

Thermodynamics:
ELASTICITY OF GASES

Materials

- ✓ One Wooden Base
- ✓ One Wooden Top
- ✓ One Small Plastic Cap
- ✓ One Syringe with Piston
- ✓ One Packet of Silicone Grease
- ✓ One Ring Stand & Clamps
- ✓ One 250 mL Glass Beaker
- ✓ One Thermometer
- ✓ Several Uniform Masses (i.e. books or weights)
- ✓ Ice
- ✓ Hot Plate
- ✓ Equilibrium



Background Research:

1. Define the following term:
 - a. Fluid (physics)
 - b. Elasticity
 - c. Equilibrium
2. Explain Pressure in terms of kinetic movement of particles.
3. Explain Boyle's Law (physics)
4. Explain Charles' Law (physics)
5. Elaborate on the concept of compressing a fluid.
6. Compare and contrast inversely proportional and directly proportional.
7. Compare cubic centimeter (cc) to milliliter (mL)

Scientific Investigation:

- ➔ Place the large wooden base, with the larger hole onto your lab table.
- ➔ There should be NO plastic cap on the end of the syringe at this point. Pull the plunger completely out of the syringe. Use the silicone rubber grease to lubricate the side wall of the black rubber plunger.
- ➔ Press the syringe body into the hole on the top side of the base.
- ➔ Press the top end of the syringe plunger into the hole in the wooden top. (Thin wooden block)
- ➔ Reassemble the syringe and press the small plastic cap over the nozzle end of the syringe under the large block.
- ➔ You are now ready to perform experiments with Boyle's Law.
- ➔ To expel air or gas from the syringe, first, remove the small plastic cap from the end of the syringe and push the piston.
- ➔ Be careful not to tear the cap or distort its shape by the careless use of pliers.

Experiment 1: Can you predict how a change in pressure will effect equal volumes of gasses

- With the assembled apparatus, draw approximately 30cc of air into the cylinder and cap the end. Stack several equal weights carefully on the top block of the apparatus. You can use several copies of the same textbook for this.
- When stacking weights, keep centered and do not exceed 30 lbs. I suggest you take the mass of the books. It would not give us good data if you use a book so heavy that only like 2 or 3 of them = 30 lbs. Record the volume of the gas as indicated on the scale of the syringe. Before reading the scale on the syringe, tap the table or the top of the apparatus a couple of times to help overcome the static friction between the piston and the syringe walls. Record the weight and corresponding volume for as many values as possible.
- After all of the weights are stacked on the apparatus, unstack them one at a time and record the volumes again. Use this data as trial #2.

