Experiment Name: To determine the value of J, the mechanical equivalent of heat by electric method.

Experimental Data:

Mass of the calorimeter $m_1 = 71.03$ gm

Mass of the calorimeter and water m = 248.1gm

Mass of water $m_2 = (m - m_1) = 177.07$ gm

Mass of the stirrer, $m_3 = 21$ gm

Specific heat of the material of the calorimeter $S_1 = 0.0909$ cal / gm – ^{o}C

Specific heat of water $S_2 = 1$ cal / gm – ^{o}C

Specific heat of the material of the stirrer $S_3 = 0.089$ cal / gm – ^{o}C

Table1: Readings of current-voltage-temperature

No. of Obs.	Time Minute	Current I amp.	Voltage V volts	Temp-erature °C		No. of Obs	Time Minute	Current I amp.	Voltage **V** volts	Temp-erature ° C
1	0	0.00	0.00	21		11	10	1.12	7.1	25
2	1	1.12	7.1	22		12	11	1.12	7.1	26
3	2	1.12	7.1	22		13	12	1.12	7.1	26
4	3	1.12	7.1	22		14	13	0	0	27
5	4	1.12	7.1	22		15	14	0	0	28
6	5	1.12	7.1	22		16	28	0	0	27.5
7	6	1.12	7.1	23		17				
8	7	1.12	7.1	23		18				
9	8	1.12	7.1	23		19				
10	9	1.12	7.1	24		20				

Recordings of time and temperature with radiation correction:

Initial temperature of the calorimeter + contents, $\theta_1 = 21\ ^o$C

Final temperature, $\theta_2 = 28\ ^o$C

Time during which the current is passed, t =12 Min = 720 sec

Mean current during the interval, I = 1.12 amp

Mean voltage during the interval, V = 7.2 volt

Rise of temperature, $\Delta\theta' = \theta_2 - \theta_1 = 7\ ^oC$

Radiation correction, $\theta_r = (\theta_2 - \theta_2')/2 = 0.25\ ^oC$

Corrected rise of temperature, $\Delta\theta = \Delta\theta' + \theta_r = 7.25\ ^oC$

CALCULATION:

The mechanical equivalent of heat,

$$J = \frac{VIt}{(m_1S_1 + m_2S_2 + m_3S_3)\Delta\theta}$$

$$= \frac{(7.1*1.12*720)}{((71.03*0.0909)+(1.7*0.07*1)+(21*0.08))}$$

$$= 4.2596 \quad J/cal$$

Result:

From the experiment we have got the value of mechanical equivalent of heat as

$J = 4.2596 \quad J/cal$