**PREPARATION OF STANDARD SOLUTIONS**

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**INTRODUCTION:**

In titration, acid in biuret will reacts to base in the conical flask in a known concentration to form water and a salt and involves the combination of H+ ions and OH- ions to generate water. This reaction is known as neutralization reaction. This is we called as standard solution. The standard solution can be prepared by weighed method. The mass of solute is calculated and weighed. After that the solute will be dissolved with distilled water in a beaker and it will be transferred into volumetric flask. More distilled water added to get the required volume and concentration of the solution. Standard solution also can be prepared by dilution method.

The process of dilution is involving mixing of a concentration solution with additional solvent to give a larger final volume. Thus, we can know the relationship of the molarity before and after the dilution process. This means that the molarity before the dilution is directly proportional to the molarity after the dilution.

M1V1=M2V2

Where, M1=Initial molar concentration M2=Final molar concentration V1=Initial volume of solution V2=Final volume of solution

**AIM :**

To know the preparation techniques of standard base solutions. To understand the concept of dilution and its calculation

**APPARATUS:** Analytical balance, beaker 100 mL, burette 50 mL, conical flask 250 mL, dropper, funnel, glass rod, pipette 25 mL, volumetric flask 100 mL, distilled water.

**CHEMICALS:** Hydrochloric acid (HCl) 0.1M, Sodium hydroxide (NaOH), thymol blue indicator.

**EXPERIMENTAL PROCEDURES:**

**a) Preparation of standard solutions**

1. 2.00-2.50 gram of solid sodium hydroxide was accurately weighed in a dry 100 mL beaker and the weight of the sodium hydroxide was recorded.

2. 30 mL of distilled water was added into the beaker and the solution was stir until dissolve.

3. The solution was removed into a 100 mL volumetric flask by using coneshaped funnel and a glass rod.The beaker and glass rod was rinsed with the distilled water.

4. The distilled water was carefully added into volumetric flask until it reached the calibration mark.Then, a stopper was placed and the flask was slowly shaked.

**b) Dilution**

1. 25 mL of the sodium hydroxide solution from procedure a) was pipetted and placed it into a 100 mL volumetric flask.

2.Distilled water was added until it reached the calibration mark. Then, a stopper was placed and the flask slowly Shaked.

**c) Standardizing the solutions**

1. 25 mL of the sodium hydroxide solution obtained from procedure b) was pipetted and placed into a 250 mL conical flask.

2. 3 or 4 drops f thymol blue indicator was added into the conical flask.

3. 0.1M of standardized hydrochloride acid was filled into burette until it reached the zero mark.

4. The sodium hyroxide from step number 2 was titrated with the standardized hydrochloric acid from step 3 until first change in colour was seen. It changed from colour of blue to yellow.

5. The volume of standardized hydrochloric acid used to change the colour was determined.

6. With extra care, the procedure c) from step 1 until 5 was repeated twice.

**RESULTS:**

**a) Preparation of standard solutions**

1. Weight Weight of beaker + solid NaOH : 58.2268 g

Weight of beaker : 55.7779 g

Weight of solid NaOH : 2.4489 g

2. Calculate the concentration of the prepared sodium hydroxide solution in g/L.

Weight of NaOH= 2.4489 g Volume of distilled water used=0.10 L

Therefore, The concentration of NaOH solution= 2.4489 g / 0.10 L = 24.489 g/L.

3. Calculate the concentration of the prepared sodium hydroxide in molar.

Concentration in g/L= Molar mass x Molarity.

Therefore, Molarity=concentration in g/L / Molar mass.

=24.489 g/L / 39.997 g/mol =0.6123 mol/L

**b) Dilution**

1.Calculate the number of dilution (dilution factor) made

Dilution factor=Final volume of solution/ Initial volume of solution

Initial volume of NaOH=25 mL

Final volume of NaOH=100 mL

Therefore, DF=100 mL/ 25 mL =4

2.Calculate the concentration of diluted sodium hydroxide in molar

M1V1=M2V2 M1=0.6123 mol/L M2=? V1=25 mL V2=100 mL

Therefore, (0.6123 mol/L)x(25 mL)=(M2)x(100 mL) M2=(0.6123 mol/L x 25 mL)/ (100 mL)

=0.1531 mol/L

**c) Standardizing the solutions.**

1. Result of titration:

Molarity of standardized hydrochloric acid: 0.1 M

Volume of pipette used : 25 mL

|  |  |  |  |
| --- | --- | --- | --- |
| Reading of burette (mL) | No. of titration | | |
| 1 | 2 | 3 |
| Final reading | 41.50 | 39.80 | 39.90 |
| Initial reading | 0.00 | 0.00 | 0.00 |
| Volume of HCl | 41.50 | 39.80 | 39.90 |
| Average volume of HCl | 40.40 | | |

2. Calculate the molarity of the titrated sodium hydroxide.

HCl + NaOH NaCl + H20

MaVa/ MbVb = a /b

Therefore,(0.1M)(40.40mL)/(Mb)(25.00mL)=1/1

Mb=(0.1 M)(40.40 mL)/25,00mL =0.1616 M

3.Calculate the molarity of the original sodium hydroxide used.

M1V1=M2V2

Therefore, (M1)(25 mL)=(0.1616M)/(100 mL)

M1=(0.1616M)/(100 mL) 25 mL

M1=0.6464 M