Heat Capacity Kit

Lab Experiment 3

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Contents

Aim

1. To measure the heat capacity of a teflon heat capacity kit using a silver sample of known specific heat capacity.
2. To measure the specific heat capacity of multiple materials using a teflon heat capacity kit.

Theory

Heat capacity is one of the important thermal properties of solids. We can determine the heat capacity of solids in the form of a cylindrical rod of a fixed size. The temperature change in the specimen is detected using an iron-constant uni-junction thermocouple. The resulting thermo emf is amplified and displayed using suitable electrical circuitry. The rate of temperature change is proportional to the rate of input energy and inversely proportional to the mass. The proportionality constant is the inverse of the specific heat. Hence by measuring these properties, we can measure the specific heat capacity

Method

1. Measure the mass m of the sample.
2. Send a fixed current I through the calorimeter setup.
3. Measure the time taken t to increase the temperature over some range ΔT.
4. Measure the resistance R of the calorimeter heat coil using a Ohmeter.
5. Calculate the specific heat capacity as per the following equation

$$c = \frac{I^2 Rt - W_c \Delta T}{m \Delta T}$$

where W_c is the water equivalent of the calorimeter.

W_c can be found with a sample of known c with the same formula and procedure.

Experimental Set Up

Results

$R = 3.6ohm$, $I = 0.3A$, $\Delta T = 5K$

Material	Mass (kg)	Time (s)	s($Jkg^{-1}K^{-1}$)
Al	0.0023	68.65	915.34
Ag	0.0084	66.23	232(taken)
Brass	0.0068	74.83	368.54
Cu	0.0076	80.75	380.22

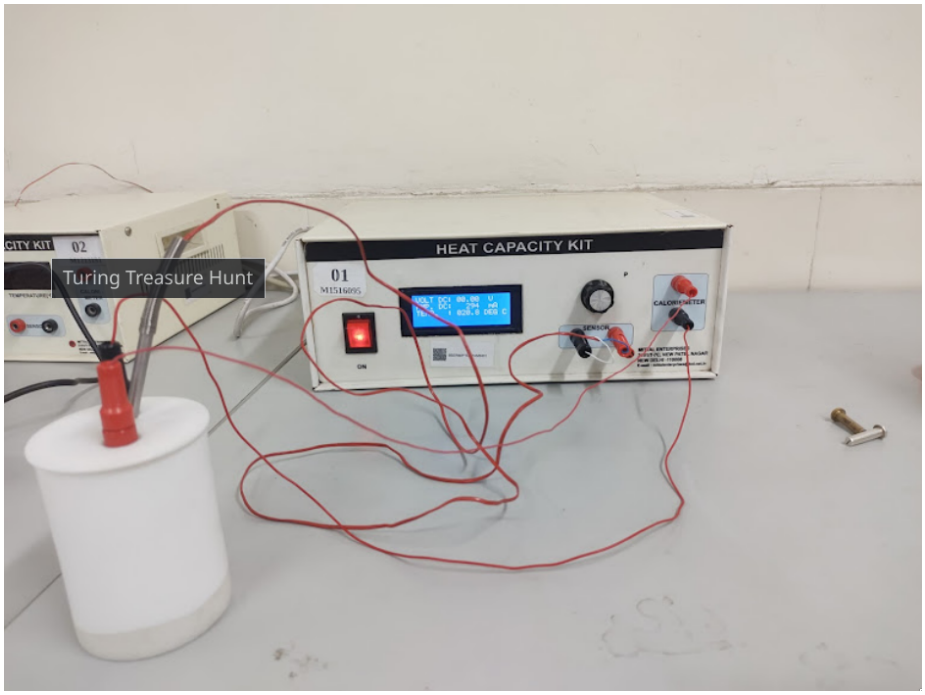

Figure 1: Experimental Set Up

From the Ag sample, we get $W_c = 2.3432$