Theory :

We know that, the rate of loss of heat of a liquid is directly proportional to the temperature difference between the liquid and that of the surroundings.

$$-\frac{dQ}{dt} \propto (\theta_2 - \theta_1)$$

Where θ_2 and θ_1 are the temperatures of liquid and surroundings respectively and $\frac{dQ}{dt}$ is the rate of heat loss.

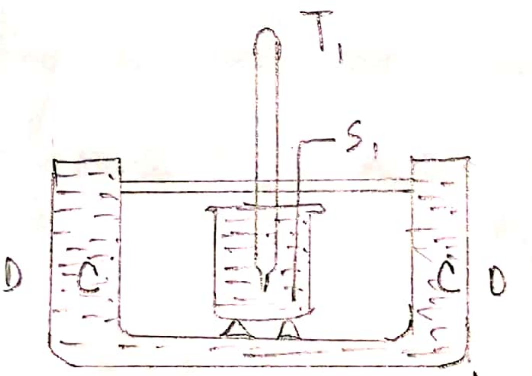


Figure 1 : Calorimeter

~~Suppose~~ Let,

M_1 = mass of liquid

S_1 = specific heat of liquid

M_w = mass of water

S_w = Specific heat of water

M_c = Mass of calorimeter

if a Mass M_1 of liquid of specific heat s_1, takes t_1 seconds to cool from θ_1 to θ_2 ~~ad~~ and a mass M_w of water of specific heat S_w takes t_2 seconds to cool between the same ranges of temperature. If M_c and s_c are the mass and specific heat of calorimeter the the rate of ~~coll~~ cooling for liquid and water are

$$\frac{(M_1 s_1 + M_c s_c)(\theta_1 - \theta_2)}{t_1} \text{ and } \frac{(M_w S_w + M_c S_c)(\theta_1 - \theta)}{t_2}$$

The rates of cooling in both cases are equal

so $$\frac{(M_1 S_1 + M_c S_c)}{t} = \frac{M_w S_w + M_c S_c}{t_2}$$

we get,

$$S_1 = \frac{M_w S_w t_1 + M_c S_c (t_1 - t_2)}{M_1 t_2}$$

Apparatus: Stop watch, Thermometer, Cylinder, Calorimeter, Sprit lamp, and Beaker

Procedure:

(i) We heated 100 cc ~~kero~~ liquid in a beaker to about 75°C

(ii) We poured the hot in calorimeter.

(iii) Covered the calorimeter with their lids and insert the thermometers in them

(iv) When the temperature rose ~~is~~ about 70°C, we started stopwatch and took the reading of the thermometer at intervals of 1 minute as the temperature falls from 70°C to 45°C keeping the liquid gently stirred all the time.

(v) We repeated the same process for 100 cc of water.

(vi) Ploted the two cooling curves on the same graph paper taking temperature in the Y axis and time in X axis. We showed that the cooling ~~oil~~ curve for oill was steeper more than that for water.

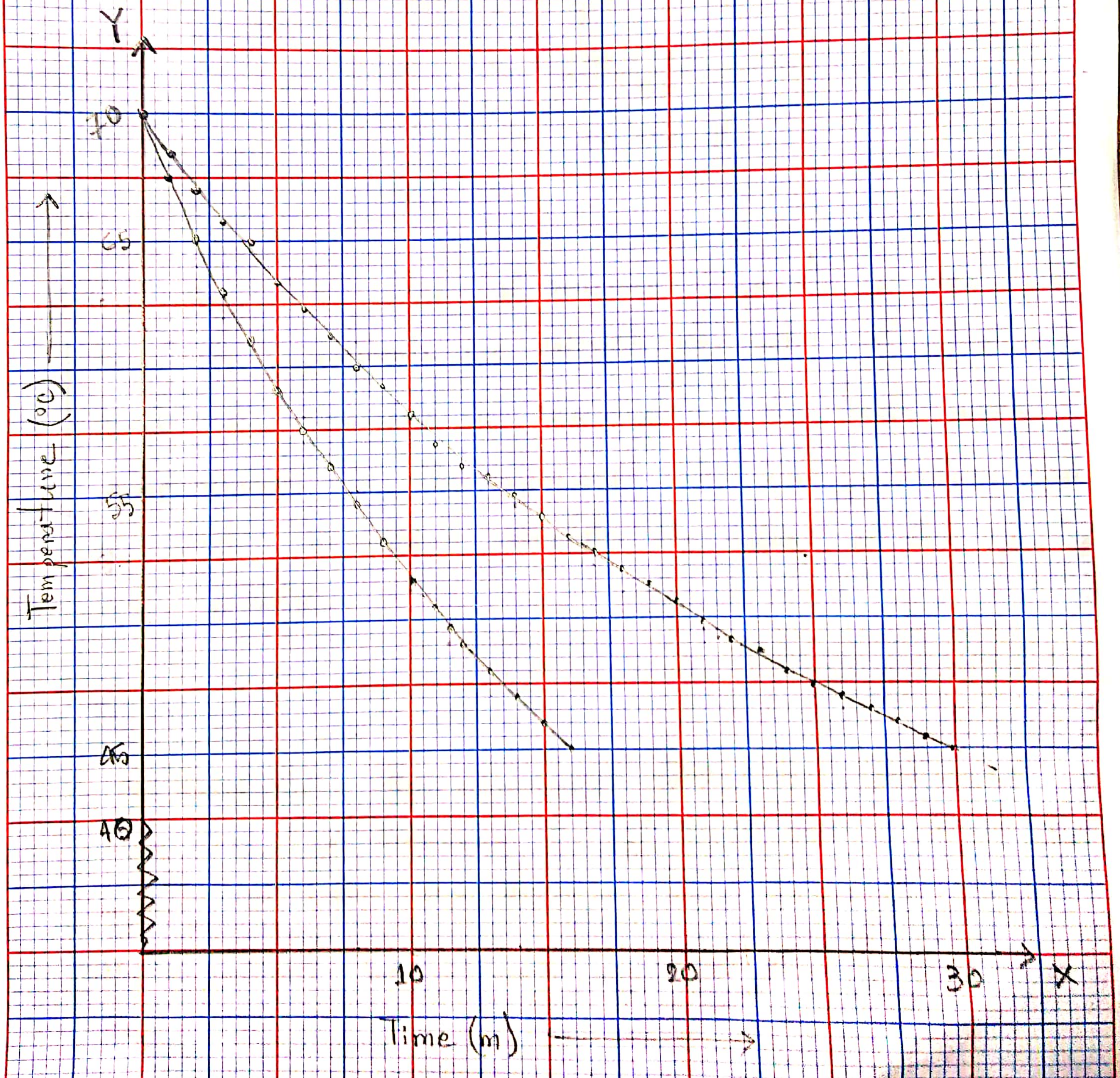
Experimental Data:

Table 1 for time temperature record

No of Obs	Time of cooling	Temp of cooling for water °C	Temp for cooling for kerosene °C	No of obs	Time of cooling	Temp of cooling for water °C	Temp for cooling for kerosene °C
1	0	70	70	16	15	54	46
2	1	68.5	67.5	17	16	53.2	45
3	2	67	65	18	17	52.6	
4	3	65.6	63	19	18	51.9	
5	4	65	61	20	19	50.6	
6	5	63.3	59	21	20	49.2	
7	6	62.2	57.4	22	21	48.7	
8	7	61.3	55.9	23	22	48	
9	8	60	54.3	24	23	47.5	
10	9	59.1	53	25	24	47	
11	10.5	58	51	26	25	46.5	
12	11	57.8	50.4	27	26	45.9	
13	12	57	49	28	27	45.5	
14	13	55.6	48	29	28	45	
15	14	54.8	47.1	30	29		
				31	30		

7.02.2020

Roll No. ....



8 Inch x 10 Inch

Error calculation :

$$\text{Percentage of error} = \frac{Y - X}{Y} \times 100\%$$

$$= \frac{.54 - .48}{.54} \times 100\%$$

$$= 11.117\ \%$$

Result :

The ideal value of kerosene's specific is .48 $cal\,gm^{-1}\,c^{-1}$ From the experiment we calculate the value of specific heat for kerosene is .54 $cal\,gm^{-1}c^{-1}$. So, there were some errors in the experiment data and procedure because of which we couldn't calculate the value of the specific heat perfectly

Discussion :

We found from the experiment that water took much more time than kerosene to cool down. Because the thermal capacity of water and kerosene are different. From the experiment we can easily say that the thermal capacity

Mass of the calorimeter with stirrer M_c = ·37 gm

specific heat at the material of the calorimeter S_c = ·0909 cal gm^{-1} $°C^{-1}$

Mass of the water M_w = 100gm

Mass of the kerosene M_1 = 100gm

specific heat of water S_w = 1 cal/g/c°

t_1 = time taken by the kerosene to cool from 70°c to 45°c = 16 minute = 960 sec

t_2 = time taken by the water to cool from 70°C to 45°C = 30 minute = 1800 sec.

Calculation:

$$S_1 = \left[\frac{t_1 \times (M_w S_w + M_c S_c)}{t_2} - M_c S_2\right]\frac{1}{M_1}$$

$$= \left\{\frac{100 \times 1 \times 960 + 137 \times \cdot 0909 \times 840}{100 \times 960}\right\} \text{cal/gm/°c}$$

$$= \cdot 475 \text{ cal/gm/°c}$$

of kerosene but couldn't do the perfactly because of some errors. Thus some disturbance in the instrument could also be the reason for these errors. But from this experiment we came to know about some important act of water and kerosene.