



Demountable and Mull Omni Cells GS01800 Series

User Manual

644-004



1. Introduction

The Demountable and Mull Omni Cells have been designed to study liquid solutions in demountable liquid cell assemblies or as liquid mulls for both Dispersive and FTIR instruments at ambient temperatures and pressures. The Omni Cell is supplied in separate parts: cell body, spacers and windows for assembly by the user. The cell body accepts a standard gasket/window/spacer construction, which is contained between front and back anodised aluminium plates. The plates are of the standard 3" x 2" dimension allowing the cell to be held in all spectrometer mounting systems via the back plate. Rectangular windows are used for liquid cell applications, whereas circular windows are used for mull cell applications.

2. Safety Considerations

With use of any spectroscopic accessory that involves the study of a wide range of chemical samples, the associated risk in handling may mostly be attributed to the specific sample type to be handled itself. You should follow the procedure for safe handling and containment of the type of sample to be used.

With respect to safety of use specifically for the range of Demountable and Mull Omni Cells, they use different window materials (see Section 8) for containment of a specific liquid or mull sample type between two standard 3" x 2" aluminium plates. The Omni Cell's performance is only as good as the quality of the windows. Some are soft and can deform, others are hard and brittle. Care is needed while handling them.



Caution: *Out of the different window types proposed (see Section 8), ZnSe, BaF₂ & KRS-5 are the most potentially hazardous material with respect to toxicity risk in use and handling (see the Safety Data Sheet provided with the product).*

NaCl, KBr, CaF₂, Silica, AgBr, Silicon and Polyethylene window materials can be considered relatively safe to use, although all of them may be harmful to the body if ingested in significant quantities. The general rule when working with any crystal material (and sample) is to always wear gloves and safety gear (e.g., safety spectacles and lab coat) when handling to obviate the risk of contact with the skin. For these window materials, as well as ZnSe, BaF₂ and KRS-5, Safety Data Sheets can be downloaded from our website or provided on request.

Salt windows (NaCl and KBr) need to be kept in a dry environment as much as possible due to their high solubility and hygroscopic nature.

3. Operation

A typical Omni Cell, demountable or mull type, is constructed as shown (Construction, Section 3). Demountable liquid cells have separate windows and a PTFE or Mylar spacer, as well as two O-rings for extra sealing between the top window and the Luer slip connectors in the front plate. The mull cell has circular windows and a PTFE or Mylar spacer. The front plate has a PTFE gasket permanently bonded into position to allow sealing between the front plate and front window.

The 4 quick release nuts are tightened to provide a sufficient seal between all the components but not over-tightened such that the windows could break. As mentioned in Section 2, window materials have their own physical characteristics; some are soft and can deform, others are hard and brittle. It is a matter

of practice and familiarity with the cells and specific window material that determines the ideal sealing conditions.

A recommended method for assembly is to place the back plate onto a flat surface. Build up the cell components as in the diagram, but before fixing the quick release nuts, hold the front plate centrally and apply an even pressure over the whole assembly. Slip on the quick release nuts and tighten until just holding. The nuts can then be tightened further, but do so in a diagonal sequence.

The rectangular windows used are nominally 4mm thick. ZnSe, Fused Silica, AgBr and Si windows are 2mm thick. With the thinner liquid cell windows it is necessary to use an additional spacer (P/N GS01893) placed between the back plate and neoprene gasket shown in all diagrams.

4. Construction: Demountable Cell

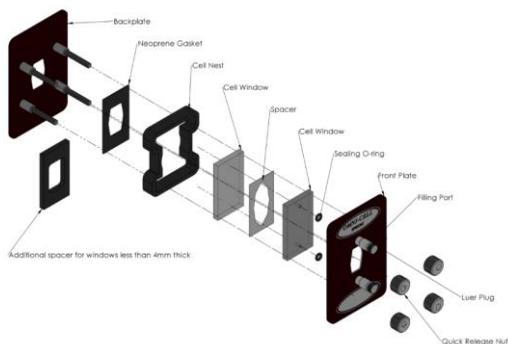


Figure 1: Construction of a Demountable Omni Cell.

4. Construction: Mull Cell

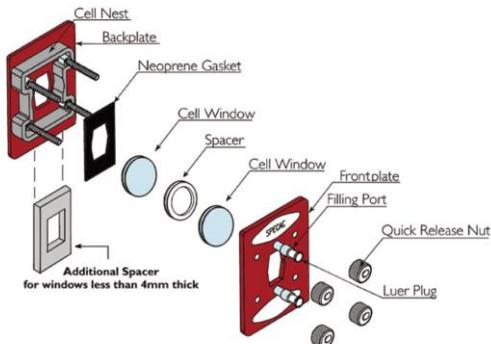


Figure 2: Construction of a Mull Omni Cell.

5. Filling the Demountable Omni Cell

Two Luer syringes P/N GS01110 can be used to introduce a solution into the Demountable Omni Cell via the Luer fittings. Lay the Omni Cell on a flat surface and remove the PTFE plugs and fit the syringes into the Luer ports. One syringe should be empty while the other is filled with the liquid analyte sample. Pull the sample through the cell with suction by drawing on the empty syringe, allowing the cell to be filled with the sample without over-pressurisation. When the cell is filled, remove one syringe, and seal the Luer port with a Luer plug before repeating the same step for the other Luer port. Any seepage around the Luer ports when fitting the Luer plugs can be wiped away with a tissue.

Note: Care must be taken when filling so that there are no trapped pockets of air in the cell. Any cell not filled completely will show a fringing pattern in the spectrum. Any trapped air pockets can usually be removed by suction. Avoid over-pressurisation by pushing the liquid sample into the cell (with just one syringe), which could result in leaks.

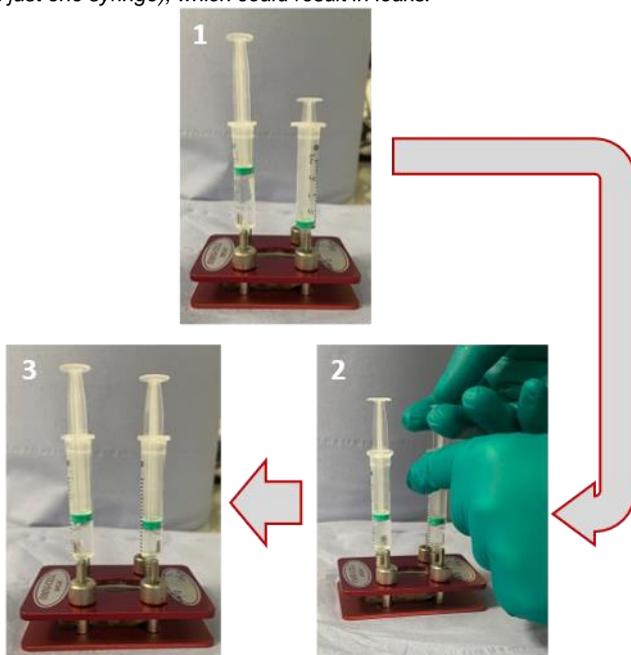


Figure 1: Filling & Flushing the Omni-Cell: (1) In one side, syringe with liquid. In the other, an empty syringe, (2) Pull on the empty syringe, to make the liquid pass from the filled syringe into the Omni Cell, (3) With the liquid in both syringes and in the Omni Cell, remove the syringes and put on Luer plugs.

6. Omni Cell Used for Mulls

A mull is generally a mixture of a solid sample ground to a paste with liquid paraffin (Nujol). This paste is supported between two windows (with an optional pathlength spacer) and a transmission measurement is made. The Omni Cell mount allows for a mull window assembly to be supported in a spectrometer. The mull cell is built as a “sandwich” construction. The sample paste is placed on to the surface of one circular window and is then squashed between this window and another. Avoid overloading the mull cell as excess sample will be squeezed out and may contaminate the mount. When clamping the windows between the front and back plates a similar method of tightening as for liquid cells should be adopted.

7. Care of Windows

The Omni Cell's performance is only as good as the quality of the windows. To keep the windows in good and serviceable condition the Specac Polishing Kit P/N GS04000 is recommended. The kit contains all the essential materials required to clean and repolish NaCl and KBr windows to within a few fringes of flatness. Repolishing can be achieved efficiently and economically with a minimum degree of skill.

8. Catalogue Part Numbers

All Omni Cell windows are 4mm thick except ZnSe, Silica (IR), AgBr and Si, which are 2mm and Polythene which are 3mm thick. These thinner windows require the additional spacer P/N GS01893.

Rectangular Liquid Omni Cell Windows (Pair) (41mm x 23mm)	Circular Mull Omni Cell Windows (Pair) (25mm diameter)
P/N GS01810 Sodium Chloride (NaCl)	P/N GS01830 Sodium Chloride (NaCl)
P/N GS01811 Potassium Bromide (KBr)	P/N GS01831 Potassium Bromide (KBr)
P/N GS01812 Calcium Fluoride (CaF ₂)	P/N GS01832 Calcium Fluoride (CaF ₂)
P/N GS01813 Barium Fluoride (BaF ₂)	P/N GS01833 Barium Fluoride (BaF ₂)
P/N GS01814 Zinc Selenide (ZnSe)	P/N GS01834 Zinc Selenide (ZnSe)
P/N GS01815 KRS-5	P/N GS01835 KRS-5
P/N GS01818 Fused Silica (IR) (SiO ₂)	P/N GS01838 Fused Silica (IR) (SiO ₂)
P/N GS01819 Silver Bromide (AgBr)	P/N GS01839 Silver Bromide (AgBr)
P/N GS01820 Silicon (Si)	P/N GS01840 Silicon (Si)
P/N GS01821 Polythene	P/N GS01841 Polythene

Rectangular Liquid Omni Cell Spacers (Packet of 5)	Circular Mull Omni Cell Spacers (Packet of 5)
P/N GS01850 0.05mm PTFE material	P/N GS01870 0.05mm PTFE material
P/N GS01851 0.10mm PTFE material	P/N GS01871 0.10mm PTFE material
P/N GS01852 0.20mm PTFE material	P/N GS01872 0.20mm PTFE material
P/N GS01853 0.50mm PTFE material	P/N GS01873 0.50mm PTFE material
P/N GS01854 1.00mm PTFE material	P/N GS01874 1.00mm PTFE material
P/N GS01861 0.006mm Mylar material	P/N GS01881 0.006mm Mylar material
P/N GS01862 0.012mm Mylar material	P/N GS01882 0.012mm Mylar material
P/N GS01863 0.025mm Mylar material	P/N GS01883 0.025mm Mylar material

Spares

- P/N GS01800 Omni Cell body mount assembly complete.
- P/N GS01890 Rear neoprene gaskets (Packet of 2).
- P/N GS01891 Quick release nuts (Packet of 4).
- P/N GS01892 Luer port PTFE filling plugs (Packet of 2).
- P/N GS01893 Additional packing spacer for thin windows (1).
- P/N GS01894 FKM O rings 2.5mm ID x 1.5mm section (Packet of 2)
- P/N GS03620 Bottle of Nujol mulling agent (25mL)
- P/N GS01110 Luer syringe at 2ml volume (1).

Brilliant Spectroscopy™

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