South Pasadena • AP Chemistry

Name _____
Period ___ Date ___/___/___

20 • Entropy & Free Energy

STUDY QUESTIONS

1. Imagine tossing two coins in the air.
   a. Predict the distribution of various combinations of heads and tails.
   b. What is the probability of the result being two heads?
   c. What is the most probable result?

   Now imaging tossing three coins in the air.
   d. What is the probability of a three heads result?
   e. Which system has the highest entropy, the two-coin system or the three-coin system?

2. Which one of the following pairs of samples has the higher entropy?
   a. $Br_2(l)$ or $Br_2(g)$
   b. $C_2H_6(g)$ or $C_3H_8(g)$
   c. MgO(s) or NaCl(s)
   d. KOH(s) or KOH(aq)

3. Predict the entropy change for the following processes:
   a. $O_2(g) \rightarrow 2O(g)$
   b. $2O_3(g) \rightarrow 3O_2(g)$
   c. $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$
   d. $NaCl(s) \rightarrow Na^+(aq) + Cl^-(aq)$
   e. $C_2H_5OH(l) \rightarrow C_2H_5OH(g)$
   f. $Ag^+(aq) + Cl^-(aq) \rightarrow AgCl(s)$

9. Of the following reactions,
   which are spontaneous at any temperature,
   which are never spontaneous regardless of the temperature,
   which are spontaneous only at a high temperature,
   and which are spontaneous only at low temperature?

		ΔH	ΔS
a.	$C_8H_{18}(l) + {}^{25}/_2O_2(g) \rightarrow 8CO_2(g) + 9H_2O(g)$	–	+
b.	$N_2(g) + 2F_2(g) \rightarrow N_2F_4(g)$	–	–
c.	$Cl_2(g) \rightarrow 2Cl(g)$	+	+
d.	$2O_3(g) \rightarrow 3O_2(g)$	–	+
e.	$2C(s) + 2H_2(g) \rightarrow C_2H_4(g)$	+	–