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## CASWELL SCIENCE PLATING KITS

Electroplating is a process that uses electricity to move metallic ions from a metal containing solution onto another surface. The process was invented in the early 1800's and while the specific techniques and chemistries have been improved and revised over the years, the basic process remains the same.

Our Science Plating Kits consist of:

1. A One Pint Plastic Beaker
2. One Pint of Plating Solution (Electrolyte)
3. Two small anodes
4. One DC Power Supply with removable alligator clip on the red (positive) banana plug.
5. One wire to connect the two anodes
6. A Wooden Tank Bar
7. A Short Length of Copper Wire (to hang the part)

Additional Items Required:

1. Nitrile or Latex Gloves
2. Eye Protection
3. Beaker Of Water (for rinsing)
4. Cleaning Agent (dish soap and hot water, or commercial detergent based cleaner such as Simple Green)

### ***System Setup***

1. Pour 1 pint of plating solution into the beaker. Note that if you plan to electroplate larger parts, you may want to reduce the amount to avoid spillage when the part is submerged. This could be a good lesson on volumes.
2. With a pair of metal snips, cut a 1/8" slice about an inch long on one side of each anode (metal sheet). Bend this slice back and use it to hang the anode on the edge of the beaker.
3. Connect the two anodes together with the wire containing two alligator clips. Connect to the slice outside the beaker.
4. Attach the alligator clip onto the banana plug on the power supply. You may wish to crimp this down for a tight fit, or with a small screwdriver, open up the banana plug slightly.

### ***Part Preparation (The Cathode)***

Electroplating will occur regardless of part cleanliness, but it will delaminate. This zinc plating solution will plate onto other metals including steel, iron, zinc, pot metal and tin. While wearing gloves, clean your part. Avoid any petroleum based cleaners such as lacquer thinner. Also avoid alcohol. Use a detergent based cleaner.

1. Rinse part thoroughly in water.
2. Attach your cleaned part to one end of the copper wire. Make sure it is secure.
3. Make a hook on the other end of the wire.

4. Put the wooden tank bar across the beaker and hook the copper wire over it so the part is suspended in the plating solution.
5. Connect the POSITIVE (red) alligator clip on the power supply to one of the anodes. Make sure to connect it to the slice that is outside the beaker.
6. Connect the NEGATIVE (black) alligator clip to the copper wire. Either connect it to the hook on the tank bar, or just below the tank bar. It should not be in the plating solution.
7. Plug in the power supply.

## ***Electroplating***

Once the power supply is plugged in, a small stream of bubbles should appear to form on the part being plated (the cathode). Plating is now occurring. With this zinc electrolyte, plating rates of approx. 1/1000” per hour can be expected.

## ***Additional Teaching Possibilities***

1. Electroplating to achieve polished and attractive parts is achieved by first polishing the cathode before electroplating. Just like painting a car, if you start with a bumpy, badly prepped part, you will end with the same. Dremels or small bench grinders can be used to polish small parts. Use caution – metal parts flying around at high speed will cause injury.
2. Best results will be achieved when controlling the amperage applied to the part during plating. Zinc plating prefers 140 milliamps of DC current per square inch of part surface area. The power supply in this kit supplies a fixed 300ma. Build a rheostat to control the amperage.

## ***Troubleshooting***

### **No Plating Occurring**

1. Check For Power. With a multimeter, check at the cathode and anode to ensure voltage. Source could be a bad power unit, or loose connection.

### **Plating Peels Off**

1. Check Surface Prep/Cleaning. Ensure part can pass the “Waterbreak Test”. See [support.caswellplating.com](http://support.caswellplating.com) for more info
2. Too much current causes blisters and peeling. Build a rheostat or add additional parts into the beaker to rob the excess current.