Waft It — Don't Sniff It!

Introduction

The importance of learning the proper technique for smelling a substance is demonstrated using a simple pH indicator.

Concepts

- Safety
- Gas Diffusion
- Wafting
- pH indicators
- Gases

Materials

Ammonium hydroxide solution, NH_4OH (0.5 or 1 M)
Phenolphthalein solution, 1% alcoholic, 15 mL
Filter paper, 7.5- or 9-cm size
Forceps
Petri dish

Safety Precautions

Solutions and vapors of ammonium hydroxide (also called ammonia) are extremely irritating—especially to eyes. Ammonium hydroxide is also toxic by inhalation and ingestion. Phenolphthalein solution is an alcohol-based solution and is moderately toxic by ingestion and is flammable. Wear chemical splash goggles, chemical-resistant gloves, and a chemical-resistant apron. Please review current Material Safety Data Sheets for additional safety, handling, and disposal information.

Preparation

1. Place about 15 mL of phenolphthalein indicator solution into a Petri dish.
2. Soak a piece of filter paper in the solution for a few minutes.
3. Remove the filter paper with forceps.
4. Allow the filter paper to air dry overnight in an operating fume hood or in a well-ventilated area.

Procedure

1. Carefully swirl the bottle of ammoniun hydroxide solution. This will increase the gas pressure in the bottle slightly.
2. Open the bottle slowly to release the pressure.
3. Hold the treated filter paper with forceps and slowly pass the filter paper above the open mouth of the bottle. The paper will turn pink, indicating the presence of ammonia vapor. Explain to students that directly smelling this vapor would cause serious damage to their nasal cavity.
4. Now illustrate the wafting procedure and refer to the rapid color change in the indicator as the reason to be very cautious when wafting materials.

Disposal

Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures governing the disposal of laboratory waste. The bottle of ammonium hydroxide can be recapped and used again. The filter paper can be disposed of according to Flinn Suggested Disposal Method #26a and the phenolphthalein solution by Flinn Suggested Disposal Method #18b.

Publication No. 10359
061616

Discussion

The sense of smell is often relied upon in the laboratory. Unfortunately, it can be easily damaged. Care should always be taken whenever a student needs to use his or her sense of smell. An odor must never be smelled directly. Detecting an odor in a laboratory is best done using the technique of *wafting*. Wafting involves drawing one's hand across the opening of a container in order to push the odor towards the nose (see Figure 1). If the odor is undesirable or dangerous, the person can move his or her face away.

Most gases, including noxious ones quickly diffuse through air. The lower the molecular weight of the gas, the faster its rate of diffusion. An increase in temperature will also increase the rate of gas diffusion. Students should be made aware that gases
produced during certain reactions can be of serious concern, even if their production cannot be detected by human senses.

In this demonstration the filter paper is treated with an acid–base indicator called phenolphthalein. Phenolphthalein turns pink in the presence of a base (pH 8.2 colorless to 10.0 pink). Ammonia is a base. Since ammonia gas is highly soluble in water it will quickly dissolve in the water-saturated filter paper.

Reference

Bilash, B. *A Demo A Day—Another Year of Physical Science Demonstrations;* Flinn Scientific Inc.: Batavia, IL, 1997; p 5.

Materials for *Waft It — Don't Sniff It!* are available from Flinn Scientific, Inc.

Catalog No.	Description
A0227	Ammonium Hydroxide, ACS reagent, 2.5 L
A0174	Ammonium Hydroxide, ACS reagent, 100 mL
A0087	Ammonium Hydroxide, 1 M, 1 L
P0019	Phenolphthalein Indicator Solution, 1%, 100 mL
P0020	Phenolphthalein Indicator Solution, 1%, 500 mL
AP3101	Filter Paper, 7.5 cm, pkg of 100
GP3019	Petri Dish, 100 × 15 mm, pkg of 6

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.