**LEE`S DISC APPARATUS**

**Description of Lee`s Disc Apparatus:**

Lees' Disc is a method of finding heat flow through a bad conductor.

**Aim:**

To determine the coefficient of thermal conductivity of the material of a bad conductor (cardboard / glass) using Lee`s disc apparatus.

**Apparatus:**

Lee`s apparatus consist of a metallic disc D provided with a hole for inserting a thermometer. A disc C of the bad conductor is placed above D. Above the disc C, a steam chamber is placed. Through the hole in the solid base B of the chamber, a thermometer T1 is inserted. A sensitive thermometer T2 is kept inserted in the metallic disc D.

**Principle:**

At the steady state, heat conducted through the cardboard disc /glass per second will be equal to the heat radiated per second by the exposed potion of the metallic disc.



Where λ = coefficient of thermal conductivity of the poor conductor,

A = area of the object in contact with the metal block,

d = thickness of the object, and

T1, T2 are steady temperature recorded by T1 and T2 respectively.

If r is the radius of the object (same as that of the metallic disc),





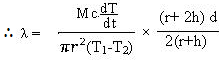
Where M = mass of the metallic disc,

c = the Heat capacity of the metallic disc

h = thickness of the metallic disc, and



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**Procedure:**

The thickness (d) of the object is measured. The radius (r) of the metallic disc (same as that of the object disc), and its height (h) are measured. The mass (M) of the metallic disc is also measured.

Steam is passed through the steam chamber until the readings of the thermometers are steady; they are recorded as T1 and T2 respectively.

The object is removed. The steam chamber is kept in contact with the metallic disc. When the metallic disc is heated to about 10°C above the steady temperature **T2**, the steam chamber is removed. The disc is allowed to cool. When its temperature falls to 5°C above **T2,** a stop watch is started. Temperature is recorded at intervals of half a minute; until the temperature falls by about 5°C below the steady temperature.

A graph is plotted with time against temperature from that the rate of cooling dT/dt at the steady temperature can be determined. Hence λ is calculated.

**Manual:**

The user can select a object given in the drop down menu. Then the selected object has to be placed in between the metallic disc and heat chamber, this can be done by just clicking the “Place object” button. After placing the object, the user have to start the steamer, it can be done with the “Start heating” button. Then the steam will begin to flow to the heat chamber and the T1 reading will start to rise.

After some time the readings at T1 and T2 will becomesteady. Then remove the object from the Lee`s disc by clicking on the “Remove object” (the “Place object” button will change to “Remove object”). The temperature of T2 will rise again; stop the heater when the reading of T2 reaches 10 degrees above the steady temperature. The “Stop heating” button can be used to do so.

Now the temperature at the Lee`s disc will start to drop. Start the stop watch, and note down the temperature at T2 from 5 degrees above the steady temperature up to 5 degrees below of that on each 30 seconds. Using these points a graph has to be plotted and the dT/dt will be obtained from it and the λ value can be calculated. The user can view the graph by clicking the “show graph”. When the mouse moves over the graph, the corresponding x and y values will be displayed.

**Interface:**

