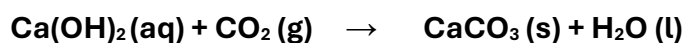
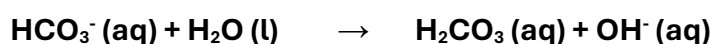
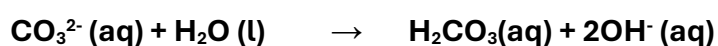


Objective

To identify washing soda or baking soda from the given set of samples and understand the chemistry behind the reaction.

Theory

White solids include baking soda (NaHCO_3) and washing soda ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$). Their alkaline aqueous solutions take on a reddish-blue hue. When carbonates and hydrogen carbonates react with weak acids, carbon dioxide gas is produced, which is that gives lime water milky colour.



Lime water

Milky

On passing excess of CO_2 through limewater, calcium hydrogen carbonate is formed. It is soluble in water and forms a colourless solution.



To determine whether the chemical samples provided are washing soda or baking soda, we will use litmus paper and a lime water test in this experiment. Baking soda or washing soda from the provided chemical samples.

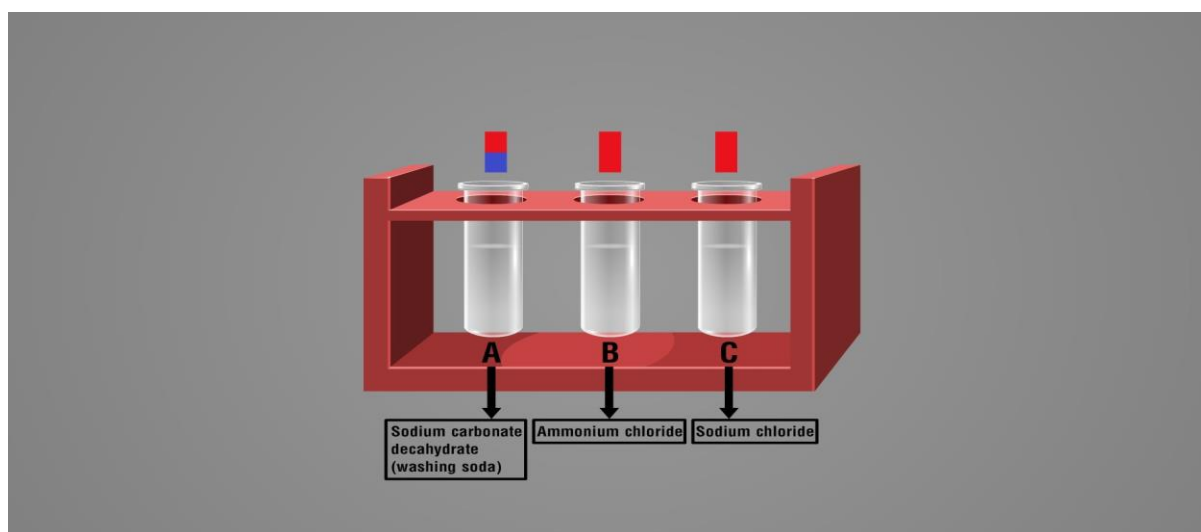


Fig. 1 Litmus paper test

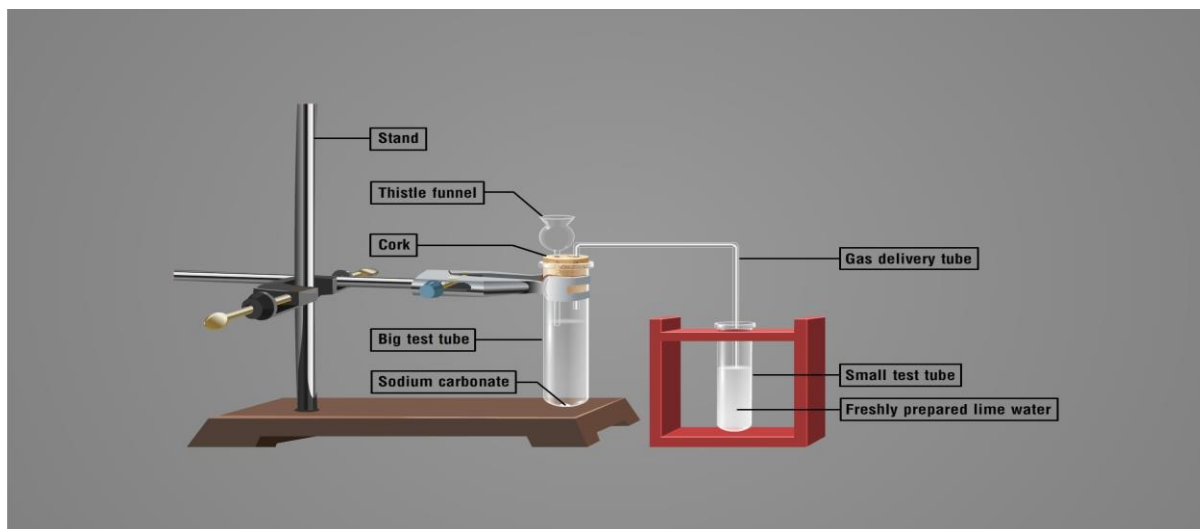
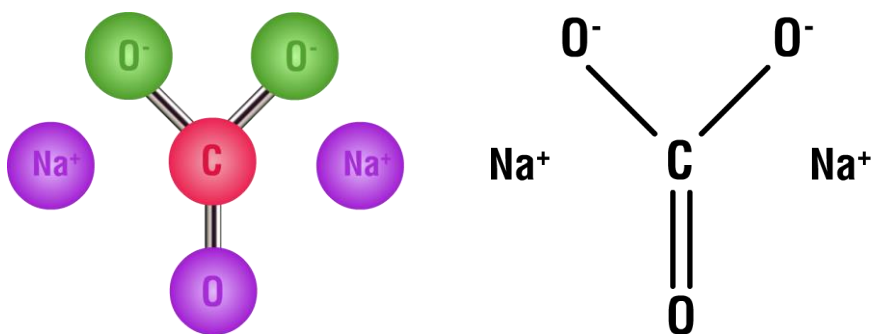


Fig. 2 Lime water test

What is Washing Soda?

Washing soda is a white crystalline solid and its chemical formula is $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$. It is a sodium carbonate decahydrate. Soda ash got its name because it was taken from the ashes of plants that were grown in soils high in sodium. It dissolves very easily in water and creates a very alkaline solution.



Uses of Washing Soda

- Used in households and workplaces as a cleaning agent.
- It is prominently used in glass, paper, textile, soap, and detergent industries.
- It is used in the water softening process.

What is Baking Soda?

Sodium bicarbonate, a chemical compound with the formula NaHCO_3 and the IUPAC designation sodium hydrogen carbonate, is also referred to as baking soda or bicarbonate of soda. This salt is made up of a bicarbonate anion (HCO_3^-) and a sodium

cation (Na^+). Sodium bicarbonate is a fine powder that is typically found in white, crystalline form. It has an alkaline, somewhat salty flavour like washing soda (sodium carbonate decahydrate).

Uses of Baking Soda

- Reduces the stomach's acidity.
- It is used in fire extinguishers because it produces soapy foam.
- Cosmetics, ear drops, and personal care items all contain it.
- It is a component used in the production of antacids.

Preparation of Washing soda or Baking soda

Using Solvay's method, washing soda is synthesised. The reaction of sodium chloride, ammonia, and carbon dioxide in water is the basis of Solvay's process. Calcium carbonate is used to produce carbon dioxide, and the calcium oxide that remains is used to recover ammonia from ammonium chloride. Sodium bicarbonate is first produced, and upon heating, it transforms into sodium carbonate decahydrate. Lastly, sodium carbonate decahydrate is recrystallized to produce washing soda.

Learning Outcomes

Students learn and understand:

- The concept of 'washing soda and baking soda' through the experiment.
- The preparation and uses of washing soda and baking soda.
- To perform the experiment in the real lab after experiencing it in the virtual lab.