

APPENDIX 2 *Experimental Data*

2A THERMODYNAMIC DATA AT 25°C

Inorganic Substances

Substance	Molar mass, M ($\text{g}\cdot\text{mol}^{-1}$)	Enthalpy of formation, ΔH_f° ($\text{kJ}\cdot\text{mol}^{-1}$)	Free energy of formation, ΔG_f° ($\text{kJ}\cdot\text{mol}^{-1}$)	Molar heat capacity, $C_{P,m}$ ($\text{J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$)	Molar entropy,* S_m° ($\text{J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$)
Aluminum					
Al(s)	26.98	0	0	24.35	28.33
Al^{3+} (aq)	26.98	-524.7	-481.2	—	-321.7
Al_2O_3 (s)	101.96	-1675.7	-1582.35	79.04	50.92
$\text{Al}(\text{OH})_3$ (s)	78.00	-1276	—	—	—
AlCl_3 (s)	133.33	-704.2	-628.8	91.84	110.67
Antimony					
Sb(s)	121.76	0	0	25.23	45.69
SbH_3 (g)	124.78	+145.11	+147.75	41.05	232.78
SbCl_3 (g)	228.11	-313.8	-301.2	76.69	337.80
SbCl_5 (g)	299.01	-394.34	-334.29	121.13	401.94
Arsenic					
As(s), gray	74.92	0	0	24.64	35.1
As_2S_3 (s)	246.05	-169.0	-168.6	116.3	163.6
AsO_4^{3-} (aq)	138.92	-888.14	-648.41	—	-162.8
Barium					
Ba(s)	137.33	0	0	28.07	62.8
Ba^{2+} (aq)	137.33	-537.64	-560.77	—	+9.6
BaO(s)	153.33	-553.5	-525.1	47.78	70.42
BaCO_3 (s)	197.34	-1216.3	-1137.6	85.35	112.1
BaCO_3 (aq)	197.34	-1214.78	-1088.59	—	-47.3
Boron					
B(s)	10.81	0	0	11.09	5.86
B_2O_3 (s)	69.62	-1272.8	-1193.7	62.93	53.97
BF_3 (g)	67.81	-1137.0	-1120.3	50.46	254.12
Bromine					
Br_2 (l)	159.80	0	0	75.69	152.23
Br_2 (g)	159.80	+30.91	+3.11	36.02	245.46
Br(g)	79.90	+111.88	+82.40	20.79	175.02
Br^- (aq)	79.90	-121.55	-103.96	—	+82.4
HBr(g)	80.91	-36.40	-53.45	29.14	198.70
Calcium					
Ca(s)	40.08	0	0	25.31	41.42
Ca(g)	40.08	+178.2	+144.3	20.79	154.88
Ca^{2+} (aq)	40.08	-542.83	-553.58	—	-53.1

(continued)

Inorganic Substances (*continued*)

Substance	Molar mass, M ($\text{g}\cdot\text{mol}^{-1}$)	Enthalpy of formation, ΔH_f° ($\text{kJ}\cdot\text{mol}^{-1}$)	Free energy of formation, ΔG_f° ($\text{kJ}\cdot\text{mol}^{-1}$)	Molar heat capacity, $C_{P,m}$ ($\text{J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$)	Molar entropy,* S_m° ($\text{J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$)
CaO(s)	56.08	-635.09	-604.03	42.80	39.75
Ca(OH) ₂ (s)	74.10	-986.09	-898.49	87.49	83.39
Ca(OH) ₂ (aq)	74.10	-1002.82	-868.07	—	-74.5
CaCO ₃ (s), calcite	100.09	-1206.9	-1128.8	81.88	92.9
CaCO ₃ (s), aragonite	100.09	-1207.1	-1127.8	81.25	88.7
CaCO ₃ (aq)	100.09	-1219.97	-1081.39	—	-110.0
CaF ₂ (s)	78.08	-1219.6	-1167.3	67.03	68.87
CaF ₂ (aq)	78.08	-1208.09	-1111.15	—	-80.8
CaCl ₂ (s)	110.98	-795.8	-748.1	72.59	104.6
CaCl ₂ (aq)	110.98	-877.1	-816.0	—	59.8
CaBr ₂ (s)	199.88	-682.8	-663.6	72.59	130
CaC ₂ (s)	64.10	-59.8	-64.9	62.72	69.96
CaSO ₄ (s)	136.14	-1434.11	-1321.79	99.66	106.7
CaSO ₄ (aq)	136.14	-1452.10	-1298.10	—	-33.1
Carbon (for organic compounds, see the next table)					
C(s), graphite	12.01	0	0	8.53	5.740
C(s), diamond	12.01	+1.895	+2.900	6.11	2.377
C(g)	12.01	+716.68	+671.26	20.84	158.10
CO(g)	28.01	-110.53	-137.17	29.14	197.67
CO ₂ (g)	44.01	-393.51	-394.36	37.11	213.74
CO ₃ ²⁻ (aq)	60.01	-677.14	-527.81	—	-56.9
CCl ₄ (l)	153.81	-135.44	-65.21	131.75	216.40
CS ₂ (l)	76.15	+89.70	+65.27	75.7	151.34
HCN(g)	27.03	+135.1	+124.7	35.86	201.78
HCN(l)	27.03	+108.87	+124.97	70.63	112.84
HCN(aq)	27.03	+107.1	+119.7	—	124.7
Cerium					
Ce(s)	140.12	0	0	26.94	72.0
Ce ³⁺ (aq)	140.12	-696.2	-672.0	—	-205
Ce ⁴⁺ (aq)	140.12	-537.2	-503.8	—	-301
Chlorine					
Cl ₂ (g)	70.90	0	0	33.91	223.07
Cl(g)	35.45	121.68	105.68	21.84	165.20
Cl ⁻ (aq)	35.45	-167.16	-131.23	—	+56.5
HCl(g)	36.46	-92.31	-95.30	29.12	186.91
HCl(aq)	36.46	-167.16	-131.23	—	56.5
Copper					
Cu(s)	63.55	0	0	24.44	33.15
Cu ⁺ (aq)	63.55	+71.67	+49.98	—	+40.6
Cu ²⁺ (aq)	63.55	+64.77	+65.49	—	-99.6
Cu ₂ O(s)	143.10	-168.6	-146.0	63.64	93.14
CuO(s)	79.55	-157.3	-129.7	42.30	42.63
CuSO ₄ (s)	159.61	-771.36	-661.8	100.0	109
CuSO ₄ ·5H ₂ O(s)	249.69	-2279.7	-1879.7	280	300.4

Substance	Molar mass, M ($\text{g}\cdot\text{mol}^{-1}$)	Enthalpy of formation, ΔH_f° ($\text{kJ}\cdot\text{mol}^{-1}$)	Free energy of formation, ΔG_f° ($\text{kJ}\cdot\text{mol}^{-1}$)	Molar heat capacity, $C_{P,m}$ ($\text{J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$)	Molar entropy,* S_m° ($\text{J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$)
Deuterium					
$\text{D}_2(\text{g})$	4.028	0	0	29.20	144.96
$\text{D}_2\text{O}(\text{g})$	20.028	-249.20	-234.54	34.27	198.34
$\text{D}_2\text{O}(\text{l})$	20.028	-294.60	-243.44	34.27	75.94
Fluorine					
$\text{F}_2(\text{g})$	38.00	0	0	31.30	202.78
$\text{F}^-(\text{aq})$	19.00	-332.63	-278.79	—	-13.8
$\text{HF}(\text{g})$	20.01	-271.1	-273.2	29.13	173.78
$\text{HF}(\text{aq})$	20.01	-330.08	-296.82	—	88.7
Hydrogen (see also Deuterium)					
$\text{H}_2(\text{g})$	2.0158	0	0	28.82	130.68
$\text{H}(\text{g})$	1.0079	+217.97	+203.25	20.78	114.71
$\text{H}^+(\text{aq})$	1.0079	0	0	0	0
$\text{H}_2\text{O}(\text{l})$	18.02	-285.83	-237.13	75.29	69.91
$\text{H}_2\text{O}(\text{g})$	18.02	-241.82	-228.57	33.58	188.83
$\text{H}_2\text{O}_2(\text{l})$	34.02	-187.78	-120.35	89.1	109.6
$\text{H}_2\text{O}_2(\text{aq})$	34.02	-191.17	-134.03	—	143.9
$\text{H}_3\text{O}^+(\text{aq})$	19.02	-285.83	-237.13	75.29	+69.91
Iodine					
$\text{I}_2(\text{s})$	253.80	0	0	54.44	116.14
$\text{I}_2(\text{g})$	253.80	+62.44	+19.33	36.90	260.69
$\text{I}^-(\text{aq})$	126.90	-55.19	-51.57	—	+111.3
$\text{HI}(\text{g})$	127.91	+26.48	+1.70	29.16	206.59
Iron					
$\text{Fe}(\text{s})$	55.84	0	0	25.10	27.28
$\text{Fe}^{2+}(\text{aq})$	55.84	-89.1	-78.90	—	-137.7
$\text{Fe}^{3+}(\text{aq})$	55.84	-48.5	-4.7	—	-315.9
$\text{Fe}_3\text{O}_4(\text{s})$, magnetite	231.52	-1118.4	-1015.4	143.43	146.4
$\text{Fe}_2\text{O}_3(\text{s})$, hematite	159.68	-824.2	-742.2	103.85	87.40
$\text{FeS}(\text{s}, \alpha)$	87.90	-100.0	-100.4	50.54	60.29
$\text{FeS}(\text{aq})$	87.90	—	+6.9	—	—
$\text{FeS}_2(\text{s})$	119.96	-178.2	-166.9	62.17	52.93
Lead					
$\text{Pb}(\text{s})$	207.2	0	0	26.44	64.81
$\text{Pb}^{2+}(\text{aq})$	207.2	-1.7	-14.43	—	+10.5
$\text{PbO}_2(\text{s})$	239.2	-277.4	-217.33	64.64	68.6
$\text{PbSO}_4(\text{s})$	303.3	-919.94	-813.14	103.21	148.57
$\text{PbBr}_2(\text{s})$	367.0	-278.7	-261.92	80.12	161.5
$\text{PbBr}_2(\text{aq})$	367.0	-244.8	-232.34	—	175.3
Magnesium					
$\text{Mg}(\text{s})$	24.31	0	0	24.89	32.68
$\text{Mg}(\text{g})$	24.31	+147.70	+113.10	20.79	148.65

(continued)

Inorganic Substances (*continued*)

Substance	Molar mass, M ($\text{g}\cdot\text{mol}^{-1}$)	Enthalpy of formation, ΔH_f° ($\text{kJ}\cdot\text{mol}^{-1}$)	Free energy of formation, ΔG_f° ($\text{kJ}\cdot\text{mol}^{-1}$)	Molar heat capacity, $C_{P,m}$ ($\text{J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$)	Molar entropy,* S_m° ($\text{J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$)
$\text{Mg}^{2+}(\text{aq})$	24.31	-466.85	-454.8	—	-138.1
$\text{MgO}(\text{s})$	40.31	-601.70	-569.43	37.15	26.94
$\text{MgCO}_3(\text{s})$	84.32	-1095.8	-1012.1	75.52	65.7
$\text{MgBr}_2(\text{s})$	184.11	-524.3	-503.8	—	117.2
Mercury					
$\text{Hg}(\text{l})$	200.59	0	0	27.98	76.02
$\text{Hg}(\text{g})$	200.59	+61.32	+31.82	20.79	174.96
$\text{HgO}(\text{s})$	216.59	-90.83	-58.54	44.06	70.29
$\text{Hg}_2\text{Cl}_2(\text{s})$	472.08	-265.22	-210.75	102	192.5
Nitrogen					
$\text{N}_2(\text{g})$	28.02	0	0	29.12	191.61
$\text{NO}(\text{g})$	30.01	+90.25	+86.55	29.84	210.76
$\text{N}_2\text{O}(\text{g})$	44.02	+82.05	+104.20	38.45	219.85
$\text{NO}_2(\text{g})$	46.01	+33.18	+51.31	37.20	240.06
$\text{N}_2\text{O}_4(\text{g})$	92.02	+9.16	+97.89	77.28	304.29
$\text{HNO}_3(\text{l})$	63.02	-174.10	-80.71	109.87	155.60
$\text{HNO}_3(\text{aq})$	63.02	-207.36	-111.25	—	146.4
$\text{NO}_3^-(\text{aq})$	62.02	-205.0	-108.74	—	+146.4
$\text{NH}_3(\text{g})$	17.03	-46.11	-16.45	35.06	192.45
$\text{NH}_3(\text{aq})$	17.03	-80.29	-26.50	—	111.3
$\text{NH}_4^+(\text{aq})$	18.04	-132.51	-79.31	—	+113.4
$\text{NH}_2\text{OH}(\text{s})$	33.03	-114.2	—	—	—
$\text{HN}_3(\text{g})$	43.04	+294.1	+328.1	98.87	238.97
$\text{N}_2\text{H}_4(\text{l})$	32.05	+50.63	+149.34	139.3	121.21
$\text{NH}_4\text{NO}_3(\text{s})$	80.05	-365.56	-183.87	84.1	151.08
$\text{NH}_4\text{Cl}(\text{s})$	53.49	-314.43	-202.87	—	94.6
$\text{NH}_4\text{ClO}_4(\text{s})$	117.49	-295.31	-88.75	—	186.2
Oxygen					
$\text{O}_2(\text{g})$	32.00	0	0	29.36	205.14
$\text{O}_3(\text{g})$	48.00	+142.7	+163.2	39.29	238.93
$\text{OH}^-(\text{aq})$	17.01	-229.99	-157.24	—	-10.75
Phosphorus					
$\text{P}(\text{s})$, white	30.97	0	0	23.84	41.09
$\text{P}_4(\text{g})$	123.88	+58.91	+24.44	67.15	279.98
$\text{PH}_3(\text{g})$	33.99	+5.4	+13.4	37.11	210.23
$\text{P}_4\text{O}_{10}(\text{s})$	283.88	-2984.0	-2697.0	—	228.86
$\text{H}_3\text{PO}_3(\text{aq})$	81.99	-964.8	—	—	—
$\text{H}_3\text{PO}_4(\text{l})$	97.99	-1266.9	—	—	—
$\text{H}_3\text{PO}_4(\text{aq})$	97.99	-1288.34	-1142.54	—	158.2
$\text{PCl}_3(\text{l})$	137.32	-319.7	-272.3	—	217.18
$\text{PCl}_3(\text{g})$	137.32	-287.0	-267.8	71.84	311.78
$\text{PCl}_5(\text{g})$	208.22	-374.9	-305.0	112.8	364.6
$\text{PCl}_5(\text{s})$	208.22	-443.5	—	—	—

Substance	Molar mass, M ($\text{g}\cdot\text{mol}^{-1}$)	Enthalpy of formation, ΔH_f° ($\text{kJ}\cdot\text{mol}^{-1}$)	Free energy of formation, ΔG_f° ($\text{kJ}\cdot\text{mol}^{-1}$)	Molar heat capacity, $C_{P,m}$ ($\text{J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$)	Molar entropy,* S_m° ($\text{J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$)
Potassium					
K(s)	39.10	0	0	29.58	64.18
K(g)	39.10	+89.24	+60.59	20.79	160.34
K ⁺ (aq)	39.10	-252.38	-283.27	—	+102.5
KOH(s)	56.11	-424.76	-379.08	64.9	78.9
KOH(aq)	56.11	-482.37	-440.50	—	91.6
KF(s)	58.10	-567.27	-537.75	49.04	66.57
KCl(s)	74.55	-436.75	-409.14	51.30	82.59
KBr(s)	119.00	-393.80	-380.66	52.30	95.90
KI(s)	166.00	-327.90	-324.89	52.93	106.32
KClO ₃ (s)	122.55	-397.73	-296.25	100.25	143.1
KClO ₄ (s)	138.55	-432.75	-303.09	112.38	151.0
K ₂ S(s)	110.26	-380.7	-364.0	—	105
K ₂ S(aq)	110.26	-471.5	-480.7	—	190.4
Silicon					
Si(s)	28.09	0	0	20.00	18.83
SiO ₂ (s, α)	60.09	-910.94	-856.64	44.43	41.84
Silver					
Ag(s)	107.87	0	0	25.35	42.55
Ag ⁺ (aq)	107.87	+105.58	+77.11	—	+72.68
Ag ₂ O(s)	231.74	-31.05	-11.20	65.86	121.3
AgBr(s)	187.77	-100.37	-96.90	52.38	107.1
AgBr(aq)	187.77	-15.98	-26.86	—	155.2
AgCl(s)	143.32	-127.07	-109.79	50.79	96.2
AgCl(aq)	143.32	-61.58	-54.12	—	129.3
AgI(s)	234.77	-61.84	-66.19	56.82	115.5
AgI(aq)	234.77	+50.38	+25.52	—	184.1
AgNO ₃ (s)	169.88	-124.39	-33.41	93.05	140.92
Sodium					
Na(s)	22.99	0	0	28.24	51.21
Na(g)	22.99	+107.32	+76.76	20.79	153.71
Na ⁺ (aq)	22.99	-240.12	-261.91	—	+59.0
NaOH(s)	40.00	-425.61	-379.49	59.54	64.46
NaOH(aq)	40.00	-470.11	-419.15	—	48.1
NaCl(s)	58.44	-411.15	-384.14	50.50	72.13
NaBr(s)	102.89	-361.06	-348.98	51.38	86.82
NaI(s)	149.89	-287.78	-286.06	52.09	98.53
Sulfur					
S(s), rhombic	32.06	0	0	22.64	31.80
S(s), monoclinic	32.06	+0.33	+0.1	23.6	32.6
S ²⁻ (aq)	32.06	+33.1	+85.8	—	-14.6
SO ₂ (g)	64.06	-296.83	-300.19	39.87	248.22
SO ₃ (g)	80.06	-395.72	-371.06	50.67	256.76

(continued)

Inorganic Substances (continued)

Substance	Molar mass, M ($\text{g}\cdot\text{mol}^{-1}$)	Enthalpy of formation, ΔH_f° ($\text{kJ}\cdot\text{mol}^{-1}$)	Free energy of formation, ΔG_f° ($\text{kJ}\cdot\text{mol}^{-1}$)	Molar heat capacity, $C_{P,m}$ ($\text{J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$)	Molar entropy,* S_m° ($\text{J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$)
$\text{H}_2\text{SO}_4(\text{l})$	98.08	-813.99	-690.00	138.9	156.90
$\text{SO}_4^{2-}(\text{aq})$	96.06	-909.27	-744.53	—	+20.1
$\text{HSO}_4^-(\text{aq})$	97.07	-887.34	-755.91	—	+131.8
$\text{H}_2\text{S}(\text{g})$	34.08	-20.63	-33.56	34.23	205.79
$\text{H}_2\text{S}(\text{aq})$	34.08	-39.7	-27.83	—	121
$\text{SF}_6(\text{g})$	146.06	-1209	-1105.3	97.28	291.82
Tin					
$\text{Sn}(\text{s}), \text{white}$	118.71	0	0	26.99	51.55
$\text{Sn}(\text{s}), \text{gray}$	118.71	-2.09	+0.13	25.77	44.14
$\text{SnO}(\text{s})$	134.71	-285.8	-256.9	44.31	56.5
$\text{SnO}_2(\text{s})$	150.71	-580.7	-519.6	52.59	52.3
Zinc					
$\text{Zn}(\text{s})$	65.41	0	0	25.40	41.63
$\text{Zn}^{2+}(\text{aq})$	65.41	-153.89	-147.06	—	-112.1
$\text{ZnO}(\text{s})$	81.41	-348.28	-318.30	40.25	43.64

*The entropies of individual ions in solution are determined by setting the entropy of H^+ in water equal to 0 and then defining the entropies of all other ions relative to this value; hence a negative entropy is one that is lower than the entropy of H^+ in water. All *absolute* entropies are positive, and no sign need be given; all entropies of ions are relative to that of H^+ and are listed here with a sign (either + or -).

Organic Compounds

Substance	Molar mass, M ($\text{g}\cdot\text{mol}^{-1}$)	Enthalpy of combustion, ΔH_c° ($\text{kJ}\cdot\text{mol}^{-1}$)	Enthalpy of formation, ΔH_f° ($\text{kJ}\cdot\text{mol}^{-1}$)	Free energy of formation, ΔG_f° ($\text{kJ}\cdot\text{mol}^{-1}$)	Molar heat capacity, $C_{P,m}$ ($\text{J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$)	Molar entropy, S° ($\text{J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$)
Hydrocarbons						
$\text{CH}_4(\text{g}), \text{methane}$	16.04	-890	-74.81	-50.72	35.31	186.26
$\text{C}_2\text{H}_2(\text{g}), \text{ethyne}$ (acetylene)	26.04	-1300	+226.73	+209.20	43.93	200.94
$\text{C}_2\text{H}_4(\text{g}), \text{ethene}$ (ethylene)	28.05	-1411	+52.26	+68.15	43.56	219.56
$\text{C}_2\text{H}_6(\text{g}), \text{ethane}$	30.07	-1560	-84.68	-32.82	52.63	229.60
$\text{C}_3\text{H}_6(\text{g}), \text{propene}$ (propylene)	42.08	-2058	+20.42	+62.78	63.89	266.6
$\text{C}_3\text{H}_6(\text{g}), \text{cyclopropane}$	42.08	-2091	+53.30	+104.45	55.94	237.4
$\text{C}_3\text{H}_8(\text{g}), \text{propane}$	44.09	-2220	-103.85	-23.49	73.5	270.2
$\text{C}_4\text{H}_{10}(\text{g}), \text{butane}$	58.12	-2878	-126.15	-17.03	97.45	310.1

Organic Compounds (continued)

Substance	Molar mass, M ($\text{g}\cdot\text{mol}^{-1}$)	Enthalpy of combustion, ΔH_c° ($\text{kJ}\cdot\text{mol}^{-1}$)	Enthalpy of formation, ΔH_f° ($\text{kJ}\cdot\text{mol}^{-1}$)	Free energy of formation, ΔG_f° ($\text{kJ}\cdot\text{mol}^{-1}$)	Molar heat capacity, $C_{p,m}$ ($\text{J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$)	Molar entropy, S° ($\text{J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$)
$\text{C}_5\text{H}_{12}(\text{g})$, pentane	72.14	-3537	-146.44	-8.20	120.2	349
$\text{C}_6\text{H}_6(\text{l})$, benzene	78.11	-3268	+49.0	+124.3	136.1	173.3
$\text{C}_6\text{H}_6(\text{g})$	78.11	-3302	+82.9	+129.72	81.67	269.31
$\text{C}_7\text{H}_8(\text{l})$, toluene	92.13	-3910	+12.0	+113.8	—	221.0
$\text{C}_7\text{H}_8(\text{g})$	92.13	-3953	+50.0	+122.0	103.6	320.7
$\text{C}_6\text{H}_{12}(\text{l})$, cyclohexane	84.15	-3920	-156.4	+26.7	156.5	204.4
$\text{C}_6\text{H}_{12}(\text{g})$	84.15	-3953	—	—	—	—
$\text{C}_8\text{H}_{18}(\text{l})$, octane	114.22	-5471	-249.9	+6.4	—	358
Alcohols and phenols						
$\text{CH}_3\text{OH}(\text{l})$, methanol	32.04	-726	-238.86	-166.27	81.6	126.8
$\text{CH}_3\text{OH}(\text{g})$	32.04	-764	-200.66	-161.96	43.89	239.81
$\text{C}_2\text{H}_5\text{OH}(\text{l})$, ethanol	46.07	-1368	-277.69	-174.78	111.46	160.7
$\text{C}_2\text{H}_5\text{OH}(\text{g})$	46.07	-1409	-235.10	-168.49	65.44	282.70
$\text{C}_6\text{H}_5\text{OH}(\text{s})$, phenol	94.11	-3054	-164.6	-50.42	—	144.0
Carboxylic acids						
$\text{HCOOH}(\text{l})$, formic acid	46.02	-255	-424.72	-361.35	99.04	128.95
$\text{CH}_3\text{COOH}(\text{l})$, acetic acid	60.05	-875	-484.5	-389.9	124.3	159.8
$\text{CH}_3\text{COOH}(\text{aq})$	60.05	—	-485.76	-396.46	—	86.6
$(\text{COOH})_2(\text{s})$, oxalic acid	90.04	-254	-827.2	-697.9	117	120
$\text{C}_6\text{H}_5\text{COOH}(\text{s})$, benzoic acid	122.12	-3227	-385.1	-245.3	146.8	167.6
Aldehydes and ketones						
$\text{HCHO}(\text{g})$, methanal (formaldehyde)	30.03	-571	-108.57	-102.53	35.40	218.77
$\text{CH}_3\text{CHO}(\text{l})$, ethanal (acetaldehyde)	44.05	-1166	-192.30	-128.12	—	160.2
$\text{CH}_3\text{CHO}(\text{g})$	44.05	-1192	-166.19	-128.86	57.3	250.3
$\text{CH}_3\text{COCH}_3(\text{l})$, propanone (acetone)	58.08	-1790	-248.1	-155.4	124.7	200
Sugars						
$\text{C}_6\text{H}_{12}\text{O}_6(\text{s})$, glucose	180.15	-2808	-1268	-910	—	212
$\text{C}_6\text{H}_{12}\text{O}_6(\text{aq})$	180.15	—	—	-917	—	—
$\text{C}_6\text{H}_{12}\text{O}_6(\text{s})$, fructose	180.15	-2810	-1266	—	—	—
$\text{C}_{12}\text{H}_{22}\text{O}_{11}(\text{s})$, sucrose	342.29	-5645	-2222	-1545	—	360
Nitrogen compounds						
$\text{CO}(\text{NH}_2)_2(\text{s})$, urea	60.06	-632	-333.51	-197.33	93.14	104.60
$\text{C}_6\text{H}_5\text{NH}_2(\text{l})$, aniline	93.13	-3393	+31.6	+149.1	—	191.3
$\text{NH}_2\text{CH}_2\text{COOH}(\text{s})$, glycine	75.07	-969	-532.9	-373.4	99.2	103.51
$\text{CH}_3\text{NH}_2(\text{g})$, methylamine	31.06	-1085	-22.97	+32.16	53.1	243.41