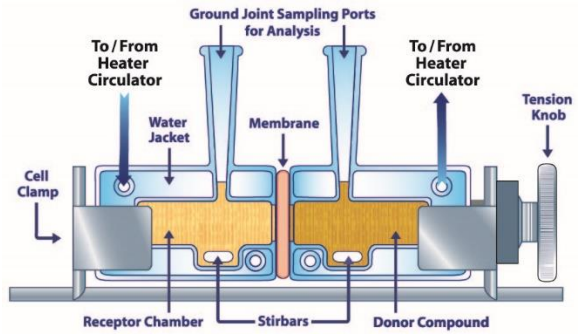
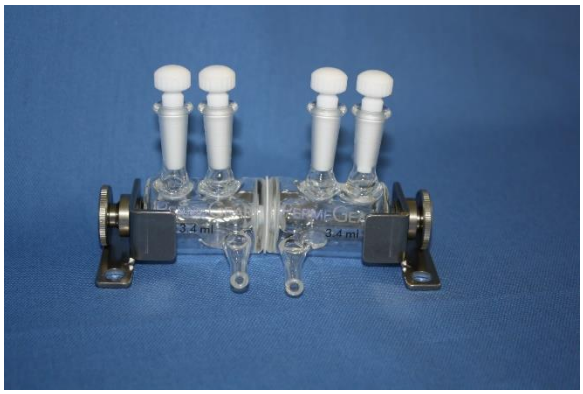
Choosing the Right Side-Bi-Side Cell

Introduction



Horizontal diffusion cells hold the membrane vertically between a donor and receptor chamber. This type of cell is typically used for determining the diffusion coefficient of a membrane, or for the diffusion of a compound from one liquid into another liquid. The design of horizontal diffusion cells also make them well suited to iontophoresis applications.

Cell Types – Valia Chien and Side-Bi-Side



There are a few different types of horizontal diffusion cells. The first is the traditional Side-Bi-Side cell. This cell uses a C-shaped wrap around clamp to push the cell halves together. Side-Bi-Side cells have a water jacket which extends to the membrane to help ensure an even temperature. The only joints for the donor and receptor chambers are ground glass, which are suitable for most membranes.

Valia-Chien cells are still horizontal cells, but are clamped in the center. This allows for the use of different joints which may be better suited for some applications. Flat ground joints are available, but o-ring joints can also be used, which perform better with volatile fluids or gases. Spherical joints are available for corneal diffusion work. Flat flange joints are also available. Valia-Chien cells can be jacketed or unjacketed, however the water jacket does not extend through the joint. Generally speaking, Valia-Chien cells are easier to use.

Orifice Diameter

Orifice diameter determines the surface area available for diffusion. The surface area is required for calculating Flux or the diffusion coefficient of the material. In order for the results to be usable, both sides of the Side-Bi-Side or Valia-Chien cell need to have the same orifice diameter, however the volumes for each side do not need to be the same. Orifice diameters are available from 5 mm up to 60 mm.

Receptor Volumes

For most diffusion testing, the receptor media needs to be at or near sink conditions. This means enough volume must be present so that the compound diffusing into it will not have the diffusion rate slowed due to a high concentration.

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Determining what the right receptor volume is will largely depend upon the product being tested and the analytical methods available. If the product is easy to detect and/or a lot of it is diffusing into the receptor chamber, then high receptor volumes are suitable. If the product is difficult to detect, a smaller volume may be required to ensure the concentration is high enough to be quantified. If the product is poorly soluble, a higher volume may be required to ensure sink conditions are maintained for the test.

Horizontal diffusion cells can have volumes from 3 mL and exceed 100 mL for the donor and receptor chambers.

Jacketed vs Unjacketed

Jacketing the diffusion cells refers to the presence of a water jacket. The water jacket is typically connected, either directly or indirectly, to a circulating water bath which will maintain the cell temperature at 32 °C or 37 °C depending on the test requirements.

Due to the design, Side-Bi-Side cells are required to be jacketed. This jacket extends to the membrane surface, which can be valuable if the temperature of the membrane is absolutely critical to testing. Jacketed Valia-Chien cells can be jacketed, but this jacket will not cover the joint due to the style of clamp used.

Unjacketed Valia Chien cells can be temperature controlled if placed into a heated water bath or an incubator. The unjacketed cells also cost less than jacketed cells of the same orifice diameter and volume.

H-Series Stirrer

Medium cells (orifice diameter 15 mm to 25 mm) and Large/Super Cells (orifice diameter from 25 mm to 60 mm) can be used on the H1-SC stirrer. This holds only 1 cell at a time. For smaller cells (orifice diameter 5-15 mm), the H1, H3, and H6 stirrers are available.

The H-series stirrers provide stirring, and in the case of the H3 and H6, a manifold for easy connection to the circulating water bath.

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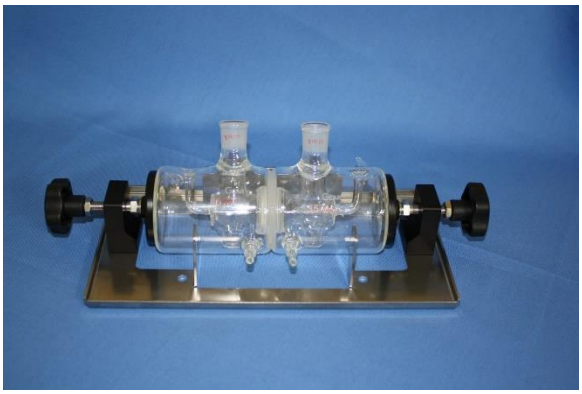
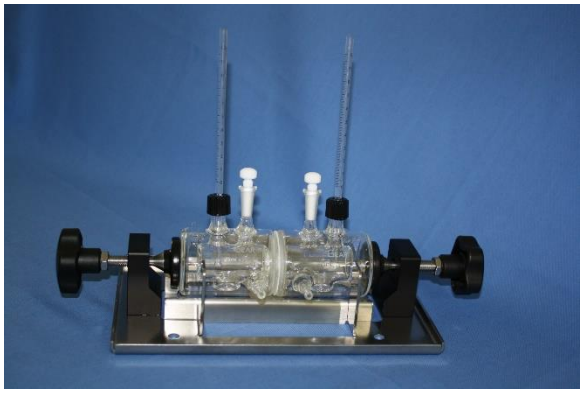
Customization

Side-Bi-Side and Valia-Chien cells are relatively easy to customize. Typical customizations may be to add additional ports for sampling or for resident probes. Ports can be threaded, luer, and in some cases can be sized to fit larger probes. Orifice diameter and volumes can also be customized. There are however physical considerations that need to be taken into account. For example, it's not possible to have a diffusion cell with a 25 mm orifice, but only a 1 mL volume. There are typically volume requirements tied to the orifice diameter, number of ports, and many other features which can be added. When this is required, it's best to work directly with PermeGear to design the cell ideal for your method needs.





Conclusion

Selecting the right equipment is key to ensuring a method runs smoothly and delivers consistent and useful data. Selection of the right orifice diameter, receptor volume, joint, and other features can save weeks if not months of testing.

To ensure you get the right cells for your needs, contact PermeGear or your PermeGear distributor.

Webste: www.permegear.com

E-mail: support@permegear.com

LinkedIn: https://www.linkedin.com/company/permegear-inc