

**Experiment 19****Advance Study Assignment:** Determination of Molar Mass by Depression of the Freezing Point

1. A student determines the molar mass of acetone,  $\text{CH}_3\text{COCH}_3$ , by the method used in this experiment. She found that the equilibrium temperature of a mixture of ice and water was  $1.0^\circ\text{C}$  on her thermometer. When she added 11.1 g of her sample to the mixture, the temperature, after thorough stirring, fell to  $-3.0^\circ\text{C}$ . She then poured off the solution through a screen into a beaker. The mass of the solution was 90.4 g.

a. What was the freezing point depression? \_\_\_\_\_  $^\circ\text{C}$

b. What was the molality of the acetone? \_\_\_\_\_ m

c. How much acetone was in the decanted solution? \_\_\_\_\_ g

d. How much water was in the decanted solution? \_\_\_\_\_ g

e. How much acetone would there be in a solution containing 1 kg of water and acetone at the same concentration as she had in her experiment?

\_\_\_\_\_ g acetone

f. What did she find to be the molar mass of acetone, assuming she made the calculation properly?

\_\_\_\_\_ g