THERMODYNAMIC PROPERTIES OF AQUEOUS SYSTEMS

This table contains standard state thermodynamic properties of ions and neutral species in aqueous solution. It includes enthalpy and Gibbs energy of formation, entropy, and heat capacity, and thus serves as a companion to the preceding table, "Standard Thermodynamic Properties of Chemical Substances". The standard state is the hypothetical ideal solution with molality m = 1 mol/kg (mean ionic molality $m_{\pm}$ in the case of a species which is assumed to dissociate at infinite dilution). Further details on conventions may be found in Reference 1.

Cations are listed by formula in the first part of the table, followed by anions and finally neutral species. All values refer to standard conditions of 25°C and 100 kPa pressure.

References

1. Wagman, D. D., Evans, W. H., Parker, V. B., Schumm, R. H., Halow, I., Bailey, S. M., Churney, K. L., and Nuttall, R. L., *The NBS Tables of Chemical Thermodynamic Properties, J. Phys. Chem. Ref. Data*, Vol. 11, Suppl. 2, 1982.
2. Zemaitis, J. F., Clark, D. M., Rafal, M., and Scrivner, N. C., *Handbook of Aqueous Electrolyte Thermodynamics*, American Institute of Chemical Engineers, New York, 1986.

Species	$\Delta_f H°$/ kJ mol^{-1}	$\Delta_f G°$/ kJ mol^{-1}	$S°$/ J mol^{-1}K^{-1}	C_p/ J mol^{-1}K^{-1}
Cations				
Ag^{+}	105.6	77.1	72.7	21.8
Al^{+3}	−531.0	−485.0	−321.7	
$AlOH^{+2}$		−694.1		
Ba^{+2}	−537.6	−560.8	9.6	
$BaOH^{+}$		−730.5		
Be^{+2}	−382.8	−379.7	−129.7	
Bi^{+3}		82.8		
$BiOH^{+2}$		−146.4		
Ca^{+2}	−542.8	−553.6	−53.1	
$CaOH^{+}$		−718.4		
Cd^{+2}	−75.9	−77.6	−73.2	
$CdOH^{+}$		−261.1		
Ce^{+3}	−696.2	−672.0	−205.0	
Ce^{+4}	−537.2	−503.8	−301.0	
Co^{+2}	−58.2	−54.4	−113.0	
Co^{+3}	92.0	134.0	−305.0	
Cr^{+2}	−143.5			
Cs^{+}	−258.3	−292.0	133.1	−10.5
Cu^{+}	71.7	50.0	40.6	
Cu^{+2}	64.8	65.5	−99.6	
Dy^{+3}	−699.0	−665.0	−231.0	21.0
Er^{+3}	−705.4	−669.1	−244.3	21.0
Eu^{+2}	−527.0	−540.2	−8.0	
Eu^{+3}	−605.0	−574.1	−222.0	8.0
Fe^{+2}	−89.1	−78.9	−137.7	
Fe^{+3}	−48.5	−4.7	−315.9	
$FeOH^{+}$	−324.7	−277.4	−29.0	
$FeOH^{+2}$	−290.8	−229.4	−142.0	
$Fe(OH)_2^{+}$		−438.0		
Ga^{+2}		−88.0		
Ga^{+3}	−211.7	−159.0	−331.0	
$GaOH^{+2}$		−380.3		
$Ga(OH)_2^{+}$		−597.4		
Gd^{+3}	−686.0	−661.0	−205.9	
H^{+}	0	0	0	0
Hg^{+2}	171.1	164.4	−32.2	
Hg_2^{+2}	172.4	153.5	84.5	
$HgOH^{+}$	−84.5	−52.3	71.0	
Ho^{+3}	−705.0	−673.7	−226.8	17.0
In^{+}		−12.1		
In^{+2}		−50.7		
In^{+3}	−105.0	−98.0	−151.0	
$InOH^{+2}$	−370.3	−313.0	−88.0	
$In(OH)_2^{+}$	−619.0	−525.0	25.0	
K^{+}	−252.4	−283.3	102.5	21.8
La^{+3}	−707.1	−683.7	−217.6	−13.0
Li^{+}	−278.5	−293.3	13.4	68.6
Lu^{+3}	−665.0	−628.0	−264.0	25.0
LuF^{+2}		−931.4		
Mg^{+2}	−466.9	−454.8	−138.1	
$MgOH^{+}$		−626.7		
Mn^{+2}	−220.8	−228.1	−73.6	50.0
$MnOH^{+}$	−450.6	−405.0	−17.0	
NH_4^{+}	−132.5	−79.3	113.4	79.9
$N_2H_5^{+}$	−7.5	82.5	151.0	70.3
Na^{+}	−240.1	−261.9	59.0	46.4
Nd^{+3}	−696.2	−671.6	−206.7	−21.0
Ni^{+2}	−54.0	−45.6	−128.9	
$NiOH^{+}$	−287.9	−227.6	−71.0	
PH_4^{+}		92.1		
Pa^{+4}	−619.0			
Pb^{+2}	−1.7	−24.4	10.5	
$PbOH^{+}$		−226.3		
Pd^{+2}	149.0	176.5	−184.0	
Po^{+2}		71.0		
Po^{+4}		293.0		
Pr^{+3}	−704.6	−679.1	−209.0	−29.0
Pt^{+2}		254.8		
Ra^{+2}	−527.6	−561.5	54.0	
Rb^{+}	−251.2	−284.0	121.5	
Re^{+}		−33.0		
Sc^{+3}	−614.2	−586.6	−255.0	
$ScOH^{+2}$	−861.5	−801.2	−134.0	
Sm^{+2}		−497.5		
Sm^{+3}	−691.6	−666.6	−211.7	−21.0
Sn^{+2}	−8.8	−27.2	−17.0	
$SnOH^{+}$	−286.2	−254.8	50.0	
Sr^{+2}	−545.8	−559.5	−32.6	
$SrOH^{+}$		−721.3		
Tb^{+3}	−682.8	−651.9	−226.0	17.0
$Te(OH)_3^{+}$	−608.4	−496.1	111.7	
Th^{+4}	−769.0	−705.1	−422.6	
$Th(OH)^{+3}$	−1030.1	−920.5	−343.0	
$Th(OH)_2^{+2}$	−1282.4	−1140.9	−218.0	
Tl^{+}	5.4	−32.4	125.5	

Species	$\Delta_f H°$/ kJ mol^{-1}	$\Delta_f G°$/ kJ mol^{-1}	$S°$/ J mol^{-1}K^{-1}	C_p/ J mol^{-1}K^{-1}
Tl^{+3}	196.6	214.6	−192.0	
$TlOH^{+2}$		−15.9		
$Tl(OH)_2^{+}$		−244.7		
Tm^{+3}	−697.9	−662.0	−243.0	25.0
U^{+3}	−489.1	−476.2	−188.0	
U^{+4}	−591.2	−531.9	−410.0	
Y^{+3}	−723.4	−693.8	−251.0	
$Y_2(OH)_2^{+4}$		−1780.3		
Yb^{+2}		−527.0		
Yb^{+3}	−674.5	−644.0	−238.0	25.0
$Y(OH)^{+2}$		−879.1		
Zn^{+2}	−153.9	−147.1	−112.1	46.0
$ZnOH^{+}$		−330.1		
Anions				
AlO_2^-	−930.9	−830.9	−36.8	
$Al(OH)_4^-$	−1502.5	−1305.3	102.9	
AsO_2^-	−429.0	−350.0	40.6	
AsO_4^{-3}	−888.1	−648.4	−162.8	
BF_4^-	−1574.9	−1486.9	180.0	
BH_4^-	48.2	114.4	110.5	
BO_2^-	−772.4	−678.9	−37.2	
$B_4O_7^{-2}$		−2604.8		
BeO_2^{-2}	−790.8	−640.1	−159.0	
Br^-	−121.6	−104.0	82.4	−141.8
BrO^-	−94.1	−33.4	42.0	
BrO_3^-	−67.1	18.6	161.7	
BrO_4^-	13.0	118.1	199.6	
$CHOO^-$	−425.6	−351.0	92.0	−87.9
CH_3COO^-	−486.0	−369.3	86.6	−6.3
$C_2O_4^{-2}$	−825.1	−673.9	45.6	
$C_2O_4H^-$	−818.4	−698.3	149.4	
Cl^-	−167.2	−131.2	56.5	−136.4
ClO^-	−107.1	−36.8	42.0	
ClO_2^-	−66.5	17.2	101.3	
ClO_3^-	−104.0	−8.0	162.3	
ClO_4^-	−129.3	−8.5	182.0	
CN^-	150.6	172.4	94.1	
CO_3^{-2}	−677.1	−527.8	−56.9	
CrO_4^{-2}	−881.2	−727.8	50.2	
$Cr_2O_7^{-2}$	−1490.3	−1301.1	261.9	
F^-	−332.6	−278.8	−13.8	−106.7
$Fe(CN)_6^{-3}$	561.9	729.4	270.3	
$Fe(CN)_6^{-4}$	455.6	695.1	95.0	
$HB_4O_7^-$		−2685.1		
HCO_3^-	−692.0	−586.8	91.2	
HF_2^-	−649.9	−578.1	92.5	
HPO_3F^-		−1198.2		
HPO_4^{-2}	−1292.1	−1089.2	−33.5	
$HP_2O_7^{-3}$	−2274.8	−1972.2	46.0	
HS^-	−17.6	12.1	62.8	
HSO_3^-	−626.2	−527.7	139.7	
HSO_4^-	−887.3	−755.9	131.8	−84.0
$HS_2O_4^-$		−614.5		
HSe^-	15.9	44.0	79.0	
$HSeO_3^-$	−514.6	−411.5	135.1	
$HSeO_4^-$	−581.6	−452.2	149.4	
$H_2AsO_3^-$	−714.8	−587.1	110.5	
$H_2AsO_4^-$	−909.6	−753.2	117.0	
$H_2PO_4^-$	−1296.3	−1130.2	90.4	
$H_2P_2O_7^{-2}$	−2278.6	−2010.2	163.0	
I^-	−55.2	−51.6	111.3	−142.3
IO^-	−107.5	−38.5	−5.4	
IO_3^-	−221.3	−128.0	118.4	
IO_4^-	−151.5	−58.5	222.0	
MnO_4^-	−541.4	−447.2	191.2	−82.0
MnO_4^{-2}	−653.0	−500.7	59.0	
MoO_4^{-2}	−997.9	−836.3	27.2	
NO_2^-	−104.6	−32.2	123.0	−97.5
NO_3^-	−207.4	−111.3	146.4	−86.6
N_3^-	275.1	348.2	107.9	
OCN^-	−146.0	−97.4	106.7	
OH^-	−230.0	−157.2	−10.8	−148.5
PO_4^{-3}	−1277.4	−1018.7	−220.5	
$P_2O_7^{-4}$	−2271.1	−1919.0	−117.0	
Re^-	46.0	10.1	230.0	
S^{-2}	33.1	85.8	−14.6	
SCN^-	76.4	92.7	144.3	−40.2
SO_3^{-2}	−635.5	−486.5	−29.0	
SO_4^{-2}	−909.3	−744.5	20.1	−293.0
S_2^{-2}	30.1	79.5	28.5	
$S_2O_3^{-2}$	−652.3	−522.5	67.0	
$S_2O_4^{-2}$	−753.5	−600.3	92.0	
$S_2O_8^{-2}$	−1344.7	−1114.9	244.3	
Se^{-2}		129.3		
SeO_3^{-2}	−509.2	−369.8	13.0	
SeO_4^{-2}	−599.1	−441.3	54.0	
VO_3^-	−888.3	−783.6	50.0	
VO_4^{-3}		−899.0		
WO_4^{-2}	−1075.7			
Neutral species				
AgBr	−16.0	−26.9	155.2	−120.1
AgCl	−61.6	−54.1	129.3	−114.6
AgF	−227.1	−201.7	59.0	−84.9
AgI	50.4	25.5	184.1	−120.5
$AgNO_3$	−101.8	−34.2	219.2	−64.9
Ag_2SO_4	−698.1	−590.3	165.7	−251.0
$AlBr_3$	−895.0	−799.0	−74.5	
$AlCl_3$	−1033.0	−879.0	−152.3	
AlF_3	−1531.0	−1322.0	−363.2	
AlI_3	−699.0	−640.0	12.1	
$Al_2(SO_4)_3$	−3791.0	−3205.0	−583.2	
$BaBr_2$	−780.7	−768.7	174.5	
$BaCO_3$	−1214.8	−1088.6	−47.3	
$BaCl_2$	−872.0	−823.2	122.6	
BaF_2	−1202.9	−1118.4	−18.0	
$Ba(HCO_3)_2$	−1921.6	−1734.3	192.0	
BaI_2	−648.0	−663.9	232.2	
$Ba(NO_3)_2$	−952.4	−783.3	302.5	
$BaSO_4$	−1446.9	−1305.3	29.7	
$BeSO_4$	−1292.0	−1124.3	−109.6	
CCl_3COOH	−516.3			
$CHCl_2COOH$	−512.1			
CHOOCs	−683.8	−643.0	226.0	
CHOOH	−425.6	−351.0	92.0	−87.9
CHOOK	−677.9	−634.2	192.0	−66.1
$CHOONH_4$	−558.1	−430.4	205.0	−7.9
CHOONa	−665.7	−612.9	151.0	−41.4
CHOORb	−676.7	−635.1	213.0	
$CH_2ClCOOH$	−501.3			
CH_3COOCs	−744.3	−661.3	219.7	

Species	$\Delta_f H°$/ kJ mol^{-1}	$\Delta_f G°$/ kJ mol^{-1}	$S°$/ J mol^{-1}K^{-1}	C_p/ J mol^{-1}K^{-1}
CH_3COOH	−486.0	−369.3	86.6	−6.3
CH_3COOK	−738.4	−652.6	189.1	15.5
CH_3COONH_4	−618.5	−448.6	200.0	73.6
CH_3COONa	−726.1	−631.2	145.6	40.2
CH_3COORb	−737.2	−653.3	207.9	
$(COOH)_2$	−825.1	−673.9	45.6	
$(CH_3)_3N$	−76.0	93.1	133.5	
$CaBr_2$	−785.9	−761.5	111.7	
$CaCO_3$	−1220.0	−1081.4	−110.0	
$CaCl_2$	−877.1	−816.0	59.8	
CaF_2	−1208.1	−1111.2	−80.8	
CaI_2	−653.2	−656.7	169.5	
$Ca(NO_3)_2$	−957.6	−776.1	239.7	
$CaSO_4$	−1452.1	−1298.1	−33.1	
$CdBr_2$	−319.0	−285.5	91.6	
$CdCl_2$	−410.2	−340.1	39.7	
CdF_2	−741.2	−635.2	−100.8	
CdI_2	−186.3	−180.8	149.4	
$Cd(NO_3)_2$	−490.6	−300.1	219.7	
$CdSO_4$	−985.2	−822.1	−53.1	
$CeCl_3$	−1197.5	−1065.6	−38.0	
$CoBr_2$	−301.2	−262.3	50.0	
$CoCl_2$	−392.5	−316.7		
CoI_2	−168.6	−157.7	109.0	
$Co(NO_3)_2$	−472.8	−276.9	180.0	
$CoSO_4$	−967.3	−799.1	−92.0	
$CsBr$	−379.8	−396.0	215.5	
$CsCl$	−425.4	−423.2	189.5	−146.9
CsF	−590.9	−570.8	119.2	
$CsHCO_3$	−950.3	−878.8	224.3	
$CsHSO_4$	−1145.6	−1047.9	264.8	
CsI	−313.5	−343.6	244.3	−152.7
$CsNO_3$	−465.6	−403.3	279.5	−99.0
Cs_2CO_3	−1193.7	−1111.9	209.2	
Cs_2S	−483.7	−498.3	251.0	
Cs_2SO_4	−1425.8	−1328.6	286.2	
Cs_2Se		−454.8		
$Cu(NO_3)_2$	−350.0	−157.0	193.3	
$CuSO_4$	−844.5	−679.0	−79.5	
$DyCl_3$	−1197.0	−1059.0	−61.9	−389.0
$ErCl_3$	−1207.1	−1062.7	−75.3	−389.0
$EuCl_2$	−862.0			
$EuCl_3$	−1106.2	−967.7	−54.0	−402.0
$FeBr_2$	−332.2	−286.8	27.2	
$FeBr_3$	−413.4	−316.7	−68.6	
$FeCl_2$	−423.4	−341.3	−24.7	
$FeCl_3$	−550.2	−398.3	−146.4	
FeF_2	−754.4	−636.5	−165.3	
FeF_3	−1046.4	−840.9	−357.3	
FeI_2	−199.6	−182.1	84.9	
FeI_3	−214.2	−159.4	18.0	
$Fe(NO_3)_3$	−670.7	−338.3	123.4	
$FeSO_4$	−998.3	−823.4	−117.6	
$Fe_2(SO_4)_3$	−2825.0	−2242.8	−571.5	
$GdCl_3$	−1188.0	−1059.0	−36.8	−410.0
HBr	−121.6	−104.0	82.4	−141.8
HCN	150.6	172.4	94.1	
HCl	−167.2	−131.2	56.5	−136.4
HF	−332.6	−278.8	−13.8	−106.7
HI	−55.2	−51.6	111.3	−142.3
HNO_3	−207.4	−111.3	146.4	−86.6
$HSCN$	76.4	92.7	144.3	−40.2
H_2SO_4	−909.3	−744.5	20.1	−293.0
$HoCl_3$	−1206.7	−1067.3	−57.7	−393.0
KBr	−373.9	−387.2	184.9	−120.1
KCl	−419.5	−414.5	159.0	−114.6
KF	−585.0	−562.1	88.7	−84.9
$KHCO_3$	−944.4	−870.0	193.7	
$KHSO_4$	−1139.7	−1039.2	234.3	−63.0
KI	−307.6	−334.9	213.8	−120.5
KNO_3	−459.7	−394.5	248.9	−64.9
K_2CO_3	−1181.9	−1094.4	148.1	
K_2S	−471.5	−480.7	190.4	
K_2SO_4	−1414.0	−1311.1	225.1	−251.0
K_2Se		−437.2		
$LaCl_3$	−1208.8	−1077.3	−50.0	−423.0
$LiBr$	−400.0	−397.3	95.8	−73.2
$LiCl$	−445.6	−424.6	69.9	−67.8
LiF	−611.1	−571.9	−0.4	−38.1
LiI	−333.7	−344.8	124.7	−73.6
$LiNO_3$	−485.9	−404.5	160.2	−18.0
Li_2CO_3	−1234.1	−1114.6	−29.7	
Li_2SO_4	−1466.2	−1331.2	47.3	−155.6
$LuCl_3$	−1167.0	−1021.0	−96.0	−385.0
$MgBr_2$	−709.9	−662.7	26.8	
$MgCl_2$	−801.2	−717.1	−25.1	
MgI_2	−577.2	−558.1	84.5	
$Mg(NO_3)_2$	−881.6	−677.3	154.8	
$MgSO_4$	−1376.1	−1199.5	−118.0	
$MnBr_2$	−464.0			
$MnCl_2$	−555.1	−490.8	38.9	−222.0
MnI_2	−331.0			
$Mn(NO_3)_2$	−635.5	−450.9	218.0	−121.0
$MnSO_4$	−1130.1	−972.7	−53.6	−243.0
NH_4Br	−254.1	−183.3	195.8	−61.9
NH_4BrO_3	−199.6	−60.7	275.1	
NH_4CN	18.0	93.0	207.5	
NH_4Cl	−299.7	−210.5	169.9	−56.5
NH_4ClO_3	−236.5	−87.3	275.7	
NH_4ClO_4	−261.8	−87.8	295.4	
NH_4F	−465.1	−358.1	99.6	−26.8
NH_4HCO_3	−824.5	−666.1	204.6	
NH_4HS	−150.2	−67.2	176.1	
NH_4HSO_3	−758.7	−607.0	253.1	
NH_4HSO_4	−1019.9	−835.2	245.2	−3.8
NH_4HSeO_4	−714.2	−531.6	262.8	
$NH_4H_2AsO_3$	−847.3	−666.4	223.8	
$NH_4H_2AsO_4$	−1042.1	−832.5	230.5	
$NH_4H_2PO_4$	−1428.8	−1209.6	203.8	
$NH_4H_3P_2O_7$	−2409.1	−2102.6	326.0	
NH_4I	−187.7	−130.9	224.7	−62.3
NH_4IO_3	−354.0	−207.4	231.8	
NH_4NO_2	−237.2	−111.6	236.4	−17.6
NH_4NO_3	−339.9	−190.6	259.8	−6.7
NH_4OH	−362.5	−236.5	102.5	−68.6
NH_4SCN	−56.1	13.4	257.7	39.7
$(NH_4)_2CO_3$	−942.2	−686.4	169.9	
$(NH_4)_2CrO_4$	−1146.2	−886.4	277.0	
$(NH_4)_2Cr_2O_7$	−1755.2	−1459.5	488.7	
$(NH_4)_2HAsO_4$	−1171.4	−873.2	225.1	

Species	$\Delta_f H°$/ kJ mol^{-1}	$\Delta_f G°$/ kJ mol^{-1}	$S°$/ J mol^{-1}K^{-1}	C_p/ J mol^{-1}K^{-1}
$(NH_4)_2HPO_4$	−1557.2	−1247.8	193.3	
$(NH_4)_2S$	−231.8	−72.6	212.1	
$(NH_4)_2SO_3$	−900.4	−645.0	197.5	
$(NH_4)_2SO_4$	−1174.3	−903.1	246.9	−133.1
$(NH_4)_2SeO_4$	−864.0	−599.8	280.7	
$(NH_4)_3PO_4$	−1674.9	−1256.6	117.0	
NaBr	−361.7	−365.8	141.4	−95.4
NaCl	−407.3	−393.1	115.5	−90.0
NaF	−572.8	−540.7	45.2	−60.2
$NaHCO_3$	−932.1	−848.7	150.2	
$NaHSO_4$	−1127.5	−1017.8	190.8	−38.0
NaI	−295.3	−313.5	170.3	−95.8
$NaNO_3$	−447.5	−373.2	205.4	−40.2
Na_2CO_3	−1157.4	−1051.6	61.1	
Na_2S	−447.3	−438.1	103.3	
Na_2SO_4	−1389.5	−1268.4	138.1	−201.0
Na_2Se		−394.6		
$NdCl_3$	−1197.9	−1065.6	−37.7	−431.0
$NiBr_2$	−297.1	−253.6	36.0	
$NiCl_2$	−388.3	−307.9	−15.1	
NiF_2	−719.2	−603.3	−156.5	
NiI_2	−164.4	−149.0	93.7	
$Ni(NO_3)_2$	−468.6	−268.5	164.0	
$NiSO_4$	−963.2	−790.3	−108.8	
$PbBr_2$	−244.8	−232.3	175.3	
$PbCl_2$	−336.0	−286.9	123.4	
PbF_2	−666.9	−582.0	−17.2	
PbI_2	−112.1	−127.6	233.0	
$Pb(NO_3)_2$	−416.3	−246.9	303.3	
$PrCl_3$	−1206.2	−1072.7	−42.0	−439.0
$RaCl_2$	−861.9	−823.8	167.0	
$Ra(NO_3)_2$	−942.2	−784.0	347.0	
$RaSO_4$	−1436.8	−1306.2	75.0	
RbBr	−372.7	−387.9	203.9	
RbCl	−418.3	−415.2	178.0	
RbF	−583.8	−562.8	107.5	
$RbHCO_3$	−943.2	−870.8	212.7	
$RbHSO_4$	−1138.5	−1039.9	253.1	
RbI	−306.4	−335.6	232.6	
$RbNO_3$	−458.5	−395.2	267.8	
Rb_2CO_3	−1179.5	−1095.8	186.2	
Rb_2S	−469.4	−482.0	228.4	
Rb_2SO_4	−1411.6	−1312.5	263.2	
$SmCl_3$	−1193.3	−1060.2	−42.7	−431.0
$SrBr_2$	−788.9	−767.4	132.2	
$SrCO_3$	−1222.9	−1087.3	−89.5	
$SrCl_2$	−880.1	−821.9	80.3	
SrI_2	−656.2	−662.6	190.0	
$Sr(NO_3)_2$	−960.5	−782.0	260.2	
$SrSO_4$	−1455.1	−1304.0	−12.6	
$TbCl_3$	−1184.1	−1045.5	−59.0	−393.0
TlBr	−116.2	−136.4	207.9	
$TlBr_3$	−168.2	−97.1	54.0	
TlCl	−161.8	−163.6	182.0	
$TlCl_3$	−305.0	−179.0	−23.0	
TlF	−327.3	−311.2	111.7	
TlI	−49.8	−84.0	236.8	
$TlNO_3$	−202.0	−143.7	272.0	
Tl_2SO_4	−898.6	−809.3	271.1	
$TmCl_3$	−1199.1	−1055.6	−75.0	−385.0
UCl_4	−1259.8	−1056.8	−184.0	
UO_2CO_3	−1696.6	−1481.5	−154.4	
$UO_2(NO_3)_2$	−1434.3	−1176.0	195.4	
UO_2SO_4	−1928.8	−1698.2	−77.4	
$YbCl_3$	−1176.1	−1037.6	−71.0	−385.0
$ZnBr_2$	−397.0	−355.0	52.7	−238.0
$ZnCl_2$	−488.2	−409.5	0.8	−226.0
ZnF_2	−819.1	−704.6	−139.7	−167.0
ZnI_2	−264.3	−250.2	110.5	−238.0
$Zn(NO_3)_2$	−568.6	−369.6	180.7	−126.0
$ZnSO_4$	−1063.2	−891.6	−92.0	−247.0