

Cell Kit Information - Use and Assembly of the Low Volume Cell Series

This brief product information document will describe how to assemble the LowVolume Cell Series Cap Kit and if required, the cell itself. The cell is designed to isolate half-reactions, diffusionaly, though the conductivity of the membrane used may dictate the response observed. The cell is not a pressure vessel, so if any insert gas is added (e.g. sparging), be sure to add a vent in the headspace. This is true for both sides of the cell, as gas will not easily pass from one half to the other with traditional membranes.

1. LowVolume Membrane Cell Assembly

1.1 Assemble the membrane

The membrane cell is designed to create a two compartment electrochemical cell, where the researcher provides their own separator. Often, a porous glass frit is used to allow electrical connection between cell halves but a diffusional barrier for mass transport (e.g. to prevent mixing of species from anode and cathode side of the cell).



Figure 1-1. Lay each cell half down and place an O-ring in the groove of the spherical joint.

Researchers can use any membrane they wish. Common membrane materials may be: thin Nafion-like films, polycarbonate membranes, biofilms, and even thin layers of porous glass.

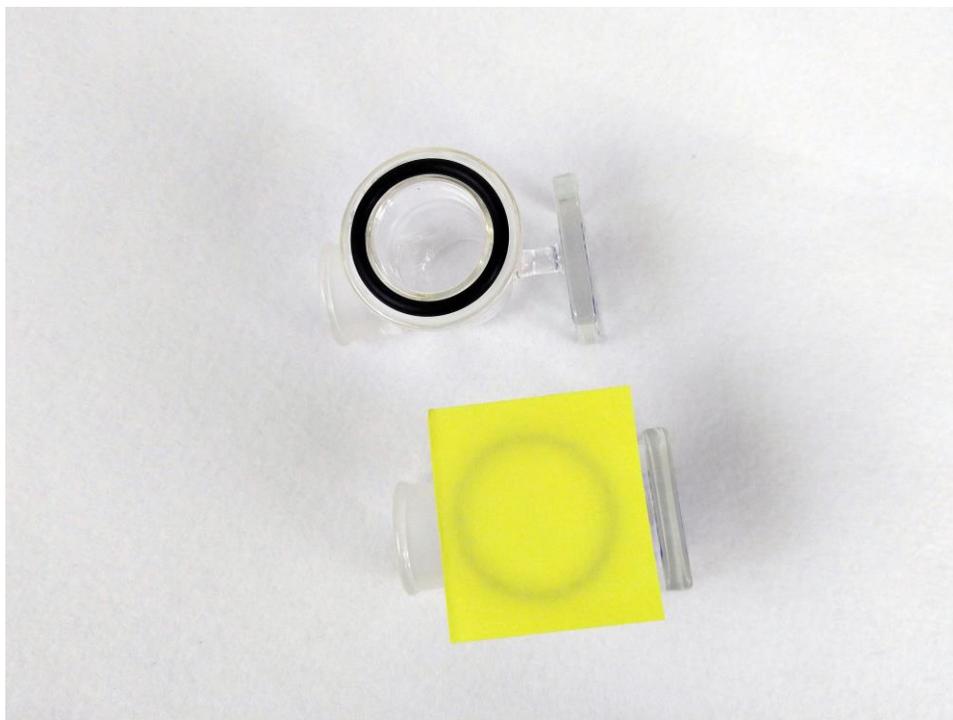


Figure 1-2. Place the membrane down on one half of the cell. Slowly tilt up both halves, sandwiching the membrane between each O-ring, seated in the groove.



Figure 1-3. Fully open the spherical joint clamp and use the prongs to grip each side. Tighten the set screw if necessary,

1.2 Assemble electrodes and purge tubes in the sealing cap kit.

The LowVolume Cell cap kit is designed to tightly seal around all probes (electrodes, sparge tubes, purge tubes). Once assembled, the cap kit seals into the joint in the LowVolume cell.

Use of this cell requires a plan prior to experimentation. You must have identified the working, counter, and reference electrodes and have them prepared and ready to use. Similarly, decide whether or not you will add insert gas into the cell and if so, plan for a vent as well (perhaps in the headspace).

The cap kit consists of four 7 mm holes and one 3.5 mm hole. The kit includes appropriately sized O-rings for use with matching probe diameters. Pine Research offers working and counter electrodes to fit the 7 mm hole and reference electrodes to fit the 3.5 mm hole. To take advantage of the sealing aspect of the lid, select the appropriately plug to use in any hole that does not contain a probe.

The basic principle of the cap kit is to seal all probes (i.e. electrodes) into the cap by wedging a soft O-ring between the upper and lower halves of the cap and clamping the halves together to seal any gaps. Then, the assembled cap kit seals directly into the cells. The following images will walk through the steps to position and seal the electrodes in the cap, then the cap in the cell.

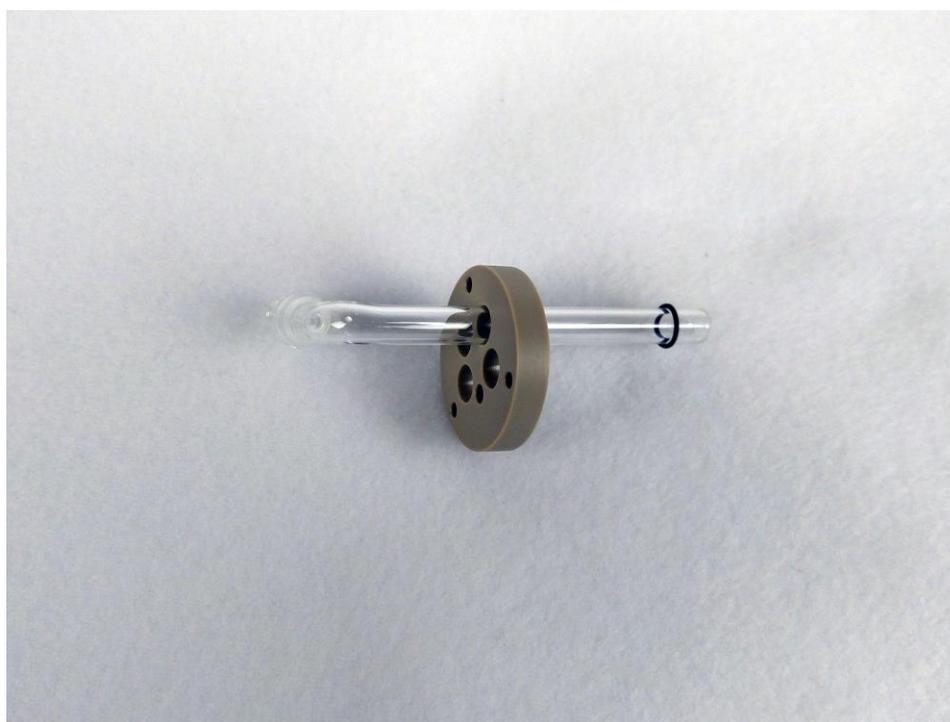


Figure 1-4. With the thin aspect of the cap kit, insert a probe (a vent tube in this image) through the appropriate hole and add an O-ring.

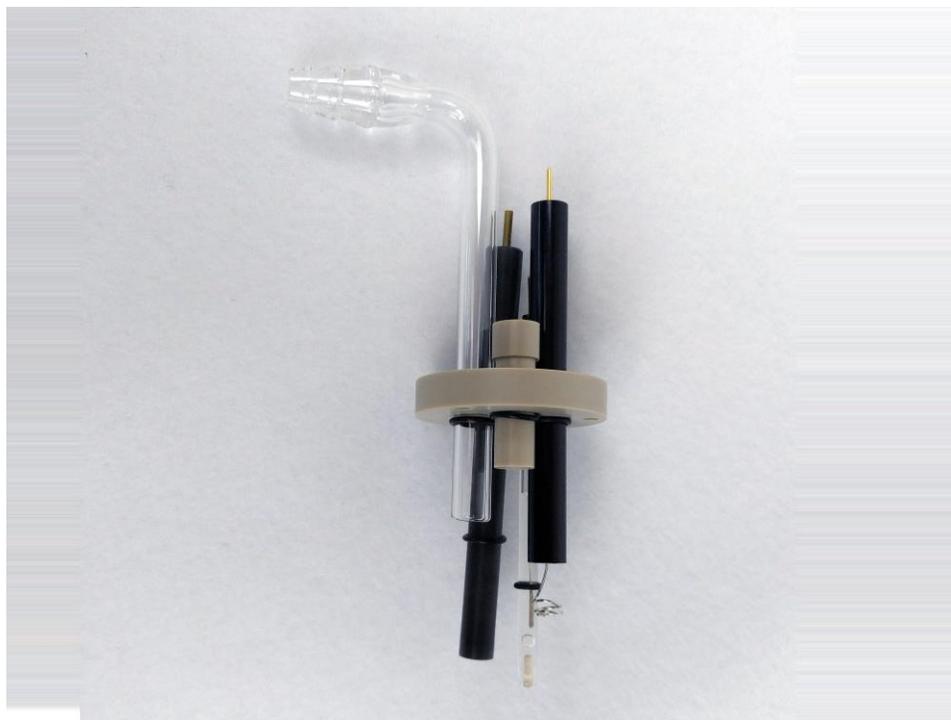


Figure 1-5. Repeat the probe and O-ring insertion for each type of electrode, plug, or glass tube. Take special caution to appropriately adjust the height of the O-ring to ensure the assembled cap will fit into the cell without the probes hitting the bottom of the cell surface.



Figure 1-6. Invert the cap so that the probes are held in place when the O-ring hits the cap. Again, adjust height appropriately.



Figure 1-7. Slide the larger part of the Cap kit onto the probes. Note, there is a directionality and the cap will only fit on in one orientation. Shown here is the cap kit with probes and O-rings installed, just before sealing the probes into the cap.



Figure 1-8. Install a screw to join the two cap halves. Loosely tighten one screw at a time to appropriately balance the cap seal.

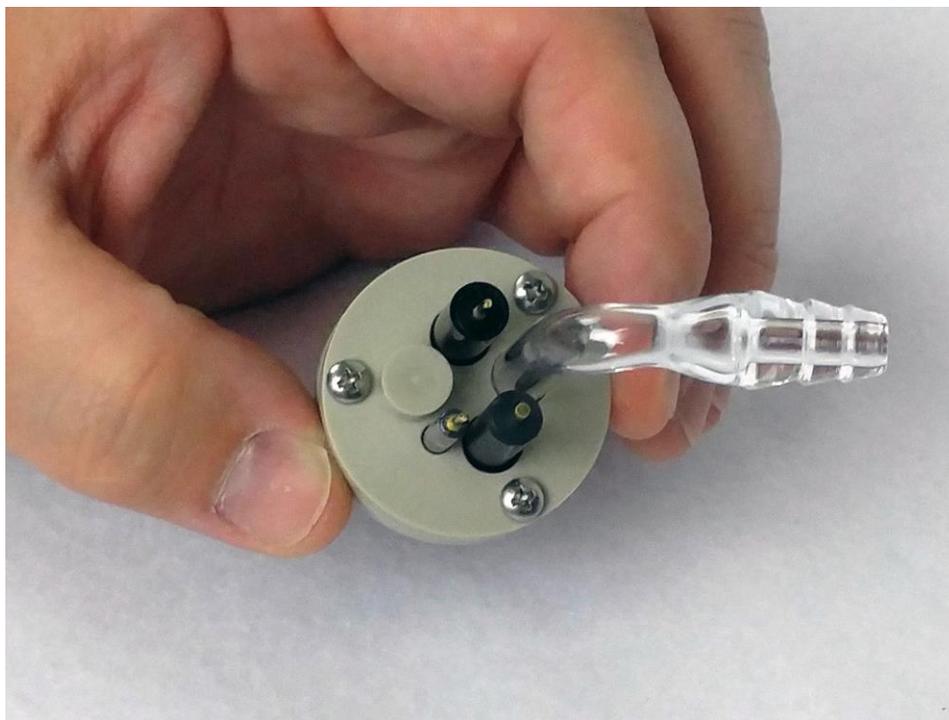


Figure 1-9. Once all three screws are loosely installed, slowly tighten each in a random order, watching the side of the cap to ensure pressure against the O-rings is applied evenly.



Figure 1-10. Ensure the cap seals around the probes and then install the entire cap into the cell port. Do the same for the other side. The researcher chooses which electrodes and probes to put on each side. In general, one side typically has a working and reference electrode while the other side has a counter.