HOMEWORK: Molarity vs. Molality

1. Find the molarity of a solution made by dissolving 0.335 moles of ammonium sulfate, $(NH_4)_2SO_4$, in 600.0 mL of solution.

$$M = \frac{0.335 mol}{0.60 L} = \boxed{0.558 M}$$

2. What mass (in grams) of calcium nitrate, $Ca(NO_3)_2$, is present in 400.0 mL of a 0.150 M solution?

$M = \frac{mol}{L}$

$0.150 = \frac{mol}{0.400}$ → $mol = 0.06 mol\ Ca(NO_3)_2 \cdot \frac{164.09 g}{1 mol} = \boxed{9.85 g\ Ca(NO_3)_2}$

3. What volume (in mL) of a 3.00 M solution would contain 6.50 g of lithium silicate, Li_2SiO_3.

$6.50 g\ Li_2SiO_3 \cdot \frac{1 mol}{89.57 g} = 0.073 mol$

$M = \frac{mol}{L}$

$3.00 = \frac{0.073}{L}$ → $0.024 L$ → $\boxed{24 mL}$

4. How much water (solvent) in kilograms should be added to 0.25 moles of KI to prepare a 0.75 m solution?

$m = \frac{mol}{kg}$ → $0.75 = \frac{0.25}{kg}$ → $\boxed{0.333 kg\ H_2O}$

5. Determine the molality of a solution made by adding 15.9 g C_2H_5OH to 168 g of H_2O (be careful with units here)?

$15.9 g\ C_2H_5OH \cdot \frac{1 mol}{46.07 g} = 0.345 mol$

solute

$0.168 kg$

$m = \frac{0.345 mol}{0.168 kg} = \boxed{2.05 m}$

6. If 255 g of K_2CO_3 are dissolved in 1330 grams of H_2O, what is the molality of the solution?

$1.33 kg$

$255 g\ K_2CO_3 \cdot \frac{1 mol}{138.21 g} = 1.85 mol$

$m = \frac{mol}{kg} = \frac{1.85 mol}{1.33 kg} = \boxed{1.39 m}$