2.5 Krypton

Equations for thermodynamic properties have been cited from the National Standard Reference Data Service of the USSR, A Series of Property Tables [1].

2.5.1 Temperature Scale

International practical temperature scale 1968 (IPTS-1968)

2.5.2 The Names of Substance, Library File and Single Shot Program

Name of Substance:	Krypton
Library File for UNIX:	libjkr.a
Library File for DOS,Windows95/NT:	JKR.LIB
Single Shot Program for UNIX:	kr-ss
Single Shot Program for DOS,Windows95/NT:	KR–SS.EXE

2.5.3 Important Constants and Others

Molecular Formula:	Kr
Relative Molecular Mass:	83.80
Gas Constant:	99.22 J/(kg·K)

Critical Constants:

Critical Pressure:	5.496×10^{6}Pa (54.96 bar)
Critical Temperature:	209.39 K (-63.76°C)
Critical Specific Volume:	1.098×10^{-3}m^3/kg

Triple Point:

Pressure:	0.07319×10^{6}Pa (0.7319 bar)
Temperature:	115.76 K (-157.39°C)

2.5.4 Formula

Equation of State:

Equations (2.44) and (3.36) in a function form of $P = P(\rho, T)$ in reference [1]. Here P=pressure, ρ=density and T=temperature.

Vapor Pressure:

Equation (1.70) in reference [1].

Properties at Vapor-Liquid Equilibrium:

Equations (2.44) and (3.36) for specific volume in reference [1].

Pressure and Temperature on Melting Line:

Equation (1.65) in reference [1].

Transport Properties:

Equations (4.25) and (6.13) in reference [1] for viscosity.

References

[1] V.A.Rabinovich, A.A.Vasserman, V.I.Nedstup and L.S.Veksler, Thermophysical Properties of NEON, ARGON, KRYPTON AND XENON, National Standard Reference Data Service of the USSR: A Series of Property Tables, Vol.10, English-Language Edition, edited by T.B.Selover, Jr., (1987).

Table II–2.5–1 Krypton Function

No.	Name of Function	Function and Argument(s)	Range of Argument(s)
1	AIPPT(P,T)		
94	AJTPT(P,T)		
8A	AKPD(P)		
8B	AKPDD(P)		
82	AKPT(P,T)		
8C	AKTD(T)		
8D	AKTDD(T)		
2	ALAPP(P)		
3	ALAPT(T)		
4	ALHP(P)		
5	ALHT(T)		
6	ALMPD(P)		
7	ALMPDD(P)		
8	ALMPT(P,T)		
9	ALMTD(T)		
10	ALMTDD(T)		
11	AMUPD(P)	AMUPD: Coefficient of Viscosity of Saturated Liquid [Pa·s] P∗: Pressure [Pa],[bar]	$73.19\times10^3\leq P\leq5.496\times10^6$ [Pa] $0.7319\leq P\leq54.96$ [bar]
12	AMUPDD(P)	AMUPDD: Coefficient of Viscosity of Saturated Vapor [Pa·s] P∗: Pressure [Pa],[bar]	$73.19\times10^3\leq P\leq5.496\times10^6$ [Pa] $0.7319\leq P\leq54.96$ [bar]
13	AMUPT(P,T)		
14	AMUTD(T)	AMUTD: Coefficient of Viscosity of Saturated Liquid [Pa·s] T∗: Temperature [K],[°C]	$115.76\leq T\leq209.39$ [K] $-157.39\leq T\leq-63.76$ [°C]
15	AMUTDD(T)	AMUTDD: Coefficient of Viscosity of Saturated Vapor [Pa·s] T∗: Temperature [K],[°C]	$115.76\leq T\leq209.39$ [K] $-157.39\leq T\leq-63.76$ [°C]
92	BPPT(P,T)		
90	BSPT(P,T)		
91	BTPT(P,T)		
93	BVPT(P,T)		
16	CPPD(P)		
17	CPPDD(P)		
18	CPPT(P,T)		
19	CPTD(T)		
20	CPTDD(T)		
21	CRP('A')	CRP: Critical Constants P∗: 'A'='P': 5.496×10^6[Pa], 54.96 [bar] Pressure T∗: 'A'='T': 209.39 [K], −63.76 [°C] Temperature V: 'A'='V': 1.098×10^{-3} [m^3/kg] Specific Volume	one of 'P', 'T' and 'V'
7A	CVPD(P)		
76	CVPDD(P)		
77	CVPT(P,T)		
7B	CVTD(T)		
78	CVTDD(T)		
2A	EPSPD(P)		
2B	EPSPDD(P)		
22	EPSPT(P,T)		
2C	EPSTD(T)		
2D	EPSTDD(T)		
89	FC('A')	FC: Fundamental Constants M: 'A'='M': 83.80 Relative Molecular Mass R: 'A'='R': 99.22 [J/(kg·K)] Gas Constant	one of 'M' and 'R'
9A	GAMPD(P)		

Table II–2.5–1 Krypton Function (cont'd)

No.	Name of Function	Function and Argument(s)	Range of Argument(s)
96	GAMPDD(P)		
95	GAMPT(P,T)		
9B	GAMTD(T)		
97	GAMTDD(T)		
23	HPD(P)		
24	HPDD(P)		
71	HPS(P,S)		
25	HPT(P,T)		
26	HPX(P,X)		
27	HTD(T)		
28	HTDD(T)		
29	HTX(T,X)		
84	IDENTF('A')	IDENTF: CHARACTER TYPE FUNCTION for Package Identification (Length 20) C: 'A'='C': 'KR' Molecular Formula S: 'A'='S': 'KRYPTON' Name of Substance V: 'A'='V': '10.1' Version Number	one of 'C', 'S' and 'V'
66	PLDT(T)		
68	PMLT(T)	PMLT∗: Pressure on Melting Curve [Pa], [bar] T∗: Temperature [K],[°C]	115.76≤T≤144 [K] −157.39≤T≤−129.15 [°C]
85	PRPD(P)		
86	PRPDD(P)		
81	PRPT(P,T)		
87	PRTD(T)		
88	PRTDD(T)		
99	PSBT(T)		
30	PST(T)	PST∗: Saturation Pressure [Pa], [bar] T∗: Temperature [K],[°C]	115.76≤T≤209.39 [K] −157.39≤T≤−63.76 [°C]
72	PSTD(T)		
73	PSTDD(T)		
31	SIGP(P)		
32	SIGT(T)		
33	SPD(P)		
34	SPDD(P)		
35	SPT(P,T)		
36	SPX(P,X)		
37	STD(T)		
38	STDD(T)		
39	STX(T,X)		
67	TLDP(P)		
69	TMLP(P)	TMLP∗: Temperature on Melting Curve [K],[°C] P∗: Pressure [Pa],[bar]	73.19×10^{3}≤P≤100.7×10^{6} [Pa] 0.7319≤P≤1007 [bar]
64	TPH(P,H)		
6H	TPH2(P,H)		
65	TPS(P,S)		
6S	TPS2(P,S)		
98	TPSEUP(P)		
70	TPV(P,V)		
41	TRPL('A')	TRPL∗: Properties at Triple Point P∗: 'A'='P': 0.07319×10^{6} [Pa], 0.7319 [bar] Pressure T∗: 'A'='T': 115.76 [K], −157.39 [°C] Temperature	one of 'P' and 'T'
100	TSBP(P)		

Table II–2.5–1 Krypton Function (cont'd)

No.	Name of Function	Function and Argument(s)	Range of Argument(s)
40	TSP(P)	TSP∗: Saturation Temperature [K],[°C] P∗: Pressure [Pa],[bar]	$73.19\times10^3\leq P\leq5.496\times10^6$ [Pa] $0.7319\leq P\leq54.96$ [bar]
74	TSPD(P)		
75	TSPDD(P)		
42	UPD(P)		
43	UPDD(P)		
79	UPS(P,S)		
44	UPT(P,T)		
45	UPX(P,X)		
46	UTD(T)		
47	UTDD(T)		
48	UTX(T,X)		
49	VPD(P)	VPD: Specific Volume of Saturated Liquid [m^3/kg] P∗: Pressure [Pa],[bar]	$73.19\times10^3\leq P\leq5.496\times10^6$ [Pa] $0.7319\leq P\leq54.96$ [bar]
50	VPDD(P)	VPDD: Specific Volume of Saturated Vapor [m^3/kg] P∗: Pressure [Pa],[bar]	$73.19\times10^3\leq P\leq5.496\times10^6$ [Pa] $0.7319\leq P\leq54.96$ [bar]
80	VPS(P,S)		
51	VPT(P,T)		
52	VPX(P,X)		
53	VTD(T)	VTD: Specific Volume of Saturated Liquid [m^3/kg] T∗: Temperature [K],[°C]	$115.76\leq T\leq209.39$ [K] $-157.39\leq T\leq-63.76$ [°C]
54	VTDD(T)	VTDD: Specific Volume of Saturated Vapor [m^3/kg] T∗: Temperature [K],[°C]	$115.76\leq T\leq209.39$ [K] $-157.39\leq T\leq-63.76$ [°C]
55	VTX(T,X)		
8E	WPD(P)		
8F	WPDD(P)		
83	WPT(P,T)		
8G	WTD(T)		
8H	WTDD(T)		
56	XPH(P,H)		
57	XPS(P,S)		
58	XPU(P,U)		
59	XPV(P,V)		
60	XTH(T,H)		
61	XTS(T,S)		
62	XTU(T,U)		
63	XTV(T,V)		