CHAPTER IV

EXPERIMENTAL

4.1 EXPERIMENTAL ARRANGEMENT FOR STUDIES OF ELECTRICAL CONDUCTIVITY

4.1.1 SAMPLES

Fresh apple fruit (Red Delicious) used in this study were purchased from a local market in Bangalore, Karnataka and stored at refrigeration conditions (4^0 C) prior to experiments (not more than 2 days). Potatoes were purchased from a local market in Guwahati, Assam.

4.1.2 SAMPLE PREPARATION

Apples and potatoes were washed with water to remove dirt on the skin and then the water on the skin surface was drained. For experiment, thin uniform slices were cut from the samples and placed between the electrodes of the sample holder.

4.1.3 SAMPLE HOLDER

A special type of sample holder was designed and fabricated as shown in fig.3. It consist of two circular electrodes each of 0.311 cm diameter and one of it is fixed to one side of a ceramic block and the other is fitted to the end of a micrometer screw at the other end of the ceramic block. The sample was placed between the electrodes for measurement of resistance. The thickness of each sample was measured by the micrometer screw attached to the holder.

4.1.4 OVEN

A special type of oven was designed and fabricated for measuring electrical conductivity at different temperatures as shown in fig.4. It is double walled with insulated material (cotton wool) placed in between and having provision for inserting a thermometer for recording the temperature inside the oven.

4.1.5 COMPOSITION OF POTATO

For finding the composition of potato , the XRF Spectra was obtained in Axios XRF Spectrometer (PW 1480 Philips) at Gauhati University, Guwahati.

4.1.6 MEASUREMENT OF ELECTRICAL CONDUCTIVITY

(a) At room temperature; **(b)** Saturated with NaCl solution of different concentrations; **(c)** At different temperatures.

For measuring conductivity of the samples (potato and apple) their resistances were measured by using an L.C.R Bridge (LCR-Model-JED-2). The LCR bridge is a development of the Wheatctone bridge. The range of resistance measurement of the bridge was 300 ohms to 10^3 Kilo-ohms.

(a). For measuring conductivity at room temperature sample holder with sample was connected to the LCR bridge and the resistance was measured. From the known values of resistance, thickness and cross-sectional area of samples electrical conductivity was calculated.

(b). For measuring conductivity of the samples with NaCl solutions of different concentrations, the sample was submerged in the solution for 10

minutes. The saturated sample was then loaded in the sample holder and conductivity measured.

(c). For measuring conductivities at higher temperatures , the sample holder with the sample in it was placed within an oven specially constructed. Sample resistance was measured using the terminals coming out of the oven with the help of the LCR bridge.Fig. 5 shows the block diagram.

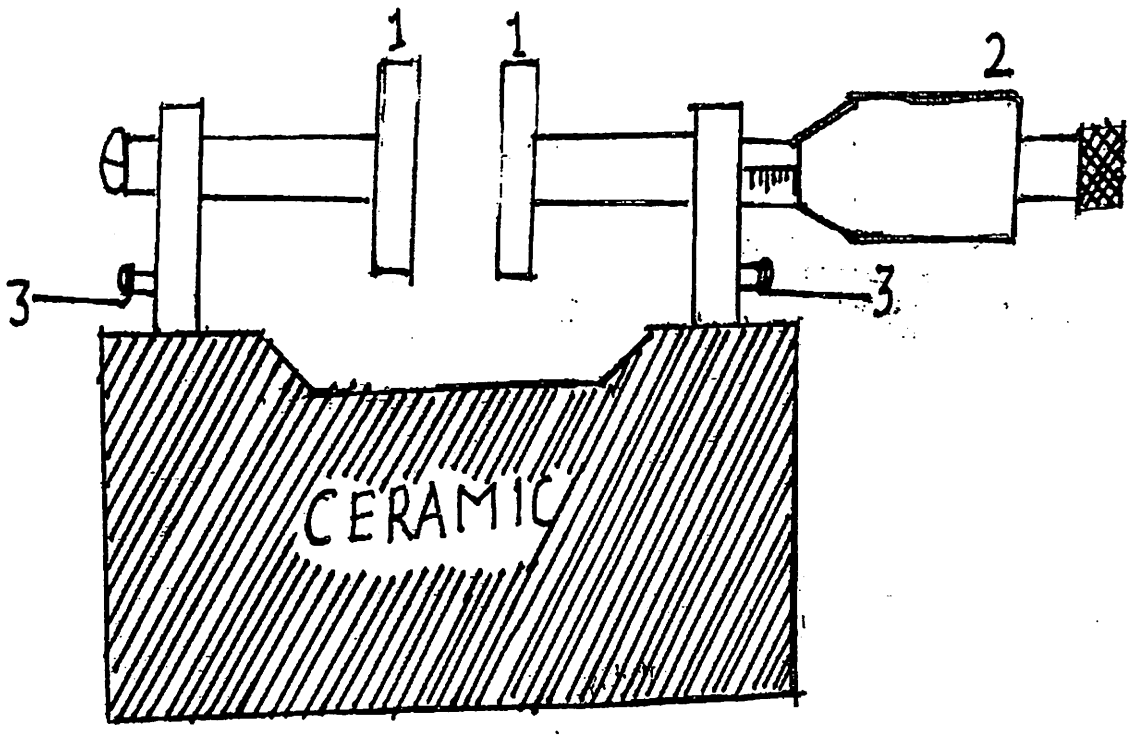

FIG.3 : Schematic diagram of the sample holder for electrical conductivity measurements : 1, circular electrodes; 2, screw of a gauge; 3, measuring leads

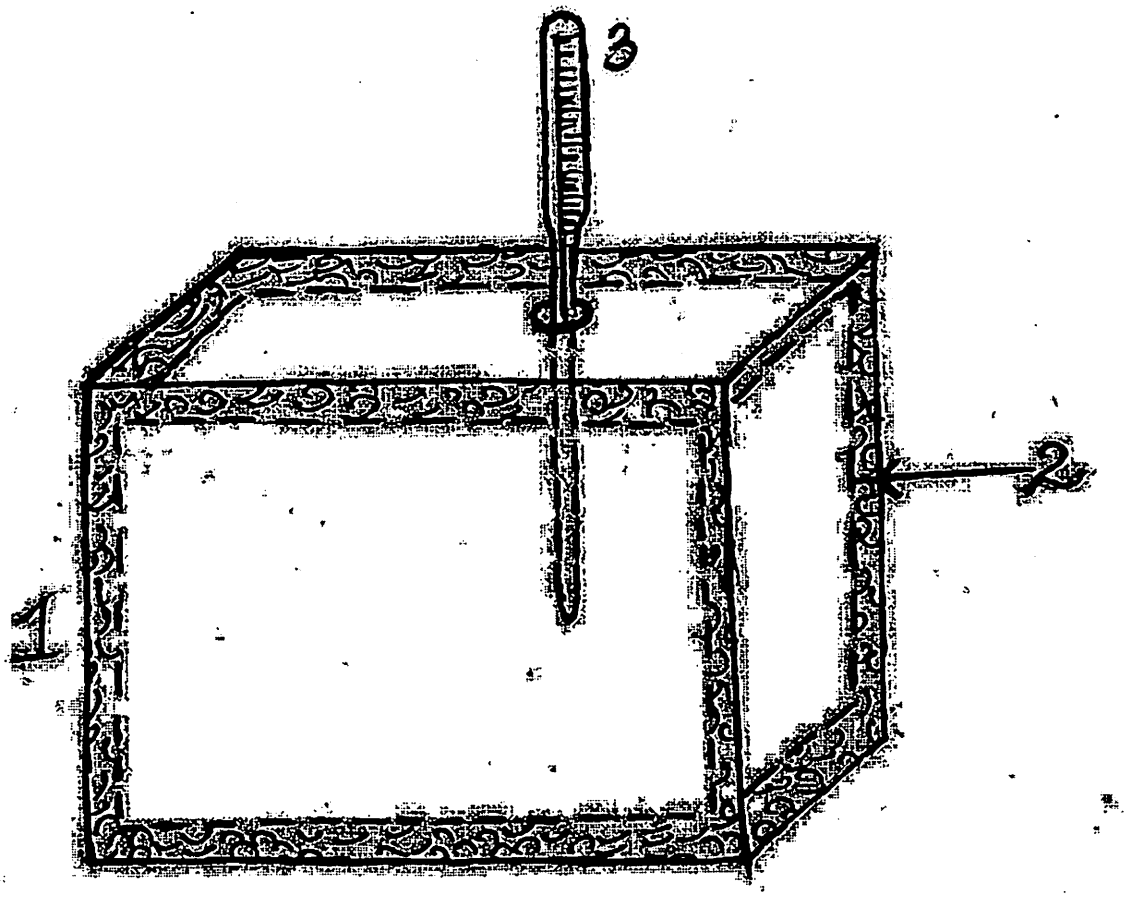

FIG.4 : Schematic diagram of the oven : 1, double wall; 2, cotton wool; 3, thermometer

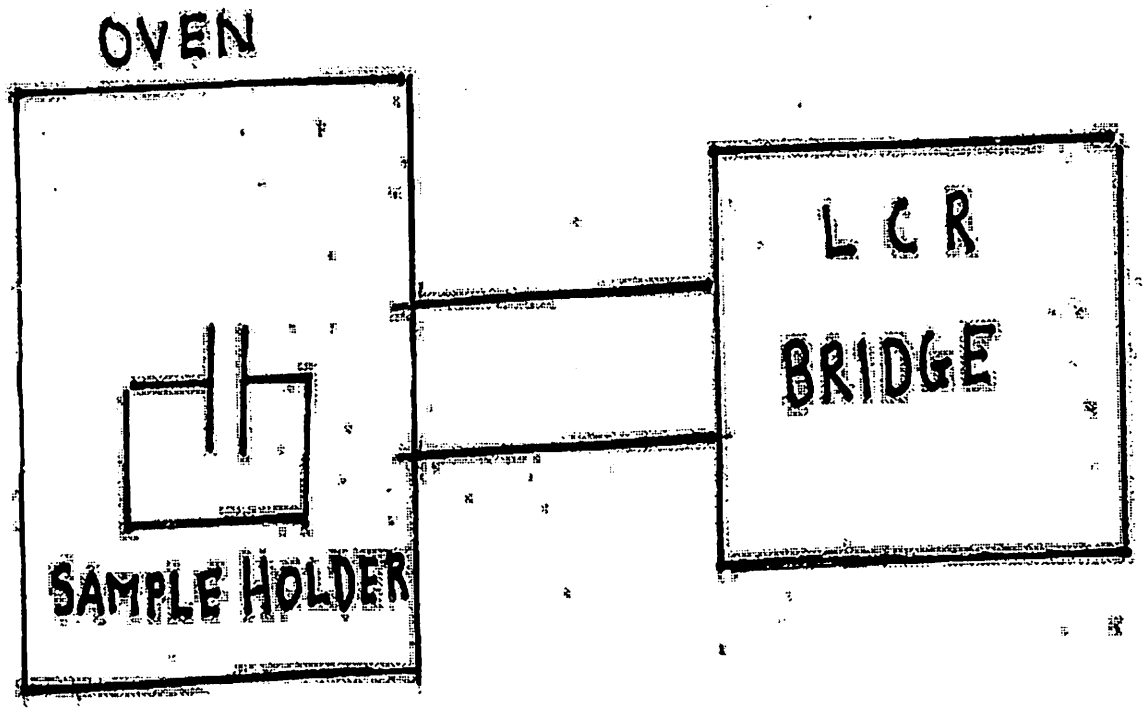

FIG.5 : Block diagram of the experimental arrangement for the measurement of electrical conductivity at different temperatures