Standard Enthalpies of Formation

- The standard enthalpy of formation of a substance, denoted ΔH_f^o, is the **enthalpy change for the formation of one mole of a substance in its standard state from its component elements in their standard state.**
  - Note that the standard enthalpy of formation for a pure element in its standard state is zero.

Table 6.2 (Continued)

Formula	ΔH_f° (kJ/mol)	Formula	ΔH_f° (kJ/mol)
$NH_4^+(aq)$	−132.8	$HF(g)$	−273
$NO(g)$	90.3	***Chlorine***	
$NO_2(g)$	33.2	$Cl^-(aq)$	−167.5
$HNO_3(aq)$	−206.6	$Cl(g)$	121.0
Oxygen		$Cl_2(g)$	0
$O(g)$	249.2	$HCl(g)$	−92.3
$O_2(g)$	0	***Bromine***	
$O_3(g)$	143	$Br^-(g)$	−218.9
$OH^-(aq)$	−229.9	$Br^-(aq)$	−120.9
$H_2O(g)$	−241.8	$Br_2(l)$	0
$H_2O(l)$	−285.8	***Iodine***	
Sulfur		$I^-(g)$	−194.7
$S(g)$	279	$I^-(aq)$	−55.9
$S_2(g)$	129	$I_2(s)$	0
S_8(rhombic)	0	***Silver***	
S_8(monoclinic)	2	$Ag^+(g)$	1026.4
$SO_2(g)$	−296.8	$Ag^+(aq)$	105.9
$H_2S(g)$	−20	$Ag(s)$	0
Fluorine		$AgF(s)$	−203
$F^-(g)$	−255.6	$AgCl(s)$	−127.0
$F^-(aq)$	−329.1	$AgBr(s)$	−99.5
$F_2(g)$	0	$AgI(s)$	−62.4

*See Appendix C for additional values.

Standard Enthalpies of Formation

- The l**aw of summation of heats of formation** states that the enthalpy of a reaction is equal to the total formation energy of the products minus that of the reactants.

$$\Delta H^{o} = \sum n\Delta H_f^{o}(\text{products}) - \sum m\Delta H_f^{o}(\text{reactants})$$

- Σ is the mathematical symbol meaning “the sum of”, and *m* and *n* are the coefficients of the substances in the chemical equation.