Glass tubing connected to rubber tubing or inserted into rubber stoppers is a common feature of laboratory apparatus. Because glass can break and cause injuries, proper procedures for connecting and inserting must be observed. Never use glass with sharp edges. Carefully look over glassware, and if it appears to have chips or sharp edges, call the instructor over to replace the glassware.

**CONNECTING:**
Lubrication is *always* required. Water is the usual lubricant used. Moisten the outside of the glass and the end of the rubber tubing with water (tap water is OK) by either running water on the tubing or by wetting your fingers and then rubbing the tubing at the connection points. Hold the glass in one hand and the rubber tubing in the other hand close to the ends you will connect. Push the rubber tubing onto the glass at a slight angle as shown in the drawing.

The rubber tubing should overlap the glass about one cm or less. Too small an overlap can lead to disconnection in the middle of an experiment. Too large an overlap makes the juncture hard to disconnect.

The rubber tubing should have a smaller inside diameter (ID) than the outside diameter (OD) of the glass tubing. In our labs, we use glass with an OD of 6 mm. The amber colored rubber tubing has an ID of 3/16 inch, which is about 5 mm. This ensures a good fit. The red tubing on the Bunsen burners has an ID of 1/4 inch, which is about 6.4 mm. The red tubing does not give a good fit on 6 mm glass tubing and should not be used with that tubing.

**DISCONNECTING:**
Removing rubber tubing from glass is generally easier if the rubber is pushed off rather than pulled off.

Hold the rubber/glass juncture between your thumb and first finger and push the rubber off with your thumb. If the rubber won’t push off, squirt some water in between the rubber and the glass from a plastic bottle, knead the joint a bit, and try again. Call the instructor if the tubing is stuck on the glass.

**RUBBER STOPPERS:**
The stopper must be *out of the container* when inserting glass tubing. Lubricate the glass and the hole in the stopper with water. Hold the stopper and the tubing as shown and gently push.

Water is a sufficient lubricant for the stoppers used in our labs because we use fusiform bored stoppers. The holes in these stoppers are drilled with an inner flare, reducing the contact area between glass and rubber, as shown in the cutaway diagram.

(For stoppers with straight bored holes, use glycerin as a lubricant, and hold the glass tubing with a towel to protect your hand from injury in case the glass breaks.)

When removing glass from the stopper, make sure the glass is moist. Work some water into the rubber/glass seal if necessary. Call the instructor if the glass is stuck in the stopper.

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