COLEGIO DE SAN FRANCISCO DE PAULA CCNN 9º
Departamento de Ciencias Naturales 2014-15

Unit 1. Structure of matter II. CONCENTRATION PROBLEMS

1.- We dissolve 0.009 kg of salt in water to make a 75 mL solution; what is the concentration by weight of the solution?

2.- How many grams of table salt are there in a 10 mL solution with a concentration by weight of 2 g/L?

3.- We use 50 mL of pure water to make a NaCl solution. Calculate the amount of NaCl used if the solution is 30% NaCl by mass.

4.- Calculate the mass percent of the following solutions: a) 40 g of table salt in 250 g of water; b) 50 g of sugar in 1 kg of solution; c) 12 g silver nitrate in half a liter of pure water.

5.- We have an aqueous solution where 12 g of sugar have been dissolved in 200 mL of solution. The density of the solution is 1.022 g/cm3. Calculate: a) The concentration in mass percent; b) the concentration by weight in g/L.

6.- Determine the molarity of a sulfuric acid solution if we mixed 19.6 g of the acid to water until a 2 L solution was obtained.
Atomic masses: H: 1; S: 32; O: 16.

7.- How much potassium nitrate do we need to weight in order to have 250 cm3 of a 2 M solution?
Atomic masses: N: 14; K: 39.

8.- We have two beakers A and B. Beaker A has 50 mL of a 0,.1 M aluminum hydroxide solution; and beaker B 100 mL of a 0.5 M nitric acid solution. We would like to know the number of grams of the corresponding solute in each beaker.
Atomic masses: Al: 27; N: 14; O: 16; H: 1.

9.- Determine the amount of calcium nitrate required in order to prepare 250 mL of a 0.25 M solution.
Atomic masses: Ca: 40; N: 14; O: 16.

10.- Calculate the volume of a 0.2 M aluminum chloride solution if it contains 5.34 g of solute.
Atomic masses: Cl: 35.5; Al: 27.

11.- Determine the volume, in mL, of pure water required to prepare a 2 molal sodium sulfate solution if we are adding 142 g of sodium sulfate.
Atomic masses: Na: 23; S: 32; O: 16.

12.- We prepare a nitric acid solution by adding 50 g of the acid to 250 cm3 of pure. What is the molality of the solution?
Atomic masses: H: 1; N: 14; O: 16.

13.-We make a solution mixing 200 cm^3 of pure water and 38 g of sodium chloride. The total volume of our solution is 212 cm^3. Determine: the density, the molarity and the molality of the solution.
Atomic masses: Cl: 35.5; Na: 23.

14.- How many grams of potassium hydroxide do we have to weigh to make 500 mL of a 0.5 M solution? If we were to take the same number of grams of potassium hydroxide and added them to 2 liters of water, what would be the molality of the solution?
Atomic masses: K: 39; H: 1; O: 16.

15.- We dissolve 20 g of sulfuric acid in 100 mL of pure water reaching the solution a final volume of 0.111 L. Calculate: a) the concentration of the solution in mass %; b) the concentration by weight; c) the molarity; d) the molality.
Atomic masses: S: 32; O: 16.

16.- Determine the molarity of a hydrochloric acid solution if it has a density of 1.15 g/mL and contains 45 % hydrochloric acid mass percent.
Atomic masses: Cl: 35.5.

17.- How would you prepare 500 g of a potassium chloride solution with 15 % mass percent? If the density of the prepared solution is 1.15 g/mL, what would be its molarity?
Atomic masses: Cl: 35.5; K: 39.

18.- A commercial solution of potassium hydroxide has a density of 1.35 g/mL and a concentration by weight of 350 g/L y. Calculate: a) its concentration in mass %; b) the molarity of the solution.
Atomic masses: H:1; O: 16; K: 39.

19.- The label on a laboratory bottle of aqueous sucrose solution, $C_{12}H_{22}O_{11}$, states that the contents have a d = 1.10 g/mL and contain 120 g/L sucrose by weight. We want to know: a) the number of grams of sucrose in 500 mL of the solution; b) the concentration of the solution is mass %; c) the molarity of the solution.
Atomic masses: C: 12; O: 16; H: 1.

20.- We dissolve 150 g of ethanol (C_2H_6O), with d = 0.8 g/cm^3, in water to make 0.5 L of solution. Calculate the molarity and molality of the solution.
Atomic masses: C: 12; O: 16; H: 1.

21 The label on a laboratory bottle of aqueous sulfuric acid states that the contents have a density 1.10 g/cm^3 and contain 40 % sulfuric acid mass percent. Calculate: a) the molarity and molality of the solution; b) the concentration by weight of the solution (g/L); c) the volume of water needed to prepare 2 L of solution.
Atomic masses: S: 32; O: 16; H: 1.

22.- A sodium carbonate solution has a concentration of 35 % mass percent. If the number of grams of solute contained in such solution were mixed with water to make 750 mL of a new sodium carbonate solution , what would be the molarity of the solution?
Atomic masses: C: 12; Na: 23.