

16.1 Sodium hydroxide and dry ice

Subjects: Acids/bases, chemical reactions, titrations

Description: To a solution containing dilute sodium hydroxide and universal indicator, a piece of dry ice is added. The color change of the solution is observed as the solution is first neutralized then becomes acidic.

Materials:

0.1M NaOH‡

500 mL tall form beaker or use the 500 L graduated cylinder on the prep shelf

Dry ice[◇]

Dry ice bucket*

Tongs

Universal indicator‡

[◇]Requires advanced prep: Get dry ice prior to class from the stockroom.

*Bucket is located on shelf in alcove

‡NaOH is located in the cabinet under the hood. Universal indicator is located in the flammables cabinet.

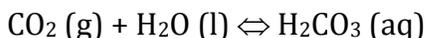
Procedure:

Note: For large lecture halls, it may help to use the document camera.

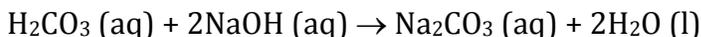
1. Place the sodium hydroxide and a few drops of universal indicator in the beaker
2. Note the color of the universal indicator.
3. Add a piece of dry ice.
4. The color of the solution will change as the dry ice reacts with the sodium hydroxide going from basic to neutral to an acidic solution.
5. Add enough dry ice so that the sodium hydroxide is neutralized.

Discussion:

Carbon dioxide initially reacts with water in the aqueous solution as follows:



The carbonic acid neutralizes the sodium hydroxide to sodium carbonate and water.



If the carbon dioxide is in excess, then when the NaOH runs out, an increase in the carbonic acid is seen and the solution becomes acidic as indicated by the universal indicator.

Safety: Sodium hydroxide can irritate skin. Use proper protective equipment including gloves and safety glasses. Dry ice is extremely cold and can cause burns. Handle with tongs or insulated gloves.

Disposal: The solution can be flushed down the drain with water.

References:

1. None