

Gas Purge and Sparge Kits Product Guide

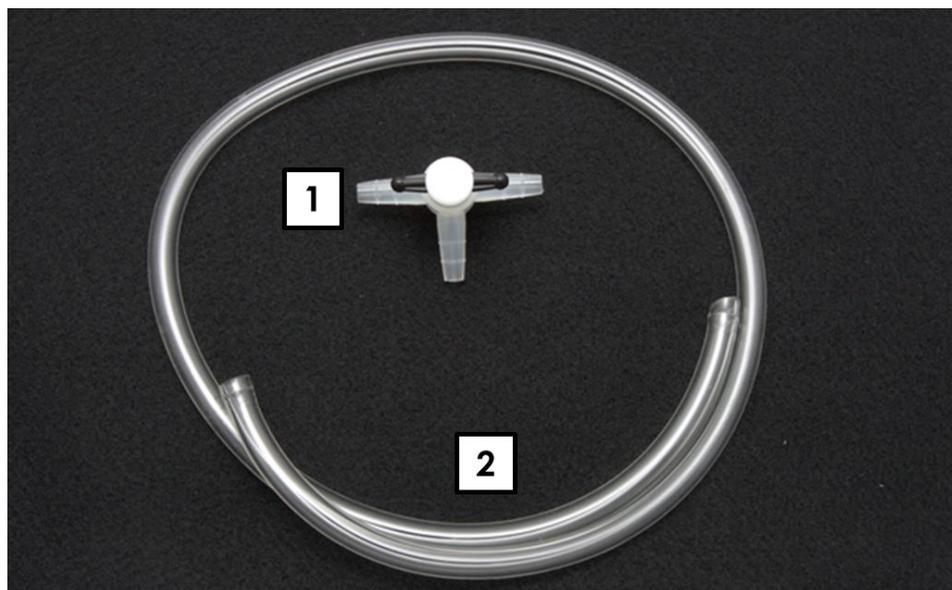
A Guide to Purge Tubing Adaptations

This product information document describes how to assemble the Three-Way Valve Purge Kit and Micro-Connection Purge Kit. These kits offer flexibility to the air-free electrochemist as they enable efficient purging, sparging, and blanketing of large and small cells.

1. Overview of Purge Kits

1.1 Three-Way Valve Purge Kit Description

The Three-Way Valve Purge Kit (part #: AKPURGE1) consists of 1/4" ID PVC (polyvinyl chloride) tubing and a three-way valve (see: Figure 1). The inner diameter of the PVC tubing connects to the male luer lock hose barb (1/4" OD) present on most gas regulators. The three-way valve makes it possible to switch from bubbling to blanketing the solution with an inert gas.

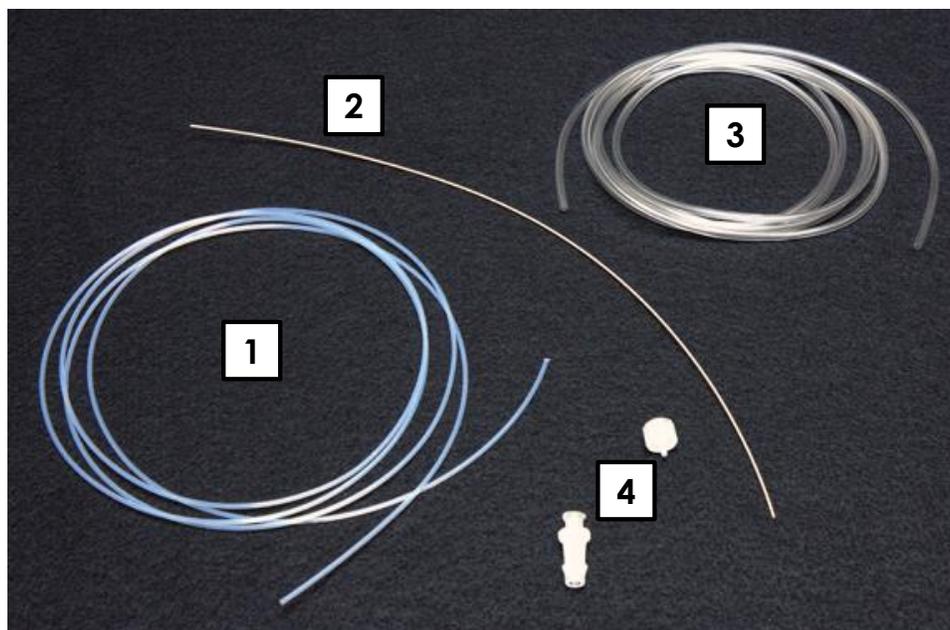


1	Three-Way Valve	Controls gas flow to the cell; used to switch between purging or blanketing the cell solution
2	PVC Tubing	Connects to the main gas source; dimensions are: 1/4" ID, 3/8" OD

Figure 1. Three-Way Valve Purge Kit Components

1.2 Micro-Connection Purge Kit

The Micro-Connection Purge Kit (part #: AKPURGE2) consists of microtubing and adapters that work with the Three-Way Valve Purge Kit to provide a gas purging option for smaller cells (see: Figure 2). The tubing adapters feature two pieces: a female luer lock to 1/4" hose connector and a male luer lock to 1/8" hose connector. They are used to adapt the larger PVC tubing (1/4" ID, Three-Way Valve Purge Kit) to the smaller Micro-PVC tubing (1/16" ID, Micro-Connection Purge Kit). From there, the PTFE (polytetrafluoroethylene) tubing (1/32" ID) and PEEK (polyether ether ketone) tubing (1/64" ID) are used to adapt to the smallest cells (see: Section 3.2).



1	Micro-PVC Tubing	Accepts the Tubing Adapter; dimensions are: 1/16" ID, 1/8" OD
2	PEEK Tubing	Slides inside the PTFE tubing; dimensions are: 1/64" ID, 1/32" OD
3	PTFE Tubing	Slides inside the 1/16" ID PVC tubing; dimensions are: 1/32" ID, 1/16" OD
4	Tubing Adapter	Adapts 1/4" ID tubing to 1/16" ID tubing

Figure 2. Micro-Connection Purge Kit Components

The tubing of the Micro-Connection Purge Kit is designed with robust materials (PTFE and PEEK) so that it can be placed directly in solution to sparge a variety of aqueous and non-aqueous solutions. However, PTFE reacts with alkali metals and PEEK is susceptible to attack by concentrated strong acids; do not use these reagents in combination with PTFE and PEEK.



CHEMICAL COMPATIBILITY:

PTFE reacts with alkali metals at room temperature.

PEEK dissolves in concentrated acid solutions like sulfuric and nitric acid.



INFO:

Throughout this product guide, *PVC tubing* refers to the PVC tubing purchased with the Three-Way Valve Purge Kit while *Micro-PVC tubing* refers to the PVC tubing purchased with the Micro-Connection Purge Kit. These tubes have different diameters (see: Figure 1 and Figure 2).

1.3 Common Apparatus that Utilize the Purge Kits

The Three-Way Valve Purge Kit can be used to supply inert gas to most standard electrochemical cells (often, it is used in conjunction with the Dual Port Gas Inlet, see: Section 2). The Micro-Connection Purge Kit supplies inert gas

to smaller cells like the Honeycomb Spectroelectrochemical Cell and the Compact Voltammetry Cell offered by Pine Research (see: Figure 3).

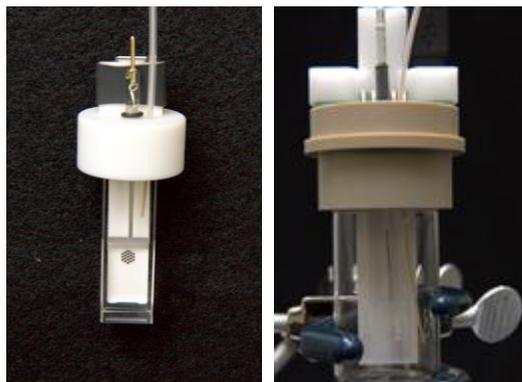


Figure 3. Honeycomb Cell (left) and Compact Voltammetry Cell (right) with Micro-Connection Purge Kit Tubing

2. Optional Accessories

The Dual Port Gas Inlet (part #: RRP086) is a deaeration accessory that is often used with the Three-Way Valve Purge Kit. It is compatible with the 1/4" OD PVC tubing of the Three-Way Valve Purge Kit and is designed to mount in a 14/20 port. The top hose barb of the Dual Port Gas Inlet bubbles gas directly through the electrochemical system while the bottom hose barb blankets the solution with gas (see: Figure 4).

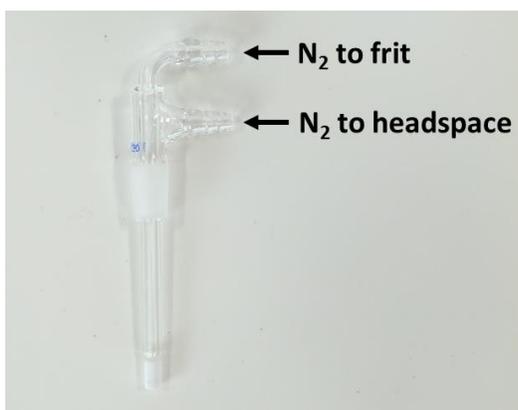


Figure 4. Dual Port Gas Inlet and Single Port Gas Outlet

3. Assembly Instructions

As stated, the Three-Way Valve Purge Kit can be assembled and used to supply an inert gas source for standard electrochemical cells. In order to supply an inert gas source to smaller microcells (volume less than around 2 mL), the Micro-Connection Purge Kit is used, often in conjunction with the Three-Way Valve Purge Kit. The assembly of each of these kits will be considered separately below.

3.1 Three-Way Valve Purge Kit

The Three-Way Valve Purge Kit is most commonly used with the Dual Port Gas Inlet deaeration accessory (see: Section 2). To use the kit and accessory, cut the PVC tubing into three sections; two of the sections should have the same length and the third section should be long enough to connect the Three-Way Valve to the inert gas source. Then, connect the two pieces of PVC tubing that are the same length to the hose barbs of the Dual Port Gas Inlet and connect the other piece of PVC tubing to the inert gas source. Finally, connect the loose ends of the PVC tubing to the Three-Way Valve so that the middle valve is connected to the gas source (see: Figure 5).

**TIP:**

Tubing can be cut cleanly using single edge razor blades commonly found in box cutters.

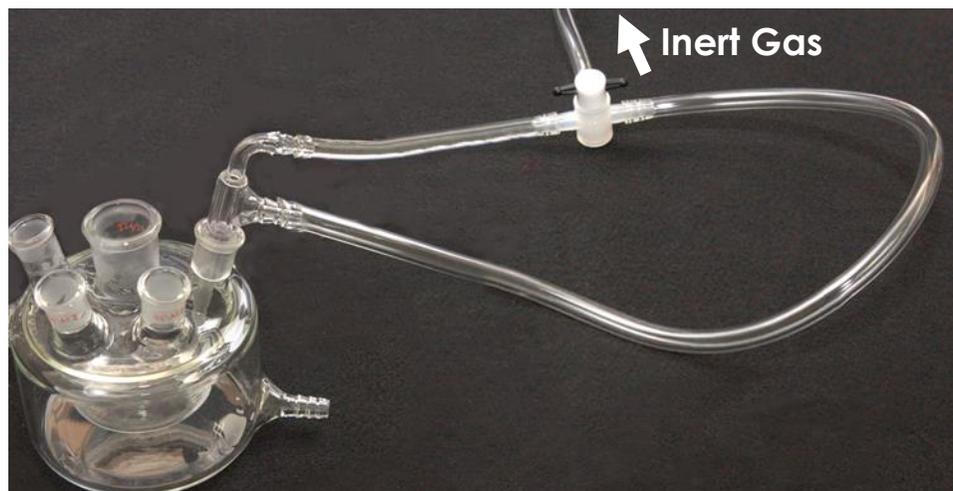


Figure 5. Three-Way Valve Purge Kit Assembly

3.2 Micro-Connection Purge Kit

To assemble the Micro-Connection Purge Kit, gather a single-sided razor, tubing adapters, and the microtubing supplied with the kit. While it is not necessary to use the Three-Way Valve, some users opt to use it; often, the two PVC tubes that were connected to the Dual Port Gas Inlet are adapted to smaller tubing, allowing one tube to be placed in the microcell solution for sparge purposes while the other tube maintains an inert atmosphere (see below).

3.2.1 Assemble the Three-Way Valve (Optional)

Connect the PVC tubing (from the Three-Way Valve Kit) to the Three-Way Valve, ensuring that the middle valve is connected to the gas source (see: Figure 6). Set aside for later use.

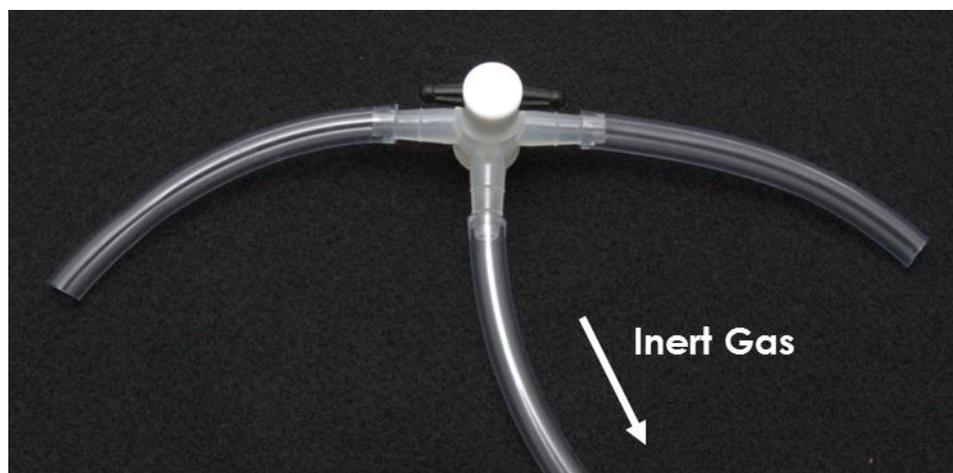


Figure 6. Kit Attached to the Electrochemical Cell

3.2.2 Micro-Tube Adaptations

Cut the PEEK, PTFE, and Micro-PVC tubes to appropriate lengths with a single-sided razor blade. Insert one end of the PEEK tubing at least 1" into the PTFE tubing; the PEEK tubing should be snug inside the PTFE tubing (see: Figure 7). Insert the other end of the PTFE tubing at least 1" into the Micro-PVC tubing (see: Figure 7).



Figure 7. PEEK, PTFE, and PVC Micro-Tube Connections

3.2.3 Connect to the Gas Source

The Micro-PVC tubing can be connected to the PVC tubing via the Tubing Adapter. The Tubing Adapter has two pieces: a female luer lock to 1/4" hose connector and a male luer lock to 1/8" hose connector. Slide the PVC tubing over the hose barb of the female luer lock to 1/4" hose connector (if using the Three-Way Adapter, connect the adapter to the PVC tubing assembly constructed previously, see: Figure 5). Then, slide the Micro-PVC tubing over the hose barb of the male luer lock to 1/8" hose connector (see: Figure 8). Join the adapters together to complete the Micro-Connection Purge Kit assembly (see: Figure 8).



Figure 8. PVC to Micro-PVC Tubing Adapter Connections

4. Disassembly and Clean Up Instructions

The Three-Way Valve and Micro-Connection Purge Kits can be disassembled by performing the assembly instructions in reverse order (see: Section 3). Any tubing that came into contact with solution should be rinsed properly with solvent and water and then dried.

5. Contact Us/Support

If you have any questions or would like to inquire about the purge kits described in this document, please contact us via the means provided below:

5.1 Email

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

5.2 Website

There is a contact us 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/>.