Chemistry 20 - Unit 2 - Concentration Practice

Name: _____

You may find the following formulas useful:

$C = \frac{n}{V}$	$C_{v/v} = \frac{V_{solute}}{V_{solution}} \times 100\%$
$m = Mn$	$C_{w/w} = \frac{m_{solute}}{m_{solution}} \times 100\%$
$d = \frac{m}{V}$	$C_{ppm} = \frac{m_{solute}}{m_{solution}} \times 10^6$
$C_{ppm} = \frac{V_{solute}}{V_{solution}} \times 10^6$	

1. 15.0 mL of sodium chloride is added to 35.0 mL of water. What is the solution's concentration in parts per million?

$C_{ppm} = \frac{V_{solute}}{V_{solution}} \times 10^6 = \frac{15.0mL}{50.0mL} \times 10^6 = 3.00 \times 10^5 ppm$

2. Mr. Pruden's dog wears a lot of jewelry. Her collar is sterling silver and has a mass of 48.0 grams. If 12.6 grams of silver are present in the collar, what is the silver's percentage concentration by weight?

$C_{w/w} = \frac{m_{solute}}{m_{solution}} \times 100\% = \frac{12.6g}{48.0g} \times 100\% = 26.3\% w/w$

3. How many liters of 1.50 mol/L solution of magnesium hydroxide would contain 40.0 g of solute?

$Mg(OH)_2$

$n = \frac{m}{M} = \frac{40.0g}{58.33g/mol} = 0.686mol$

$V = \frac{n}{C} = \frac{0.686mol}{1.50mol/L} = 0.457L$

4. Sodium phosphate solution is used to remove the scales at the bottom of a tea kettle. Calculate the mass of sodium phosphate needed to make 4.00 L of a 0.500 mol/L cleaning solution.

$n = CV = 0.500M \times 4.00L = 2.00mol$

(Na_3PO_4)

$m = Mn = (163.94g/mol) \times 2.00mol = 328g$

5. Calculate the mass of silver nitrate needed to prepare 1.00 liter of a 0.325 mol/L.

$AgNO_3$ $M = 169.88g/mol$

$n = CV = 0.325 \text{ mol/L} \times 1.00 \text{ L} = 0.325 \text{ mol}$

$m = Mn = 169.88 \text{ g/mol} \times 0.325 \text{ mol}$

$= 55.2 \text{ g}$

6. Mr. Pruden's dog is frighteningly intelligent and decides to prepare a brine solution for fun. She uses 15.0 grams of sodium chloride to prepare 100 mL of solution.
   a. How many moles of sodium chloride were used?

$$n = \frac{m}{M} = 15.0 \text{ g} \times \frac{1 \text{ mol}}{58.44 \text{ g}} = 0.257 \text{ mol}$$

   b. What is the chemical amount concentration of brine in moles per litre?

$$C = \frac{n}{V} = \frac{0.257 \text{ mol}}{0.100 \text{ L}} = 2.57 \text{ M}$$

7. What is the % (w/w) concentration of 433 ppm by weight of sodium chloride?

$$433 \text{ ppm} = \frac{433}{1000000} = \frac{0.000433}{1} \times \frac{100}{100}$$

Want per cent (100)

$= 0.0433\%$