* Glucose has a molar mass of 180.16 g/mol

$$0.155 \text{ mol} \left(\frac{180.16 \text{ g } C_6H_{12}O_6}{1 \text{ mol } C_6H_{12}O_6}\right) = 27.9 \text{ g}$$

8.) The concentration of NaCl in blood serum is approximately 0.14 M. what volume in mL of blood serum contains 2.0 g of NaCl?

* NaCl $n = 58.44$ g/mol

$$2.0 \text{ g NaCl} \times \frac{1 \text{ mole NaCl}}{58.44 \text{ g/mol}} = 0.034 \text{ mol}$$

* don't round up to get ↓

$$0.034 \text{ mol} \left(\frac{1 \text{ L}}{0.14 \text{ M}}\right)\left(\frac{1000 \text{ mL}}{1 \text{ L}}\right) = 244.45 \text{ mL}$$

9.) Find the normality of the base if 31.87 mL of the base is used in the standardization of 0.4258 g of KHP (eq. wt. = 204.23)

$$N = \frac{\text{no. of grams eq. wt}}{\text{L of solution}} \Big/ (M)(\text{no. of eq})$$

$$= \left(\frac{\text{no. of moles of KHP}}{\text{L solution}}\right)\left(\text{no. of equivalence}\right)$$

* no. of replaceable H^+, OH^- valence of soln

$$= \left(\frac{\frac{0.4258 \text{ g of KHP}}{204.23}}{0.3187 \text{ L}}\right)(1)$$

$N =$ 0.6542 is the normality of the base

10.) A 13.0% solution of K_2CO_3 by mass has a molar mass of 138.2055 g/mol. Calculate the molality of the solution.

$$m = \frac{\text{no. of moles of solute}}{\text{kg of solvent}}$$

$$= \frac{\frac{13 \text{ g } K_2CO_3}{138.2055 \text{ g/mol}}}{(100 \text{ g} - 13 \text{ g})}$$

* convert mass to moles

* solution mass to solute mass + solvent mass

$$= \left(\frac{0.094 \text{ moles}}{87 \text{ g}}\right)\left(\frac{1000 \text{ g}}{1 \text{ kg}}\right)$$

* convert g to kg

$m = 1.08$ molality

11.) What is the concentration in ppb of PCB's (polychlorinated biphenyl) in a chemical spill, if there is 0.060 mg in 4,600 kg of soil?

$$\text{Parts per billion (ppb)} = \frac{\text{grams of solute}}{\text{grams of solution}} \times 10^9$$

$$= \frac{0.00006 \text{ g}}{4,600,000 \text{ g}} \times 10^9$$

$$= 0.013 \text{ ppb}$$

12.) What are the mole fractions of H_3PO_4 and water in a solution of 14.5 g of H_3PO_4 ($n = 98$ g/mol) in 125 g of water ($n = 18$ g/mol)?

$$X_A = \frac{n_A}{n_A + n_B + n_C + \ldots}$$

Where:
X_A = mole fraction of A
n_x = no. of moles of ...

$$n_{H_3PO_4} = 14.5 \text{ g of } H_3PO_4 \times \frac{1 \text{ mol } H_3PO_4}{98 \text{ g } H_3PO_4}$$

$$n_{H_3PO_4} = 0.1481 \text{ moles}$$

$$n_{H_2O} = 125 \text{ g of } H_2O \times \frac{1 \text{ mol of } H_2O}{18 \text{ g } H_2O}$$

$$n_{H_2O} = 6.937 \text{ moles}$$

$$X_{H_3PO_4} = \frac{0.1481}{0.1481 + 6.937} = 0.021$$

$$X_{H_2O} = \frac{6.937}{0.1481 + 6.937} = 0979$$