

Name: \_\_\_\_\_

Period: \_\_\_\_\_

Seat#: \_\_\_\_\_

**Directions:** Show all work in a way that would earn you credit on the AP Test! This is always the rule! Some answers are provided at the end in italics and underlined. If you need more space, use binder paper and staple to your worksheet.

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 imagine tossing three coins in the air.

a) Predict the distribution of various combinations of heads and tails.

a) What is the probability of a three heads result?

b) Which system has the highest entropy, the two-coin system or the three-coin system? Why?

2) Which substance in each of the following pairs of samples has the higher entropy? Explain why.

a)  $\text{Br}_2(l)$  or  $\text{Br}_2(g)$

b)  $\text{C}_2\text{H}_6(g)$  or  $\text{C}_3\text{H}_8(g)$

c)  $\text{MgO}(s)$  or  $\text{NaCl}(s)$

d)  $\text{KOH}(s)$  or  $\text{KOH}(aq)$

**Dougherty Valley HS Chemistry - AP  
Thermodynamics – Study Questions**

3) Predict the sign of the entropy change for the following processes (+ or -), explain why:

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) $Ag^+(aq) + Cl^-(aq) \rightarrow AgCl(s)$

4) For the following reactions below, look at the chart of the algebraic signs on  $\Delta H$  and  $\Delta S$ , and then answer the following questions. List the letter that corresponds to the reactions to choose from.

a) Which are spontaneous at any temperature:
b) Which are never spontaneous regardless of the temperature:
c) Which are spontaneous only at a high temperature:
d) Which are spontaneous only at low temperature:

**Reactions to Choose From**

	$\Delta H$	$\Delta S$
A. $C_8H_{18}(l) + \frac{25}{2}O_2(g) \rightarrow 8CO_2(g) + 9H_2O(g)$	-	+
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. $2C(s) + 2H_2(g) \rightarrow C_2H_4(g)$	+	-