Enthalpy of Formation – Study Guide

*section 5.3 in OpenStax*

**Enthalpy of Formation**

Standard state conditions mean a pressure of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ for gases and a concentration of \_\_\_\_\_\_\_\_\_\_\_\_ for solutions.

Inspect the data in Appendix G. What is the value of $ΔH\_{f}^{°}$ of a pure element in its standard state? \_\_\_\_\_\_\_\_

What is the equation that determines $ΔH\_{rxn}^{°}$ for a reaction using the $ΔH\_{f}^{°}$ of the reactants and products?

Read Examples 5.11 and 5.12, then determine which of the following reactions have the same $ΔH\_{rxn}^{°}$ and $ΔH\_{f}^{°}$.

1. 2 CO(g) + O2(g) → 2 CO2(g)
2. 3/2 H2(g) + 1/2 N2(g) → NH3(g)
3. H2S (g) + 2 O2(g) → H2SO4(l)

*(ans: b)*

Explain why the other two reactions above do not represent heat of formation equations.

***Watch video tutorial on calculations with*** [Enthalpy of Formation](https://www.youtube.com/watch?v=S_eJ6_P23rI&feature=youtu.be)

Calculate $ΔH\_{rxn}^{°}$ for each of the following reactions (*use the* $ΔH\_{f}^{°} $*data in Appendix G*):

(a) 2 C4H10 (g) + 13 O2(g) → 8 CO2(g) + 10 H2O(g) *ans. -5315 kJ*

(b) 4 NH3(g) + 5 O2(g) → 4 NO(g) + 6 H2O(l) *ans. -1166 kJ*

**End of Chapter 5 Practice Problems**

#55, 69, 71

For detailed solutions to these problems, go to the [OpenStax website](https://openstaxcollege.org/textbooks/chemistry/resources) and download the “Student Answer and Solution Guide.”