Pre Lab: Freezing Point Experiment

1) Define: Colligative properties.

2) List four Colligative properties.

3) Define: Molal freezing point depression constant, K_f.

4) Does the value of K_f depend on the nature of (solvent, or solute)?_____

5) a) Show a freezing point of 6.00 °C on a cooling curve for a pure solvent.

b) If the freezing point of a pure solvent is 6.00 °C, will the solvent which is contaminated with a soluble material have a freezing point (higher than, lower than, or same as) 6.00 °C ? Answer: _____.
Explain:_____

c) Show a freezing point on the cooling curve for the above contaminated solvent.

6) Assume you had used a well calibrated thermometer to measure the freezing point of a solvent, can you tell from the cooling curve if the solvent is contaminated with soluble material?_____

How can you tell?

a) _____

b) _____

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7) Show the freezing point on a cooling curve for a solvent contaminated with <u>insoluble</u> material.

8) What is the relationship between ΔT and molar mass of solute?

The larger the value of ΔT, the (larger, or smaller) the molar mass of the solute?

9) If some <u>insoluble</u> material contaminated your solution after it had been prepared, how would this effect the measured ΔT_f and the calculated molar mass of solute?
Explain: _____

10) If some <u>soluble</u> material contaminated your solution after it had been prepared, how would this effect the measured ΔT_f and the calculated molar mass of solute?
Explain: _____

11) a) Why did we have to use the <u>same</u> thermometer for finding, the freezing point of both, solvent and solution?

b) If your thermometer was not calibrated (reading 0.50 °C below the correct temperature), how would this effect your measured value of ΔT_f ?Answer: _____
Explain: _____
_____

12) How would the freezing point of a <u>solution</u> change if the unknown had ionized or dissociated? Answer: _____
Explain: _____

13) If the solvent had been impure (that is, contaminated with soluble material);
a) how would this effect ΔT_f ? Explain;_____
b) how would this effect the calculated molar mass?

14) Why would you use weighing paper instead of filter paper for weighing the unknown sample?

<u>Exercise</u>:

The freezing point of a cyclohexane sample is 6.20 °C. A solution is prepared by dissolving 0.4660 g of an unknown solute in 36.0 g cyclohexane. The freezing point of the solution is 4.11 °C. Calculate the molar mass of the unknown solute. K_f for cyclohexane is 20.0 °C.kg/mole. <u>Answer</u>: 124 g/mole