Freezing Point Depression Worksheet

As you work through the steps in the lab procedures, record your experimental values and the results on this worksheet.

Complete the following tables and answer the questions below. (All masses must be reported to three decimal places and all temperatures must be reported to one decimal place.)

Data Table A: Measuring the Freezing Point of Stearic Acid

Mass of 30 mL beaker	g
Mass of 30 mL beaker plus stearic acid	g
Mass of stearic acid	g
Measured freezing point of stearic acid (first trial)	°C
Measured freezing point of stearic acid (second trial)	°C
Average measured freezing point to stearic acid	°C

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Data Table B: Freezing Point Depression by a Solute, Lauric Acid

	First Solution	Second Solution
Mass of 30 mL beaker (from Part A)	—	—
Mass of 30 mL beaker and contents	g	g
Mass of 30 mL beaker plus stearic and lauric acids	g	g
Total mass of lauric acid	g	g
Colligative molality (m_c) of the solution (Your stearic acid mass from Table A is not accurate. Please use your original beaker tare and the necessary data from Table B.)	m	m
Predicted ΔT_f (Assume that k_f is known to two significant figures, 4.5°C/m.)	°C	°C
Theoretical freezing point of the solution (To calculate, use the last entry for your average freezing point from Data Table A to the 0.1°C.)	°C	°C
Measured freezing point of the solution	°C	°C

In Part B, for the first solution made by adding lauric acid, did you expect the freezing point to be at a higher or lower temperature than that of the pure solvent stearic acid?

Using your measured amounts of stearic acid and lauric acid for the first addition, calculate the colligative molality (m_c) of the resulting solution, the freezing point depression ($\Delta \mathrm{T}_f$) this molality should cause and the theoretical freezing point of the solution. Enter your results in Data Table B.

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In Part B, for the first solution made by adding lauric acid, how did your measured freezing point compare to your theoretical freezing point?

In Part B, for the first solution made by adding lauric acid, calculate the % difference. The equation for percent difference is:

% difference = ((theoretical value − actual value) × 100%)/theoretical value.

A percent difference can be positive or negative.

% difference =

In Part B, for the second solution made by adding lauric acid, did you expect the freezing point to be at a higher or lower temperature than that of the pure solvent stearic acid?

Using your measured amounts of stearic acid and lauric acid for the second addition, calculate the colligative molality (m_c) of the resulting solution, the freezing point depression (ΔT_f) this molality should cause, and the theoretical freezing point of the solution. Enter your results in Data Table B.

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In Part B, for the second solution made by adding lauric acid, how did your measured freezing point compare to your theoretical freezing point?

In Part B, for the second solution made by adding lauric acid, calculate the % difference. The equation for percent difference is:

% difference = ((theoretical value − actual value) × 100%)/theoretical value.

A percent difference can be positive or negative.

% difference =

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