

# Vapor Pressure Equilibrium

## Vapor Pressure of Liquids



### Introduction

Here is a simple demonstration of vapor pressure equilibrium. If done in a lively style, you can really keep your students' attention and strengthen their knowledge of dynamic equilibrium and saturation.

### Concepts

- Vapor pressure
- Evaporation and condensation

### Materials

Acetone,  $\text{CH}_3\text{COCH}_3$ , 5 mL

Separatory funnel, 250-mL

Graduated cylinder, 10-mL

### Safety Precautions

*Acetone is a flammable liquid; avoid contact with flames and other sources of ignition. Avoid contact of all chemicals with eyes, skin, and clothing. Wear chemical splash goggles, chemical-resistant gloves, and a chemical-resistant apron. Please consult current Material Safety Data Sheets for additional safety, handling, and disposal information.*

### Procedure

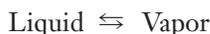
1. Pour 5 mL of acetone into a 250-mL separatory funnel. Stopper the funnel.
2. Invert the funnel and ask the students the question, "What will happen when the stopcock is opened?"
3. Instruct the students to listen for any sound and then open the stopcock. Did they hear a "phfffft"—gas going out—or a "thththt"—gas going in.
4. At this point, engage the students into a brief discussion of vapor pressure.
5. Repeat the experiment. Do not add more acetone. Once again, ask about the sound.
6. Will the acetone ever stop evaporating? Continue to open the stopcock every 20–30 seconds. Each time the sound becomes less noticeable. Eventually, no sound is heard.

### Disposal

Acetone may be allowed to evaporate in the hood according to Flinn Suggested Disposal Method #18a. Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures governing the disposal of laboratory wastes.

### Discussion

When liquids are put in a closed container, they reach dynamic equilibrium with their vapors. Molecules continue to evaporate from the liquid to the vapor phase as molecules condense from the vapor phase to liquid at the same rate.



When a volatile liquid like acetone is placed in a stoppered separatory funnel filled with air, the combined equilibrium vapor pressure plus air in the stoppered funnel is greater than the outside pressure. When the stopper is removed, the vapor rushing from the funnel creates the "phfffft"—gas going out sound.

## Connecting to the National Standards

This laboratory activity relates to the following National Science Education Standards (1996):

***Unifying Concepts and Processes: Grades K–12***

Systems, order, and organization  
Evidence, models, and explanation

***Content Standards: Grades 5–8***

Content Standard B: Physical Science, properties and changes of properties in matter

***Content Standards: Grades 9–12***

Content Standard B: Physical Science, structure and properties of matter

## Flinn Scientific—Teaching Chemistry™ eLearning Video Series

A video of *Vapor Pressure Equilibrium* activity, presented by Bob Lewis, is available in *Vapor Pressure of Liquids*, part of the Flinn Scientific—Teaching Chemistry eLearning Video Series.

**Materials for *Vapor Pressure Equilibrium* are available from Flinn Scientific, Inc.**

Catalog No.	Description
A0156	Acetone
GP5060	Separatory Funnel, 250-mL

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