

12.55, p 519

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

molality:

$$\frac{\text{mol } C_6H_{12}O_6}{\text{kg } H_2O}$$

1.75g, convert to mol
using FW

$$C: 6 \times 12.01$$

$$H: 12 \times 1.008$$

$$O: 6 \times 16.00$$

$$\underline{180.156 \text{ g/mol}}$$

Find moles fructose:

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

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

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

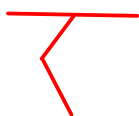
$$= 0.0777 \text{ kg } H_2O = \boxed{77.7 \text{ g } H_2O}$$

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!



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

Metal/nonmetal pairs are usually ionic!



Compounds containing only nonmetals and/or metalloids are usually molecular



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

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.

$$\Delta T_f = K_f \times C_m \quad \text{p500} \quad \left| \quad T_{f, \text{pure H}_2\text{O}} = 0,000^\circ\text{C} \right.$$

\uparrow
 $1,858^\circ\text{C}/m$

NaCl: Ionic! Dissociates into two ions:



1 mol NaCl = 2 mol ions

$$C_m = C_{m, \text{ions}} \quad \frac{1,50 \text{ mol NaCl}}{\text{kg H}_2\text{O}} \times \frac{2 \text{ mol ions}}{1 \text{ mol NaCl}} = 3,00 \text{ m ions}$$

$$\Delta T_f = (1,858^\circ\text{C}/m) \times (3,00 \text{ m}) = 5,57^\circ\text{C}$$

$$\text{So } T_f = 0,000 - 5,57 = -5,57^\circ\text{C}$$

Acetone: Molecular!

$$\Delta T_f = (1,858^\circ\text{C}/m)(1,50 \text{ m}) = 2,79^\circ\text{C}$$

$$T_f = -2,79^\circ\text{C}$$