

2.3 Neon

Equations for thermodynamic properties have been cited from the National Standard Reference Data Service of the USSR, A Series of Property Tables [1] and one for surface tension from Miller et al.[2].

2.3.1 Temperature Scale

International practical temperature scale 1968 (IPTS-1968)

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

Name of Substance:	Neon
Library File for UNIX:	libjne.a
Library File for DOS,Windows95/NT:	JNE.LIB
Single Shot Program for UNIX:	ne-ss
Single Shot Program for DOS,Windows95/NT:	NE-SS.EXE

2.3.3 Important Constants and Others

Molecular Formula:	Ne
Relative Molecular Mass:	20.183
Gas Constant:	411.95 J/(kg·K)

Critical Constants:

Critical Pressure:	2.653×10 ⁶ Pa (26.53 bar)
Critical Temperature:	44.40 K (−228.75°C)
Critical Specific Volume:	2.069×10 ^{−3} m ³ /kg

Triple Point:

Pressure:	0.04335×10 ⁶ Pa (0.4335 bar)
Temperature:	24.55 K (−248.6°C)

2.3.4 Formula

Equation of State:

Equations (2.44) and (3.33) in a function form of $P = P(\rho, T)$ in reference [1]. Here P =pressure, ρ =density and T =temperature.

Vapor Pressure:

Equation (1.71) in reference [1].

Properties at Vapor-Liquid Equilibrium:

Equations (2.44) and (3.33) for specific volume, equations (3.27), (3.31), (3.32) and (3.33) for isobaric specific heat. All of these have been cited from 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.

The Other Properties:

Equation (23-1) in reference [2] for surface tension.

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).
- [2] J.W.Miller, Jr. and C.L.Yaws, Chem. Eng., 83-23, (1976), p.127.

Table II-2.3-1 Neon 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]	$43.35 \times 10^3 \leq P \leq 2.653 \times 10^6$ [Pa] $0.4335 \leq P \leq 26.53$ [bar]
12	AMUPDD(P)	AMUPDD: Coefficient of Viscosity of Saturated Vapor [Pa·s] P*: Pressure [Pa], [bar]	$43.35 \times 10^3 \leq P \leq 2.653 \times 10^6$ [Pa] $0.4335 \leq P \leq 26.53$ [bar]
13	AMUPT(P,T)		
14	AMUTD(T)	AMUTD: Coefficient of Viscosity of Saturated Liquid [Pa·s] T*: Temperature [K], [°C]	$24.55 \leq T \leq 44.4$ [K] $-248.6 \leq T \leq -228.75$ [°C]
15	AMUTDD(T)	AMUTDD: Coefficient of Viscosity of Saturated Vapor [Pa·s] T*: Temperature [K], [°C]	$24.55 \leq T \leq 44.4$ [K] $-248.6 \leq T \leq -228.75$ [°C]
92	BPPT(P,T)		
90	BSPT(P,T)		
91	BTPT(P,T)		
93	BVPT(P,T)		
16	CPPD(P)	CPPD: Isobaric Specific Heat of Saturated Liquid [J/(kg·K)] P*: Pressure [Pa], [bar]	$43.35 \times 10^3 \leq P < 1.6118 \times 10^6$ [Pa] $0.4335 \leq P < 16.118$ [bar]
17	CPPDD(P)		
18	CPPT(P,T)		
19	CPTD(T)	CPTD: Isobaric Specific Heat of Saturated Liquid [J/(kg·K)] T*: Temperature [K], [°C]	$24.55 \leq T < 40.673$ [K] $-248.6 \leq T < -232.477$ [°C]
20	CPTDD(T)		
21	CRP('A')	CRP: Critical Constants P*: 'A'='P': 2.653×10^6 [Pa], 26.53 [bar] Pressure T*: 'A'='T': 44.40 [K], -228.75 [°C] Temperature V: 'A'='V': 2.069×10^{-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)		

Table II-2.3-1 Neon Function (cont'd)

No.	Name of Function	Function and Argument(s)	Range of Argument(s)
89	FC('A')	FC: Fundamental Constants M: 'A'='M': 20.183 Relative Molecular Mass R: 'A'='R': 411.95 [J/(kg·K)] Gas Constant	one of 'M' and 'R'
9A	GAMPD(P)		
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': 'NE' Molecular Formula S: 'A'='S': 'NEON' 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]	24.55 ≤ T ≤ 38 [K] -248.6 ≤ T ≤ -235.15 [°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]	24.55 ≤ T ≤ 44.4 [K] -248.6 ≤ T ≤ -228.75 [°C]
72	PSTD(T)		
73	PSTDD(T)		
31	SIGP(P)	SIGP: Surface Tension [N/m] P*: Pressure [Pa], [bar]	43.35 × 10 ³ ≤ P ≤ 2.653 × 10 ⁶ [Pa] 0.4335 ≤ P ≤ 26.53 [bar]
32	SIGT(T)	SIGT: Surface Tension [N/m] T*: Temperature [K], [°C]	24.55 ≤ T ≤ 44.4 [K] -248.6 ≤ T ≤ -228.75 [°C]
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]	43.35 × 10 ³ ≤ P ≤ 1.039 × 10 ⁸ [Pa] 0.4335 ≤ P ≤ 1039 [bar]
64	TPH(P,H)		
6H	TPH2(P,H)		
65	TPS(P,S)		
6S	TPS2(P,S)		

Table II-2.3-1 Neon Function (cont'd)

No.	Name of Function	Function and Argument(s)	Range of Argument(s)
98	TPSEUP(P)		
70	TPV(P,V)		
41	TRPL('A')	TRPL*: Properties at Triple Point P*: 'A'='P': 0.04335×10^6 [Pa], 0.4335 [bar] Pressure T*: 'A'='T': 24.55 [K], -248.60 [°C] Temperature	one of 'P' and 'T'
100	TSBP(P)		
40	TSP(P)	TSP*: Saturation Temperature [K], [°C] P*: Pressure [Pa], [bar]	$43.35 \times 10^3 \leq P \leq 2.653 \times 10^6$ [Pa] $0.4335 \leq P \leq 26.53$ [bar]
98	TPSEUP(P)		
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]	$43.35 \times 10^3 \leq P \leq 2.653 \times 10^6$ [Pa] $0.4335 \leq P \leq 26.53$ [bar]
50	VPDD(P)	VPDD: Specific Volume of Saturated Vapor [m ³ /kg] P*: Pressure [Pa], [bar]	$43.35 \times 10^3 \leq P \leq 2.653 \times 10^6$ [Pa] $0.4335 \leq P \leq 26.53$ [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]	$24.55 \leq T \leq 44.4$ [K] $-248.6 \leq T \leq -228.75$ [°C]
54	VTDD(T)	VTDD: Specific Volume of Saturated Vapor [m ³ /kg] T*: Temperature [K], [°C]	$24.55 \leq T \leq 44.4$ [K] $-248.6 \leq T \leq -228.75$ [°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)		