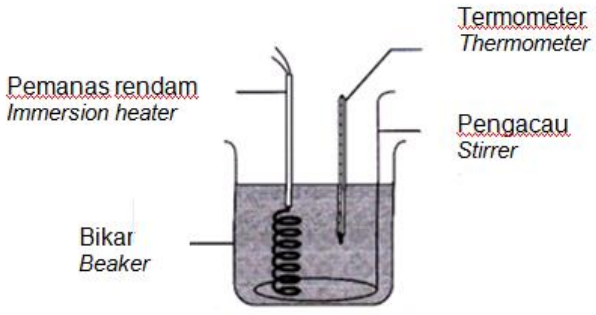
USCI Paper 3

1. A student carried out an experiment to investigate the relationship between increase of temperature, $\Delta\theta$ and the mass of liquid, *m*. A liquid with 20.0 g is heated by an immersion heater of 60 W for 5 minutes. The arrangement of the apparatus for the experiment is shown in Diagram 1.1.

   Seorang murid menjalankan satu eksperimen untuk mengkaji hubungan antara kenaikan suhu cecair , $\Delta\theta$ *dan jisim cecair ,m . Suatu cecair dengan jisim 20.0 g dipanaskan oleh sebuah pemanas rendam yang berkuasa 60 W selama 5 minit . Susunan radas eksperimen seperti ditunjukkan dalam Rajah 1.1*



Rajah 1.1/ Diagram 1.1

The initial temperature of the liquid, θ_0 is shown in Diagram 1.2 . The liquid is stirred slowly and the maximum temperature of liquid, θ_1 is shown in Diagram 1.3. Calculate increase of temperature using the following formula.

Suhu permulaan cecair ialah θ_0*, seperti yang ditunjukkan dalam Rajah 1.2.*

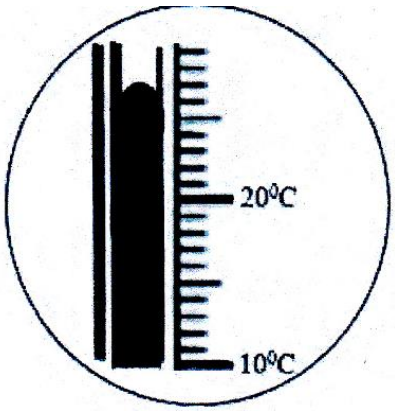
Air tersebut dikacau dengan perlahan dan suhu maksimum cecair, θ_1 *ditunjukkan dalam Rajah 1.3. Hitungkan peningkatan suhu dengan menggunakan formula berikut.*

$$\Delta\theta = \theta_1 - \theta_0$$

The experiment is repeated by using liquid with mass 30.0 g , 40.0 g , 50.0 g dan 60.0 g. The reading of the thermometer are shown in Diagram 1.4 , 1.5 , 1.6 and 1.7

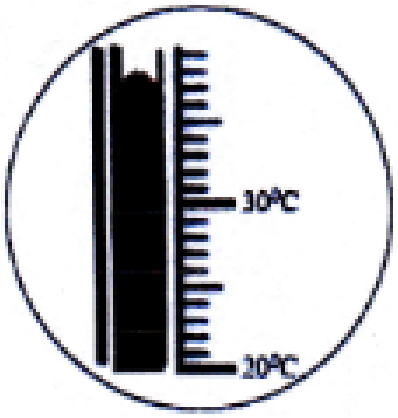
Eksperimen diulang dengan menggunakan cecair dengan jisim

30.0 g , 40.0 g , 50.0 g dan 60.0 g. Bacaan termometer ditunjukkan dalam Rajah 1.4, 1.5 , 1.6 dan 1.7.

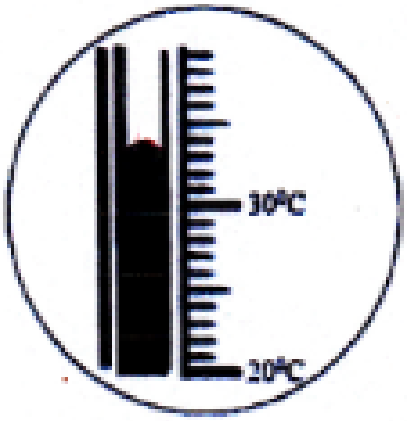


$\theta_0 = 27\ ^\circ C$

Rajah 1.2



Rajah 1.3



Rajah 1.4

m= 20.0 g

$\theta_1 =$ _____ $^\circ C$

m= 30.0 g

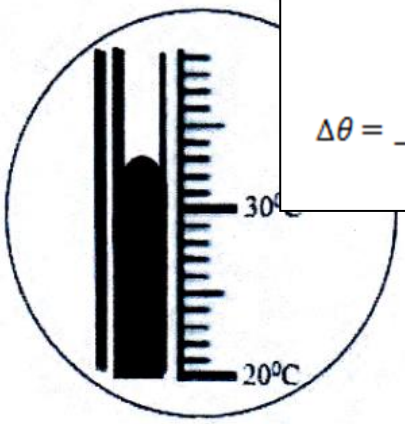
$\theta_1 =$ _____ $^\circ C$

m= 40.0 g

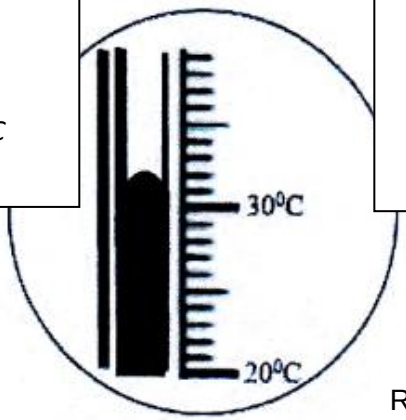
$\Delta\theta =$ _____ $^\circ C$

m= 50.0 g

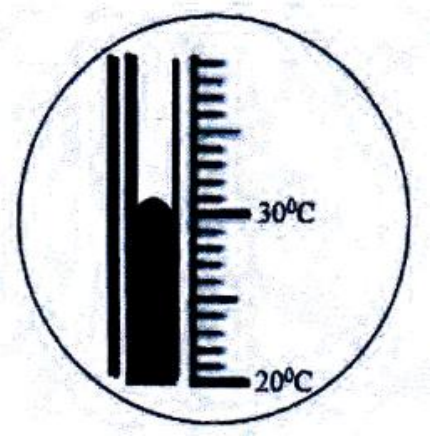
$\Delta\theta =$ _____ $^\circ C$



Rajah 1.5



Rajah 1.6



m= 60.0 g

$\Delta\theta$ = _____

Rajah 1.7

(a) For the experiment described above, identify:

Daripada penerangan eksperimen di atas, kenalpasti:

(i) The manipulated variable

Pemboleh ubah dimanipulasikan,

……

[1 markah/1 mark]

(ii) The responding variable

Pemboleh ubah bergerak balas

……

[1 markah/1 mark]

(iii) The constant variable

Pemboleh ubah dimalarkan

……

[1 markah/1 mark]

(b) Base on diagram 1.2 , 1.3 , 14 , 1.5 , 1.6 and 1.7

Berdasarkan Rajah 1.2 ,1.3 ,1.4 ,1.5 ,1.6 dan 1.7

Recorded the reading , θ_1 , of the thermometer

Catat bacaan, θ_1 bagi setiap termometer [2 markah/2 marks]

(i) For each value of θ_1, in 1(b)(i), calculate the $\Delta\theta$, by using the following formula

Bagi setiap nilai bacaan , θ_1, dalam 1(b)(i) ,kirakan $\Delta\theta$, menggunakan formula berikut:

$$\Delta\theta = \theta_1 - \theta_0$$

Record the value of $\Delta\theta$

Catat nilai $\Delta\theta$ [2 markah/2 marks]

(c) Tabulate your results of m , $\frac{1}{m}$, θ_1, $\Delta\theta$ in the space below.

Jadualkan keputusan anda bagi m , $\frac{1}{m}$, θ_1, $\Delta\theta$, pada ruangan di bawah.

[3 marks/3 markah]

(d) On the graph paper on page 7. Draw a Graph of $\Delta\theta$ against $\frac{1}{m}$

*Pada kertas graf di halaman **7**, lukis graf $\Delta\theta$ melawan $\frac{1}{m}$*

[5 marks/*5 markah*]

(e) Based on your graph ,state the relationship between $\Delta\theta$ and $\frac{1}{m}$

Berdasarkan graf anda ,nyatakan hubungan antara $\Delta\theta$ dengan $\frac{1}{m}$

……

[1 mark/*1 markah*]