.7575D+03	7.8222D+00	1.0138D-04	6.8379D-06	7.9745D-06	1.2713D+01
4150	1.8981D+03	4.8495D-01	4.1604D-01	6.6317D+00	1.7558D+03	7.8132D+00	1.0135D-04	6.8824D-06	8.0223D-06	1.2633D+01

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	DH (J/G)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (1/ATM)
4160	1.9029D+03	4.8495D-01	4.1626D-01	6.8543D+00	1.7541D+03	7.8042D+00	1.0131D-04	6.9272D-06	8.0704D-06	1.2554D+01
4170	1.9078D+03	4.8495D-01	4.1647D-01	7.0830D+00	1.7523D+03	7.7952D+00	1.0128D-04	6.9722D-06	8.1187D-06	1.2475D+01
4180	1.9126D+03	4.8495D-01	4.1668D-01	7.3180D+00	1.7506D+03	7.7862D+00	1.0124D-04	7.0175D-06	8.1673D-06	1.2396D+01
4190	1.9175D+03	4.8495D-01	4.1689D-01	7.5593D+00	1.7489D+03	7.7772D+00	1.0121D-04	7.0631D-06	8.2162D-06	1.2318D+01
4200	1.9223D+03	4.8495D-01	4.1710D-01	7.8071D+00	1.7471D+03	7.7683D+00	1.0118D-04	7.1089D-06	8.2653D-06	1.2241D+01
4210	1.9272D+03	4.8495D-01	4.1731D-01	8.0616D+00	1.7454D+03	7.7593D+00	1.0114D-04	7.1551D-06	8.3147D-06	1.2164D+01
4220	1.9320D+03	4.8495D-01	4.1752D-01	8.3228D+00	1.7437D+03	7.7503D+00	1.0111D-04	7.2015D-06	8.3645D-06	1.2088D+01
4230	1.9369D+03	4.8495D-01	4.1773D-01	8.5909D+00	1.7419D+03	7.7413D+00	1.0107D-04	7.2481D-06	8.4144D-06	1.2012D+01
4240	1.9417D+03	4.8495D-01	4.1794D-01	8.8661D+00	1.7402D+03	7.7323D+00	1.0104D-04	7.2951D-06	8.4647D-06	1.1937D+01
4250	1.9466D+03	4.8495D-01	4.1815D-01	9.1484D+00	1.7384D+03	7.7233D+00	1.0101D-04	7.3423D-06	8.5153D-06	1.1862D+01
4260	1.9514D+03	4.8495D-01	4.1835D-01	9.4381D+00	1.7367D+03	7.7143D+00	1.0097D-04	7.3898D-06	8.5662D-06	1.1787D+01
4270	1.9563D+03	4.8495D-01	4.1856D-01	9.7351D+00	1.7350D+03	7.7053D+00	1.0094D-04	7.4376D-06	8.6173D-06	1.1713D+01
4280	1.9611D+03	4.8495D-01	4.1877D-01	1.0040D+01	1.7332D+03	7.6964D+00	1.0090D-04	7.4857D-06	8.6688D-06	1.1640D+01
4290	1.9660D+03	4.8495D-01	4.1897D-01	1.0352D+01	1.7315D+03	7.6874D+00	1.0087D-04	7.5341D-06	8.7205D-06	1.1567D+01
4300	1.9708D+03	4.8495D-01	4.1918D-01	1.0672D+01	1.7298D+03	7.6784D+00	1.0084D-04	7.5828D-06	8.7725D-06	1.1494D+01
4310	1.9757D+03	4.8495D-01	4.1939D-01	1.1001D+01	1.7280D+03	7.6694D+00	1.0080D-04	7.6318D-06	8.8249D-06	1.1422D+01
4320	1.9805D+03	4.8495D-01	4.1959D-01	1.1337D+01	1.7263D+03	7.6604D+00	1.0077D-04	7.6811D-06	8.8776D-06	1.1351D+01
4330	1.9854D+03	4.8495D-01	4.1979D-01	1.1682D+01	1.7246D+03	7.6514D+00	1.0073D-04	7.7307D-06	8.9305D-06	1.1280D+01
4340	1.9902D+03	4.8495D-01	4.2000D-01	1.2035D+01	1.7228D+03	7.6424D+00	1.0070D-04	7.7806D-06	8.9838D-06	1.1209D+01
4350	1.9951D+03	4.8495D-01	4.2020D-01	1.2397D+01	1.7211D+03	7.6335D+00	1.0067D-04	7.8308D-06	9.0374D-06	1.1139D+01
4360	1.9999D+03	4.8495D-01	4.2041D-01	1.2768D+01	1.7193D+03	7.6245D+00	1.0063D-04	7.8814D-06	9.0913D-06	1.1069D+01
4370	2.0048D+03	4.8495D-01	4.2061D-01	1.3147D+01	1.7176D+03	7.6155D+00	1.0060D-04	7.9322D-06	9.1456D-06	1.1000D+01
4380	2.0096D+03	4.8495D-01	4.2081D-01	1.3536D+01	1.7159D+03	7.6065D+00	1.0057D-04	7.9834D-06	9.2001D-06	1.0931D+01
4390	2.0144D+03	4.8495D-01	4.2101D-01	1.3934D+01	1.7141D+03	7.5975D+00	1.0053D-04	8.0349D-06	9.2550D-06	1.0862D+01
4400	2.0193D+03	4.8495D-01	4.2122D-01	1.4341D+01	1.7124D+03	7.5885D+00	1.0050D-04	8.0867D-06	9.3103D-06	1.0794D+01
4410	2.0241D+03	4.8495D-01	4.2142D-01	1.4758D+01	1.7107D+03	7.5795D+00	1.0046D-04	8.1388D-06	9.3658D-06	1.0727D+01

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	DH (J/G)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (1/ATM)
4420	2.0290D+03	4.8495D-01	4.2162D-01	1.5184D+01	1.7089D+03	7.5705D+00	1.0043D-04	8.1913D-06	9.4217D-06	1.0659D+01
4430	2.0338D+03	4.8495D-01	4.2182D-01	1.5620D+01	1.7072D+03	7.5616D+00	1.0040D-04	8.2441D-06	9.4780D-06	1.0593D+01
4440	2.0387D+03	4.8495D-01	4.2202D-01	1.6067D+01	1.7055D+03	7.5526D+00	1.0036D-04	8.2973D-06	9.5345D-06	1.0526D+01
4450	2.0435D+03	4.8495D-01	4.2222D-01	1.6523D+01	1.7037D+03	7.5436D+00	1.0033D-04	8.3508D-06	9.5915D-06	1.0460D+01
4460	2.0484D+03	4.8495D-01	4.2242D-01	1.6990D+01	1.7020D+03	7.5346D+00	1.0030D-04	8.4046D-06	9.6487D-06	1.0395D+01
4470	2.0532D+03	4.8495D-01	4.2262D-01	1.7468D+01	1.7002D+03	7.5256D+00	1.0026D-04	8.4588D-06	9.7064D-06	1.0330D+01
4480	2.0581D+03	4.8495D-01	4.2282D-01	1.7956D+01	1.6985D+03	7.5166D+00	1.0023D-04	8.5133D-06	9.7644D-06	1.0265D+01
4490	2.0629D+03	4.8495D-01	4.2301D-01	1.8455D+01	1.6968D+03	7.5076D+00	1.0020D-04	8.5682D-06	9.8227D-06	1.0200D+01
4500	2.0678D+03	4.8495D-01	4.2321D-01	1.8965D+01	1.6950D+03	7.4987D+00	1.0016D-04	8.6235D-06	9.8814D-06	1.0136D+01
4510	2.0726D+03	4.8495D-01	4.2341D-01	1.9486D+01	1.6933D+03	7.4897D+00	1.0013D-04	8.6791D-06	9.9405D-06	1.0073D+01
4520	2.0775D+03	4.8495D-01	4.2361D-01	2.0018D+01	1.6916D+03	7.4807D+00	1.0010D-04	8.7351D-06	1.0000D-05	1.0010D+01
4530	2.0823D+03	4.8495D-01	4.2381D-01	2.0562D+01	1.6898D+03	7.4717D+00	1.0006D-04	8.7914D-06	1.0060D-05	9.9467D+00
4540	2.0872D+03	4.8495D-01	4.2400D-01	2.1118D+01	1.6881D+03	7.4627D+00	1.0003D-04	8.8482D-06	1.0120D-05	9.8842D+00
4550	2.0920D+03	4.8495D-01	4.2420D-01	2.1686D+01	1.6863D+03	7.4537D+00	9.9995D-05	8.9053D-06	1.0181D-05	9.8221D+00
4560	2.0969D+03	4.8495D-01	4.2439D-01	2.2266D+01	1.6846D+03	7.4447D+00	9.9962D-05	8.9628D-06	1.0242D-05	9.7604D+00
4570	2.1017D+03	4.8495D-01	4.2459D-01	2.2858D+01	1.6829D+03	7.4357D+00	9.9929D-05	9.0206D-06	1.0303D-05	9.6991D+00
4580	2.1066D+03	4.8495D-01	4.2479D-01	2.3462D+01	1.6811D+03	7.4268D+00	9.9895D-05	9.0789D-06	1.0365D-05	9.6380D+00
4590	2.1114D+03	4.8495D-01	4.2498D-01	2.4079D+01	1.6794D+03	7.4178D+00	9.9862D-05	9.1375D-06	1.0427D-05	9.5774D+00
4600	2.1163D+03	4.8495D-01	4.2518D-01	2.4709D+01	1.6777D+03	7.4088D+00	9.9829D-05	9.1966D-06	1.0489D-05	9.5171D+00
4610	2.1211D+03	4.8495D-01	4.2537D-01	2.5351D+01	1.6759D+03	7.3998D+00	9.9796D-05	9.2560D-06	1.0552D-05	9.4572D+00
4620	2.1260D+03	4.8495D-01	4.2557D-01	2.6007D+01	1.6742D+03	7.3908D+00	9.9762D-05	9.3159D-06	1.0616D-05	9.3976D+00
4630	2.1308D+03	4.8495D-01	4.2576D-01	2.6677D+01	1.6725D+03	7.3818D+00	9.9729D-05	9.3761D-06	1.0680D-05	9.3384D+00
4640	2.1357D+03	4.8495D-01	4.2595D-01	2.7359D+01	1.6707D+03	7.3728D+00	9.9696D-05	9.4368D-06	1.0744D-05	9.2795D+00
4650	2.1405D+03	4.8495D-01	4.2615D-01	2.8056D+01	1.6690D+03	7.3639D+00	9.9663D-05	9.4979D-06	1.0808D-05	9.2209D+00
4660	2.1454D+03	4.8495D-01	4.2634D-01	2.8766D+01	1.6672D+03	7.3549D+00	9.9630D-05	9.5594D-06	1.0873D-05	9.1627D+00
4670	2.1502D+03	4.8495D-01	4.2654D-01	2.9490D+01	1.6655D+03	7.3459D+00	9.9597D-05	9.6213D-06	1.0939D-05	9.1048D+00

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	DH (J/G)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (1/ATM)
4680	2.1551D+03	4.8495D-01	4.2673D-01	3.0229D+01	1.6638D+03	7.3369D+00	9.9564D-05	9.6837D-06	1.1005D-05	9.0473D+00
4690	2.1599D+03	4.8495D-01	4.2692D-01	3.0982D+01	1.6620D+03	7.3279D+00	9.9531D-05	9.7465D-06	1.1071D-05	8.9901D+00
4700	2.1648D+03	4.8495D-01	4.2711D-01	3.1749D+01	1.6603D+03	7.3189D+00	9.9498D-05	9.8097D-06	1.1138D-05	8.9332D+00
4710	2.1696D+03	4.8495D-01	4.2731D-01	3.2532D+01	1.6586D+03	7.3099D+00	9.9465D-05	9.8734D-06	1.1205D-05	8.8766D+00
4720	2.1745D+03	4.8495D-01	4.2750D-01	3.3329D+01	1.6568D+03	7.3009D+00	9.9432D-05	9.9375D-06	1.1273D-05	8.8204D+00
4730	2.1793D+03	4.8495D-01	4.2769D-01	3.4142D+01	1.6551D+03	7.2920D+00	9.9399D-05	1.0002D-05	1.1341D-05	8.7644D+00
4740	2.1842D+03	4.8495D-01	4.2788D-01	3.4970D+01	1.6534D+03	7.2830D+00	9.9366D-05	1.0067D-05	1.1410D-05	8.7088D+00
4750	2.1890D+03	4.8495D-01	4.2807D-01	3.5814D+01	1.6516D+03	7.2740D+00	9.9333D-05	1.0133D-05	1.1479D-05	8.6535D+00
4760	2.1939D+03	4.8495D-01	4.2826D-01	3.6673D+01	1.6499D+03	7.2650D+00	9.9300D-05	1.0199D-05	1.1548D-05	8.5985D+00
4770	2.1987D+03	4.8495D-01	4.2845D-01	3.7548D+01	1.6481D+03	7.2560D+00	9.9267D-05	1.0265D-05	1.1619D-05	8.5439D+00
4780	2.2036D+03	4.8495D-01	4.2864D-01	3.8440D+01	1.6464D+03	7.2470D+00	9.9234D-05	1.0332D-05	1.1689D-05	8.4895D+00
4790	2.2084D+03	4.8495D-01	4.2884D-01	3.9347D+01	1.6447D+03	7.2380D+00	9.9202D-05	1.0399D-05	1.1760D-05	8.4354D+00
4800	2.2133D+03	4.8495D-01	4.2903D-01	4.0272D+01	1.6429D+03	7.2291D+00	9.9169D-05	1.0467D-05	1.1832D-05	8.3817D+00
4810	2.2181D+03	4.8495D-01	4.2922D-01	4.1213D+01	1.6412D+03	7.2201D+00	9.9136D-05	1.0536D-05	1.1904D-05	8.3282D+00
4820	2.2230D+03	4.8495D-01	4.2941D-01	4.2171D+01	1.6395D+03	7.2111D+00	9.9103D-05	1.0605D-05	1.1976D-05	8.2750D+00
4830	2.2278D+03	4.8495D-01	4.2960D-01	4.3146D+01	1.6377D+03	7.2021D+00	9.9071D-05	1.0674D-05	1.2049D-05	8.2221D+00
4840	2.2327D+03	4.8495D-01	4.2978D-01	4.4138D+01	1.6360D+03	7.1931D+00	9.9038D-05	1.0744D-05	1.2123D-05	8.1695D+00
4850	2.2375D+03	4.8495D-01	4.2997D-01	4.5148D+01	1.6342D+03	7.1841D+00	9.9005D-05	1.0814D-05	1.2197D-05	8.1172D+00
4860	2.2424D+03	4.8495D-01	4.3016D-01	4.6176D+01	1.6325D+03	7.1751D+00	9.8973D-05	1.0885D-05	1.2272D-05	8.0652D+00
4870	2.2472D+03	4.8495D-01	4.3035D-01	4.7221D+01	1.6308D+03	7.1661D+00	9.8940D-05	1.0957D-05	1.2347D-05	8.0135D+00
4880	2.2521D+03	4.8495D-01	4.3054D-01	4.8285D+01	1.6290D+03	7.1572D+00	9.8907D-05	1.1029D-05	1.2422D-05	7.9620D+00
4890	2.2569D+03	4.8495D-01	4.3073D-01	4.9366D+01	1.6273D+03	7.1482D+00	9.8875D-05	1.1101D-05	1.2499D-05	7.9109D+00
4900	2.2618D+03	4.8495D-01	4.3092D-01	5.0467D+01	1.6256D+03	7.1392D+00	9.8842D-05	1.1174D-05	1.2575D-05	7.8600D+00
4910	2.2666D+03	4.8495D-01	4.3111D-01	5.1586D+01	1.6238D+03	7.1302D+00	9.8810D-05	1.1248D-05	1.2653D-05	7.8094D+00
4920	2.2715D+03	4.8495D-01	4.3129D-01	5.2724D+01	1.6221D+03	7.1212D+00	9.8777D-05	1.1322D-05	1.2731D-05	7.7590D+00
4930	2.2763D+03	4.8495D-01	4.3148D-01	5.3881D+01	1.6204D+03	7.1122D+00	9.8745D-05	1.1397D-05	1.2809D-05	7.7090D+00

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	DH (J/G)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (1/ATM)
4940	2.2812D+03	4.8495D-01	4.3167D-01	5.5057D+01	1.6186D+03	7.1032D+00	9.8712D-05	1.1472D-05	1.2888D-05	7.6591D+00
4950	2.2860D+03	4.8495D-01	4.3186D-01	5.6253D+01	1.6169D+03	7.0943D+00	9.8680D-05	1.1548D-05	1.2968D-05	7.6096D+00
4960	2.2909D+03	4.8495D-01	4.3205D-01	5.7468D+01	1.6151D+03	7.0853D+00	9.8647D-05	1.1625D-05	1.3048D-05	7.5603D+00
4970	2.2957D+03	4.8495D-01	4.3223D-01	5.8704D+01	1.6134D+03	7.0763D+00	9.8615D-05	1.1702D-05	1.3129D-05	7.5113D+00
4980	2.3006D+03	4.8495D-01	4.3242D-01	5.9959D+01	1.6117D+03	7.0673D+00	9.8582D-05	1.1779D-05	1.3210D-05	7.4626D+00
4990	2.3054D+03	4.8495D-01	4.3261D-01	6.1235D+01	1.6099D+03	7.0583D+00	9.8550D-05	1.1858D-05	1.3292D-05	7.4141D+00
5000	2.3103D+03	4.8495D-01	4.3279D-01	6.2531D+01	1.6082D+03	7.0493D+00	9.8518D-05	1.1937D-05	1.3375D-05	7.3658D+00
5010	2.3151D+03	4.8495D-01	4.3298D-01	6.3847D+01	1.6065D+03	7.0403D+00	9.8485D-05	1.2016D-05	1.3458D-05	7.3178D+00
5020	2.3200D+03	4.8495D-01	4.3317D-01	6.5185D+01	1.6047D+03	7.0313D+00	9.8453D-05	1.2096D-05	1.3542D-05	7.2701D+00
5030	2.3248D+03	4.8495D-01	4.3336D-01	6.6544D+01	1.6030D+03	7.0224D+00	9.8421D-05	1.2177D-05	1.3627D-05	7.2226D+00
5040	2.3297D+03	4.8495D-01	4.3354D-01	6.7923D+01	1.6013D+03	7.0134D+00	9.8388D-05	1.2258D-05	1.3712D-05	7.1754D+00
5050	2.3345D+03	4.8495D-01	4.3373D-01	6.9325D+01	1.5995D+03	7.0044D+00	9.8356D-05	1.2340D-05	1.3798D-05	7.1284D+00
5060	2.3394D+03	4.8495D-01	4.3391D-01	7.0748D+01	1.5978D+03	6.9954D+00	9.8324D-05	1.2423D-05	1.3884D-05	7.0817D+00
5070	2.3442D+03	4.8495D-01	4.3410D-01	7.2193D+01	1.5960D+03	6.9864D+00	9.8292D-05	1.2507D-05	1.3971D-05	7.0352D+00
5080	2.3491D+03	4.8495D-01	4.3429D-01	7.3659D+01	1.5943D+03	6.9774D+00	9.8259D-05	1.2591D-05	1.4059D-05	6.9889D+00
5090	2.3539D+03	4.8495D-01	4.3447D-01	7.5148D+01	1.5926D+03	6.9684D+00	9.8227D-05	1.2675D-05	1.4148D-05	6.9429D+00
5100	2.3588D+03	4.8495D-01	4.3466D-01	7.6660D+01	1.5908D+03	6.9595D+00	9.8195D-05	1.2761D-05	1.4237D-05	6.8971D+00
5110	2.3636D+03	4.8495D-01	4.3484D-01	7.8194D+01	1.5891D+03	6.9505D+00	9.8163D-05	1.2847D-05	1.4327D-05	6.8515D+00
5120	2.3685D+03	4.8495D-01	4.3503D-01	7.9751D+01	1.5874D+03	6.9415D+00	9.8131D-05	1.2934D-05	1.4418D-05	6.8062D+00
5130	2.3733D+03	4.8495D-01	4.3522D-01	8.1331D+01	1.5856D+03	6.9325D+00	9.8099D-05	1.3021D-05	1.4509D-05	6.7611D+00
5140	2.3782D+03	4.8495D-01	4.3540D-01	8.2934D+01	1.5839D+03	6.9235D+00	9.8067D-05	1.3110D-05	1.4601D-05	6.7163D+00
5150	2.3830D+03	4.8495D-01	4.3559D-01	8.4560D+01	1.5822D+03	6.9145D+00	9.8035D-05	1.3199D-05	1.4694D-05	6.6717D+00
5160	2.3879D+03	4.8495D-01	4.3577D-01	8.6210D+01	1.5804D+03	6.9055D+00	9.8003D-05	1.3288D-05	1.4788D-05	6.6273D+00
5170	2.3927D+03	4.8495D-01	4.3596D-01	8.7884D+01	1.5787D+03	6.8965D+00	9.7971D-05	1.3379D-05	1.4882D-05	6.5831D+00
5180	2.3976D+03	4.8495D-01	4.3614D-01	8.9582D+01	1.5769D+03	6.8876D+00	9.7939D-05	1.3470D-05	1.4977D-05	6.5391D+00
5190	2.4024D+03	4.8495D-01	4.3633D-01	9.1304D+01	1.5752D+03	6.8786D+00	9.7907D-05	1.3562D-05	1.5073D-05	6.4954D+00

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	DH (J/G)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (1/ATM)
5200	2.4073D+03	4.8495D-01	4.3651D-01	9.3050D+01	1.5735D+03	6.8696D+00	9.7875D-05	1.3655D-05	1.5170D-05	6.4519D+00
5210	2.4121D+03	4.8495D-01	4.3670D-01	9.4821D+01	1.5717D+03	6.8606D+00	9.7843D-05	1.3748D-05	1.5267D-05	6.4086D+00
5220	2.4170D+03	4.8495D-01	4.3688D-01	9.6616D+01	1.5700D+03	6.8516D+00	9.7811D-05	1.3843D-05	1.5366D-05	6.3655D+00
5230	2.4218D+03	4.8495D-01	4.3707D-01	9.8437D+01	1.5683D+03	6.8426D+00	9.7779D-05	1.3938D-05	1.5465D-05	6.3226D+00
5240	2.4267D+03	4.8495D-01	4.3725D-01	1.0028D+02	1.5665D+03	6.8336D+00	9.7747D-05	1.4034D-05	1.5565D-05	6.2800D+00
5250	2.4315D+03	4.8495D-01	4.3744D-01	1.0215D+02	1.5648D+03	6.8247D+00	9.7715D-05	1.4131D-05	1.5666D-05	6.2376D+00
5260	2.4364D+03	4.8495D-01	4.3762D-01	1.0405D+02	1.5630D+03	6.8157D+00	9.7684D-05	1.4229D-05	1.5767D-05	6.1953D+00
5270	2.4412D+03	4.8495D-01	4.3781D-01	1.0597D+02	1.5613D+03	6.8067D+00	9.7652D-05	1.4327D-05	1.5870D-05	6.1533D+00
5280	2.4461D+03	4.8495D-01	4.3799D-01	1.0792D+02	1.5596D+03	6.7977D+00	9.7620D-05	1.4427D-05	1.5973D-05	6.1115D+00
5290	2.4509D+03	4.8495D-01	4.3818D-01	1.0989D+02	1.5578D+03	6.7887D+00	9.7588D-05	1.4527D-05	1.6077D-05	6.0699D+00
5300	2.4558D+03	4.8495D-01	4.3836D-01	1.1189D+02	1.5561D+03	6.7797D+00	9.7556D-05	1.4628D-05	1.6183D-05	6.0285D+00
5310	2.4606D+03	4.8495D-01	4.3855D-01	1.1392D+02	1.5544D+03	6.7707D+00	9.7525D-05	1.4730D-05	1.6289D-05	5.9873D+00
5320	2.4655D+03	4.8495D-01	4.3873D-01	1.1597D+02	1.5526D+03	6.7618D+00	9.7493D-05	1.4833D-05	1.6396D-05	5.9463D+00
5330	2.4703D+03	4.8495D-01	4.3892D-01	1.1805D+02	1.5509D+03	6.7528D+00	9.7461D-05	1.4937D-05	1.6504D-05	5.9055D+00
5340	2.4752D+03	4.8495D-01	4.3910D-01	1.2016D+02	1.5492D+03	6.7438D+00	9.7430D-05	1.5042D-05	1.6612D-05	5.8649D+00
5350	2.4800D+03	4.8495D-01	4.3928D-01	1.2229D+02	1.5474D+03	6.7348D+00	9.7398D-05	1.5148D-05	1.6722D-05	5.8245D+00
5360	2.4848D+03	4.8495D-01	4.3947D-01	1.2445D+02	1.5457D+03	6.7258D+00	9.7366D-05	1.5254D-05	1.6833D-05	5.7843D+00
5370	2.4897D+03	4.8495D-01	4.3965D-01	1.2664D+02	1.5439D+03	6.7168D+00	9.7335D-05	1.5362D-05	1.6945D-05	5.7442D+00
5380	2.4945D+03	4.8495D-01	4.3984D-01	1.2886D+02	1.5422D+03	6.7078D+00	9.7303D-05	1.5471D-05	1.7058D-05	5.7044D+00
5390	2.4994D+03	4.8495D-01	4.4002D-01	1.3110D+02	1.5405D+03	6.6988D+00	9.7272D-05	1.5581D-05	1.7171D-05	5.6648D+00
5400	2.5042D+03	4.8495D-01	4.4021D-01	1.3337D+02	1.5387D+03	6.6899D+00	9.7240D-05	1.5691D-05	1.7286D-05	5.6253D+00
5410	2.5091D+03	4.8495D-01	4.4039D-01	1.3567D+02	1.5370D+03	6.6809D+00	9.7209D-05	1.5803D-05	1.7402D-05	5.5861D+00
5420	2.5139D+03	4.8495D-01	4.4058D-01	1.3800D+02	1.5353D+03	6.6719D+00	9.7177D-05	1.5916D-05	1.7519D-05	5.5470D+00
5430	2.5188D+03	4.8495D-01	4.4076D-01	1.4036D+02	1.5335D+03	6.6629D+00	9.7146D-05	1.6030D-05	1.7637D-05	5.5081D+00
5440	2.5236D+03	4.8495D-01	4.4095D-01	1.4274D+02	1.5318D+03	6.6539D+00	9.7114D-05	1.6145D-05	1.7756D-05	5.4694D+00
5450	2.5285D+03	4.8495D-01	4.4113D-01	1.4516D+02	1.5301D+03	6.6449D+00	9.7083D-05	1.6261D-05	1.7876D-05	5.4309D+00

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	DH (J/G)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (1/ATM)
5460	2.5333D+03	4.8495D-01	4.4131D-01	1.4760D+02	1.5283D+03	6.6359D+00	9.7051D-05	1.6378D-05	1.7997D-05	5.3926D+00
5470	2.5382D+03	4.8495D-01	4.4150D-01	1.5007D+02	1.5266D+03	6.6270D+00	9.7020D-05	1.6496D-05	1.8120D-05	5.3544D+00
5480	2.5430D+03	4.8495D-01	4.4168D-01	1.5257D+02	1.5248D+03	6.6180D+00	9.6989D-05	1.6616D-05	1.8243D-05	5.3164D+00
5490	2.5479D+03	4.8495D-01	4.4187D-01	1.5510D+02	1.5231D+03	6.6090D+00	9.6957D-05	1.6736D-05	1.8368D-05	5.2787D+00
5500	2.5527D+03	4.8495D-01	4.4205D-01	1.5766D+02	1.5214D+03	6.6000D+00	9.6926D-05	1.6858D-05	1.8494D-05	5.2410D+00
5510	2.5576D+03	4.8495D-01	4.4224D-01	1.6025D+02	1.5196D+03	6.5910D+00	9.6895D-05	1.6981D-05	1.8621D-05	5.2036D+00
5520	2.5624D+03	4.8495D-01	4.4242D-01	1.6287D+02	1.5179D+03	6.5820D+00	9.6863D-05	1.7105D-05	1.8749D-05	5.1663D+00
5530	2.5673D+03	4.8495D-01	4.4261D-01	1.6552D+02	1.5162D+03	6.5730D+00	9.6832D-05	1.7230D-05	1.8879D-05	5.1292D+00
5540	2.5721D+03	4.8495D-01	4.4279D-01	1.6820D+02	1.5144D+03	6.5640D+00	9.6801D-05	1.7357D-05	1.9009D-05	5.0923D+00
5550	2.5770D+03	4.8495D-01	4.4298D-01	1.7091D+02	1.5127D+03	6.5551D+00	9.6770D-05	1.7485D-05	1.9141D-05	5.0555D+00
5560	2.5818D+03	4.8495D-01	4.4316D-01	1.7366D+02	1.5110D+03	6.5461D+00	9.6739D-05	1.7614D-05	1.9275D-05	5.0190D+00
5570	2.5867D+03	4.8495D-01	4.4335D-01	1.7643D+02	1.5092D+03	6.5371D+00	9.6707D-05	1.7744D-05	1.9409D-05	4.9825D+00
5580	2.5915D+03	4.8495D-01	4.4353D-01	1.7923D+02	1.5075D+03	6.5281D+00	9.6676D-05	1.7876D-05	1.9545D-05	4.9463D+00
5590	2.5964D+03	4.8495D-01	4.4372D-01	1.8206D+02	1.5057D+03	6.5191D+00	9.6645D-05	1.8009D-05	1.9682D-05	4.9102D+00
5600	2.6012D+03	4.8495D-01	4.4390D-01	1.8493D+02	1.5040D+03	6.5101D+00	9.6614D-05	1.8143D-05	1.9821D-05	4.8743D+00
5610	2.6061D+03	4.8495D-01	4.4409D-01	1.8782D+02	1.5023D+03	6.5011D+00	9.6583D-05	1.8279D-05	1.9961D-05	4.8385D+00
5620	2.6109D+03	4.8495D-01	4.4427D-01	1.9075D+02	1.5005D+03	6.4922D+00	9.6552D-05	1.8417D-05	2.0103D-05	4.8029D+00
5630	2.6158D+03	4.8495D-01	4.4446D-01	1.9371D+02	1.4988D+03	6.4832D+00	9.6521D-05	1.8555D-05	2.0246D-05	4.7675D+00
5640	2.6206D+03	4.8495D-01	4.4464D-01	1.9670D+02	1.4971D+03	6.4742D+00	9.6490D-05	1.8695D-05	2.0390D-05	4.7322D+00
5650	2.6255D+03	4.8495D-01	4.4483D-01	1.9972D+02	1.4953D+03	6.4652D+00	9.6459D-05	1.8837D-05	2.0536D-05	4.6971D+00
5660	2.6303D+03	4.8495D-01	4.4501D-01	2.0278D+02	1.4936D+03	6.4562D+00	9.6428D-05	1.8980D-05	2.0683D-05	4.6622D+00
5670	2.6352D+03	4.8495D-01	4.4520D-01	2.0586D+02	1.4918D+03	6.4472D+00	9.6397D-05	1.9124D-05	2.0832D-05	4.6274D+00
5680	2.6400D+03	4.8495D-01	4.4538D-01	2.0898D+02	1.4901D+03	6.4382D+00	9.6366D-05	1.9270D-05	2.0982D-05	4.5927D+00
5690	2.6449D+03	4.8495D-01	4.4557D-01	2.1213D+02	1.4884D+03	6.4292D+00	9.6335D-05	1.9418D-05	2.1134D-05	4.5582D+00
5700	2.6497D+03	4.8495D-01	4.4575D-01	2.1532D+02	1.4866D+03	6.4203D+00	9.6304D-05	1.9567D-05	2.1288D-05	4.5239D+00
5710	2.6546D+03	4.8495D-01	4.4594D-01	2.1853D+02	1.4849D+03	6.4113D+00	9.6273D-05	1.9718D-05	2.1443D-05	4.4897D+00

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	DH (J/G)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (1/ATM)
5720	2.6594D+03	4.8495D-01	4.4613D-01	2.2178D+02	1.4832D+03	6.4023D+00	9.6242D-05	1.9871D-05	2.1600D-05	4.4557D+00
5730	2.6643D+03	4.8495D-01	4.4631D-01	2.2506D+02	1.4814D+03	6.3933D+00	9.6211D-05	2.0025D-05	2.1758D-05	4.4218D+00
5740	2.6691D+03	4.8495D-01	4.4650D-01	2.2838D+02	1.4797D+03	6.3843D+00	9.6180D-05	2.0181D-05	2.1918D-05	4.3881D+00
5750	2.6740D+03	4.8495D-01	4.4668D-01	2.3173D+02	1.4780D+03	6.3753D+00	9.6149D-05	2.0338D-05	2.2080D-05	4.3545D+00
5760	2.6788D+03	4.8495D-01	4.4687D-01	2.3511D+02	1.4762D+03	6.3663D+00	9.6119D-05	2.0498D-05	2.2244D-05	4.3211D+00
5770	2.6837D+03	4.8495D-01	4.4706D-01	2.3852D+02	1.4745D+03	6.3574D+00	9.6088D-05	2.0659D-05	2.2410D-05	4.2878D+00
5780	2.6885D+03	4.8495D-01	4.4724D-01	2.4197D+02	1.4727D+03	6.3484D+00	9.6057D-05	2.0822D-05	2.2577D-05	4.2547D+00
5790	2.6934D+03	4.8495D-01	4.4743D-01	2.4545D+02	1.4710D+03	6.3394D+00	9.6026D-05	2.0986D-05	2.2746D-05	4.2217D+00
5800	2.6982D+03	4.8495D-01	4.4762D-01	2.4896D+02	1.4693D+03	6.3304D+00	9.5996D-05	2.1153D-05	2.2917D-05	4.1888D+00
5810	2.7031D+03	4.8495D-01	4.4780D-01	2.5251D+02	1.4675D+03	6.3214D+00	9.5965D-05	2.1321D-05	2.3090D-05	4.1561D+00
5820	2.7079D+03	4.8495D-01	4.4799D-01	2.5609D+02	1.4658D+03	6.3124D+00	9.5934D-05	2.1492D-05	2.3265D-05	4.1236D+00
5830	2.7128D+03	4.8495D-01	4.4818D-01	2.5971D+02	1.4641D+03	6.3034D+00	9.5904D-05	2.1664D-05	2.3442D-05	4.0911D+00
5840	2.7176D+03	4.8495D-01	4.4836D-01	2.6336D+02	1.4623D+03	6.2944D+00	9.5873D-05	2.1839D-05	2.3621D-05	4.0589D+00
5850	2.7225D+03	4.8495D-01	4.4855D-01	2.6704D+02	1.4606D+03	6.2855D+00	9.5842D-05	2.2015D-05	2.3802D-05	4.0267D+00
5860	2.7273D+03	4.8495D-01	4.4874D-01	2.7076D+02	1.4589D+03	6.2765D+00	9.5812D-05	2.2194D-05	2.3985D-05	3.9947D+00
5870	2.7322D+03	4.8495D-01	4.4893D-01	2.7452D+02	1.4571D+03	6.2675D+00	9.5781D-05	2.2374D-05	2.4170D-05	3.9628D+00
5880	2.7370D+03	4.8495D-01	4.4911D-01	2.7830D+02	1.4554D+03	6.2585D+00	9.5751D-05	2.2557D-05	2.4357D-05	3.9311D+00
5890	2.7419D+03	4.8495D-01	4.4930D-01	2.8213D+02	1.4536D+03	6.2495D+00	9.5720D-05	2.2742D-05	2.4547D-05	3.8995D+00
5900	2.7467D+03	4.8495D-01	4.4949D-01	2.8598D+02	1.4519D+03	6.2405D+00	9.5689D-05	2.2930D-05	2.4738D-05	3.8681D+00
5910	2.7516D+03	4.8495D-01	4.4968D-01	2.8987D+02	1.4502D+03	6.2315D+00	9.5659D-05	2.3119D-05	2.4932D-05	3.8367D+00
5920	2.7564D+03	4.8495D-01	4.4986D-01	2.9380D+02	1.4484D+03	6.2226D+00	9.5628D-05	2.3311D-05	2.5129D-05	3.8055D+00
5930	2.7613D+03	4.8495D-01	4.5005D-01	2.9776D+02	1.4467D+03	6.2136D+00	9.5598D-05	2.3505D-05	2.5327D-05	3.7745D+00
5940	2.7661D+03	4.8495D-01	4.5024D-01	3.0176D+02	1.4450D+03	6.2046D+00	9.5567D-05	2.3702D-05	2.5529D-05	3.7436D+00
5950	2.7710D+03	4.8495D-01	4.5043D-01	3.0579D+02	1.4432D+03	6.1956D+00	9.5537D-05	2.3901D-05	2.5732D-05	3.7128D+00
5960	2.7758D+03	4.8495D-01	4.5062D-01	3.0985D+02	1.4415D+03	6.1866D+00	9.5507D-05	2.4102D-05	2.5938D-05	3.6821D+00
5970	2.7807D+03	4.8495D-01	4.5081D-01	3.1395D+02	1.4398D+03	6.1776D+00	9.5476D-05	2.4306D-05	2.6147D-05	3.6515D+00

THERMODYNAMIC PROPERTIES OF LIQUID URANIUM DIOXIDE

T (K)	H-H(298) (J/G)	CP (J/G-K)	CV (J/G-K)	P (ATM)	DH (J/G)	RHO (G/CC)	ALPHAP (1/K)	BETAS (1/ATM)	BETAT (1/ATM)	GAMMAV (1/ATM)
5980	2.7855D+03	4.8495D-01	4.5100D-01	3.1809D+02	1.4380D+03	6.1686D+00	9.5446D-05	2.4513D-05	2.6358D-05	3.6211D+00
5990	2.7904D+03	4.8495D-01	4.5119D-01	3.2226D+02	1.4363D+03	6.1596D+00	9.5416D-05	2.4722D-05	2.6572D-05	3.5908D+00
6000	2.7952D+03	4.8495D-01	4.5137D-01	3.2647D+02	1.4345D+03	6.1507D+00	9.5385D-05	2.4934D-05	2.6788D-05	3.5607D+00

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