**Problem Set 2**

1. A pharmaceutical company is testing a new type of mouthwash. If the mouthwash contains 6.25 mL of ethanol per 250 mL, what is the V/V percentage concentration of ethanol?
2. Stephano puts 26 mL of milk into 310 mL of coffee. What is the V/V percentage concentration of milk in the new mixture?
3. A 5.0 L bottle of bleach contains approximately 0.60g of sodium hypochlorite, NaClO(aq)-. Calculate the W/V percentage concentration of sodium hypochlorite in bleach.
4. Acne cream contains 2.5% W/V salicylic acid, C7H6O3(aq)-. What mass of salicylic acid is in a 192 mL bottle of cream?
5. The W/V percentage concentration of ethylene glycol in antifreeze is 95%. What mass of ethylene glycol is required to make a 550 mL bottle of antifreeze?
6. Complete the following table of Solution Concentrations.

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| --- | --- | --- |
| **Concentration M = mol/L** | **Amount of Solute n = mol** | **Volume of Solution V = L** |
| 4.56 mol/L |  | 2.5 L |
| 2.18 mol/L | 1.06 mol |  |
|  | 0.42 mol | 5.2 L |
|  | 2.4 mol NaCl(s) | 0.20 L |
| 0.10 mol/L |  | 250 mL |
| 0.25 mol/L | mol KOH | 0.450 L |

1. Every 5.5 L of battery acid contains 490.0 g of sulfuric acid, H2SO4(aq). Calculate the concentration of sulphuric acid in the battery acid.
2. Given a container of solid zinc chloride, how would you make 200 mL of a 0.15 M solution of zinc chloride?
3. One fluorescent light bulb contains 23 mg of mercury which is enough to contaminate 3.00 x 104 L of water.
   1. What is the concentration of mercury in parts per million?
   2. Water is not considered safe to drink if more than 2 ppm of mercury is present. Is the water in a safe to drink?
4. Sulfur occurs naturally in petroleum products. When sufur is burned, if forms sulfur oxides, which contributes to acid rain. Diesel fuel contains 550 ppm of sulfur. The Canadian government requires that diesel fuel contains no more than 15 ppm of sulfur by June 2010.
   1. What mass of sulfur is currently present in 65 L of diesel fuel?
   2. What is the maximum mass of sulfur that will be allowed in 65 L of diesel fuel by June 2010?
5. What volume of 18 M hydrogen sulphate H2SO4(l) is required to make 250 mL of 0.25 mol/L sulfuric acid H2SO4(aq)?
6. A solution contains 52 g of potassium permanganate in 3.2 x 102 mL of solution. What is the molar concentration of this solution?
7. A solution contains 14.2 g of calcium phosphate in 357.9 g of water. Calculate the mass/mass percent of solute in this solution.
8. A basic solution contains % m/v lithium carbonate. Calculate the mass of lithium carbonate that would be present in mL of the solution.