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Teflon and Sapphire Cell for Optical Absorption Studies under High Pressure

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THE following system has been found useful in making measurements of optical absorption at high pressure under conditions where optical contamination is minimized.

A high pressure bomb was constructed employing half-inch cylindrical sapphire windows¹ and an unsupported area seal.² The faces of the metal endplugs were ground optically flat to match the sapphires and were positioned as shown in Fig. 1.

The internal Teflon cell is made to isolate the solution from the pressurizing oil. A low pressure seal is provided by screwing the Teflon cell on to the metal endplug, thus holding the sapphire window firmly in place. At the same time, the Teflon seals against the sapphire window and isolates the sample solution. A pressure transmitting diaphragm is made of Teflon tape.³

The cell was made in two pieces, as shown in Fig. 2, and utilizes a friction seal which permits the longer portion to be filled before placing within the pressure bomb. The short half is filled by hanging a drop of liquid on the

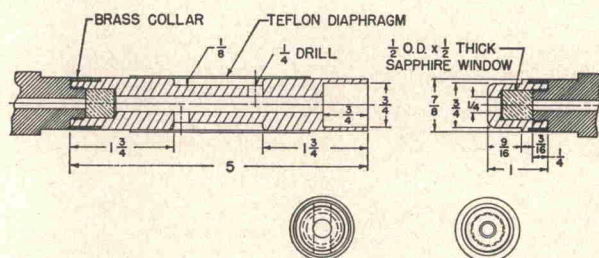


FIG. 2. Detail of internal optical cell.

window and then inserting it into the bomb. The piston action as the two halves come together forces some liquid out and eliminates bubbles. The cell is pressurized by oil pumped into the annular space surrounding the cell.

A brass collar around the threaded portion of the Teflon cell gave added strength to the unit and prevented spreading of the Teflon wall when the unit was screwed into place. The problem of trapping air in the threads of the cell was eliminated by applying a fluorocarbon grease to the threads before assembly. This cell has been used up to pressures of 1000 atm, but was theoretically designed for use up to 6000 atm.

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¹ Linde Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, New York.

² E. Fishman and H. G. Drickamer, *Anal. Chem.* **28**, 804 (1956).

³ Hana Rubber Company, 1512 Main Street, Kansas City 8, Missouri.

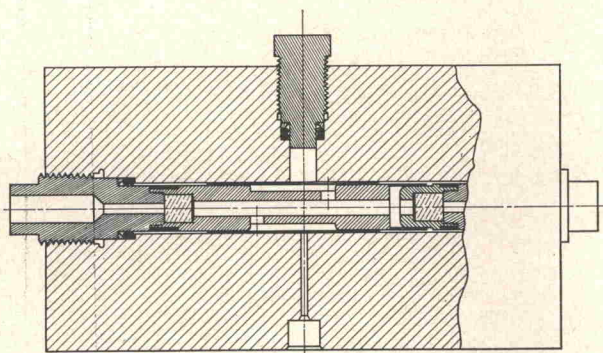


FIG. 1. Pressure bomb with internal Teflon cell.