9.16.1: Lecture Demonstrations

Introductory Demonstration

A large, one-holed rubber stopper is inserted in a porous clay cup (commonly used to isolate solutions in preparing voltaic cells), and a hose is connected to a water manometer. Freon is collected in a 1 L beaker (from a "Dust Off" aerosol, freon refill for air conditioner, etc.), and the beaker is brought up to surround the porous cup. The pressure decreases (air diffuses out of the cup faster than freon diffuses in). In a second trial, an inverted beaker of hydrogen is brought down on the inverted cup, and pressure increases in so much that it often blows water out of the manometer, as hydrogen diffuses in much faster than air diffuses out.

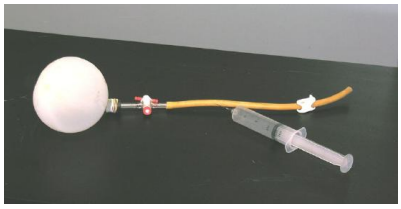
Apparatus for demonstrating gas diffusion

Graham's Law of Effusion

Insert a septum in a 14/20 standard taper female end of a vacuum distillation adaptor inserted in a 50 mL round flask. Attach the vacuum adaptor to a vacuum pump. Fill syringes with freon and hydrogen, and, in turn, insert needle of each syringe through septum. To fill the syringes, insert the needle (phlebotomist style)into latex tubing between a clamp, and a stopcock on glass tubing which passes through a rubber stopper, over which a balloon of gas is attached (See Figure). Measure time to empty syringe. v1 / v2 = R1 / R2 = kt2 / kt1 = √M2 / √M1

Graham's Law of Effusion

Graham's Law of Effusion Apparatus



Syringe Gas Filler