

### Polarimeter Tube Sample Cells Care in filling and use

***Polarimeter cells are constructed typically of a long glass tube terminated on either side with a screw cap holding a glass window for light transmission***

**PROPER ASSEMBLY AND CARE OF SAMPLE CELLS:** Polarimeter Tube Sample Cells are simple devices for use requiring care during assembly. The tubes of the cells which actually hold the sample are cut and ground to length with tight tolerances,  $\pm 0.02$  mm normally. The ends of the tubes are polished flat to form leak tight seals with the end windows. Washers placed over the windows protect them from getting strained or cracked when the end caps are tightened. To further protect them from strain tighten the end caps up to 'finger tightness' only.

**INCORRECT ASSEMBLY:** It is incorrect to assemble the cells instead with the washers between the tube and the windows. With this wrong assembly, the windows are subject to the pressure of the end caps directly and get strained. Strained windows develop birefringence, leading to optical rotation. The measured value of rotation therefore contains an unknown and variable contribution from the windows. Further, the length of the sample optical path is no longer the length of the tube (which is precisely known) but now includes a contribution from the thickness of the washers, an unknown and a variable quantity.

**MAINTENANCE:** The windows should also be checked periodically for signs of scratching, chipping or any other kinds of damage. The washers should also be checked for signs of getting hardened, and should be discarded if they lose their resilience. A cell properly assembled with strain and scratch free windows, and resilient washers should show a blank reading (with air or a non optically active solvent) of less than  $0.02^\circ$ . Any blank reading higher than this should cause concern and should be investigated.

**FILLING OF SAMPLE CELLS:** Clean and dry, the tube and all parts of the cell, and follow the procedure given for each kind of cell. **Straight cell Series 2B, 2J, 5A, 28B & 28J:** Close and tighten one end, and seat the cell vertically on that end. Take the sample in to a syringe or pipette with a flexible tip or a glass Pasteur pipette with narrow tip, longer than the tube length. Insert the tip all the way down in to the tube, and expel the sample slowly, without forming bubbles. Keep raising the tip simultaneously so that it is always just below the liquid level in the tube. Over fill the tube to form a small convex meniscus on top. Slide the window quickly across without forming bubbles under it. Place the washer, center the window and washer and screw the cap down avoiding excess pressure.

**Bubble chambers, Series 6B, 7B & 7J:** The series 6B cells have larger bore diameters and are easy to fill. Close one end of the tube, pour the liquid to fill the tube and close the end. Manoeuvre any bubbles in to the bubble chamber. **Series 7B & 7J with a small bubble chamber** can be filled the same way as series 2B above. Cells with central openings like Series 14B & 14J: Close and seal both ends of the tube. Hold the tube slightly inclined from the horizontal. Insert the flexible end of the syringe or pipette through the funnel, all the way to one end of the tube. Fill that half of the tube, slowly as for straight tubes above. Insert the tip in to other half of the tube and repeat the procedure. Check for bubbles, and manoeuvre them in to the funnel.

Series 33 cells with taper Lauer taper side tubes: Insert the Lauer tip of the syringe in to the mating taper and fill slowly, till the liquid rises in to the other side tube. Take care to see that the liquid level is same on both the sides.

**STORING OF THE CELLS AFTER USE:** Dismantle the cells completely and clean & dry all the parts, reassemble the cell keeping the end caps loose, to prevent any strain from getting set or frozen in the windows. To avoid the screw threads from seizing up over long periods of time, it is recommended to lubricate them with a dry film lubricant and anti stick agent like FLOUROGLIDE.