

Names: _____ **Block:** _____

Concentration Sheet. SHOW ALL WORK FOR CREDIT – SHOW UNITS.

- 1) How many grams of beryllium chloride are needed to make 125 mL of a 0.050 M solution?

- 2) How many grams of beryllium chloride would you need to add to 125 mL of water to make a 0.050 molal solution?

- 3) The density of ethanol is 0.789 g/mL. How many grams of ethanol should be mixed with water to make 225 mL of a 4.5% (v/v) mixture?

- 4) Explain how to make at least one liter of a 1.25 molal ammonium hydroxide solution.

- 5) What is the molarity of a solution in which 0.45 grams of sodium nitrate are dissolved in 265 mL of solution.

- 6) What is the mole fraction of sulfuric acid in a solution made by adding 3.4 grams of sulfuric acid to 3,500 mL of water?

- 7) What will the volume of a 0.50 M solution be if it contains 25 grams of calcium hydroxide?
- 8) How many grams of ammonia are present in 5.0 L of a 0.050 M solution?
- 9) If I make a solution by adding 83 grams of sodium hydroxide to 750 mL of water...
- a) What is the molality of sodium hydroxide in this solution?
 - b) What is the percent by mass of sodium hydroxide in this solution?
 - c) What is the mole fraction of sodium hydroxide in this solution?
- 10) If I make a solution by adding water to 35 mL of methanol (CH_3OH) until the final volume of the solution is 275 mL...
- a) What is the molarity of methanol in this solution? (The density of methanol is 0.792 g/mL)
 - b) What is the percent by volume of methanol in this solution?

- 11) If I add 25 mL of water to 125 mL of a 0.15 M NaOH solution, what will the molarity of the diluted solution be?
- 12) If I add water to 100 mL of a 0.15 M NaOH solution until the final volume is 150 mL, what will the molarity of the diluted solution be?
- 13) How much 0.05 M HCl solution can be made by diluting 250 mL of 10 M HCl?
- 14) I have 345 mL of a 1.5 M NaCl solution. If I boil the water until the volume of the solution is 250 mL, what will the molarity of the solution be?
- 15) How much water would I need to add to 500 mL of a 2.4 M KCl solution to make a 1.0 M solution?

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Colligative Properties – Show work and units.

1. What mass of water is needed to dissolve 34.8 g of copper(II) sulfate in order to prepare a 0.521 m solution?
2. 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 $5.50^\circ C$ and its K_f is $5.12^\circ C/m$.
3. If I add 45 grams of sodium chloride to 500 grams of water, what will the melting **and** boiling points be of the resulting solution? $K_b(H_2O) = 0.52^\circ C/m$ and $K_f(H_2O) = 1.86^\circ C/m$.
4. Which solution will have a higher boiling point: A solution containing 105 grams of sucrose ($C_{12}H_{22}O_{11}$) in 500 grams of water or a solution containing 35 grams of sodium chloride in 500 grams of water? $K_b(H_2O) = 0.52^\circ C/m$
5. A solution contains 21.6 g of a nonelectrolyte and 175 g of water. The water freezes at $-7.18^\circ C$ and $K_f = 1.86^\circ C/m$. Is the nonelectrolyte CH_3OH or C_2H_5OH ?
6. Calculate the boiling point of a solution made from 227 g of $MgCl_2$ dissolved in 700 g of water. What is the boiling point of the solution?
 $K_b = 0.512^\circ C/m$.
7. If 1.5 g of a solute having a MM of 125.0 g were dissolved in 35 g of camphor, what would be the resulting freezing point of the solution? K_f for camphor is $37.7^\circ C/m$. The normal fp for camphor is $179.5^\circ C$.
8. Determine the molecular weight of an unknown organic acid if a solution that contains 30.0 grams of the acid per kilogram of water freezes at $-0.93^\circ C$. Can you identify the acid?
9. Calculate the molecular weight of sulfur if 35.5 grams of sulfur dissolve in 100.0 grams of CS_2 to produce a solution that has a boiling point of $49.48^\circ C$. The carbon disulfide normally boils at $46.23^\circ C$ and $K_b = 2.35^\circ C/m$.
10. If an aqueous solution of a nonelectrolyte boils at $103.2^\circ C$, what is the freezing point of this solution?