Molality and Colligative Properties Homework

1. What is the molality of a solution that contains 63.0 g HNO3 in 0.500 kg H2O? **2.00*m***
2. What is the molality of a solution that contains 0.500 mol HC2H3O2 in 0.125 kg H2O? **4.00*m***
3. What mass of water is required to dissolve 100. g NaCl to prepare a 1.50*m* solution? **1.14 kg H2O**
4. What mass of water must be used to dissolve 0.500 kg C2H5OH to prepare a 3.00 *m* solution? **3.62 kg H2O**
5. What mass of H2SO4 must be dissolved to 2.40 kg H2O to produce a 1.20 *m* solution? **283 g H2SO4**
6. What is the number of molecules of C2H5OH in a 3.0 *m* solution that contains 4.00 kg H2O? **12 mol C2H5OH = 7.2 x 1024 molecules C2H5OH**
7. What is the molality of a solution that contains 80.0 g Al2(SO4)3 in 625 g H2O? **0.374*m***
8. What mass of water is required to dissolve 175 g KNO3 to produce a 2.25 *m* solution? **0.769 kg H2O**
9. What mass of HC2H3O2 must be dissolved in 800. g H2O to produce a 6.25 *m* solution? **300. g HC2H3O2**
10. How many moles of (NH4)3PO4 are dissolved in 0.750 kg of H2O when the concentration is 0.400 m? **0.300 mol**
11. How many grams of BeCl2 are needed to make 125 mL of a 0.050 M solution? **0.50 grams**
12. The density of ethanol is 0.789 g/mL. How many grams of ethanol should be mixed with 225 mL of water to make a 4.5% (v/v) mixture? **8.4 grams**
13. Explain how to make at least one liter of a 1.25 molal ammonium hydroxide solution.

**Dissolve 43.8 grams (1.25 moles) of ammonium hydroxide in 1 L H2O.**

1. What is the molarity of a solution in which 0.45 grams of NaNO3 are dissolved in 265 mL of solution. **0.020 M**
2. What will the volume of a 0.50 M solution be if it contains 25 grams of Ca(OH)2? **680 mL**
3. How many grams of NH3 are present in 5.0 L of a 0.050 M solution? **4.3 grams**

**Colligative Properties**

1. If I add 45 grams of sodium chloride (NaCl) to 500. grams of water, what will the melting and boiling points be of the resulting solution? Kb(H2O) = 0.512 0C/m and Kf(H2O) = 1.86 0C/m. **melting point = -5.7oC boiling point = 101.6oC**
2. Which solution will have a higher boiling point: A solution containing 105 grams of sucrose (C12H22O11) in 500. grams of water or a solution containing 35 grams of sodium chloride in 500 grams of water? **sodium chloride solution**
3. 5.00 grams of salt (NaCl) is added to 170. mL of water. What are the new freezing and boiling points? **freezing point = -1.86oC boiling point = 101oC**
4. What is the change in freezing point of a solution containing 132 g C12H22O11 and 250 g of H2O? **2.9oC**
5. What is the boiling point of a solution containing 52.0 g MgSO4 and 334 g H2O? **101oC**