Express on concentration of a solution

Introduction

In chemistry when the concentration of a solution is accurately known it is called a standard solution. Standard solutions are needed for carrying out chemical experiments in the laboratory. Furthermore, they are needed to get accurate results. Standard solutions are useful in several industries as well.

The concentration of a solution

The amount of moles of a solute in a unit. volume of a solution is called the concentration. Simply said, concentration gives an idea about how many moles a chemical is there in a given volume of a solution

Concentration is measure with the unit moles per cubic decimeter ($mol\,dm^{-3}$). For this equation number of moles needs to be in "mol" unit and the volume of the solution needs to be in cubic decimeters. (dm^3)

Following is the equation for calculating the concentration of a solute in a solution.

Concentration of a Solution

The amount of moles of solute contained in unit volume of a solution

$$Concentration = \frac{Moles}{Volume}$$

$$mol\,dm^{-3}$$

This is used to express the composition of a homogeneous mixture (solution)

Concentration is used to describe a homogenous mixture. A homogenous mixture can be also known as a solution in chemistry.

Practical experiment – Prepare a standard solution

In this practical session let's see how a standard solution of sodium chloride is made. Here the concentration of the standard solution of sodium chloride is 1 moldm^{-3} and the volume is 250 cm^3

(250 cm^3 is equal to 250 ml)

Calculation

finding the mass of NaCl to prepare **1mol dm^{-3}** concentration with a **250 cm^3** volume solution

$$C = n / V$$
$$n = C V$$
$$n = \frac{1mol}{1000\ cm^3} \times 250\ cm^3$$

1 dm^3 = 1 l (Litre)
1 dm^3 = 1000 cm^3
1 dm^3 = 1000 ml
1 cm^3 = 1 ml

Molar mass of NaCl = 58.5 g mol^{-1}

$$Mass\ of\ NaCl = \frac{1mol}{1000\ cm^3} \times 250\ cm^3 \times 58.5g\ mol^{-1}$$

Mass of NaCl = 14.625 g

Equipment required to carry out this experiment

- Volumetric flasks – to accurately measure the volume

- Wash bottle – to wash out the NaCl into the flask and add water dropwise

- Watch glass – to keep the solute (NaCl)

- Chemical balance – to accurately measure the number of grams of the solute

- Funnel – to direct washed-out solution in the volumetric flask

AL-Mustaqbal University

College of Science

Department of Biochemistr

Subject: Analytical Chemistry - Practical

Lab. : 3

Title: Solutions

- Sodium chloride – as the solute of the standard solution

Method of preparing the standard solution

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Preparing a standard solution (NaCl)

Method

1. For this specific solution, we need 14.625 grams of sodium chloride. It needs to be measured accurately from a chemical balance.

2. Collect the solute (NaCl) into the watch glass

3. Remove the lid of the volumetric flask connect the funnel

4. Use the wash bottle to transfer the solute from the watch glass to the volumetric flask via the funnel

5. Close the lid and mix the solution properly with around 2/3 of the volumetric flask filled

6. Open the lid and fill the volumetric flask with water with the wash bottle

7. When reaching the marked level, watch the mark at eye level and add water drop by drop from the wash bottle

8. When the mark is reached close the lid and mix the solution again gently and with minimum contact with the bulb of the volumetric flask

9. The final step is to label the standard solution. The label should contain the name of the solution, volume and concentration, and the date of preparation.

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