

# Leyden Jar

In the winter of 1745-46, experimenters tried electrifying water in a bottle. They got a powerful electric shock – they'd discovered what would be called the Leyden Jar. Today, the jars have developed into high-voltage capacitors, and are built quite differently. The old-style jars can have either a narrow neck or a wide neck. The wide-neck types are easier and cheaper to make.

Get a plastic jar with a plastic cap, the wider the top the better. Think of the jars peanut butter comes in. Plastic is more reliable with electricity than glass, and doesn't shatter if dropped. You need to line the bottom half of the bottle with a conductor, then cover the outside with a conductor to the same extent.



**Get at the hardware store:** roll of 2" aluminum tape, 5/32" brass rod, two brass lamp balls tapped 8-32, one rubber grommet 1/8" ID, about one foot of the smallest chain the store has. The best small chain is found in beading, jewelry making, and craft stores. Get fake silver or gold, not the expensive stuff.

**Tools needed:** Two popsicle sticks or tongue depressors (depending on the size of the jar). Hacksaw, vise, die to thread the 5/32 rod to 8-32. Scissors. Quarter inch drill. **Somebody who knows how to use a shop.**



Cut a 1" strip from the end of the tape. Fold about a quarter of an inch back, remove the backing from the sticky stuff, and put it on the end of a popsicle stick. Maneuver the tape into the jar, down to the bottom. The adhesive on this tape is very aggressive, so once it's in place, it'll *stay* in place. Use the other popsicle stick to burnish down the bottom part of the tape, then carefully pull out the first stick; it should come loose fairly easily. Finish burnishing. Keep on going until the inside of the bottle is completely covered up to the 2" mark.

Now start cutting off half-inch strips. In similar fashion, cover the inside bottom of the jar, overlapping the inside walls of the jar. It doesn't matter if it gets a bit thick in the middle.

When the inside is covered, do the outside. You have more control, so you can use the whole tape. Cover the bottom of the jar and burnish it down. Trim the overhang to about half an inch, snip it every half inch, stick down the tabs and burnish to the jar.

Wrap the outside wall of the jar with aluminum tape. The bottom edge of the tape should cover over the tabs from the bottom surface of the jar. The actual 'capacitor' part of the Leyden Jar is finished.



Carefully drill a quarter-inch hole in the center of the plastic lid. Put the grommet in the hole.

Measure the height of the jar. Cut a piece of five/thirty-seconds inch brass rod about half again the height of the jar. Thread each end of the rod to 8-32. Screw one of the brass balls onto an end of the rod. Carefully push the other end of the rod through the grommet in the lid, so the threaded end is inside. Support the grommet while you do this, or it might be pushed out of the hole.

Put the rod's midsection roughly at the grommet. Cut a piece of chain about the height of the jar in length. Put the end link onto the brass rod, then screw the second brass ball on. Screw the lid on the jar.

Behold! You have a Leyden Jar. To test it, you need an electrostatic generator.

Hold the jar by the bottom, and bring the top up to the generator to charge it. To get familiar with what your jar can do, hold the jar in one hand, then bring the index finger **of the same hand** up to touch the brass rod. *Yeouch! Shocking!* But if you do it one-handed, only your index finger got the shock. Make your Leyden Jar no larger than it has to be for the purpose you have in mind. The average pint jar works nicely in the lab. Only the smallest jars make good toys. Large ones are serious business. VERY large ones can be deadly.

Y'all be careful out there, hear?

## Chains

There are many different kinds of chain that can be used in a Leyden Jar. As long as they're small enough to be an easy fit, and made of metal, they'll work. At a hardware store you can get relatively small brass chains, or lamp-pull chains. They all can be purchased by the foot. If the chain has links that can be put over the brass rod, just slip it over the rod before you screw on the inner lamp ball. You can get even finer chain at craft stores, in the jewelry-making section. For jewelry chains and lamp-pull chains, put a loop on the end of the chain by wrapping the chain around the brass rod, and tying the end of the chain (with fine wire or thread) into a loop that fits around the rod. I like the jewelry chains myself. Get lots of jewelry chain — it's useful all over a static electricity lab.

