You are demonstrating *adiabatic compression* where no heat is lost to the outside environment. In order for the demonstration to work, the compression has to be so fast that practically no heat generated by the compression is allowed to escape. If the compression is too slow, heat is passed from the compressed air to the plastic tube to the outside and the material won’t light. Make sure the syringe is in a firm up-right position and push the plunger as fast as you can. The fire syringe can be used to demonstrate the relationship between pressure and temperature. When the pressure on a gas is increased, the particles (atoms and molecules) are forced to move in a small space. The French scientist Joseph Gay-Lussac concluded that equal volume of all gases expand the same with identical increases in temperature. This is known as the Gay-Lussac’s Law.

Dismantle the syringe before storing. Make sure to lightly lubricate the o-rings with glycerin or vegetable oil before use.