

Selected Enthalpies of Formation
Last Update: October 23, 2013

Aqueous Ions

Chemical Species	ΔH_f° (kJ/mole)
H ⁺ (aq)	0.000
OH ⁻ (aq)	-229.99
C ₂ H ₃ O ₂ ⁻ (aq)	-486.01
Br ⁻ (aq)	-121.55
Cl ⁻ (aq)	-167.16
I ⁻ (aq)	-55.19
NO ₃ ⁻ (aq)	-205.0
CO ₃ ²⁻ (aq)	-677.14
HCO ₃ ⁻ (aq)	-691.99
SO ₄ ²⁻ (aq)	-909.27

Bromide Salts

Chemical Species	ΔH_f° (kJ/mole)
KBr (s)	-393.80
NaBr (s)	-361.06

Iodide Salts

KI (s)	-327.90
NaI (s)	-287.78

Nitrate Salts

Al(NO ₃) ₃ ·9H ₂ O (s)	-3757.06
Ba(NO ₃) ₂ (s)	-992.07
KNO ₃ (s)	-488.96
LiNO ₃ (s)	-483.13
Mg(NO ₃) ₂ ·6H ₂ O (s)	-790.65
NaNO ₃ (s)	-461.278
NH ₄ NO ₃ (s)	-365.56

Molecular Compounds

Chemical Species	ΔH_f° (kJ/mole)
H ₂ O (l)	-285.830
HC ₂ H ₃ O ₂ (aq)	-484.5

Hydroxide Salts

Ba(OH) ₂	-946.30
KOH	-424.76
LiOH	-484.93
NaOH (s)	-425.61
NaOH (aq)	-470.1

Chloride Salts

Chemical Species	ΔH_f° (kJ/mole)
AlCl ₃ ·6H ₂ O (s)	-2691.6
BaCl ₂ (s)	-858.6
BaCl ₂ ·2H ₂ O (s)	-1460.13
CaCl ₂ (s)	-795.8
CaCl ₂ ·2H ₂ O (s)	-1402.9
CuCl (s)	-137.2
CsCl	-442.83
KCl (s)	-436.75
LiCl (s)	-408.61
MgCl ₂ (s)	-641.32
NaCl (s)	-411.15
NH ₄ Cl (s)	-314.43
SrCl ₂ ·6H ₂ O (s)	-2623.8

Sulfate Salts

Chemical Species	ΔH_f^0 (kJ/mole)
K ₂ SO ₄ (s)	-1437.71
MgSO ₄ (s)	-1284.9
MgSO ₄ ·7H ₂ O (s)	-3388.71
Na ₂ SO ₄ (s)	-1375.653
Na ₂ SO ₄ ·10H ₂ O (s)	-4327.26

Carbonate Salts

Chemical Species	ΔH_f^0 (kJ/mole)
Li ₂ CO ₃ (s)	-1215.9
Na ₂ CO ₃	-1130.77
Na ₂ CO ₃ ·H ₂ O (s)	-1431.26

References

Afeefy, H. Y.; Liebman; J. F. and Stein, S. E. "Neutral Thermochemical Data" in *NIST Chemistry WebBook, NIST Standard Reference Database Number 69*, Eds. Linstrom, P. J. and Mallard, W. G., National Institute of Standards and Technology, Gaithersburg MD, <http://webbook.nist.gov>, last accessed October 24, 2013.

Atkins, P. and de Paula, J. *Physical Chemistry, 9th Ed.* W. H. Freeman: New York, 2010.

Kotz, J. C. and Treichel, Jr., P. *Chemistry and Chemical Reactivity, 4th Ed.* Saunders College Publishing: New York, 1999.

Wagman, D. D.; Evans, W. H.; Parker, V. B.; Schemm, R. H.; Halow, I.; Bailey, S. M.; Churney, K. L. and Nuttall, R. L. *J. Phys. Chem. Ref. Data* **1982**, *11* (Suppl. 2).