

# How to Generate Ammonia Gas

## Properties of Ammonia

### Introduction

Ammonia gas can be generated by heating concentrated ammonium hydroxide.

### Concepts

- Gas properties
- Temperature effects

### Materials

Ammonium hydroxide,  $\text{NH}_4\text{OH}$ , concentrated, 20 mL

Erlenmeyer flasks, 250-mL, 2

Hot plate

Plastic tube

Rubber stoppers, one-hole, 2

Rubber stopper, solid

### Safety Precautions

*Ammonia is toxic and irritating by inhalation. Inhalation may be fatal. Use ammonia gas only under an operating fume hood. Ammonia is a moderate fire risk. Wear chemical splash goggles, a chemical-resistant apron, and chemical-resistant gloves. Please review current Material Safety Data Sheets for additional safety, handling, and disposal information.*

### Procedure

1. Place a one-hole rubber stopper in each flask. Insert a glass dropping pipet (ex: from an eye dropper) in each rubber stopper. Connect the pipets with a piece of plastic tubing.
2. In an operating fume hood, pour about 20 mL of the concentrated ammonium hydroxide into the flask.
3. Hold the collecting flask mouth down and at a higher level than the flask being heated. This allows the gas to travel upwards into the collecting container.
4. Gently warm the flask on a hot plate until the gas is seen bubbling freely from the liquid. Heat until enough gas has been generated to completely fill the flask and then close the collecting flask with a solid rubber stopper.
5. Remove the heated flask from the hot plate and allow it to cool.

### Disposal

Please consult your current Flinn Scientific Catalog/Reference Manual for general guidelines and specific procedures, and review all federal, state and local regulations that may apply, before proceeding. Place all pieces of equipment in an operating fume hood overnight to remove all traces of the ammonia gas. After degassing, rinse all items, and flush the water down the drain. Excess ammonium hydroxide solution may be neutralized according to Flinn Suggested Disposal Method #10.

## Tips

- Be careful to not turn up the heat on the hot plate too high. The ammonium hydroxide should just bubble and release gas, it should not boil and release water vapor. If water vapor begins to condense on the sides of the flask, then the heat is too high.
- 100 mL of  $\text{NH}_4\text{OH}$  will make 4–5 L of gas.

## Flinn Scientific—Teaching Chemistry™ eLearning Video Series

A video of the *How to Generate Ammonia Gas* activity, presented by George Gross, is available in *Properties of Ammonia*, part of the Flinn Scientific—Teaching Chemistry eLearning Video Series.

**Materials for *How to Generate Ammonia Gas* are available from Flinn Scientific, Inc.**

Catalog No.	Description
A0174	Ammonium Hydroxide, $\text{NH}_4\text{OH}$ , Concentrated, 100 mL
GP3045	Erlenmeyer Flask, 250-mL
AP5337	Replacement Pipet with Bulb

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