Solutions Review Name Key hr

1. Define or differentiate:
   a. Homogeneous vs. Heterogeneous → mixture w/ varying properties, visibly different → coloids
      ↘ mixture with uniform properties - not visibly different - solutions
   b. Suspension heterogeneous mixture → particles that settle
   c. Colloid heterogeneous mixture - suspended particles do not settle
   d. Electrolyte vs. Nonelectrolyte → solute with covalent bond, does not conduct electricity in solution
      ↘ solute with ionic bonds, does conduct electricity in solution
   e. Solute vs. Solvent → substance that the solute dissolves in (larger part of solution)
      ↘ substance being dissolved (smaller part of solution)
   f. Solution homogeneous mixture of 2 or more substances in a single phase
   g. Solubility the amount of solute needed to make a saturated solution at a given temp.
   h. Saturated vs. Unsaturated vs. Supersaturated
      max amount ↘ less than max amount → more than max amount dissolved
   i. Dissolution the process of dissolving
   j. Dissociate the process of an ionic substance breaking apart when dissolving
   k. Molarity - measure of concentration $M = \frac{\text{moles}}{\text{Liters}}$
   l. Concentrated vs. Dilute Conc → more particle per amount of solution, Dilute is less particles per solution
   m. Dilution Adding water to make new concentration, use $M_1V_1 = M_2V_2$
   n. ppm parts per million

2. In the following, write **E** for Element, **C** for compound, **HO** for homogeneous and **HE** for heterogeneous
   a. HO a solution of KCl and water
   b. E chromium
   c. HE soil
   d. C sodium nitrate
   e. HO salt water
   f. E tin
   g. HO air
   h. HO sugar water
   i. C $CuSO_4$
   j. HO 70% isopropyl alcohol

3. To distinguish the following, write **E** for electrolyte or **NE** for nonelectrolyte for each compound dissolved in water.
   a. E NaCl
   b. E HNO_3
   c. NE CH_3OH
   d. E K_2SO_4
   e. NE O_2
   f. E H_3PO_4
   g. NE SO_3
   h. E FeO
   i. NE C_6H_{12}

4. What types of substances are electrolytes? acids or ionic substances
   What types of substances are non-electolyes? covalent substances

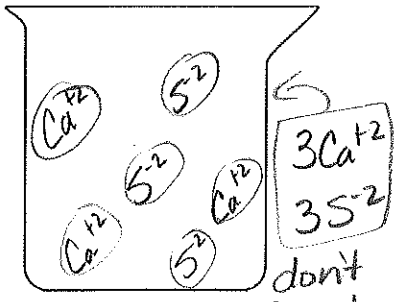
5. Draw a water molecule and explain why it is polar.
   pos. side → $H^{\delta+}-O^{\delta-}-H^{\delta+}$ ← neg. side

6. You are making a 2 quart solution of Kool-aid (sugar water) . What are three things that you can do to increase the time it takes to dissolve? (You may not change the final concentration of the Kool-aid)
   1. heat up water 2. stir 3. crush (kool aid) into finer particles

7. You pour canola oil and water together and they separate/do not mix. The formula for canola oil is $C_{22}H_{42}O_2$. Why does canola oil not mix with water? (Hint: Use bonding type and "likes dissolves likes" in your answer.)
   Canola oil is nonpolar covalent + water is polar covalent, therefor their charge type is not alike and they do not mix.

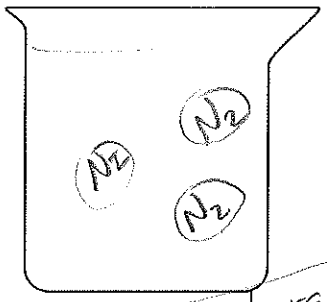
8. Write the dissociation for each molecule that will dissociate. If dissociation does not occur, write "no dissociation"
   CaS → $Ca^{+2} + S^{-2}$ Is this an electrolyte? yes (ionic bond)
   N_2 → no dissociation Is this an electrolyte? no - covalent
   $AlBr_3$ → $Al^{+3} + 3Br^{-1}$ Is this an electrolyte? yes - (ionic bond)

Model the dissolution of 3 particles of each compound that will dissolve in water. Pay attention to the charges and proportions.



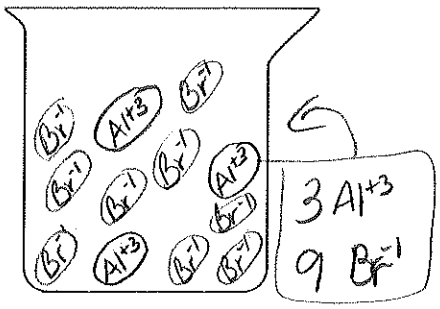
CaS

don't forget charges



N_2

no charges
N_2 is not dissociated



$AlBr_3$

Concentrations and Dilutions Review Name_____ hr__

1. What is the molarity of a solution that contains 4.53 moles of lithium nitrate in 2.85 liters of solution?

$M = \frac{mol}{L} = \frac{4.53 mol}{2.85 L}$ = 1.59 M $LiNO_3$ solution

2. A flask contains 85.5 g $C_{12}H_{22}O_{11}$ (sucrose) in 1.00 liters of solution. What is the molarity?

C 12 x 12 = 144
H 22 x 1 = 22
O 11 x 16 = 176
} 342 g/mol

85.5 g | 1 mol / 342 g = 0.25 mol

$\frac{0.25 mol}{1 L}$ = 0.25 M sucrose solution

3. What is the molarity of a solution that contains 14.92 grams magnesium oxalate in 3.65 ml of solution?

MgC_2O_4
Mg 24
C 2 x 12 = 24
O 4 x 16 = 64
} 112 g/mol

14.92 g | mol / 112 g = 0.133 mol

$\frac{0.133}{0.00365}$ = 36.5 M MgC_2O_4 solution

4. What mass of lithium phosphate would you mass to make 2.5 liter of 1.06 M lithium phosphate solution?

Li_3PO_4
Li 3 x 7 = 21
P 31
O 4 x 16 = 64
116 g/mol

1.06 M = $\frac{x mol}{2.5 L}$

x = 2.65 mol | 116 g / 1 mol = 307.4 g Li_3PO_4

5. 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?

$(125 mL)(0.15 M) = (150 mL) M_2$

M_2 = 0.125 M NaOH solution

6. 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?

$(100 mL)(0.15 M) = (150 mL) M_2$

M_2 = 0.1 M NaOH solution

7. 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?

$(345 mL)(1.5 M) = (250 mL) M_2$

M_2 = 2.07 M NaCl solution

8. Suppose 15.0 grams of glucose is dissolved in 410 grams of water.
   a. What is the % by mass of glucose in this solution?

$\frac{15 g}{425 g} = \frac{x}{100}$ x = 3.5% glucose

   b. What is the concentration of glucose in ppm?

$\frac{15}{425} = \frac{x}{1,000,000}$ x = 35,000 ppm glucose ← yes, I rounded

9. In a beaker, 45 mL of ethanol is mixed with 65 mL of water.
   a. What is the % by volume of ethanol?

$\frac{45}{110} \times 100$ = 40.9% ethanol by volume (OR) $\frac{45}{110} = \frac{x}{100}$ x = 40.9% by volume ethanol

   b. What is the % by volume of water?

$\frac{65}{110} \times 100$ = 59.1% water by volume (OR) $\frac{65}{110} = \frac{x}{100}$ x = 59.1% water by volume