

Enthalpy of Atom Combination Worksheet

Here is a small table giving enthalpies of atom combination for several elements and molecules. Use these values to answer the questions shown below.

substance	ΔH_{ac}° (kJ/mol _{rxn})
H(g)	0
C(g)	0
N(g)	0
O(g)	0
C(s, graphite)	-716.682
C(s, diamond)	-714.787
H ₂ (g)	-435.30
N ₂ (g)	-945.408
O ₂ (g)	-498.340
CH ₄ (g)	-1662.09
H ₂ O(g)	-926.29
H ₂ O(l)	-970.30
NH ₃ (g)	-1171.76
NO ₂ (g)	-937.86
N ₂ O ₄ (g)	-1932.93

Why is ΔH_{ac}° for C(g) equal to 0 kJ/mol?

Why are values of ΔH_{ac}° for the molecules negative?

Do the relative ΔH_{ac}° values for N₂(g) and O₂(g) make sense?

What is ΔH° if one mole of CH₄(g) is broken apart into atoms and then reformed?

What is ΔH_{ac}° if 2 moles of NH₃(g) is made from N(g) and H(g)?

Which has stronger bonds: C_{graphite} or C_{diamond}?