



CHAPTER IV . EXPERIMENTAL

4.1 Materials and Equipments

4.1.1 Deionized Distilled Water

Deionized distilled water was used as the pure solvent.

4.1.2 Capillary Tubes

Capillary tubes used in this study were precision bore borosilicate glass capillaries obtained from Sigma-Aldrich with a uniform internal radius 0.17 mm.

4.1.3 Annular Tubes

Annular tubes were made from borosilicate cylindrical tubes obtained from Pyrex. Their specifications are as follows,

Table 4.1 Tube sizes used in the experiment

External diameter (mm)	Thickness of the tube (mm)
Inner tube 14	1.0 ± 0.04
Outer tube 18	1.2 ± 0.05

4.1.4 Cathetometer

The cathetometer is a highly precision optical instrument for measuring vertical displacement with an accuracy of 0.0001 inch per foot. It is a model TC-II from Titan Tool Supply Inc. It is a micro-telescope, which has a simple cross hair recticle mounted in the eyepiece and is attached to the digimatic height guage, Model 192-631, obtained from Mitutoyo with an accuracy of ± 0.002 inch.

4.2 Experimental Conditions

Experiments were carried out at room temperature, $25\pm 1^\circ\text{C}$, and atmospheric pressure, 1 atm.

4.3 Methodology

4.3.1 Glassware Cleaning

Annular and capillary tubes were cleaned by leaving them in cleaning solution for 24 hr. Then flushed out the cleaning solution by a large volume of water followed by rinsing with deionized distilled water. The cleaning solution was prepared by dissolving 50 g of potassium dichromate in 100 cm^3 of deionized distilled water, then adding 500 cm^3 of 96% sulfuric acid.

4.3.2 Capillary Rise in a Capillary Tube

The annular tube was attached to a level, which was held by a stand, so that the tube can be adjusted to a vertical alignment. Then, it was dipped into deionized water in a beaker. The height of the rising liquid was observed simultaneously until it reached equilibrium when the height was constant. Pictures of the menisci of the rising liquid were taken. And the height of the capillary rise was observed by using cathetometer. An experimental set up is shown in Figure 4.1.

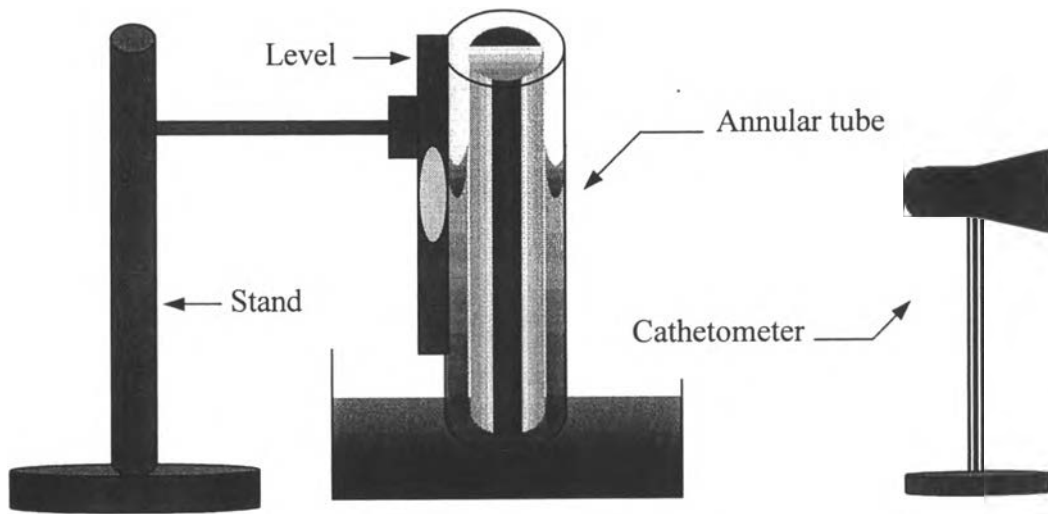


Figure 4.1 Experimental set up for a capillary rise in an annular tube.