

AP Chemistry – Entropy and Free Energy – 33

Name _____ Per ____

1. Look up the standard entropies at 25°C for each substance in the following pairs. Explain the difference in the entropy values for each pair.

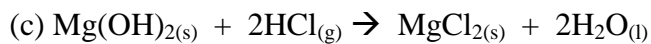
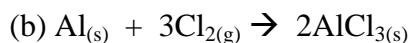
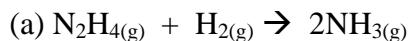
(a) $\text{CuO}_{(\text{s})}$ and $\text{Cu}_2\text{O}_{(\text{s})}$

(b) 1 mole $\text{N}_2\text{O}_{4(\text{g})}$ and 2 moles $\text{NO}_{2(\text{g})}$

(c) $\text{CH}_3\text{OH}_{(\text{g})}$ and $\text{CH}_3\text{OH}_{(\text{l})}$

(d) 1 mole $\text{PbO}_{(\text{s})}$ combined with 1 mole $\text{CO}_{2(\text{g})}$ and 1 mole $\text{PbCO}_{3(\text{s})}$

2. Calculate the ΔS° values for the following reactions.



3. What is the meaning of the standard free-energy change, ΔG° , as compared with ΔG ?

4. For any process that occurs at constant temperature and pressure, what is the significance of $\Delta G = 0$?

5. For a certain process, ΔG is large and negative. Does this mean that the process necessarily occurs rapidly? Explain.

6. A certain reaction has $\Delta H^\circ = -19.5 \text{ kJ/mole}$ and $\Delta S^\circ = 42.7 \text{ J/moleK}$.

(a) Is the reaction exothermic or endothermic?

(b) Does the reaction lead to an increase or decrease in the disorder of the system?

(c) Calculate ΔG° for the reaction at 298 K.

(d) Is the reaction spontaneous at 298 K?

7. Calculate ΔH° , ΔS° and ΔG° at 298 K for each of the following reactions. As a fourth calculation in each case, show that $\Delta H^\circ - T \Delta S^\circ = \Delta G^\circ$.

