#12.55, p 519

0.125 m $C_6H_{12}O_6$ from 1.75 g $C_6H_{12}O_6$ + water

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molality: $\frac{\text{mol } C_6H_{12}O_6}{\text{kg } H_2O}$ ← 1.75 g, convert to mol using FW

C: 6 x 12.01
H: 12 x 1.008
O: 6 x 16.00
180.156 g/mol

Find moles fructose:

$$1.75\text{ g } C_6H_{12}O_6 \times \frac{\text{mol}}{180.156\text{ g}} = 0.0097138\text{ mol } C_6H_{12}O_6$$

$$0.125\text{ m} = \frac{0.0097138\text{ mol } C_6H_{12}O_6}{\text{kg } H_2O}$$

$$\text{kg } H_2O = \frac{0.0097138\text{ mol } C_6H_{12}O_6}{0.125\text{ m}}$$

$$= 0.0777\text{ kg } H_2O = \boxed{77.7\text{ g } H_2O}$$

Colligative properties and ionic compounds

- Ionic compounds will dissociate into ions, so we calculate the concentration of IONS when we use the colligative property formulas!

How do we distinguish ionic compounds from other types?

Look at the formula!

$MgCl_2$ CCl_4 NH_4Cl

Look at the first element.
Is it a metal? Usually, formulas that start with a metal are ionic.

Metal/nonmetal pairs are usually ionic!

Some ionic compounds contain only nonmetals, BUT these will contain POLYATOMIC IONS

Compounds containing only nonmetals and/or metalloids are usually molecular

Consider a 1.50 m solution of NaCl in water and a 1.50 m solution of acetone in water. Calculate the freezing point of each solution.

$\Delta T_f = K_f \times C_m$ p500

K_f = 1.856 °C/m

$T_{f,\text{pure } H_2O} = 0.000\,°C$

NaCl: Ionic! Dissociates into two ions:

$$NaCl(s) \longrightarrow Na^+(aq) + Cl^-(aq)$$

1 mol NaCl = 2 mol ions

$C_m = C_{m,\text{ions}}$ $\quad \frac{1.50 \text{ mol NaCl}}{\text{kg } H_2O} \times \frac{2 \text{ mol ions}}{1 \text{ mol NaCl}} = 3.00 \text{ m ions}$

$\Delta T_f = (1.856\,°C/m) \times (3.00\,m) = 5.57\,°C$

So $T_f = 0.000 - 5.57 = -5.57\,°C$

Acetone: Molecular!

$\Delta T_f = (1.858\,°C/m)(1.50\,m) = 2.79\,°C$

$T_f = -2.79\,°C$