Appendix C

Table of Thermodynamic Data

Selected Thermodynamic Properties at 298.15 K, $P^\circ = 1.0$ bar, $m^\circ = 1.0$ mol/kg

Compound	ΔH_f° (kJ/mol)	ΔG_f° (kJ/mol)	S° (J/K mol)	C_P° (J/K mol)
AgCl(s)	−127.07	−109.80	96.2	50.79
Ag^+(aq)	105.58	77.124	72.68	21.7
Ar(g)	0	0	154.734	20.786
Br(g)	111.88	82.429	174.912	20.786
Br_2(g)	30.907	3.14	245.35	36.0
Br_2(liq)	0	0	152.23	75.688
C(diamond)	1.897	2.900	2.38	6.1149
C(graphite)	0	0	5.740	8.527
CO(g)	−110.52	−137.15	197.56	29.12
CO_2(g)	−393.51	−394.36	213.6	37.1
CCl_4(g)	−103.0	−60.63	309.7	83.30
CCl_4(liq)	−135.4	−65.27	216.4	131.7
CF_4(g)	−925.0	−879.0	261.5	61.09
HCOOH(aq)	−425.43	−372.0	163.0	
$HCOO^-$(aq)	−425.55	−351.0	92.0	
CH_2O(g)	−117.0	−113.0	219.9	35.4
CH_3(g)	145.7	147.9	194.2	38.7

(*continued*)

Compound	ΔH_f° (kJ/mol)	ΔG_f° (kJ/mol)	S° (J/K mol)	C_P° (J/K mol)
$CH_3Cl(g)$	−80.83	−57.40	234.5	40.7
$CH_3OH(g)$	−201.0	−162.3	239.9	44.1
$CH_3OH(liq)$	−238.67	−166.4	127.0	81.6
$CH_4(g)$	−74.81	−50.75	186.15	35.31
$C_2H_2(g)$	227.4	209.9	200.9	44.0
$C_2H_4(g)$	52.26	68.12	219.5	43.56
$C_2H_5OH(g)$	−235.1	−168.6	282.6	65.44
$C_2H_6(g)$	−84.68	−32.9	229.5	52.63
$C_6H_6(liq)$	49.1	124.5	173.4	136.0
$C_6H_6(g)$	82.9	129.7	269.2	82.4
$CaO(s)$	−668.56	−604.04	39.7	42.80
$CaCl_2(s)$	−795.8	−748.1	104.0	72.59
$CaCO_3(s)$	−1206.9	−1128.8	92.9	81.88
$Cl(g)$	121.68	105.70	165.09	21.84
$Cl_2(g)$	0	0	222.96	33.91
$Cl^-(aq)$	−167.16	−131.26	56.5	
$HCl(aq)$	−167.16	−131.26	56.5	
$Cu(s)$	0	0	33.15	24.43
$Cu^{2+}(aq)$	64.77	65.52		
$H(g)$	217.96	203.26	114.60	20.786
$H_2(g)$	0	0	130.57	28.82
$H^+(aq)$	0	0		
$OH^-(aq)$	−229.99	−157.29		
$OH(g)$	39.0	34.2	183.6	29.89
$H_2O(liq)$	−285.83	−237.18	69.91	75.291
$H_2O(g)$	−241.82	−228.59	188.72	33.58
$He(g)$	0	0	126.040	20.786
$K^+(aq)$	−252.4	−283.2	102.0	22.0
$Fe(s)$	0	0	27.3	25.1
$Fe^{2+}(aq)$	−89.1	−78.87		
$Fe^{3+}(aq)$	−48.5	−4.6		
$Fe_2O_3(s)$	−824.2	−742.2	87.40	103.8
$Ne(g)$	0	0	146.219	20.786
$N_2(g)$	0	0	191.5	29.12
$NH_3(g)$	−46.11	−16.5	192.3	35.1
$NO(g)$	90.25	86.57	210.65	29.84
$NO_2(g)$	33.2	51.30	240.0	37.2
$NOBr(g)$	82.2	82.4	273.7	45.5
$N_2O_4(g)$	9.16	97.82	304.2	77.28
$NH_4Cl(s)$	−314.4	−203.0	94.6	84.1
$PCl_3(g)$	−287.0	−268.0	311.7	71.84
$PCl_5(g)$	−374.9	−305.0	364.6	112.8

Compound	ΔH_f° (kJ/mol)	ΔG_f° (kJ/mol)	S° (J/K mol)	C_P° (J/K mol)
$O_2(g)$	0	0	205.03	29.35
O(g)	249.2	231.7	161.1	21.9
$O_3(g)$	143.0	163.0	238.8	39.2
NaCl(s)	−411.15	−384.15	72.13	50.50
$Na^+(aq)$	−240.1	−261.9	59.0	46.4
$SO_2(g)$	−296.83	−300.19	248.4	39.9
$SO_3(g)$	−395.7	−371.1	256.6	50.67
$SO_4^{2-}(aq)$	−909.27	−744.63		
Zn(s)	0	0	41.6	25.4
$Zn^{2+}(aq)$	−153.9	−147.0		

Source: Data from: Handbook of Chemistry and Physics. 64th ed. and 77th ed. Boca Raton, FL: CRC Press, 1983, 1996.