

SOME EXAMPLES ON SOLUTION COMPOSITION

- (1) Calculate the molarity of acetic acid in cider vinegar that is 5.0% by ~~weight~~ mass. Assume density to be 1.0 g/mL.

The mass of 1 L of soln is (density)(volume)
 $1.0 \text{ g/mL} \cdot 1 \text{ L} = 1000 \text{ g}$

$$\text{Mass of acetic acid in 1 L of soln} = 5.0\% \times 1000 \text{ g} = 50 \text{ g}$$

$$\text{mole of acetic acid in 1 L of soln} = \frac{50 \text{ g}}{\text{MM}(\text{acetic acid})} = \frac{50 \text{ g}}{60.05 \frac{\text{g}}{\text{mol}}} = 0.83 \text{ mol}$$

acetic acid CH_3COOH

$$2 \times 12.011 = 24.022 \text{ g}$$

$$4 \times 1.008 = 4.032 \text{ g}$$

$$2 \times 15.999 = 31.998 \text{ g}$$

$$60.052 \text{ g} \rightarrow 60.05 \frac{\text{g}}{\text{mol}}$$

$$\text{molarity} = \boxed{0.83 \text{ M}}$$

- (2) Seawater contains approximately 0.48 M NaCl. How many grams of NaCl could you obtain by evaporating 500 L?

$$\text{mole NaCl in 500 L} = (0.48 \text{ M})(500 \text{ L})$$

$$= (0.48 \frac{\text{mol}}{\text{L}})(500 \text{ L}) = 240 \text{ mol}$$

$$\text{g NaCl} = (\text{mole NaCl})(\text{MM NaCl})$$

$$= (240 \text{ mol})(58.44 \frac{\text{g}}{\text{mol}}) = 14026 \text{ g}$$

$$= \boxed{1.40 \times 10^4 \text{ g}}$$

NaCl

$$22.99$$

$$35.45$$

$$58.44 \frac{\text{g}}{\text{mol}}$$

OR 14.0 kg