

## Rapid Preparation of a Carbonate-Free Standard Base Solution

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A search in the late editions of textbooks on quantitative analysis failed to show a method for preparing a standard carbonate-free solution of sodium hydroxide which is as simple as the one which has been used in this laboratory for a number of years. Filtering, siphoning, the boiling of water are operations which can be avoided by allowing ferric hydroxide to carry and hold down the precipitate of barium carbonate produced by the addition of barium hydroxide or chloride. Calculations show that in the differential titration of 25 ml. of 0.1 N hydrochloric acid with 0.1 N sodium hydroxide, using phenolphthalein and methyl orange as indicators, a difference of 0.1 ml may be expected when no carbonate is present. For every per cent of carbonate 0.125 ml increase in the difference should be found. Since drops are the smallest units of solution added, a carbonate-free hydroxide solution may show a difference of 0.15-0.20 ml in practice. Students who have prepared solutions according to these directions have rarely exceeded this difference in their titrations.

Assuming the laboratory air to contain 7 volumes of carbon dioxide per 10,000, the 60 ml of air in the buret would contain 0.08 mg of it. If this were all absorbed while siphoning the hydroxide into the buret, an equivalent of 0.036 ml. of N. sodium carbonate would be formed. This causes an error which is negligible for most purposes.

The solution is prepared by dissolving ten per cent excess of sodium hydroxide in ordinary distilled water in the bottle to be used to store the solution. Then 0.4 g. (per liter solution) of barium chloride or hydroxide dissolved in a little water are added. The solution is shaken and allowed to stand a few minutes. Now a solution containing 0.5 g. of ferric chloride is added, followed by shaking. After a final swirl a glass siphon is inserted. The stopper which holds the siphon should have another hole provided with a soda-lime tube. The suspension settles in one, or, at most, a few hours. If water vapor condenses on the sides of the bottle it may again be shaken. The usual closure for the siphon is a rubber tube and pinch clamp. If a short glass tube is connected, the carbon dioxide from the air will precipitate barium carbonate in it. It is better to insert a clean tube before siphoning into the buret.