

Choosing the Right Franz Cell

Introduction

Franz vertical diffusion cells are used in testing topical and transdermal products. Unlike other apparatus they are widely recognized as suitable for both in-vitro permeation testing (IVPT) and in-vitro release testing (IVRT), ensuring a vertical diffusion cell system will remain useful for the entire drug development process. Selecting the right Franz Cell for the application can be challenging, especially for new users. These are the considerations for selecting a diffusion cell that best suits the method.

Orifice Diameter

Orifice diameter refers to the opening at the bottom of the donor chamber, and the top of the receptor chamber. Flux for IVPT and Release Rate for IVRT both include surface area as part of the calculation. So minimally this has to be known for calculating results, but should also be sized appropriately for the method. The diameter for the donor chamber and receptor chamber must be the same size.

Larger orifices (15 mm diameter or larger) are better suited for products with a low release rate, or products that may be very hard to detect, and a higher concentration may be required in the receptor chamber.

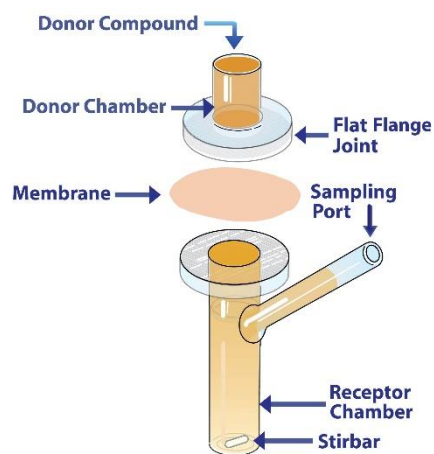
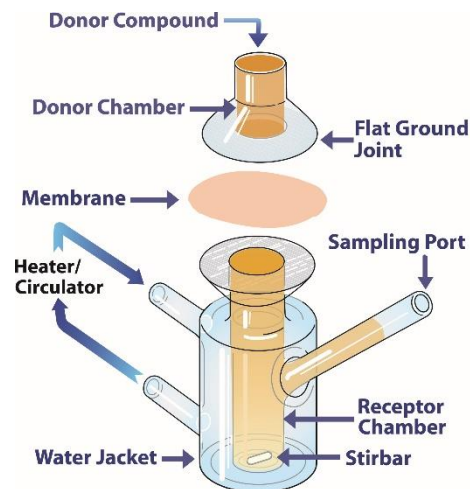
Smaller orifices (5-9 mm diameter) are better suited for any testing involving skin, skin substitutes, or mucosa as the smaller surface area means that more testing can be done with the same amount of membrane material.

When in doubt, the general recommendation is to use a 9 mm orifice. The 9 mm orifice is a nice balance between minimizing the membrane material required, and offering enough surface area to help ensure detectable samples.

Receptor Volume

In order to get usable results, the compound needs to be at detectable levels. However, both IVPT and IVRT require sink conditions in order to ensure the release rate of the drug is not reduced due to the compound approaching the limits of solubility in the media. Sink conditions definitely favor cells with higher volumes, however this must be balanced with the sample concentration and/or detectability of the compound in the receptor media with available analytical methods. For easy detection, smaller volumes tend to perform better.

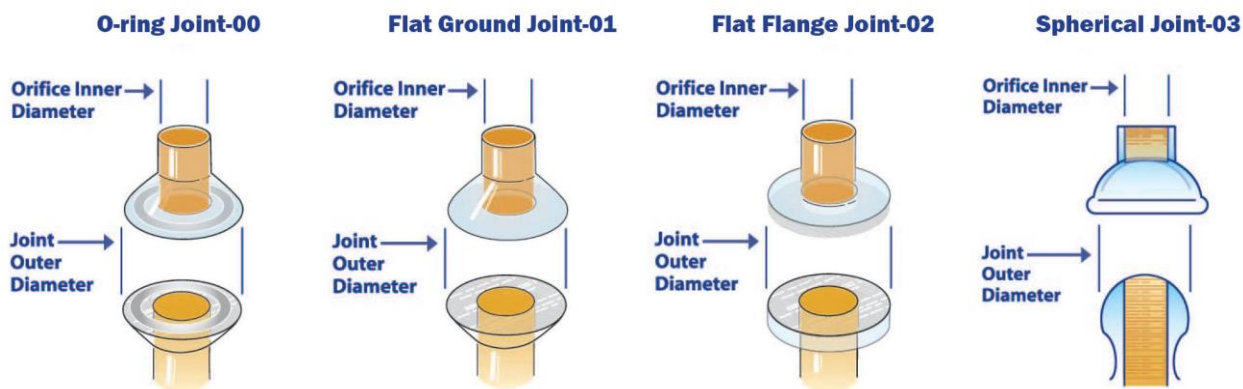
A target release profile is often determined early in the design process. The profile can be used to help determine the receptor volume that is ideal for the method. If that isn't available, or there are other factors which may make things unclear, then a 5 mL receptor volume is typically sufficient for most testing needs.



Choosing the Right Franz Cell

Cell Joint

A variety of cell joints are available. In most cases, the Flat Ground Joint (-01) will be suitable. This joint provides two ground glass surfaces which clamp the membrane into place. This provides a suitable seal for most IVPT and IVRT membranes. For rougher membranes, or diffusion where the receptor media is gaseous or volatile, typically the o-ring joint (-00) is preferred. The o-ring will help seal the receptor chamber and prevent leaks. The flat flange joint (-02) is suitable if the diffusion cell may be connected to glassware from another supplier. Functionally it seals in much the same way as the flat ground joint. Lastly the spherical joint (-03) is for corneal applications.



Jacketed vs Unjacketed – Physical Dimensions



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 membrane temperature at 32 °C or 37 °C depending on the test requirements. Unjacketed cells can have temperature control if the end user is able to immerse them in a waterbath or place them into an incubator.

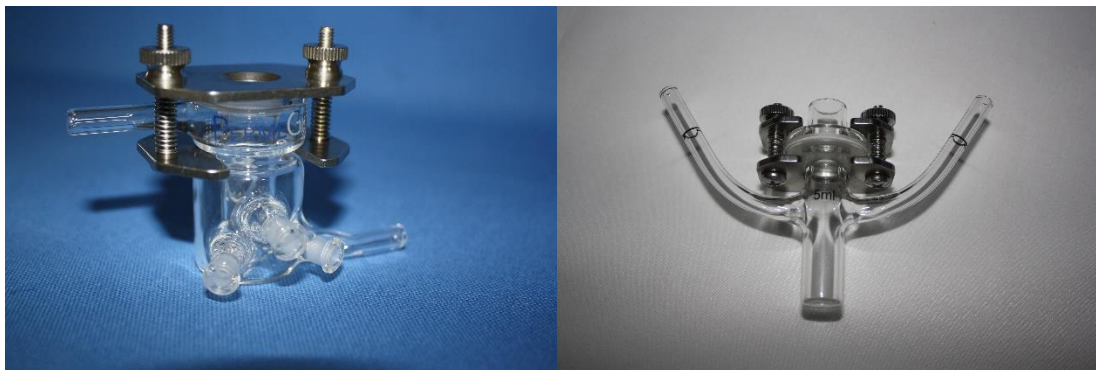
Jacketed cells make the physical size of the cell larger, and makes cells slightly more expensive than a cell with the same orifice diameter and receptor volume that is unjacketed.

V-Series stirrers require the use of jacketed cells in order to ensure a proper fit of the cell in the cell holder. Orifice diameter and receptor volume may also factor into the use of the cells with V-series stirrers in cases where either the diameter or volume needs to be very large. Typically, the V-Series stirrers would not work with cells having an orifice diameter greater than 25 mm with a flat ground joint or a volume greater than 20 mL. Cells that are too small, or where the ratios are not close together (e.g. 15 mm orifice, 5 mL volume) can also be problematic for use in the V-Series stirrers. These values may vary with different joints or any customizations that may be present on the cells. For more information on V-Series compatibility contact PermeGear or a PermeGear distributor.

Choosing the Right Franz Cell

Customization

Unlike some other diffusion cell designs, the Franz cell can easily be customized for different methods. PermeGear is able to deliver not only a range of orifice diameters and receptor chambers, but also custom ports for both the donor and receptor chambers. Sampling arms can also be modified depending on method needs. 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>