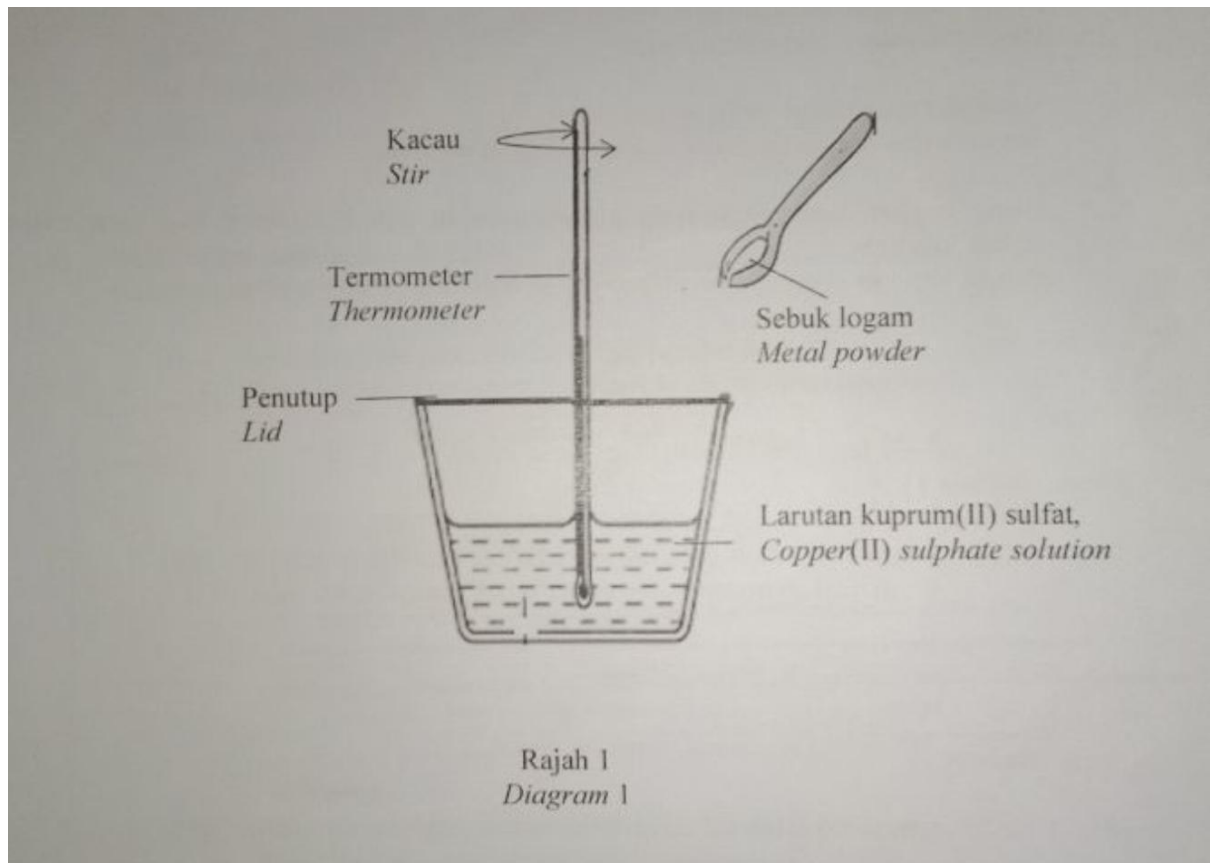


Anda dikehendaki menjalankan eksperimen untuk mengkaji kesan keelektropositifan logam terhadap perubahan suhu apabila kuprum disesarkan daripada larutan kuprum(II) sulfat.
You are required to carry out an experiment to investigate the effect of electrophysitivity of metal towards the change in temperature when copper is displaced from copper(II) sulphate solution.

Rajah 1 menunjukkan susunan radas bagi eksperimen penyesaran kuprum.
Diagram 1 shows the apparatus set-up for the experiment of displacement of copper.



Rajah 1
Diagram 1

Jalankan eksperimen dengan merujuk langkah-langkah berikut.
Carry out the experiment according to the following steps.

i. Sukat dan tuang 50 cm³ larutan kuprum(II) sulfat 0.1 mol dm⁻³ ke dalam cawan plastik.
Measure and pour 50 cm³ of 0.1 mol dm⁻³ of copper(II) sulphate solution into a plastic cup.

ii. Sukat dan catat suhu awal larutan kuprum(II) sulfat.
Measure and record the initial temperature of copper(II) sulphate solution.

iii. Tambah 1g serbuk logam S ke dalam larutan kuprum(II) sulfat dengan cepat.
Add 1g of S metal powder into copper(II) sulphate solution quickly.

iv. Tutup cawan plastik dengan penutup.
Close the plastic cup with the lid.

v. Kacau campuran menggunakan thermometer.
Stir the mixture using a thermometer.

vi. Sukat dan rekod suhu tertinggi campuran.
Measure and record the highest temperature of mixture.

vii. Ulang langkah i hingga vi dengan menggunakan serbuk logam P bagi menggantikan serbuk logam S.
Repeat step i to vi using P metal powder to replace S metal powder.



(a) Rekodkan suhu awal larutan kuprum(II) sulfat dan suhu tertinggi campuran. Hitungkan perubahan suhu bagi kedua-dua set eksperimen.

Record the initial temperature of copper(II) sulphate solution and the highest temperature of the mixture. Calculate temperature changes for both sets of experiments.

Set	I	II
Serbuk logam Metal powder	S	P
Suhu awal larutan kuprum(II) sulfat (°C) Initial temperature of copper(II) sulphate solution (°C)		
Suhu tertinggi campuran (°C) Highest temperature of the mixture (°C)		
Perubahan suhu (°C) Temperature change (°C)		

[4 markah / marks]

(b) Berdasarkan eksperimen di Set I,
Based on the experiment in Set I,

(i) Nyatakan satu pemerhatian selain perubahan suhu.
State one observation other than the change in temperature.

[1 markah / mark]

(ii) Nyatakan inferens berdasarkan pemerhatian anda di 1(b)(i).
State the inference based on the observation in 1(b)(i).

[1 markah / mark]

(iii) Tuliskan setengah persamaan bagi tindak balas penurunan.
Write the half equation for the reduction reaction.

[1 markah / mark]

(c) Berdasarkan keputusan eksperimen, bandingkan perbezaan perubahan suhu bagi tindak balas di Set I dan Set II. Terangkan jawapan anda.

Based on the results of the experiment, compare the difference in the temperature change for reaction in Set I and Set II. Explain your answer.

[2 markah / mark]

(d) Susunkan logam P, logam S dan kuprum mengikut tertib menaik kecenderungan dioksidakan.

Arrange P metal, S metal and copper in ascending order of the tendency to be oxidised.

[1 markah / mark]

(e)(i) Ramalkan perubahan suhu jika serbuk logam S digantikan dengan serbuk argentum.

Predict the temperature change if metal powder S is replaced by silver powder.

[1 markah / mark]

(e)(ii) Terangkan jawapan anda di 1(e)(i).

Explain your answer in 1(e)(i).

[2 markah / mark]

(f) Nyatakan definisi secara operasi bagi logam yang mempunyai keelektropositifan lebih tinggi.

State the operational definition for the metal with higher electropositivity.

[2 markah / mark]