

Chemistry 1140 Exam Four

Name _____

$R = 0.08206 \text{ L}\cdot\text{atm}/\text{K}\cdot\text{mol}$

$N = 6.022 \times 10^{23} /\text{mol}$

All work must be shown to get full credit. Five points will be deducted if a pen is used.

1. (8 points) For a 0.025 M HCl solution, determine each of the following quantities. Calculations need not be shown.

a) $[\text{H}_3\text{O}^+]$

b) pH

c) $[\text{OH}^-]$

d) pOH

2. (8 points) For a 0.074 M NaOH solution, determine each of the following quantities. Calculations need not be shown.

a) $[\text{H}_3\text{O}^+]$

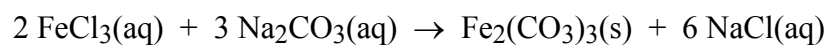
b) pH

c) $[\text{OH}^-]$

d) pOH

3. (8 points) What volume of 2.00 M CuSO_4 should be diluted with water to form 250.0 mL of 0.100 M CuSO_4 ?

4. (12 points) Given the reaction



what mass of iron(III) carbonate would be produced if 545 mL of 0.150 M iron(III) chloride were added to a solution containing excess sodium carbonate?

5. (12 points) Calculate the molarity of each solution listed below.

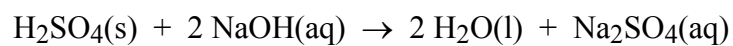
a) 4.34 g of $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$ in 250.0 mL of solution

b) 3.575 g $\text{K}_2\text{C}_2\text{O}_4$ in 45.7 mL of solution

c) 0.095 g NaOH in 0.5000 L of solution

6. (8 points) Consider a 10-g cube of ice at $-10\text{ }^{\circ}\text{C}$ and a 10-g cube of steel at $-10\text{ }^{\circ}\text{C}$. Which will be better at cooling a glass of soda? Briefly explain why.

7. (12 points) Given the reaction



what is the molarity of the sodium hydroxide solution if 32.58 mL is required to react completely with 25.00 mL of 0.5124 M sulfuric acid?

8. (8 points) Circle the substances that have hydrogen bonding in the pure liquid state.

HF NH₃ CH₃F H₂O H₂ H₂S HCl CH₄

9. (8 points) Circle the substances that have dipole-dipole attractions in the pure liquid state.

HBr N₂ CH₃F CCl₄ CO CH₄ H₂S CO₂

10. (8 points) Ethyl chloride boils at 12 °C. When it is sprayed on the skin, it freezes a small part of the skin and thus serves as a local anesthetic. Briefly explain why it cools the skin.

11. (8 points) Consider the compounds CF₄ and CCl₄. One is a gas at room temperature and one is a liquid. Which is the liquid? Briefly explain your choice.