H-Cell Product Information

A Guide Detailing the Dimensions, Applications, and Setup of the H-Cell

1. Introduction

H-cells are utilized in conjunction with electrochemistry for a variety of applications where it is necessary to isolate the working electrode from the counter electrode. Some examples of these applications include potentiometric studies, syntheses, and microbial electrolysis. In potentiometric studies, the two half-reactions are isolated so that an accurate potential difference can be measured without interference. For the synthesis of new compounds and microbial electrolysis, H-cells are utilized to separate products (at the working electrode) from byproducts (at the counter electrode). In general, both synthesis and microbial electrolysis applications utilize bulk electrolysis, a method that oxidizes or reduces functional groups and/or metal centers to synthesize a new product. Separation of the working and counter electrodes in these types of systems provides two main advantages: 1) it reduces the risk of interference from byproducts produced at the counter electrode and 2) it makes the separation and/or collection of products (especially gases) significantly easier.

2. Description of H-Cell

An H-cell physically separates anodic and cathodic reactions by means of a porous frit (see: Figure 1). While the geometry of the separated compartments can vary based upon application, the simple H-cell manufactured by Pine Research Instrumentation (part #: RRPG060) features two, $\sim 40\ mL$ cell compartment chambers, a size that is suitable for a wide range of experiments. Each cell chamber may be filled with a different solution through its respective $24/12$ port. Electrical contact between the two solutions is established via a medium frit (porosity 10-20 μm); the frit allows the passage ions but prevents the two solutions from mixing (*i.e.*, it is a salt bridge). A schematic diagram provides other dimensional data for the H-cell (see: Figure 1).

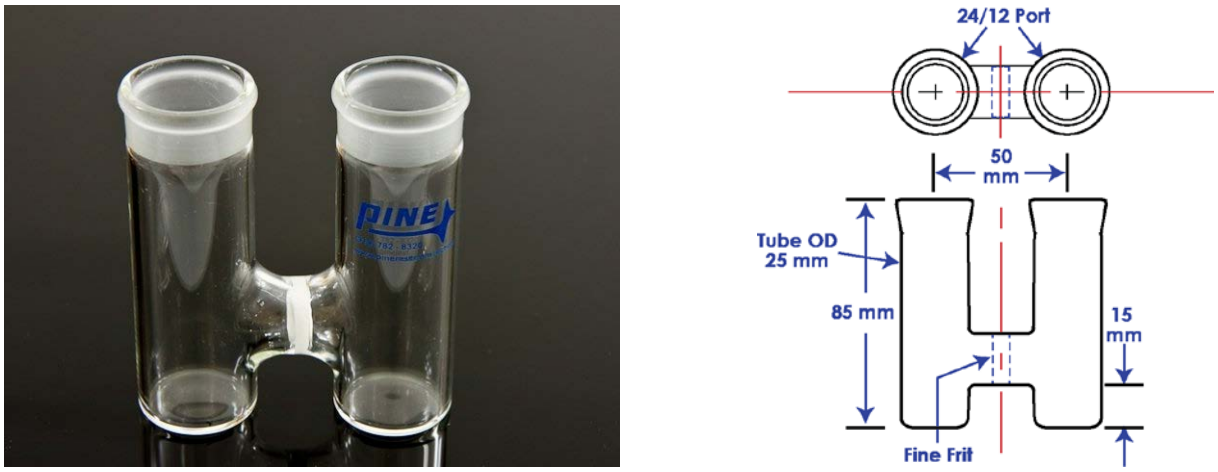

Figure 1. H-Cell (left) and Schematic of H-Cell (right)

3. Optional Accessories

As discussed, this H-cell has two, $24/12$ joints (see: Figure 1). Pine Research sells several accessories that are compatible with these $24/12$ ports, including a $24/25$ PTFE Mount for Electrodes (part #: RRPG036K1, see: Figure 2) and a $24/25$ PTFE Stopper (part #: RRPG085K1, see: Figure 2). Both accessories are made from polytetrafluoroethylene (PTFE), making them resistant to most aqueous and non-aqueous solutions; however, PTFE will react with alkali metals at standard temperature.

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The 24/25 PTFE Stopper is simple in design and serves to seal any unused H-cell ports. The 24/25 PTFE Mount for Electrodes serves as an adapter to mount electrodes to the H-cell. It features a $1/4''$ ID hole through its center that is designed to accept a $1/4''$ OD electrode. Additionally, the tapered end of the 24/25 PTFE Mount contains an O-ring to create a good seal with the 24/12 joint of the H-cell. At the opposite end, the 24/25 PTFE Mount has an adjustable red cap; after the electrode is slid into place on the 24/25 PTFE Mount, the red cap is tightened to hold the electrode at the desired solution immersion depth.

Figure 2. PTFE Mount for Electrodes (left), PTFE Stopper (middle), and Both Accessories Mounted in H-Cell (right)

4. Setup

While the setup of the H-cell varies as the application varies, always consider the following instructions:

1. There must be adequate electrolyte concentration in both cell chambers.
2. The electrolyte solution height must be such that ion exchange can occur through the frit and so that electrodes are adequately covered.
3. For two-electrode cell setups (*e.g.*, potentiometric studies), the counter/reference electrode leads from the cell cable (connected together) should be placed in one compartment and the working electrode should be placed in the other compartment.
4. For three-electrode cell setups (*e.g.*, bulk electrolysis and experiments that require a known applied voltage or current); it is common to place the reference electrode into the same compartment as the working electrode.

5. Care and Storage

The simple design of the H-Cell makes cleanup easy: simply empty the experimental contents into a proper waste container and rinse the cell with solvent and then deionized water. Pay special attention to the frit during cleaning and wash away all electrolyte so that the frit does not clog or crack. Allow the H-Cell to dry and store it in a dry location.

6. Contact Us/Support

If you have any questions or want to inquire about the H-Cell described in this document, please contact us via the means provided below:

6.1 Email

Reach us by emailing the entire sales department: pinewire@pineresearch.com.

6.2 Website

There is a contact form on our website. There may also be additional resources (such as YouTube videos) for some of the products mentioned here: http://www.pineresearch.com/.