

$$m = \frac{\text{mol}}{\text{kg}}$$

84.9 g/mol

$$\Delta T = k_b \cdot m \cdot i$$

$$\frac{8.10 \text{ g}}{1 \text{ mol}}$$

$$m \cdot m = \frac{g}{\text{mol}}$$

8. If the molal boiling point constant of carbon tetrachloride is $5.03^\circ\text{C}/\text{molal}$ and the boiling point is 76.8°C . A given solution contains 8.10 g of a nonvolatile nonelectrolyte in 300 g of CCl_4 . It boils as 78.4°C . What is the gram molecular mass of the solute?

$$1.6 = (5.03^\circ\text{C}/m)(1)m$$

$$m = .318 m$$

$$.318 m = \frac{x}{.300 \text{ kg}}$$

$$x = .0954 \text{ mol}$$

$$\frac{8.10 \text{ g}}{.0954 \text{ mol}} =$$

46.9 g/mol

9. The molal boiling point constant of ethyl alcohol is $1.22^\circ\text{C}/\text{molal}$. Its boiling point is 78.4°C . A solution of 14.2 g of a nonvolatile nonelectrolyte in 264 g of alcohol boils at 79.8°C . What is the gram molecular mass of the solute?

$$1.4 = (m)(1)(1.22^\circ\text{C}/m) \rightarrow 1.15 = x$$

$$m = 1.15 m$$

$$\frac{14.2 \text{ g}}{.303 \text{ kg}} = 46.9$$

4.00 m

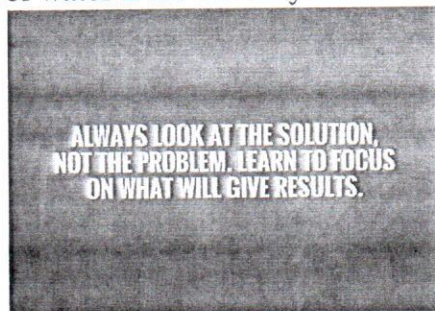
10. A solution of NaNO_3 contains 34 g of solute dissolved in 100 g of water. What is the molality of the solution?

$$34 \text{ g NaNO}_3 \left(\frac{1 \text{ mol}}{85} \right) = \frac{.4 \text{ mol}}{.100 \text{ kg}} = 4.00 m$$

10.2 g

11. What mass of AgNO_3 has been dissolved in 200 g of water if the molality of the solution is $0.300 m$?

$$.300 m = \frac{x}{.200 \text{ kg}} \quad x = .06 \text{ mol} \left(\frac{169.87 \text{ g}}{1 \text{ mol}} \right) = 10.2 \text{ g AgNO}_3$$



-3.23°C

12. What is the freezing point of a solution of ethyl alcohol ($\text{C}_2\text{H}_5\text{OH}$) that contains 20 g of the solute dissolved in 250 g of water?

$$20 \text{ g} \left(\frac{1 \text{ mol}}{46 \text{ g}} \right) = \frac{.435 \text{ mol}}{.250 \text{ kg}} = 1.74 m$$

$$\Delta T = (1.74 m)(1)(-1.86^\circ\text{C}/m)$$

$$\Delta T = 3.23$$

124 g

13. How many grams of ethylene glycol, $\text{C}_2\text{H}_4(\text{OH})_2$ must a researcher add to 500 g of water to yield a solution that will freeze at -7.44°C ?

$$7.44^\circ\text{C} = m(1)(1.86^\circ\text{C}/m) \rightarrow m = 4.00 m$$

$$4.00 = \frac{x}{.500 \text{ kg}} \quad x = 2 \text{ mol} \left(\frac{62.07 \text{ g}}{1 \text{ mol}} \right)$$

124 g

85.6 g

14. How many grams of NaCl are required to raise the boiling point of 1.00 kg of water 1.5°C ?

$$1.5 = m(2)(.512) \rightarrow m = 1.46 m$$

$$1.46 m = \frac{x}{1.00 \text{ kg}}$$

$$x = 1.46 \text{ mol} \left(\frac{58.45 \text{ g}}{1 \text{ mol}} \right) = 85.6$$

949 m

15. What is the molality of a solution made from 31 g of NaCl and 559 g of water?

$$31 \text{ g NaCl} \left(\frac{1 \text{ mol}}{58.45 \text{ g}} \right) = \frac{.530 \text{ mol}}{.559 \text{ kg}} = 949 m$$