

Name: \_\_\_\_\_ Per: \_\_\_\_\_ Date: \_\_\_\_\_

## Final Exam Study Guide

### Topic 1: Organic Chemistry

1. What is the molecular formula of an:  
a. alkene w/ 24 C's      b. alkyne w/ 10 C's      c. alkane w/ 45 C's      d. alkyne w/ 3 C's
2. Alkane/alkene/alkyne?    a.  $C_8H_{16}$       b.  $C_6H_{14}$       c.  $C_{21}H_{40}$       d.  $C_{10}H_{22}$       e.  $C_5H_8$
3. Complete p. 732 #61, p. 733 #62, 67a, 68, p. 735 #3, 5 p. 772 #69, 73, p. 773 #1, p. 886, Chapter 22 #1a, 3abc

### Topic 2: $K_{eq}$ and the equilibrium constant

1. Write the expression for the equilibrium constant for each of the following reactions.  
a.  $H_2 + Cl_2 \rightleftharpoons 2HCl$       b.  $2SO_2 + O_2 \rightleftharpoons 2SO_3$       c.  $N_2 + 3H_2 \rightleftharpoons 2NH_3$   
d.  $2CO + O_2 \rightleftharpoons 2CO_2$       e.  $Ba(OH)_{2(s)} \rightleftharpoons Ba^{2+}_{(aq)} + 2OH^{-}_{(aq)}$       f.  $2H_2O_{(l)} \rightleftharpoons 2H_{2(g)} + O_{2(g)}$
2. What is the concentration for each substance at equilibrium for the following gaseous reaction if the initial concentration of ethene ( $C_2H_4$ ) is 0.335 M and that of hydrogen is 0.526 M?  
$$C_2H_4 + H_2 \rightarrow C_2H_6 \quad K_{eq} = 0.99$$
3. 1.0 mol of  $SO_2$  and 1.0 mol of  $O_2$  are placed in a 1.0 L flask at 1000 K. When equilibrium has been achieved, 0.925 mol of  $SO_3$  has formed. Calculate  $K_{eq}$  at 1000K for the following reaction:  
$$2 SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$$
4. The reaction  $N_2(g) + O_2(g) \rightarrow 2 NO (g)$  contributes to air pollution whenever a fuel is burned in air at a high temperature, as in a gasoline engine. At 1500 K, the  $K_c = 1.0 \times 10^{-5}$  A sample of air is heated in a closed container to 1500 K Before any reaction occurs  $[N_2] = 0.80 M$  and  $[O_2] = 0.20 M$  What is the equilibrium concentration of NO?

### Topic 3: $K_a$ & $K_w$ & pH

Fill in the following chart:

	<u>pH</u>	<u>pOH</u>	<u>[H<sup>+</sup>]</u>	<u>[OH<sup>-</sup>]</u>
1.	3.01			
2.		8.56		
3.			$2.61 \times 10^{-4}$	
4.				$4.51 \times 10^{-6}$
5.		1.02		

6. Complete the following problems: p. 884 #20, 21, 24, 25

### Topic 4: Redox (LEO the lion goes GER!!!!)

1. Complete the following: p. 884 #1, 2, p. 885 #3-6, 8-10, 12

### Topic 5: Miscellaneous

1. What is a colligative property? What does it depend on? Why is salt better than sugar in melting ice?
2. What type of solution was made in the penny lab?
3. What makes polymers stronger? Where does natural rubber come from? What is benzene?