

Preparation of standard solution of Na₂CO₃ and HCl

Volumetric analysis

Volumetric analysis is the determination of an unknown solution by reaction with a solution of known concentration. The apparatus used is standard glassware.

- Preparation of solutions
- Titration (reacting the solutions together)

How can we Preparation any standard solution

- A prior calculation is carried out to estimate the approximate mass of the primary standard required to make up a known volume of standard solution.
- The primary standard is accurately weighed out on an electronic balance using a weighing bottle or boat.
- The solid is transferred to the volumetric flask and the weighing bottle rinsed into the volumetric flask.
- A volume of distilled water is added to the flask and the mixture swirled until all of the solute has dissolved.
- Distilled or deionised water is added to the mark (an engraved line on a volumetric flask).
- The volumetric flask is inverted several times to thoroughly mix the contents.
- The flask is labelled and set to one side.

Primary standards

A primary standard is a compound which has the following characteristics:

- It is available in a high degree of purity
- It is chemically stable in the atmosphere
- It is chemically stable in solution
- It reacts with the compound under investigation
- It has a high relative mass

Example: Preparation a standard solution of sodium carbonate 0.1 N in 1 L :

1-Sodium carbonate has the formula Na_2CO_3 . It has a relative formula mass of 106 so it is $\text{eq.wt} = 106/2 = 53$.. If we wish to prepare 1000 ml of a 0.1 N solution then we need a total of

$$\mathbf{N \times V = Wt/eq.wt \times 1000 \rightarrow 0.2 \times 1000 = Wt/53 \times 1000 = 10.6 \text{ g}}$$

2-Approximately 10.6g is accurately weighed on an electronic balance in a weighing bottle.

3-The sodium carbonate is transferred into a 1000 ml volumetric flask and about 100 ml of deionised water is added, rinsing out the weighing bottle.

4-The mixture is shaken in the volumetric flask until the sodium carbonate dissolves.

5-Deionised water is added to the volumetric flask up to the mark.

When we need another concentration from this standard solution then we should follow those steps with attachment equation :

1-If we need diluted solution from Previous standard solution of sodium carbonate e.g. ; when we prepare a 0.08 N in 100 ml from standard solution 0.2 N ,, then use ;

$$N \times V \text{ (of } \text{Na}_2\text{CO}_3 \text{) dilute} = N^1 \times V^1 \text{ (of } \text{Na}_2\text{CO}_3 \text{) conc}$$

$$0.08 \times 100 = 0.2 \times V^1 \rightarrow V^1 = 40 \text{ ml}$$

2-then transfer 40 ml from concentration solution to volumetric flask and add water to the mark. Now you get a diluted solution and by the same way we can prepare HCl with different concentrate ..