

Colligative Properties Practice (Plus a few random things!)

KEY

1. Which of these will have a lower freezing point: equal volumes of 0.5 M NaCl, 0.5 M aluminum chloride, or 0.5 M cupric chloride? Why?

↓ 3 part.

↓ 2 part.

↓ 4 part.

2. Name a solution that could have a lower freezing point than the previously mentioned solutions. Why?

Something w/ 5 particles / OR higher concentration
 $PbCl_4$

3. If 202.2 g of potassium nitrate is dissolved in 3000. mL of water, what is the molality of the solution

$$\frac{202.2}{101.1} = \frac{2.000 \text{ moles}}{3.000 \text{ kg}} = \boxed{0.6667 \text{ m}}$$

4. How is molarity different from molality?

↑ total vol. of solution ← mass of solvent

5. If 29.3 grams of NaCl is dissolved in 100. g of water, what will be the new boiling point? K_b for water is $0.512 \text{ }^\circ\text{C/m}$.

$$\frac{29.3}{58.5} = \frac{0.5008 \dots \text{ moles}}{.100 \text{ kg}} = 5.008 \text{ m}$$

$$\Delta T_b = (2)(.512)(5.008) = 5.13 \text{ }^\circ\text{C}$$

$$\boxed{105.13 \text{ }^\circ\text{C}}$$

6. What would be the new freezing point of 500. mL of water if 27.8 g of calcium chloride is dissolved in the solvent? K_f for water is $-1.86 \text{ }^\circ\text{C/m}$. Remember, 1 mL of water = 1 g.

$$\frac{27.8}{111.1} = \frac{0.2502 \text{ mol}}{.500 \text{ kg}} = .5004 \text{ m}$$

$$\Delta T_f = (3)(-1.86)(.5004) = -2.79 \text{ }^\circ\text{C}$$

$$\boxed{-2.79 \text{ }^\circ\text{C}}$$