

15.4 Effect of pressure on equilibrium

Subjects: Equilibrium, gases,

Description: When the flask containing a clear solution of sodium bicarbonate is evacuated, CO₂ gas is evolved and the solution turns pink.

Materials (in cabinet - no bin):

1 L side arm flask with tight fitting rubber stopper and vacuum tubing

Vacuum pump (located in cabinet)

150 mL of saturated sodium bicarbonate solution‡

phenolphthalein‡

‡Saturate sodium bicarbonate is located on the solutions shelf. Phenolphthalein is located in the cabinet under the hood.

Pre-class preparation:

1. Add the sodium bicarbonate solution to the flask.
2. Add 3-4 drops phenolphthalein solution. If the solution is pink, add dilute HCl drop wise until the color just disappears.
3. Stopper the flask.

Procedure:

1. Hook up the flask to the vacuum and turn on to evacuate the flask.
2. Carbon dioxide gas will be pulled out of solution. The solution will eventually turn pink as it becomes more alkaline.

Discussion:

The equilibrium is represented by the following scheme:



Decreasing the pressure forces the equilibrium to the right and causes the release of CO₂ leaving more OH⁻ in solution. This results in a more alkaline solution, which causes the indicator to turn pink.

Disposal: Solutions can be flushed down the sink with water.

References:

1. L. Summerlin, J. Ealy; *Chemical Demonstrations: A Sourcebook for Teachers*; Wisconsin; 1985; Volume 1; p. 64