Name(s) _____

Workshop: Ions in Solution I

1) For each of the following compounds, (a) write the formula and (b) classify it as either a strong or a weak electrolyte or a non-electrolyte.

Compound	Formula	Strong, Weak or Non-Electrolyte
Potassium hydroxide		
Acetic acid		
Sodium chloride		
Octane		
Sucrose		
Ethanol		

2) For each of the following, a description of a solution is provided. (a) Calculate the molarity of the solution, and then (b) write the formulas of all of the species present in the solution. Underline the major dissolved species. The first line is completed as an example.

Solution	Solution's Molarity	Concentration of Solute Species in Solution
0.1000 mole of NaCl in 1.000 L of aqueous solution	0.1000 M	0.1000 M Na^+(aq), 0.1000 M Cl^- (aq)
1.250 g of NaCl in 1.500 L of aqueous solution		
1.325 moles of acetic acid (CH_3COOH) in 1.300 L of aqueous solution [*Assume that 5% of acetic acid dissociates in water.*]		
0.235 grams of NaOH in 100.0 mL of aqueous solution		

3) Write the formula for potassium dihydrogen phosphate (KDP) in the box below. Draw a particulate-level sketch in the box next to it representing a beaker of a potassium dihydrogen phosphate (KDP) solution that was prepared from 2 KDP molecules and 4 H_2O molecules showing how the KDP salt dissolved, that is, solvated by the water.

Formula:	

4) A solution is made by dissolving 1.0 g of potassium dihydrogen phosphate in 1.0 L of water. Assume that the volume of the resulting solution is 1.0 L and that the density of water and the resulting solution is 1.0 g/mL. Determine the molarity of the solution.

5) A student is instructed to prepare 3.00 L of a 0.100 M solution of copper(II) sulfate. She goes to the stockroom and finds a 100 g bottle of the anhydrous salt, which cost $14.00 and a 500 mL bottle of a 1 M solution, which cost $12.50. Which source provides the most economical way of making the solution? Would it be cheaper to use $CuSO_4 \cdot 5H_2O$ which costs $37.50 / 500 g. Show your calculations.

6) Your group is being considered for a chemical research grant. As a measure of your practical understanding, the group is to provide clear, written instructions how to prepare the following four solutions using any of the following equipment and chemicals but nothing else: *a balance with a range of 0.1 to 500.0 g; a 50.00 mL buret; a 100.0 mL volumetric cylinder, pipets: 5mL, 10 mL, 25mL; volumetric flasks: 10 mL, 25mL, 50 mL, 100 mL, 200 mL, 250 mL, 500 mL, 1000 mL, and 2000 mL; 5.0 lbs of Morton's brand table salt, 1.0 kg of C&H brand cane sugar, 1.0 gallon of research grade 100% ethanol [d= 0.789 g/cm^3], and 250. g of solid ammonium phosphate, plus an unlimited source of distilled, deionized water [d= 1.0 g/cm^3].* (Use a separate page for the directions if necessary.)

1.00 L of a 0.75 M solution of sodium chloride (table salt), NaCl.

0.050 L of a 2.5 x 10^{-4} M solution of sucrose (table sugar), $C_{12}H_{22}O_{11}$.

0.10 L of a 10.0 proof solution of ethanol, C_2H_5OH *(proof = 2 x [volume ethanol/volume solution] x 100)*.

0.20 L of a 5.0% w/w *(% w/w = weight % = weight solute/weight solution x 100)* solution of ammonium phosphate fertilizer, $(NH_4)_3PO_4$.