Exam 1 Test Prep

1. What are the five factors that affect the rate of reactions?

2. What are the three factors that affect solubility?

3. Calculate the molarity of 3.7 moles of NaCl in 0.740 L solution:

4. Calculate the number of moles of solute in 36.0 mL of 5.00 M H_2SO_4:

5. Calculate the molality of 72.0 grams NaCl in 89.0 grams of H_2O:

6. Rank the following solutions from lowest to highest boiling point, a 2.5 m solution of sodium chloride, a 3.5 m solution of magnesium chloride, or a 4.5 solution of sulfur dioxide:

7. What is the osmotic pressure at 298 K of a 1.00 L solution containing 37.3 g of KCl (molar mass = 74.6 g/mol)? R = 0.0821 L x atm/ k x mol

8. Calculate the freezing point of a solution made from 32.7 g of propane, C_3H_8, dissolved in 137.0 g of benzene, C_6H_6. The freezing point of benzene is 5.50 °C and its k_f is 5.12 °C/m.

9. Calculate the boiling point of a solution made from 227 g of $MgCl_2$ dissolved in 700 g of water. K_b = 0.512 °C/m

10. The vapor pressure of water at 20 °C is 17.5 torr. What is the vapor pressure of water over a solution containing 400.0 g $C_6H_{12}O_6$ and 565.0 g of water?

11. A scientist conducts an experiment to determine the rate of the following reaction:
$N_2(g) + O_2(g) \Rightarrow 2NO(g)$
If the initial concentration of N_2 was 0.500 M and the concentration of N_2 was 0.450 M after 0.100s, what is the rate of the reaction?

12. Given the following data, determine the rate law expression of the reaction:

$$2NO(g) + Cl_2(g) \Rightarrow 2NOCl(g)$$

Experiment	[NO] (M)	[Cl_2] (M)	Rate (M/s)
1	0.0300	0.0100	3.4×10^{-4}
2	0.0150	0.0100	8.5×10^{-5}
3	0.0150	0.0400	3.4×10^{-4}

13. The decomposition of a 0.100 M sample of N_2O_5 is first order and has a k value of

$6.93 \times 10^{-3}\ s^{-1}$. What will be the concentration of N_2O_5?

12. Balance the following expressions if they are not balanced already and then write the equilibrium expression for the following reactions:

$NO(g) + Br_2(g) \leftrightarrow NOBr(g)$

$N_2O_5(g) \leftrightarrow NO_2(g) + O_2(g)$

13. At a given temperature, the K_{eq} for the following reaction is 1.40×10^{-2}. If the concentration of both H_2 and I_2 at equilibrium are 2.00×10^{-4} M, find the concentration of HI at equilibrium:

$$2HI(g) \leftrightarrow H_2(g) + I_2(g)$$