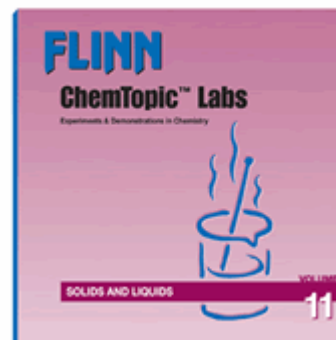


Solids and Liquids— Demonstration Summaries and Concepts



Hot Wax—Heat of Fusion of Paraffin

The temperature at which paraffin (candle wax) melts is only about 55 °C. When hot wax solidifies, however, it releases heat and causes severe skin burns. Use this calorimetry demonstration to measure the heat of fusion of paraffin and to compare the endothermic and exothermic nature of melting and freezing, respectively.

“Tennis Ball” Distillation—Kinetic-Molecular Theory in Action

Phase changes such as melting and evaporation are very “moving” events when molecules are the size of tennis balls! A tub-full of tennis balls is a perfect demonstration device for comparing the energy and motion of molecules in the solid, liquid, and gas phases. It’s time to put the “kinetic” back into the kinetic-molecular theory!

Surface Tension Jar

Quickly and easily demonstrate the remarkable properties of surface tension and air pressure using a simple jar. Surface tension is a force—a force powerful enough to prevent water from spilling out of an open jar when it is turned upside-down! A fine mesh screen hidden inside the lid of the jar provides hundreds of tiny surface tension “membranes” that will support the weight of the water against the force of gravity. Look for the key “supporting” role played by the external air pressure.

Freezing by Boiling—Discrepant Event

The boiling point of a liquid depends on the external air pressure. When an aqueous acetone solution is placed under vacuum, the boiling point decreases and the liquid boils even at room temperature. Boiling, however, is an endothermic process. As the liquid boils, the temperature decreases, and the liquid soon freezes. Boiling and freezing occur simultaneously!

Wet Dry Ice—Triple Point of CO₂

From making fog to “boiling in water,” dry ice is well-known for creating special effects. If dry ice is allowed to sublime in a sealed pipet bulb, the pressure due to carbon dioxide gas will increase to a point where the liquid form of carbon dioxide can be seen. The behavior of “wet dry ice” is an interesting way to demonstrate phase diagrams and the triple point.

Four-Square Diffusion—Vapor Pressure of Liquids and Solids

Finally—an amazing but simple way to demonstrate vapor pressure and diffusion. Simply sprinkle a few crystals of two different solids into opposite quadrants in a divided Petri dish, add a little acetone to a third quadrant, and observe. Within seconds, the solids begin to dissolve into puddles of liquid. The rate at which each solid dissolves illustrates how intermolecular forces influence the properties of liquids and solids.

Concepts

- Phase changes
- Heat of fusion
- Calorimetry
- Melting and freezing
- Evaporation and Condensation

- Surface tension
- Air pressure
- Adhesion vs. cohesion

- Boiling point
- Vapor pressure

- Phase changes
- Phase diagrams
- Triple point
- Sublimation

- Vapor pressure
- Diffusion
- Sublimation
- Intermolecular forces