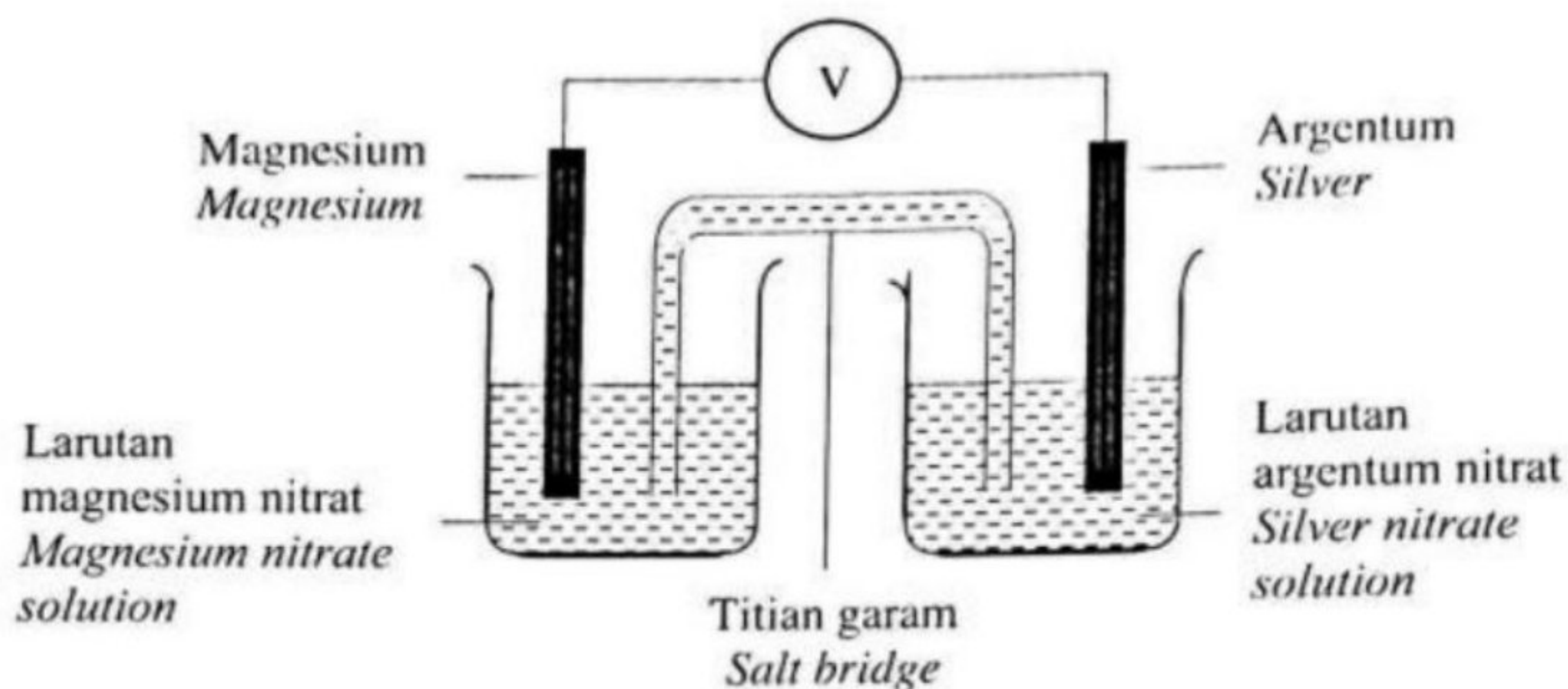


Bahagian C
[20 markah]

Jawab soalan dalam bahagian ini.

- 11** Rajah 11.1 menunjukkan susunan radas bagi satu sel kimia dalam satu tindak balas redoks
Diagram 11.1 shows the apparatus arrangement of a chemical cell in a redox reaction.



Rajah 11.1
Diagram 11.1

Nilai E° bagi dua sel setengah tersebut adalah :

The E° value for the two half-cells are :

$\text{Mg}^{2+} (\text{ak/aq}) + 2\text{e}^- \rightleftharpoons \text{Mg} (\text{p/s})$	$E^\circ = -2.38 \text{ V}$
$\text{Ag}^{2+} (\text{ak/aq}) + \text{e}^- \rightleftharpoons \text{Ag} (\text{p/s})$	$E^\circ = +0.80 \text{ V}$

Berdasarkan Rajah 11.1,
Based on Diagram 11.1,

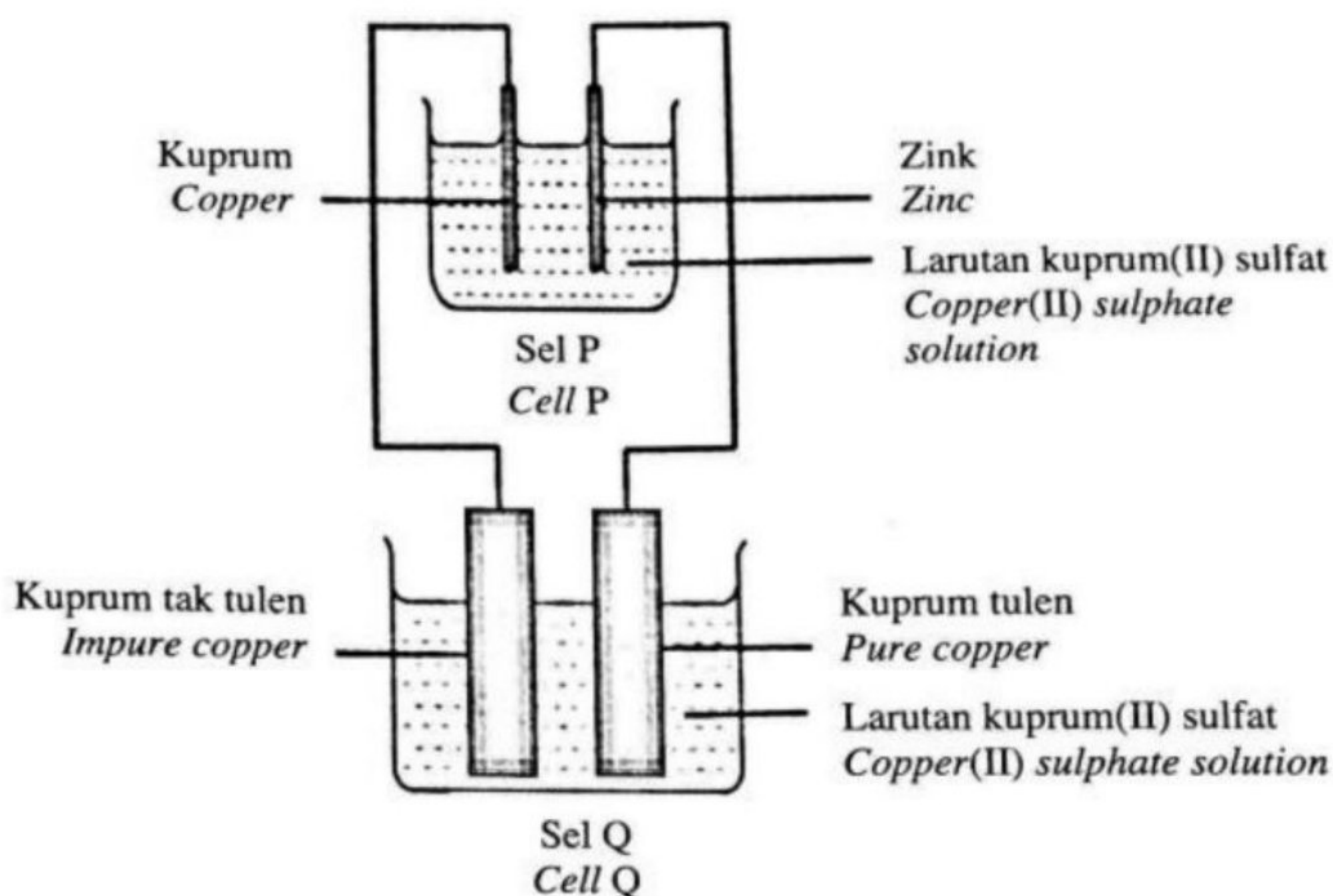
- (a) Apakah yang dimaksudkan dengan tindak balas redoks dan nyatakan terminal negatif dan terminal positif bagi sel ini. Seterusnya, tuliskan persamaan ion dan notasi sel bagi sel tersebut.

What is meant by a redox reaction and state the negative terminal and positive terminal of this cell. Next, write the ionic equation and cell notation for the cell.

[7 markah]

[7 marks]

- (b) Rajah 11.2 menunjukkan susunan radas proses penulenan logam kuprum
Diagram 11.2 shows the apparatus setup of purification process of copper metal.



Rajah 11.2
 Diagram 11.2

Nilai E° bagi beberapa sel setengah adalah :
The E° value for a few half-cells are :

$\text{Zn}^{2+} (\text{ak/aq}) + 2\text{e}^- \rightleftharpoons \text{Zn (p/s)}$	$E^\circ = -0.76 \text{ V}$
$2\text{H}^+ (\text{ak/aq}) + 2\text{e}^- \rightleftharpoons \text{H}_2 (\text{g})$	$E^\circ = 0.00 \text{ V}$
$\text{Cu}^{2+} (\text{ak/aq}) + 2\text{e}^- \rightleftharpoons \text{Cu (p/s)}$	$E^\circ = +0.34 \text{ V}$
$\text{O}_2 (\text{g}) + 2\text{H}_2\text{O (ce/l)} + 4\text{e}^- \rightleftharpoons 4\text{OH}^- (\text{ak/aq})$	$E^\circ = +0.40 \text{ V}$
$\text{S}_2\text{O}_8^{2-} (\text{ak/aq}) + 2\text{e}^- \rightleftharpoons 2\text{SO}_4^{2-} (\text{ak/aq})$	$E^\circ = +2.01 \text{ V}$

Berdasarkan Rajah 11.2, bandingkan pemerhatian pada warna elektrolit dalam sel P dan sel Q selepas 30 minit. Terangkan jawapan anda.

Based on Diagram 11.2, compare the observations on the colour of electrolytes in cell P and cell Q after 30 minutes. Explain your answer.

[5 markah]

[5 marks]

- (c) Rajah 11.3 menunjukkan senarai bahan dan radas yang dibekalkan untuk membina satu sel kimia.

Diagram 11.3 shows the list of materials and apparatus provided to construct a voltaic cell

Tomato <i>Tomato</i>	Wayar penyambung <i>Connecting wire</i>	Mentol LED <i>LED bulb</i>
Paku besi <i>Iron nail</i>	Kepingan zink <i>Zink strip</i>	Kepingan kuprum <i>Copper strip</i>
Sudu plastik <i>Plastic spoon</i>	Kepingan magnesium <i>Magnesium strip</i>	Rod karbon <i>Carbon rod</i>
	Kertas pasir <i>Sand paper</i>	

Rajah 11.3
Diagram 11.3

Jadual 11 menunjukkan sebahagian daripada nilai siri keupayaan elektrod piawai.
Table 11 shows part of the standard electrode potential series values.

Tindak balas sel setengah <i>Half cell reaction</i>	$E^\circ / \text{V (298 K)}$
$\text{Mg}^{2+} (\text{ak/aq}) + 2\text{e}^- \rightleftharpoons \text{Mg (p/s)}$	$E^\circ = -2.38 \text{ V}$
$\text{Zn}^{2+} (\text{ak/aq}) + 2\text{e}^- \rightleftharpoons \text{Zn (p/s)}$	$E^\circ = -0.76 \text{ V}$
$\text{Fe}^{2+} (\text{ak/aq}) + 2\text{e}^- \rightleftharpoons \text{Fe (p/s)}$	$E^\circ = -0.44 \text{ V}$
$2\text{H}^+ (\text{ak/aq}) + 2\text{e}^- \rightleftharpoons \text{H}_2 (\text{g})$	$E^\circ = 0.00 \text{ V}$
$\text{Cu}^{2+} (\text{ak/aq}) + 2\text{e}^- \rightleftharpoons \text{Cu (p/s)}$	$E^\circ = +0.34 \text{ V}$

Jadual 11
Table 11

Dengan menggunakan pengetahuan kimia anda, lukis susunan radas sel kimia yang dapat menyalakan mentol LED. Susunan radas yang dibina perlulah menggunakan bahan dan radas yang sesuai seperti yang disenaraikan dalam Rajah 11.3.

Huraikan secara ringkas langkah pembinaan sel kimia tersebut dan terangkan tindak balas redoks yang berlaku. Kemudian, tentukan nilai bacaan voltan yang diperoleh.

By using your chemistry knowledge, draw an apparatus setup of a voltaic cell that can light up on LED bulb. The apparatus setup constructed should use suitable materials and apparatus as listed in Diagram 11.3.

Describe briefly the steps of constructing the voltaic cell and explain the redox reaction that take place. Then determine the value of the voltage reading obtained.

[8 markah]

[8 marks]

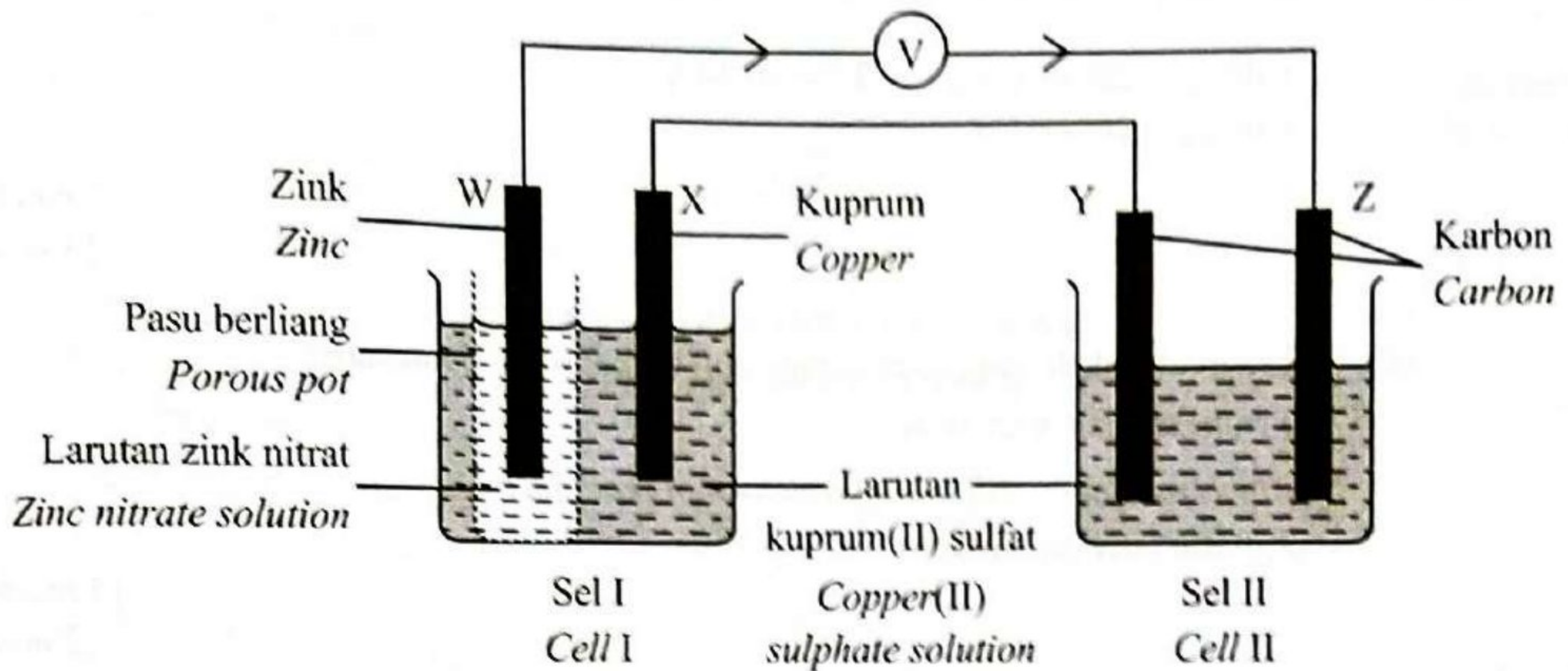
KERTAS SOALAN TAMAT

Bahagian C
Section C

[20 markah]
[20 marks]

Jawab semua soalan dalam bahagian ini.
Answer all questions in this section.

- 11 Rajah 11 menunjukkan susunan radas bagi menyiasat tindak balas redoks dalam Sel I dan Sel II.
Diagram 11 shows the apparatus set-up to investigate redox reaction in Cell I and Cell II.



Rajah 11.1
Diagram 11.1

- (a) Apakah yang dimaksudkan dengan tindak balas redoks?
Kenal pasti jenis Sel I dan Sel II.
What is the meaning of redox reaction?
Identify type of Cell I and Cell II.

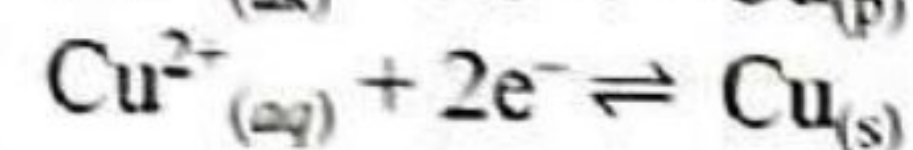
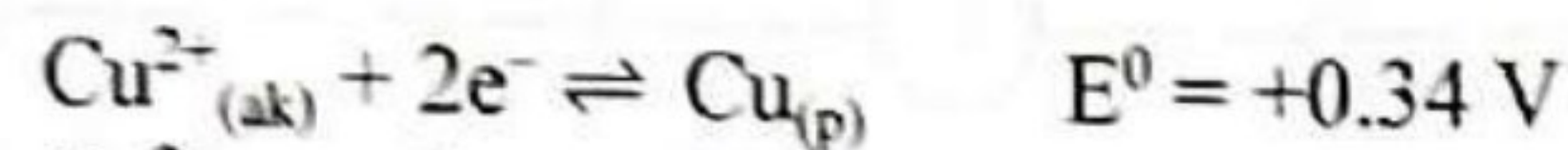
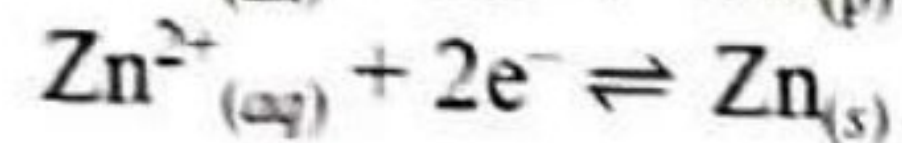
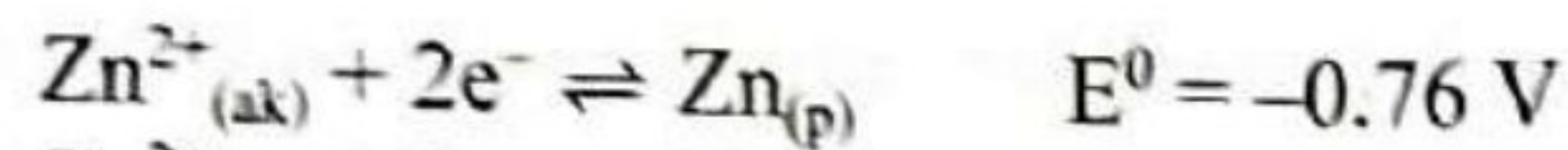
[3 markah]
[3 marks]

(b) Berdasarkan Sel I,
Based on Cell I,

- (i) tulis notasi sel yang berlaku dan hitung nilai voltan yang terhasil dalam sel itu.
Diberi nilai keupayaan elektrod piawai:

write the cell notation that occurs and calculate the value of the voltage produced in the cell.

Given the standard electrode potential value:



[3 markah]

[3 marks]

- (ii) bahan manakah yang akan mengalami tindak balas penurunan?
Terangkan jawapan anda.

which substance will undergo reduction reaction?

Explain your answer.

[2 markah]

[2 marks]

- (c) Berdasarkan Sel II, kenal pasti terminal positif dan terminal negatif.
Ramalkan pemerhatian pada elektrod Y dan elektrod Z.

Based on Cell II, identify positive terminal and negative terminal.

Predict the observation at electrode Y and electrode Z.

[4 markah]

[4 marks]

- (d) Tenaga elektrik boleh dihasilkan melalui tindak balas redoks. Anda dibekalkan dengan sebiji lemon, kepingan zink, paku besi, wayar penyambung dan mentol untuk membina sel kimia untuk membuktikan kenyataan di atas.

Lukis satu gambar rajah berlabel dan anak panah untuk menunjukkan arah aliran elektron. Tulis setengah persamaan dan persamaan ion yang sesuai. Cadangkan agen pengoksidaan dan agen penurunan yang sesuai.

Electrical energy can be produced by redox reaction. You are supplied with a lemon, a piece of zinc, iron nail, connecting wires and bulb to build a chemical cell to prove the above statement.

Draw a labelled diagram and the arrows to show the direction of electron flow. Write suitable half equation and ionic equation. Suggest suitable oxidising agent and reducing agent.

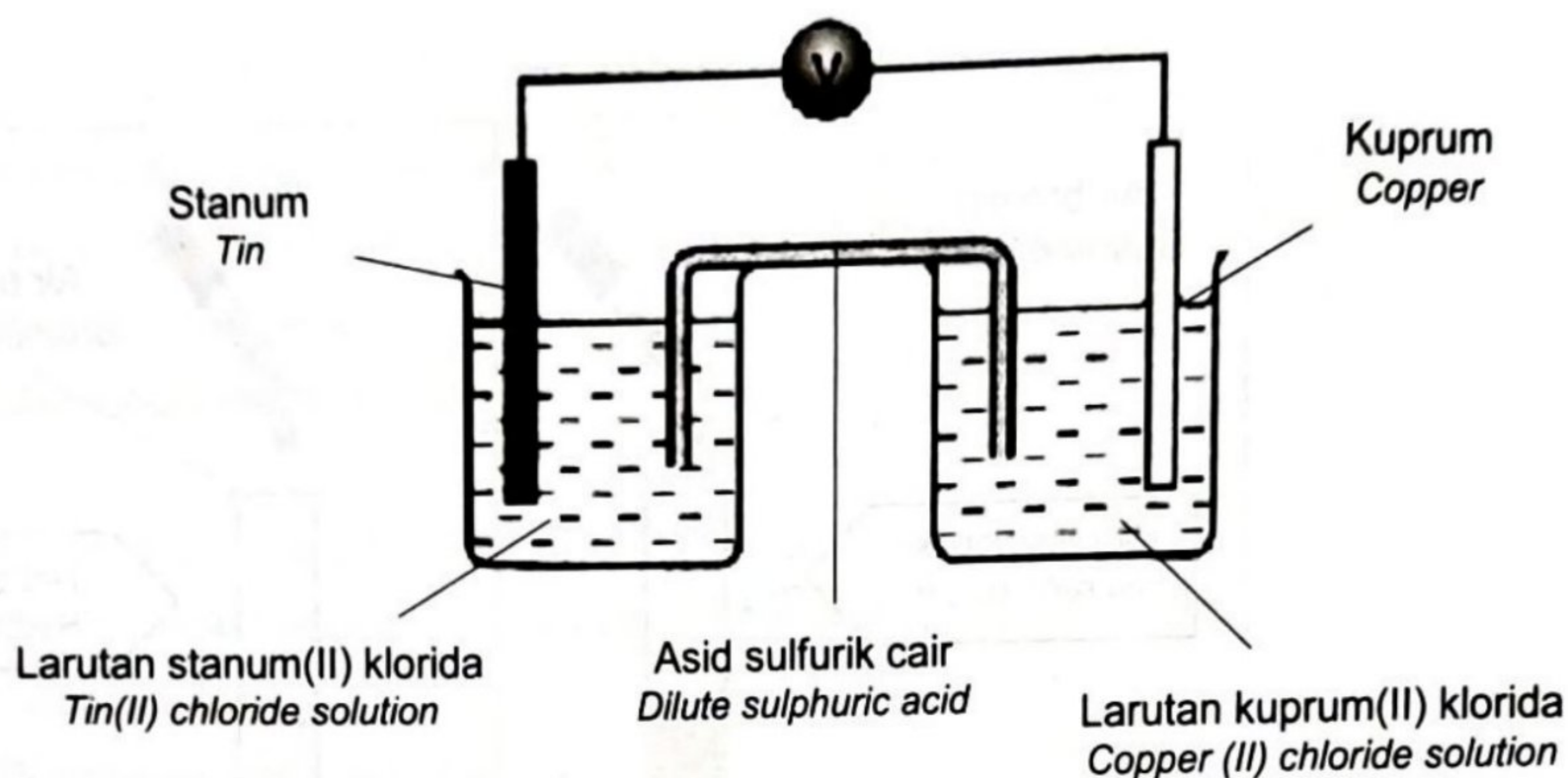
[8 markah]

[8 marks]

KERTAS PEPERIKSAAN TAMAT
END OF QUESTION PAPER

10. (a) Rajah 10.1 menunjukkan suatu sel kimia dan jadual 10.1 menunjukkan nilai E° bagi logam yang terlibat.

Diagram 10.1 shows a chemical cell and table 10.1 shows E° value of involved metals.



Rajah 10.1 / Diagram 10.1

$\text{Sn}^{2+} (\text{ak}) + 2\text{e} \rightleftharpoons \text{Sn} (\text{p})$ $\text{Sn}^{2+} (\text{aq}) + 2\text{e} \rightleftharpoons \text{Sn} (\text{s})$	$E^\circ = - 0.14 \text{ V}$
$\text{Cu}^{2+} (\text{ak}) + 2\text{e} \rightleftharpoons \text{Cu} (\text{p})$ $\text{Cu}^{2+} (\text{aq}) + 2\text{e} \rightleftharpoons \text{Cu} (\text{s})$	$E^\circ = + 0.34 \text{ V}$

Jadual 10.1 / Table 10.1

Berdasarkan rajah 10.1 dan jadual 10.1,

Based on diagram 10.1 and table 10.1,

- (i) Apakah fungsi asid sulfurik cair dan warna larutan kuprum(II) klorida?
 What is the function of dilute acid sulphuric and colour of copper(II) chloride solution?

[2 markah/marks]

- (ii) Kenalpasti terminal negatif dan terminal positif dalam sel itu.
 Identify negative terminal and positive terminal in the cell.

[2 markah/marks]

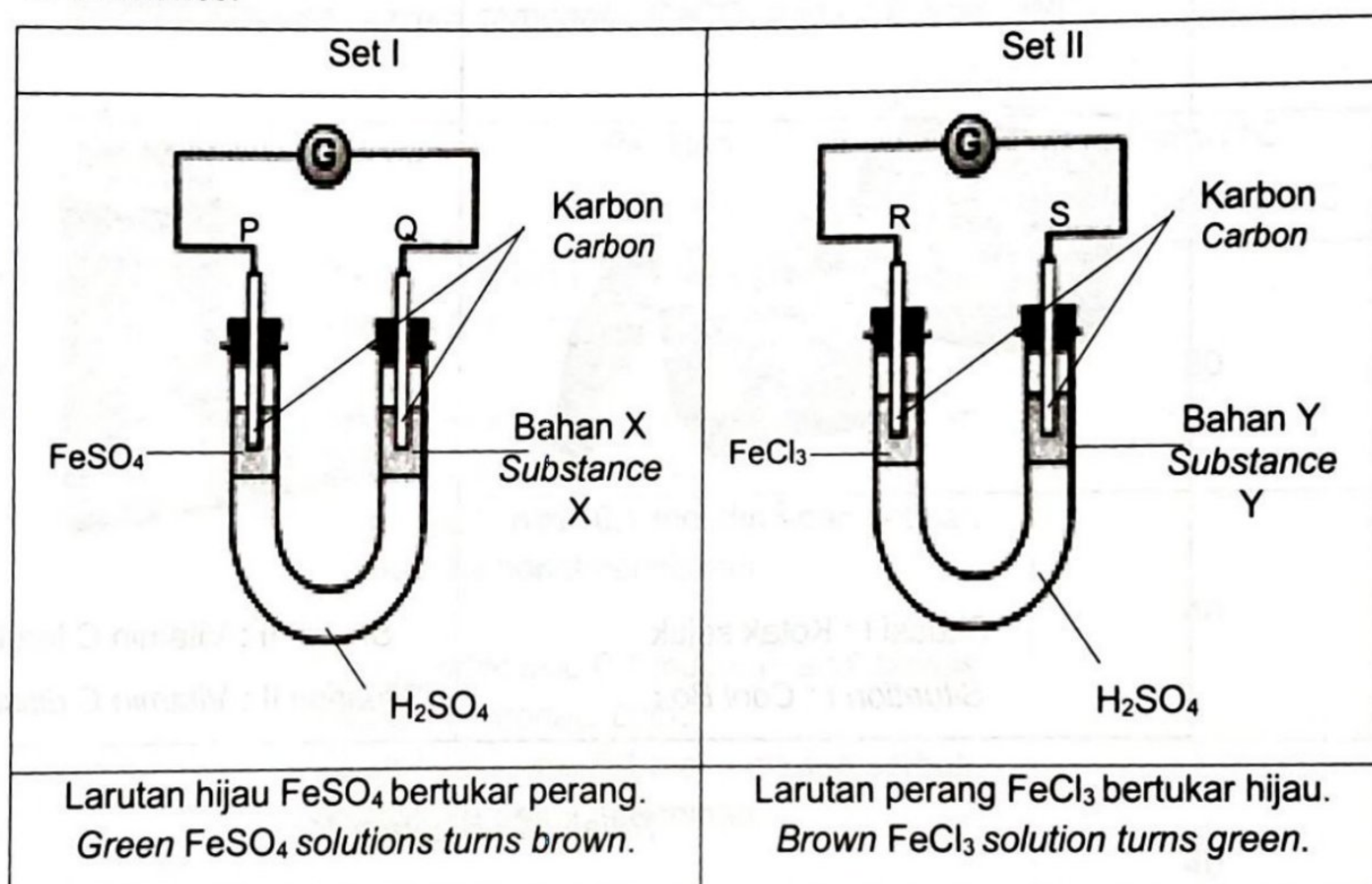
- (iii) Tuliskan persamaan setengah bagi tindak balas pengoksidaan dan penurunan, persamaan ion keseluruhan, notasi sel dan hitungkan nilai voltan yang terhasil dalam sel tersebut.

Write half equation for oxidation and reduction of the reaction, overall ionic equation, cell notation and calculate the voltage value that produced in the cell.

[6 markah/marks]

- (b) Rajah 10.2 menunjukkan dua set susunan radas untuk mengkaji pemindahan elektron pada suatu jarak.

Diagram 10.2 shows two set of apparatus set-up to investigate the transfer of electron at a distance.



Rajah 10.2 / Diagram 10.2

Dengan menamakan bahan X dan bahan Y, bandingkan tindak balas redoks dalam set I dan set II daripada aspek :

By naming substance X and substance Y, compare the redox reaction of set I and set II in term of :

- bahan yang dioksidakan
oxidized substance
- setengah persamaan bagi tindak balas penurunan
half equation of reduction reaction
- arah pengaliran elektron
direction of electron flow
- agen pengoksidaan dan agen penurunan
oxidizing agent and reducing agent

[10 markah/marks]

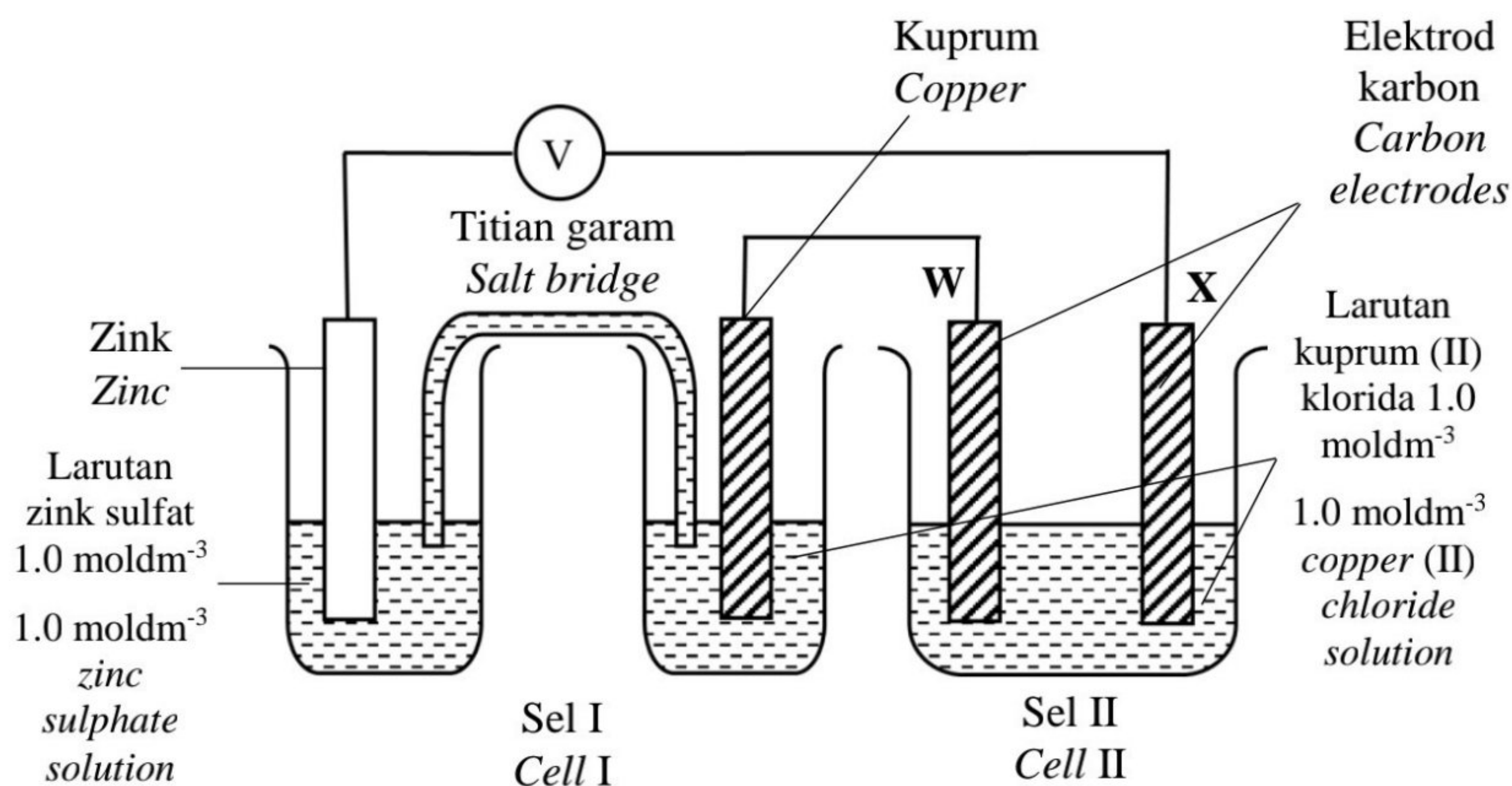
Bahagian B

[20 markah]

Jawab mana-mana **satu** soalan dalam bahagian ini.

- 9 (a) Rajah 8.1 menunjukkan susunan radas bagi dua sel, Sel I dan Sel II yang disambungkan bersama.

Diagram 8.1 shows the apparatus setup for two cells, Cell I and Cell II connected together.



Rajah 8.1/ Diagram 8.1

Jadual 4 menunjukkan sebahagian daripada nilai keupayaan elektrod piawai sel setengah.

Table 4 shows a part of the standard electrode potential of half-cells.

Tindak balas sel setengah <i>Half-cell equations</i>	E^0 / V (298K)
$\text{Zn}^{2+} + 2\text{e}^- \rightleftharpoons \text{Zn}$	-0.76
$\text{Cl}_2 + 2\text{e}^- \rightleftharpoons 2\text{Cl}^-$	+1.36
$\text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^- \rightleftharpoons 4\text{OH}^-$	+0.40
$\text{Cu}^{2+} + 2\text{e}^- \rightleftharpoons \text{Cu}$	+0.34
$2\text{H}^+ + 2\text{e}^- \rightleftharpoons \text{H}_2$	0.00
$\text{S}_2\text{O}_8^{2-} + 2\text{e}^- \rightleftharpoons 2\text{SO}_4^{2-}$	+2.01

Jadual 4/ Table 4

Berdasarkan Rajah 8.1 dan Jadual 4,

Based on Diagram 8.1 and Table 4,

- (i) Nyatakan fungsi titian garam. Kenal pasti terminal negatif dalam Sel I dan terangkan mengapa.

State the function of the salt bridge in Cell I. Identify the negative terminal in Cell I and explain why.

[3 markah/ marks]

- (ii) Terangkan tindak balas yang berlaku pada elektrod karbon **W** dan elektrod karbon **X** dalam Sel II dari segi:

- Pergerakan ion-ion ke setiap elektrod
- Pemilihan ion untuk dioksidakan dan diturunkan dan sebab mengapa ion itu dipilih
- Setengah persamaan di setiap elektrod
- Pemerhatian di setiap elektrod

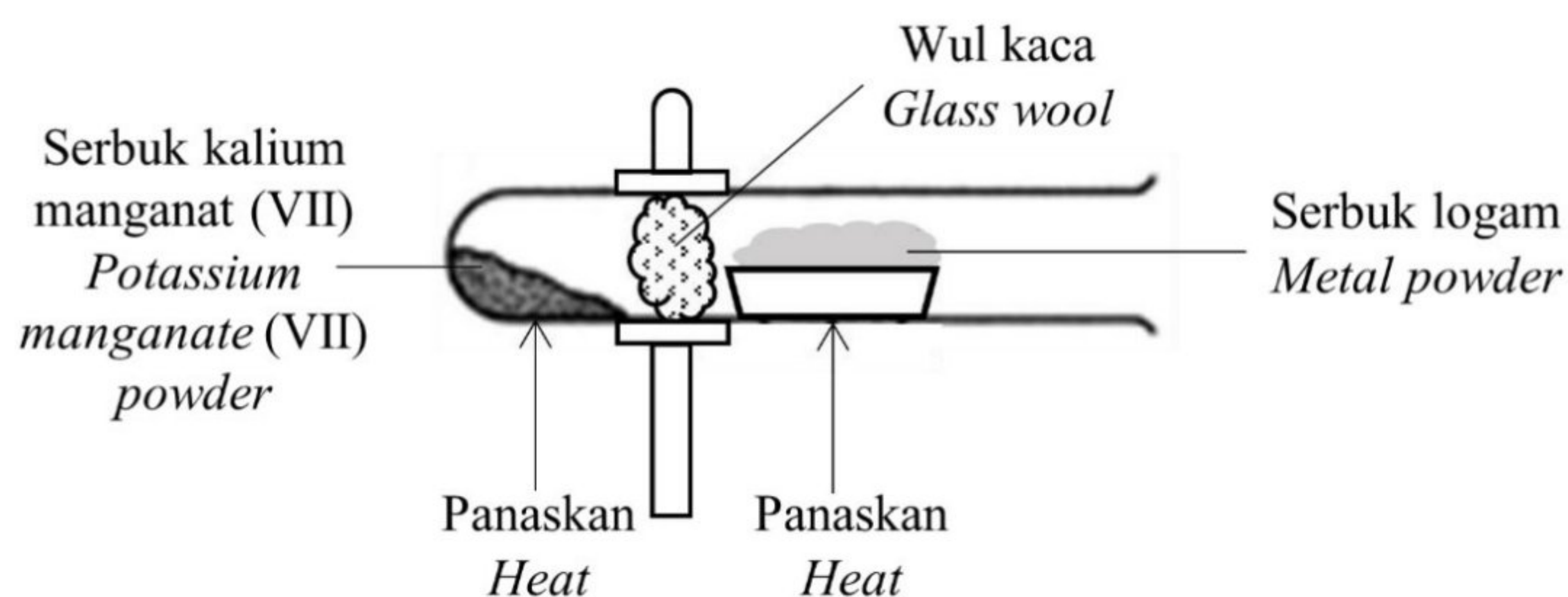
*Explain the reaction that occurs on carbon electrodes **W** and **X** in Cell II based on:*

- *Movement of ions to each electrode*
- *Choice of ions to be oxidized and reduced and the reason why the ions were chosen*
- *Half-equation at each electrode*
- *Observations at each electrode*

[10 markah/ marks]

- (b) Rajah 8.2 menunjukkan susunan radas yang digunakan didalam makmal untuk mengkaji kereaktifan logam terhadap oksigen untuk membentuk logam oksida.

Diagram 8.2 shows the apparatus setup used in the lab to investigate the reactivity of metals towards oxygen to form metal oxide



Rajah 8.2/ Diagram 8.2

Apabila ferum dipanaskan menggunakan radas dalam Rajah 8.2, ferum (III) oksida terhasil. Nyatakan warna bagi ferum (III) oksida yang terhasil dan tulis persamaan kimia bagi tindak balas itu. Hitung jisim logam oksida yang terhasil apabila 14 g serbuk ferum dipanaskan.

When iron is heated using the apparatus in Diagram 9.2, iron (III) oxide is formed. State the colour of iron (III) oxide formed and write a chemical equation for the reaction. Calculate the mass of metal oxide formed when 14 g of iron is heated.

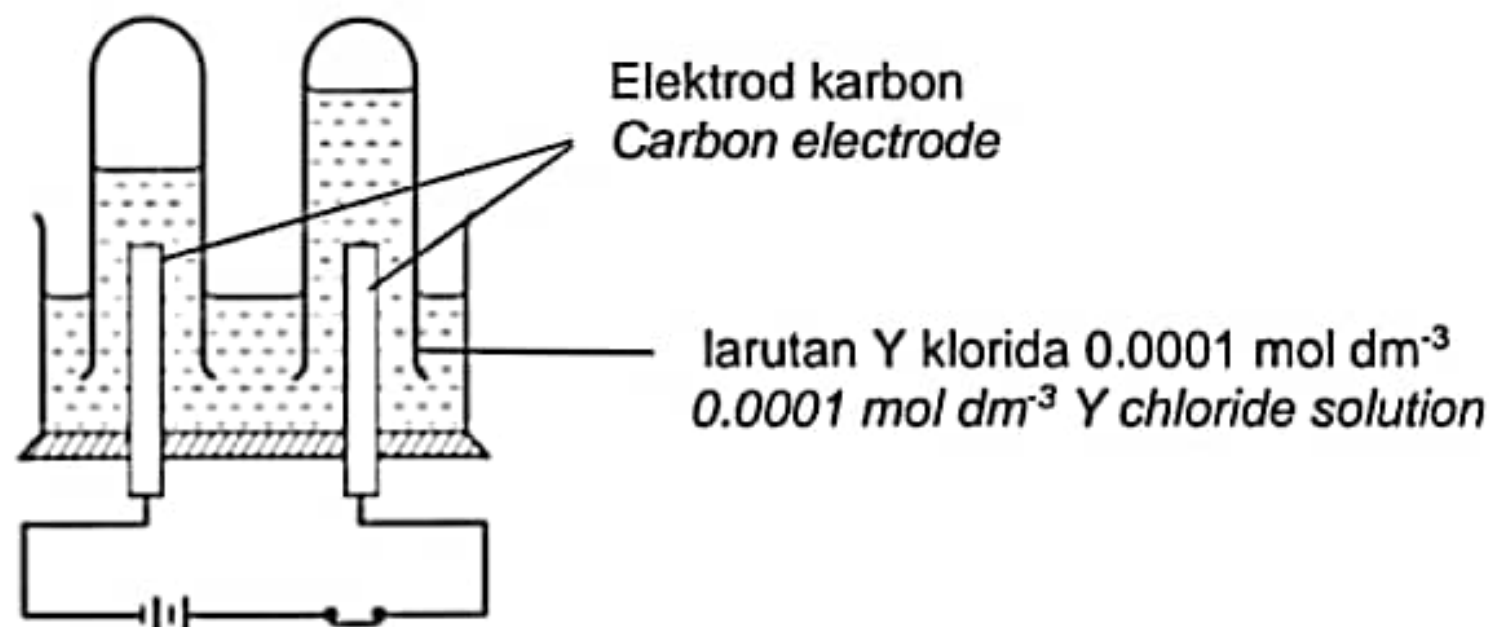
[Jisim atom relatif: O = 16; Fe = 56]

[Relative atomic mass: O = 16; Fe = 56]

[7 markah/ marks]

- 10 (a) Rajah 10.1 menunjukkan susunan radas bagi elektrolisis larutan Y klorida $0.0001 \text{ mol dm}^{-3}$ menggunakan elektrod karbon. Hasil di anod dan katod ialah gas.

Diagram 10.1 shows the apparatus set-up for electrolysis of $0.0001 \text{ mol dm}^{-3}$ Y chloride solution using carbon electrode. The products at cathode and anode are gases.



Rajah 10.1 / Diagram 10.1

Cadangkan Y klorida. Tuliskan setengah persamaan bagi tindak balas yang berlaku di anod.

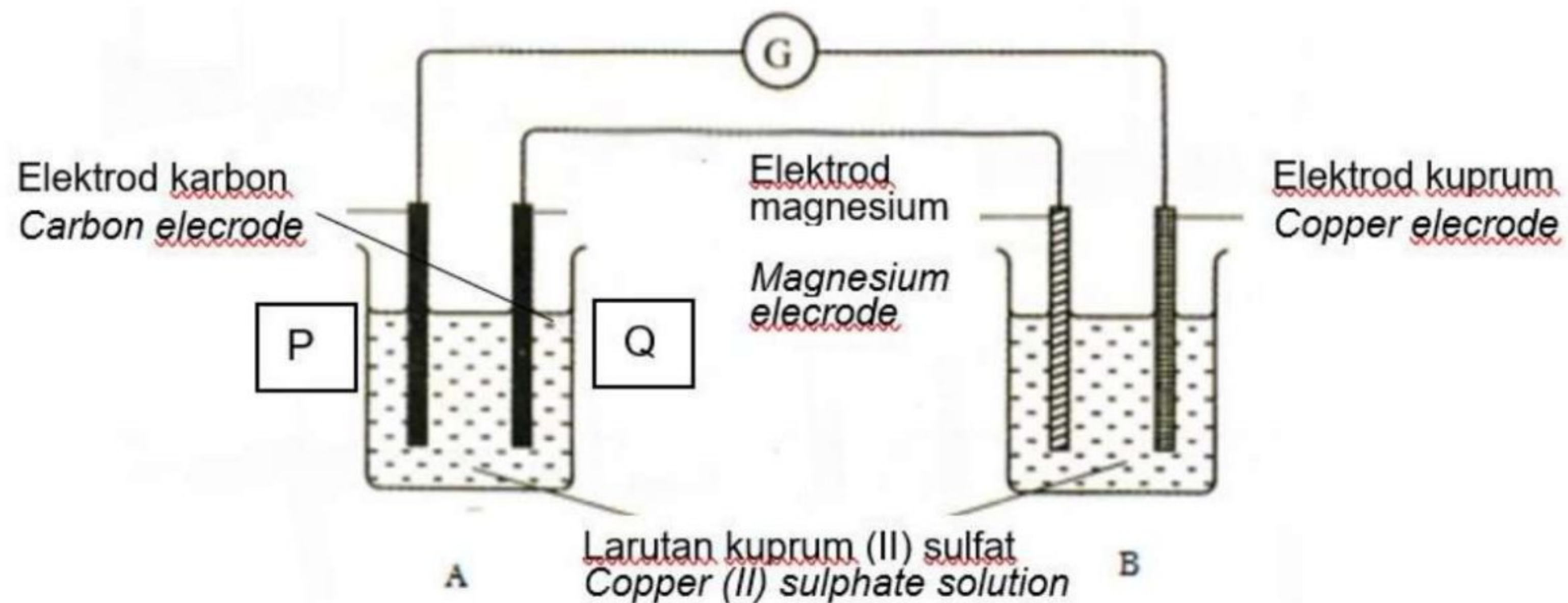
Jika larutan digantikan dengan larutan Y klorida 1.0 mol dm^{-3} nyatakan hasil di anod dan berikan satu sebab bagi jawapan anda.

Suggest Y chloride. Write half equation for the reaction occurred at anode. If the solution is replaced with 1.0 mol dm^{-3} of Y chloride solution, state the product at anode. Give reason for your answer.

Persamaan setengah sel <i>Half-cell equation</i>	E° / V
$Cl_2 + 2e \rightleftharpoons 2Cl^-$	+1.36
$O_2 + 2H_2O + 4e \rightleftharpoons 4OH^-$	+0.40
$2H^+ + 2e \rightleftharpoons H_2$	0.00

[4 markah/marks]

(b)



Rajah 10.2 / Diagram 10.2

Persamaan setengah sel <i>Half-cell equation</i>	E° / V
$Mg^{2+} + 2e^- \rightleftharpoons Mg$	-2.38
$Cu^{2+} + 2e^- \rightleftharpoons Cu$	+0.34
$S_2O_8^{2-} + 2e^- \rightleftharpoons 2SO_4^{2-}$	+2.01
$O_2 + 2H_2O + 4e^- \rightleftharpoons 4OH^-$	+0.40
$2H^+ + 2e^- \rightleftharpoons H_2$	0.00

- (i) Berdasarkan Rajah 10.2, nyatakan elektrod yang bertindak sebagai katod dalam sel A.

Based on Diagram 10.2, state the electrode that act as the cathode in cell A.

[1 markah /mark]

- (ii) Terangkan tindak balas pada katod. Jawapan anda perlulah mengandungi

aspek-aspek berikut:

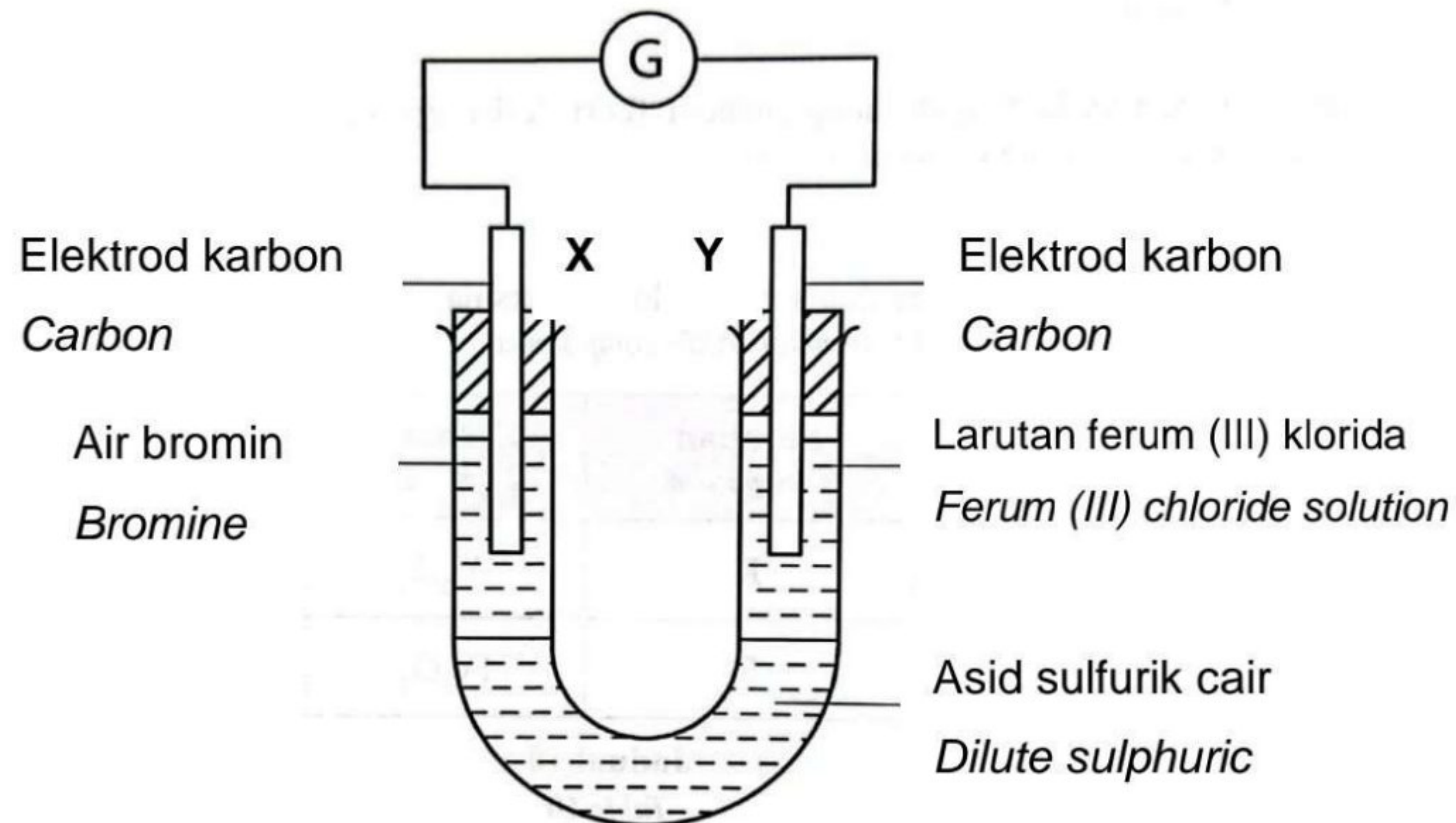
- Senarai ion-ion yang tertarik
- Nama ion yang dipilih untuk dinyahcas
- Sebab ion ini dipilih untuk dinyahcas
- Jenis tindak balas yang berlaku
- Pemerhatian

Explain the reactions at the cathode. Your answer should include the following aspects:

- List of the ions that attracted
- Name the selectively discharged ions
- The reason why the ion is selectively discharged
- Type of the reaction occurred
- Observation

[6 markah /marks]

(c)



Rajah 10.3 / Diagram 10.3

Rajah 10.3 menunjukkan susunan radas yang dijalankan oleh Ally untuk mengkaji pemindahan elektron pada suatu jarak. Selepas beberapa ketika, Ally mendapati jarum galvanometer tidak terpesong dan tiada sebarang perubahan pada larutan yang digunakan.

Diagram 10.3 shows the arrangement of the apparatus set up carried out by Ally to study the transfer of electrons at a distance. After a while, Ally noticed that the galvanometer needle was not deflected and there was no change in the solution used.

- (i) Kaji Rajah 10.3 dan kenalpasti kesalahan yang dilakukan.

Study Diagram 10.3 and identify the mistake made.

[1 markah /mark]

- (ii) Dengan bantuan gambarajah berlabel, cadangkan pengubahsuaian yang perlu dilakukan oleh Ally dan tandakan arah pengaliran elektron.

With the help of a labelled diagram, suggest the modifications that Ally should make and mark the direction of electron flow.

[2 markah/marks]

- (iii) Selepas pengubahsuaian dijalankan, didapati jarum galvanometer terpesong.

Berdasarkan jawapan di (c) (ii)

- Kenalpasti agen pengoksidaan dan agen penurunan
- Nyatakan pemerhatian di X dan Y
- Tuliskan setengah persamaan yang berlaku di X dan Y
- Tuliskan persamaan ion yang terlibat

After the modification was carried out, it was found that the galvanometer needle was deflected.

Based on the answer in (c) (ii)

- *Identify oxidising agents and reducing agents*
- *State the observations at X and Y*
- *Write the half equation that occurs at X and Y*
- *Write the ionic equation involved*

[7 markah/marks]

Bahagian B

Section B

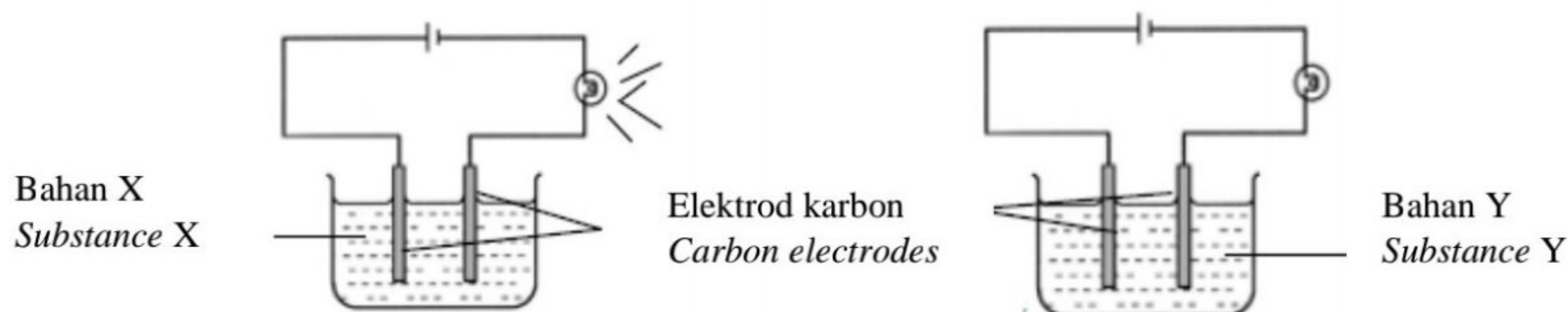
[20 markah/ marks]

Jawab mana-mana **satu** soalanAnswer any **one** question

- 9 Bahan X dan Y merupakan dua bahan tidak berwarna dalam keadaan cecair. Rajah 9.1 menunjukkan susunan radas untuk menentukan sama ada bahan X dan Y adalah suatu elektrolit.

Substances X and Y are two colourless substances in a liquid state.

Diagram 9.1 shows the set-up of apparatus to determine whether substances X and Y are electrolyte.



Rajah 9.1 / Diagram 9.1

Berdasarkan Rajah 9.1,

Based on Diagram 9.1,

- (a) (i) Nyatakan maksud elektrolit.

State the meaning of electrolyte.

[1 markah / mark]

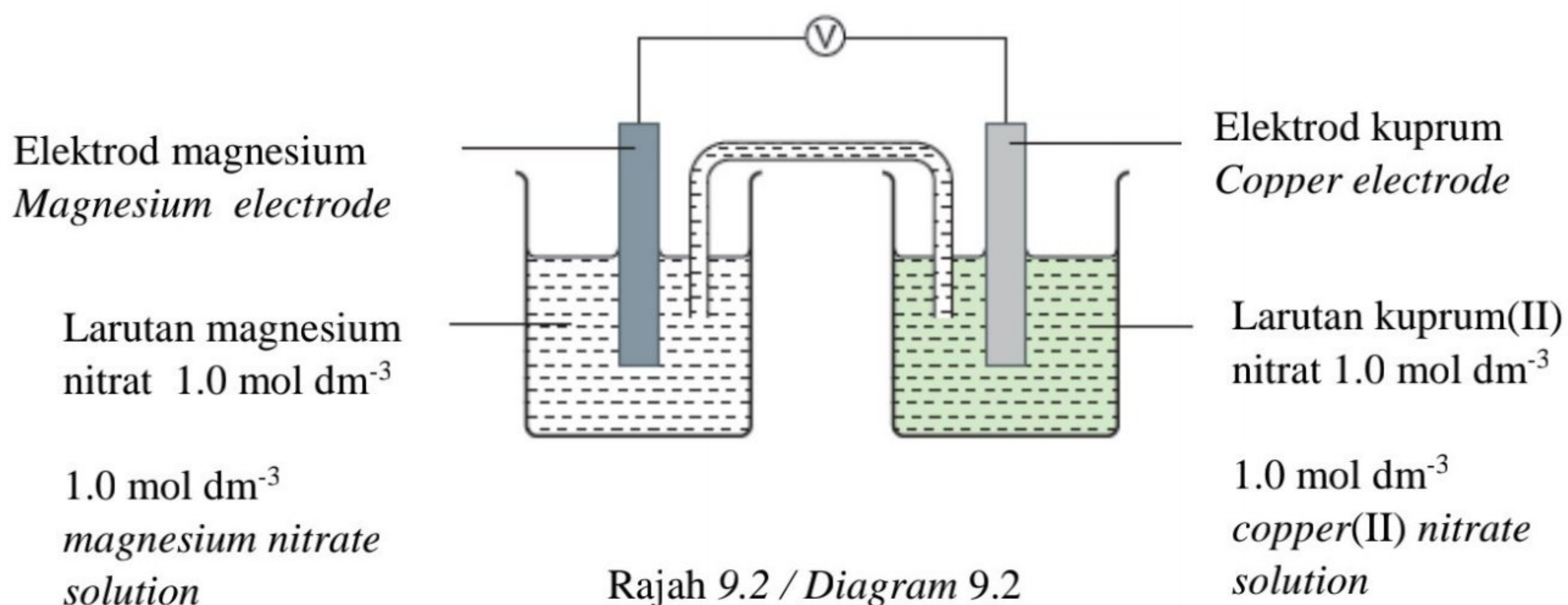
- (ii) Bahan manakah X atau Y ialah suatu elektrolit? Terangkan.

Which substance X or Y is an electrolyte? Explain.

[2 markah / marks]

- (b) Rajah 9.2 menunjukkan susunan radas untuk sel kimia A.

Diagram 9.2 shows the apparatus set-up for chemical cell A.



Rajah 9.2 / Diagram 9.2

Berdasarkan Rajah 9.2,

Based on Diagram 9.2,

- (i) Tuliskan notasi sel bagi sel kimia ini

Write cell notation of the chemical cell.

[1 markah / mark]

- (ii) Nyatakan pemerhatian dan tuliskan setengah persamaan pada elektrod magnesium.

State the observation and write half equation at magnesium electrode.

[2 markah / marks]

- (iii) Sekiranya elektrod magnesium dan larutan magnesium nitrat dalam sel kimia A digantikan dengan elektrod ferum dan larutan ferum(II) klorida untuk membentuk sel kimia B, jelaskan perbezaan voltan sel bagi sel kimia A dan B.

If the magnesium electrode and magnesium nitrate solution in Chemical Cell A are replaced by an iron electrode and iron(II) chloride solution to form Chemical Cell B, explain the difference of the cell voltages of chemical cells A and B.

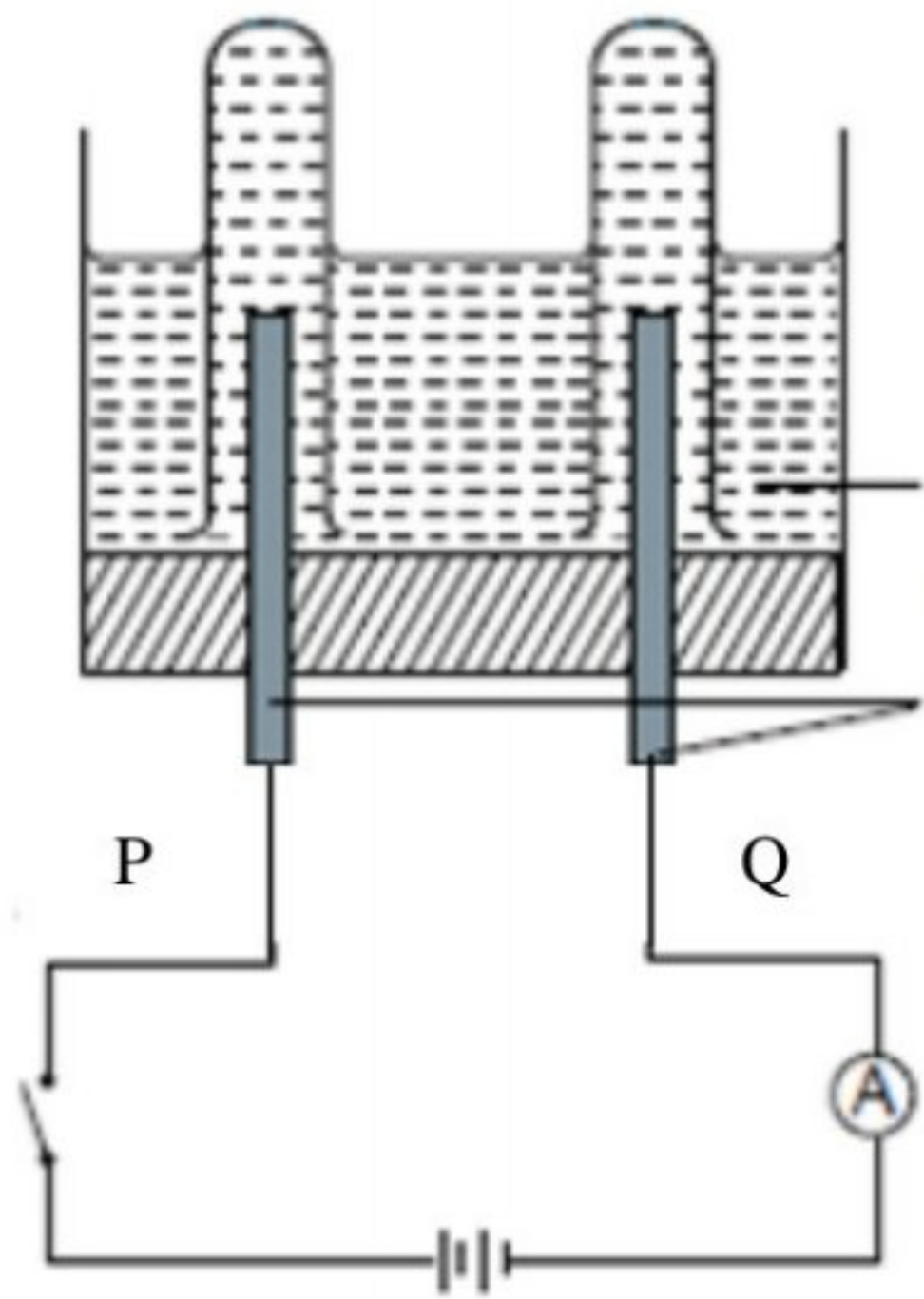
Diberi / Given

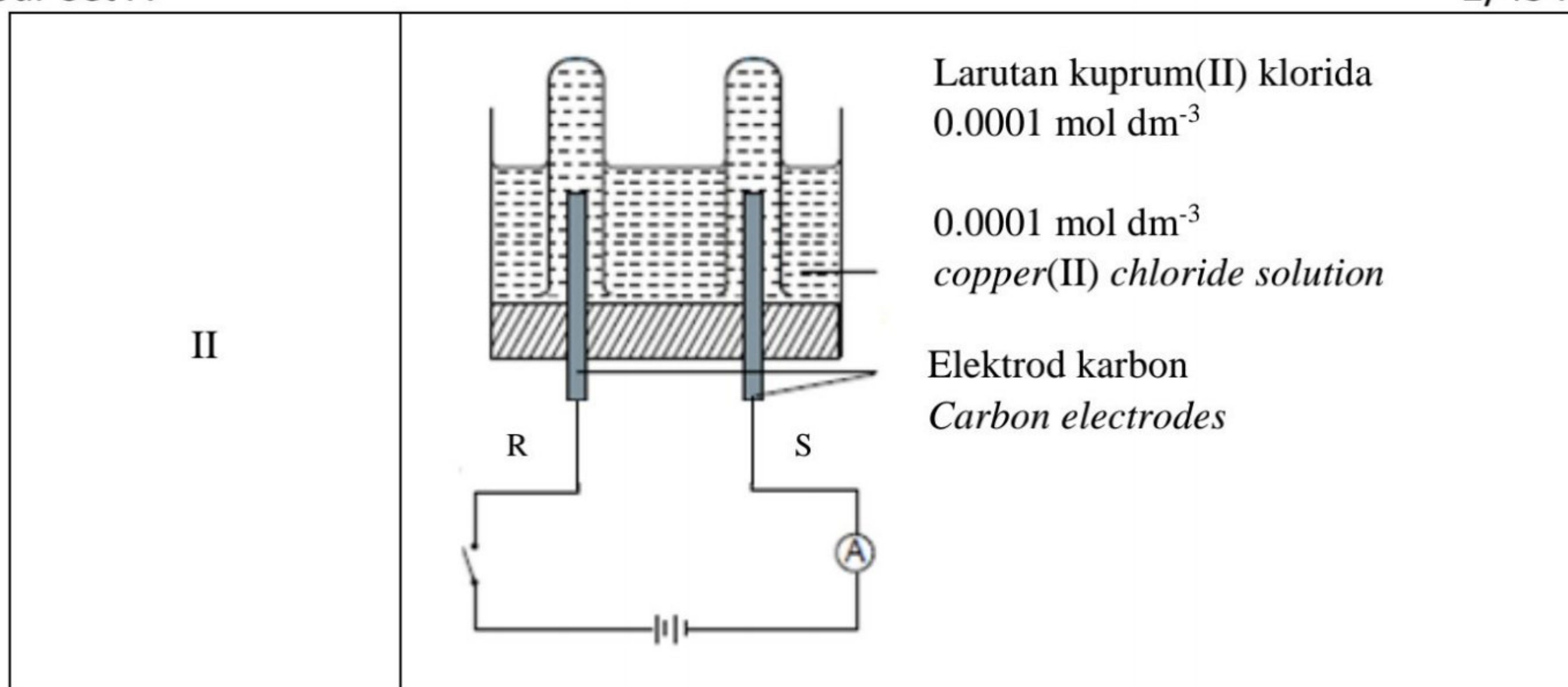


[4 markah / marks]

- (c) Rajah 9.3 menunjukkan susunan radas yang digunakan dalam eksperimen untuk mengkaji elektrolisis larutan kuprum(II) klorida.

Diagram 9.3 shows the apparatus set-up used in experiment to study the electrolysis of copper(II) chloride solution.

Eksperimen <i>Experiment</i>	Susunan radas <i>Apparatus set-up</i>
I	 Larutan kuprum(II) klorida 1.0 moldm⁻³ 1.0 mol dm⁻³ copper(II) chloride solution Elektrod karbon Carbon electrodes



Rajah / Diagram 9.3

Suis ditutup dan dibiarkan selama 20 minit. Jadual 9 menunjukkan pemerhatian selepas 20 minit.
The switch is closed and left for 20 minutes. Table 9 shows the observations after 20 minutes.

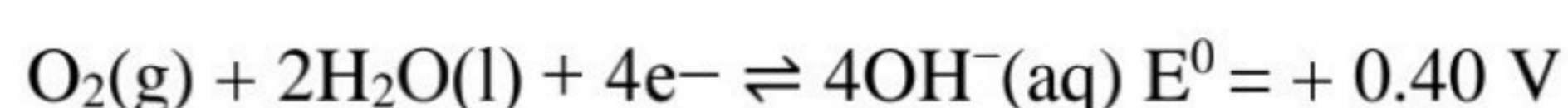
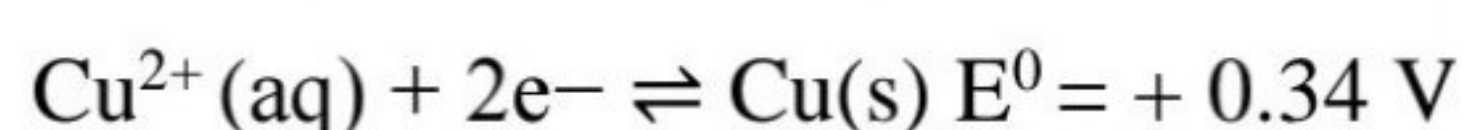
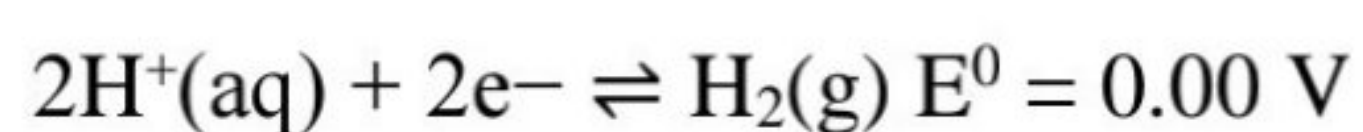
Eksperimen <i>Experiment</i>	Pemerhatian <i>Observation</i>
I	Gas kuning kehijauan terbentuk pada elektrod karbon P. Pepejal perang terbentuk pada elektrod karbon Q. Keamatan larutan biru semakin berkurang. <i>Greenish-yellow gas is produced at carbon electrode P. Brown solid is formed at carbon electrode Q. Intensity of blue colour solution decrease.</i>
II	Gas tidak berwarna terbentuk pada elektrod karbon R. Pepejal perang terbentuk pada elektrod karbon S. Keamatan larutan biru semakin berkurang. <i>Colourless gas is produced at carbon electrode R. Brown solid is formed at carbon electrode S. Intensity of blue colour solution decrease.</i>

Jadual 9 / Table 9

Nyatakan nama hasil pada elektrod P, Q, R dan S. Jelaskan pemerhatian dan tuliskan persamaan setengah pada anod dan katod eksperimen I.

State the name of the products at electrodes P, Q, R and S. Explain the observations and write half equations at the anode and cathode of experiment I.

Diberi/ *Given*



[8 markah / marks]

- (d) Rajah 9.4 menunjukkan perbualan di antara Ahmad dan Mei Ling.

Diagram 9.4 shows the conversation between Ahmad and Mei Ling.



Rajah / Diagram 9.4

Lukiskan satu gambar rajah berlabel susunan radas untuk aktiviti Ahmad.

Draw a labelled diagram of the apparatus set-up for Ahmad's activity.

[2 markah / marks]

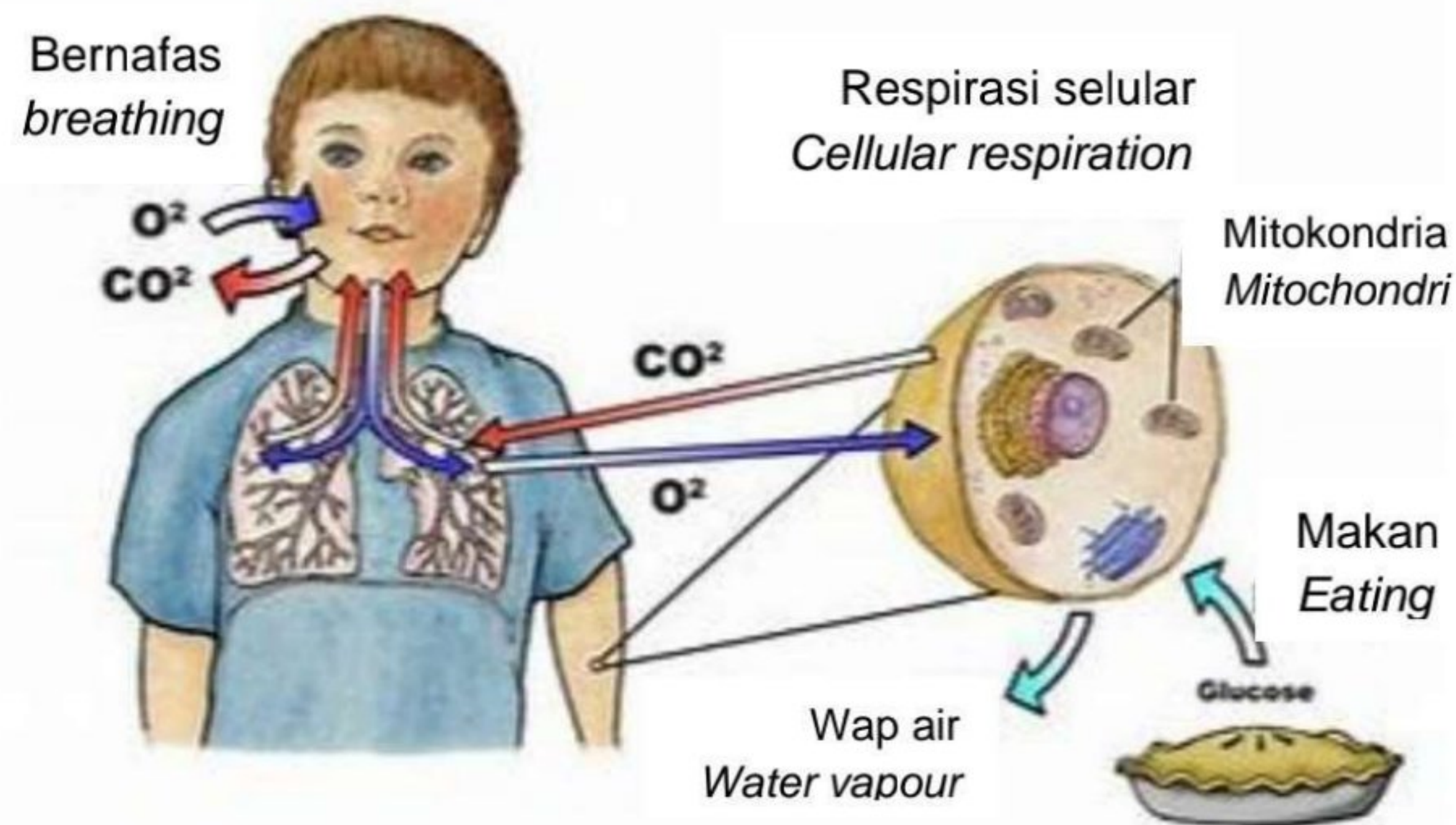
Bahagian B/ Section B

[20 markah/20 marks]

Jawab mana-mana **satu** soalan daripada bahagian ini

Answer any **one** question from this section.

- 9 (a) Rajah 9 menunjukkan respirasi selular, sumber tenaga utama bagi manusia. Makanan yang kita makan ditukarkan kepada tenaga di dalam mitokondria. Semasa pernafasan, oksigen diturunkan manakala glukosa dioksidakan. *Diagram 9 shows cellular respiration, the ultimate source of energy in human beings. The food that we consume is converted into energy in mitochondria. During respiration, oxygen is reduced whereas the glucose is oxidised.*



Bahan tindak balas <i>Reactants</i>	$C_6H_{12}O_6 + 6O_2$
Hasil tindak balas <i>Products</i>	$6CO_2 + 12H_2O + \text{Energy (ATP)}$

Rajah 9/Diagram 9

Berdasarkan Rajah 9;
Based on Diagram 9,

- (i) Nyatakan nama tindak balas yang berlaku bagi respirasi selular?
State the name of the reaction that takes place for cellular respiration?
[1 markah/mark]
- (ii) Apakah fungsi gas oksigen dan terangkan mengapa?
Berapakah jisim makanan yang dimakan bagi menghasilkan 1000 cm^3 gas karbon dioksida?
What is the function of oxygen gas and explains why?
Calculate the mass of food intake to produce 1000 cm^3 of carbon dioxide gas?

[Isipadu molar gas pada keadaan bilik = $24 \text{ dm}^3 \text{ mol}^{-1}$]
[Molar volume of gas at room conditions = $24 \text{ dm}^3 \text{ mol}^{-1}$]

[4 markah/marks]

- (b) Jadual 9 menunjukkan pemerhatian bagi tindak balas di antara logam **X** dengan dua larutan garam yang berbeza. Garam X sulfat dan garam X klorida merupakan garam tidak terlarutkan.

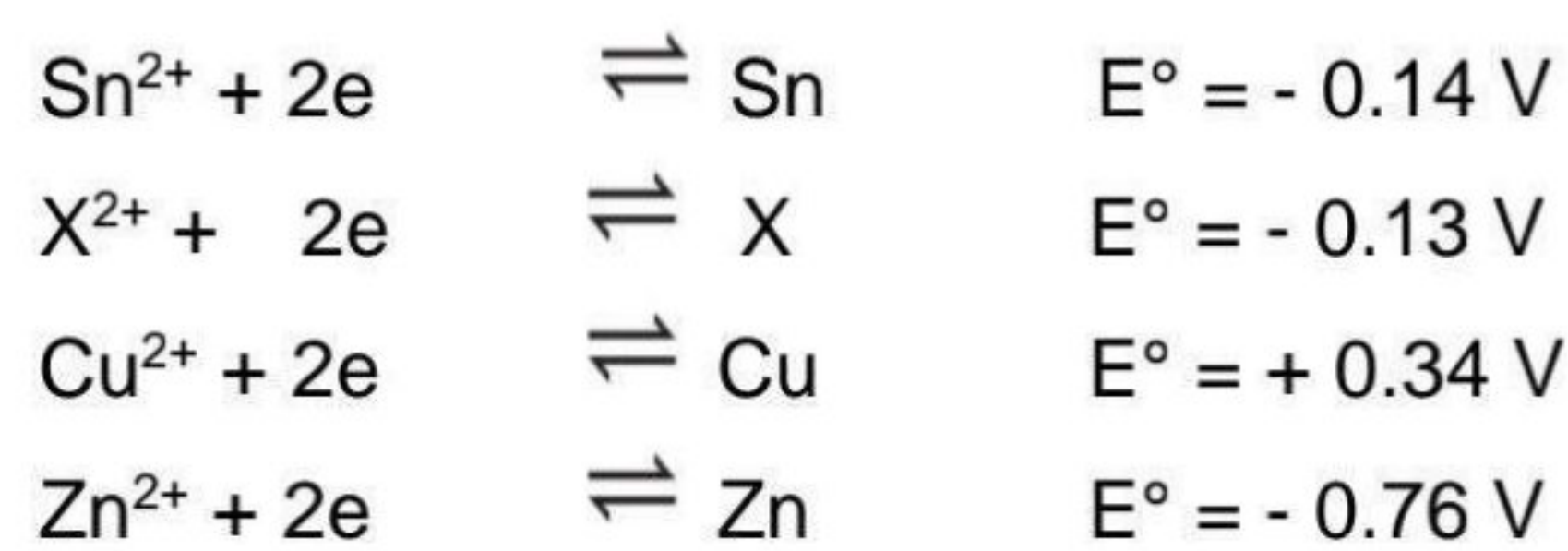
Table 9 shows the observation for the reaction between metal X with two different salt solutions.

Larutan garam <i>Salt solution</i>	Pemerhatian <i>Observation</i>
Kuprum(II) sulfat <i>Copper (II) sulphate</i>	Enapan perang terbentuk <i>Brown deposit is formed</i>
Zink sulfat <i>Zinc sulphate</i>	Tiada perubahan <i>No change</i>

Jadual 9/ Table 9

Nilai keupayaan elektrod piawai sel setengah beberapa logam diberikan seperti berikut:

Given the standard electrode of potential values of half-cells of some metals:



Berdasarkan nilai E° yang diberi,
Based on E° value given,

- (i) Kenalpasti logam X dan hitung voltan sel secara teori dengan menggunakan nilai keupayaan elektrod piawai sel setengah bagi tindak balas antara logam X dan larutan kuprum (II) sulfat.
Identify metal X and calculate the theoretical voltage of the cells using standard electrode potential value of the half-cells for the reaction between metal X and copper (II) sulphate solution.
- (ii) Tuliskan setengah persamaan pengoksidaan, setengah persamaan penurunan dan persamaan ion keseluruhan bagi tindak balas ini.
Write the half equation for oxidation reaction, half equation for reduction and the overall ionic equation for this reaction.

[5 markah/marks]

- (iii) Susun ion dalam tertib menaik kekuatan agen pengoksidaan.
Susun atom dalam tertib menaik kekuatan agen penurunan.

Arrange the ions in order of increasing strength of the oxidizing agent.
Arrange the atoms in order of increasing strength of the reducing agent.

[2 markah/marks]

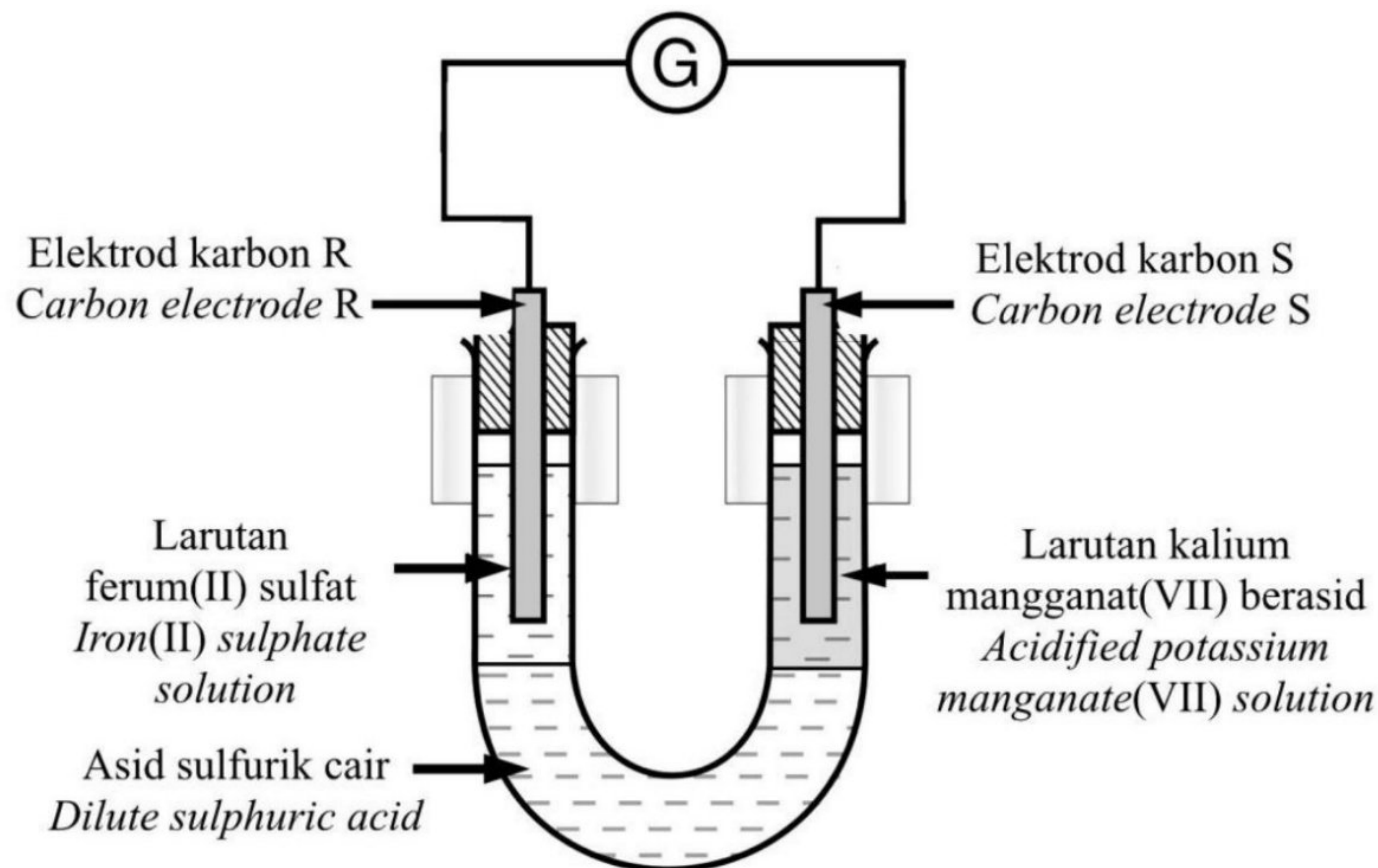
- (iv) Seterusnya, terangkan mengapa terdapat perbezaan dalam pemerhatian yang diperolehi di dalam Jadual 9.

Next, explain why there are differences in observation obtained in the Table 9.

[8 markah/marks]

- 2 Rajah 2 menunjukkan susunan radas bagi satu eksperimen untuk mengkaji pemindahan elektron pada suatu jarak dalam tindak balas redoks.

Diagram 2 shows the apparatus set-up for an experiment to investigate electron transfer at a distance in redox reaction.



Rajah 2
Diagram 2

- (a) Nyatakan warna larutan ferum(II) sulfat.
State the colour of iron(II) sulphate solution.

.....

[1 markah]

[1 mark]

- (b) Apabila litar dilengkapkan, galvanometer menunjukkan satu pesongan.
Nyatakan jenis tindak balas di elektrod R.
*When the circuit is completed, the galvanometer shows a deflection.
State the type of reaction at R electrode.*

.....

[1 markah]

[1 mark]

[Lihat halaman sebelah

(c) Merujuk kepada tindak balas yang berlaku pada elektrod S,
Referring to the reaction that takes place at S electrode,

(i) Nyatakan pemerhatian pada larutan kalium manganat(VII) berasid.
State the observation for acidified potassium manganate(VII) solution.

.....

[1 markah]

[1 mark]

(ii) Nyatakan perubahan nombor pengoksidaan mangan dalam (c)(i).
State the change in oxidation number of mangan in (c)(i).

.....

[1 markah]

[1 mark]

(d) Lukiskan anak panah pada Rajah 2 untuk menunjukkan arah aliran elektron.
Draw the arrow on Diagram 2 to show the direction of electron flow.

[1 markah]

[1 mark]

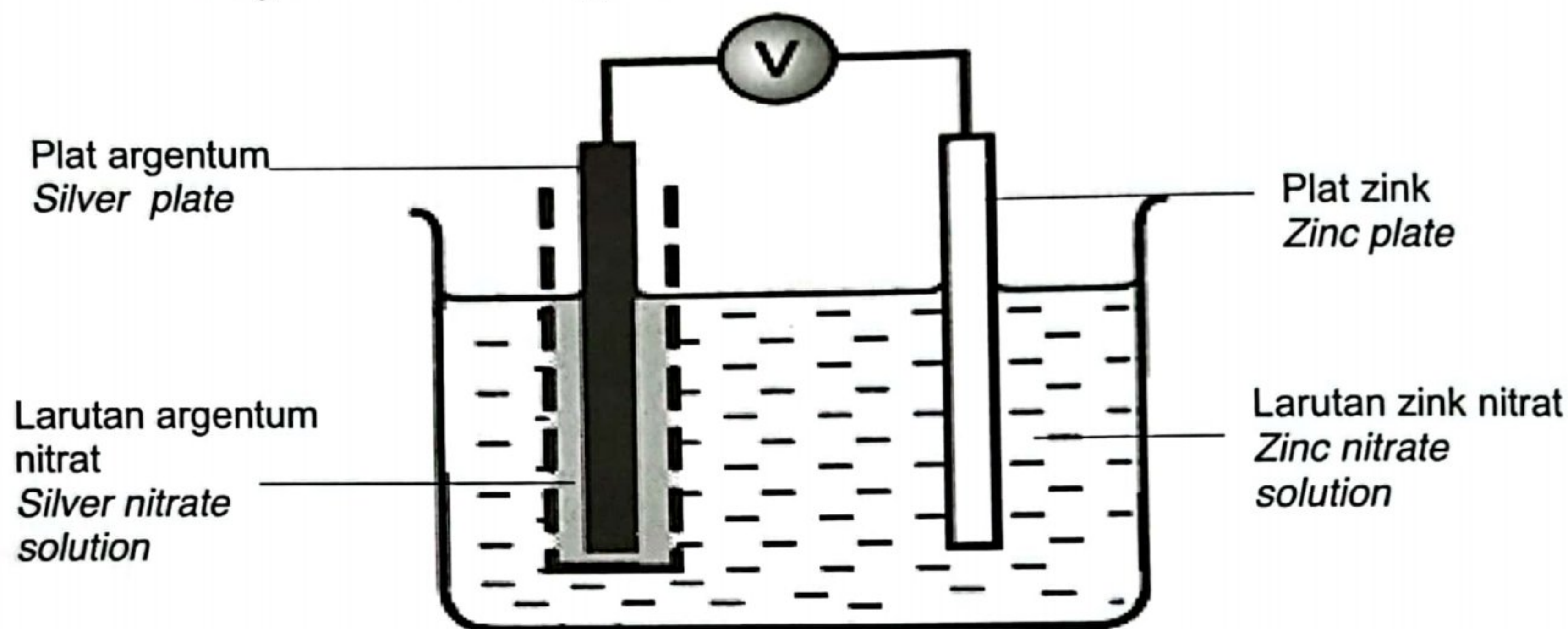
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Bahagian B
Section B

[20 markah]
[20 marks]

Jawab mana-mana **satu** soalan daripada bahagian ini.
*Answer any **one** question from this section.*

- 9 (a) Rajah 9 menunjukkan susunan radas bagi satu sel kimia.
Diagram 9 shows an apparatus set-up for a voltaic cell.



Rajah/ Diagram 9

Jadual 9.1 menunjukkan nilai keupayaan elektrod piawai sel setengah:
Table 9.1 shows standard electrode potential of a half cell:

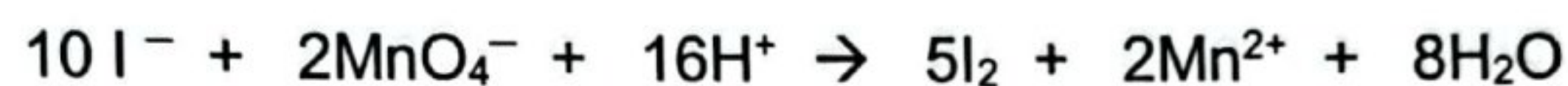
$\text{Mg}^{2+} + 2\text{e}^- \rightleftharpoons \text{Mg}$	$E^0 = -2.38 \text{ V}$
$\text{Zn}^{2+} + 2\text{e}^- \rightleftharpoons \text{Zn}$	$E^0 = -0.76 \text{ V}$
$\text{Ag}^+ + \text{e}^- \rightleftharpoons \text{Ag}$	$E^0 = +0.80 \text{ V}$

Jadual/ Table 9.1

- (i) Apakah yang dimaksudkan dengan tindak balas redoks?
What is meant by redox reaction? [1 mark]
- (ii) Berdasarkan Rajah 9,
Based on Diagram 9,
- Nyatakan pemerhatian pada terminal negatif dan terangkan
State the observation at negative terminal and explain
 - Tuliskan setengah persamaan bagi tindak balas pengoksidaan dan penurunan
Write the half equation for oxidation and reduction reaction
 - Tuliskan notasi sel bagi sel di atas
Write the cell notation of the cell
- [6 marks]

- (iii) Sekiranya logam zink ditukar kepada magnesium dan larutan zink nitrat kepada larutan magnesium nitrat, terangkan perubahan yang berlaku kepada nilai E^0 sel. Sertakan perhitungan nilai E^0 sel itu.
If zinc metal is changed to magnesium and zinc nitrate solution to magnesium nitrate solution. Explain the changes that occur to the E^0 value of the cell. Include the calculation of the value of E^0 cell.
- [3 marks]

- (b) (i) Satu eksperimen dijalankan untuk mengkaji pemindahan elektron pada suatu jarak dalam tindak balas redoks antara larutan kalium manganat(VII) berasid dan larutan kalium iodida. Persamaan ion di bawah mewakili tindak balas yang berlaku.
An experiment was conducted to investigate the transfer of electrons at a distance in a redox reaction between acidified potassium manganate (VII) solution and potassium iodide solution. The ionic equation below represents the reaction occurs.



Berdasarkan persamaan ion di atas,
Based on the ionic equation above,

- Nyatakan perubahan warna bagi larutan kalium manganat(VII) berasid.
State the colour change of acidified potassium manganate (VII) solution.
- Kenal pasti agen pengoksidaan dan agen penurunan.
Tuliskan setengah persamaan bagi tindak balas penurunan
Identify the oxidising agent and reducing agent.
Write the half equation for the reduction reaction
- Hitungkan nombor pengoksidaan bagi mangan dalam ion manganat(VII).
Calculate the oxidation number of manganese in manganate (VII) ion.

[7 marks]

- (ii) Jadual 9.2 menunjukkan senarai radas dan bahan yang telah digunakan dalam eksperimen di(b)(i).
Table 9.2 shows the list of apparatus and materials used in experiment at (b)(i).

Radas dan bahan <i>Apparatus and materials</i>	
• Tiub-U <i>U-Tube</i> • Galvanometer <i>Galvanometer</i> • Elektrod karbon <i>Carbon electrodes</i> • Wayar penyambung <i>Connecting wire</i>	• Asid sulfurik cair <i>Dilute sulphuric acid</i> • Larutan kalium iodida <i>Potassium iodide solution</i> • Larutan kalium manganat(VII) berasid <i>Acidified potassium manganate (VII) solution</i>

Jadual / Table 9.2

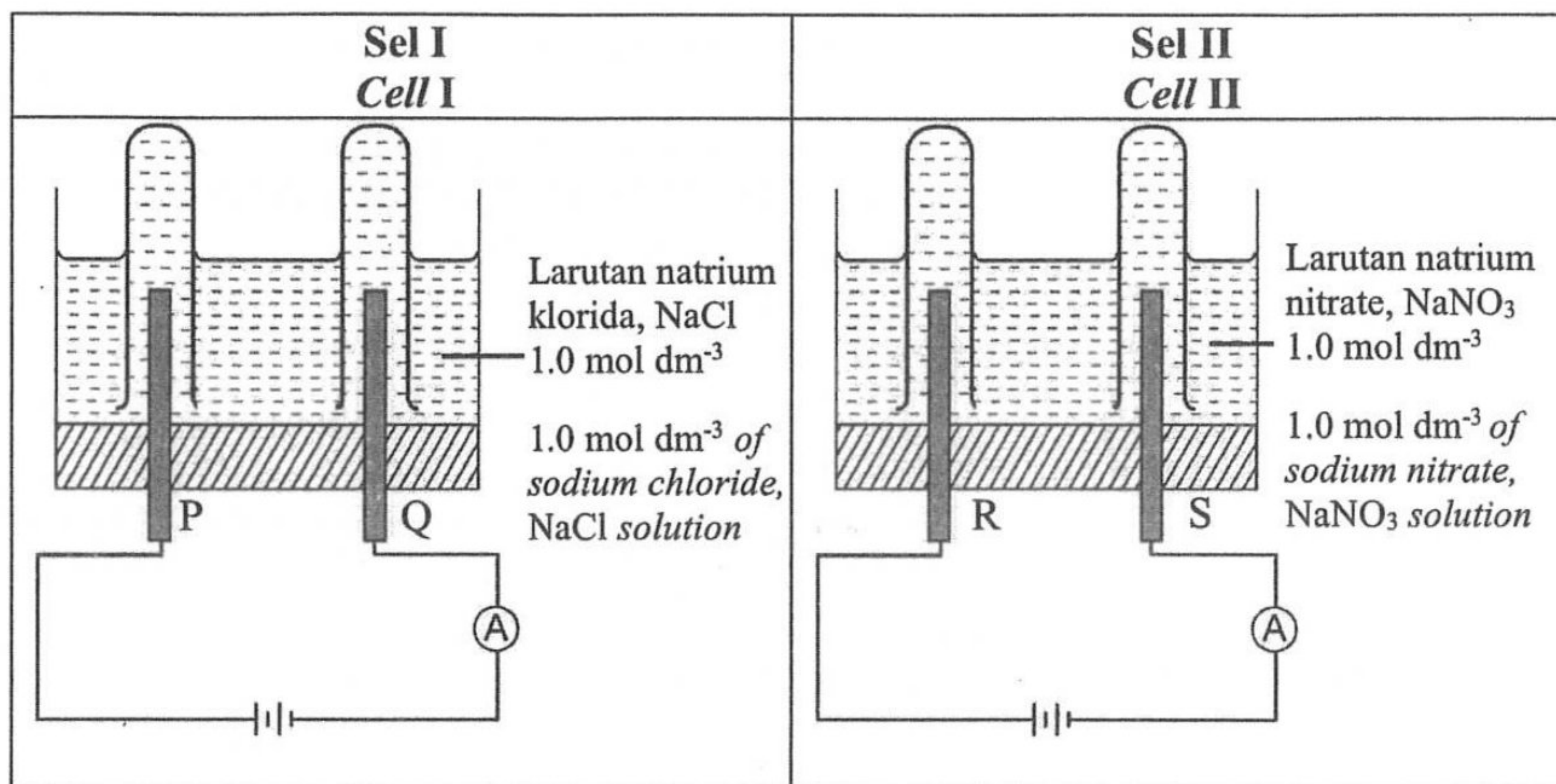
Lukis satu gambarajah berlabel untuk menunjukkan susunan radas bagi mengkaji pemindahan elektron pada suatu jarak. Rajah itu hendaklah menggunakan radas dan bahan yang diberi dalam Jadual 9.2. Dalam rajah itu, lukis anak panah untuk menunjukkan arah pengaliran elektron.

Draw a labelled diagram to show the apparatus set-up to investigate the transfer of electrons at a distance. The diagram must include the apparatus and materials given in Table 9.2. In your diagram, draw the arrows to show the direction of electron flow.

[3 marks]

- 8 Rajah 8 menunjukkan elektrolisis larutan natrium klorida, NaCl dan natrium nitrat, NaNO₃ dengan menggunakan elektrod-elektrod karbon.

Diagram 8 shows the electrolysis of sodium chloride, NaCl solution and sodium nitrate, NaNO₃ solution using carbon electrodes.



Rajah 8
Diagram 8

Diberi nilai keupayaan elektrod piawai berikut.

Given the following standard electrode potential value.



- (a) Berdasarkan Sel I,

Based on Cell I,

- (i) Nyatakan semua anion yang hadir dalam larutan natrium klorida, NaCl.

State all anions present in sodium chloride, NaCl solution.

.....
[1 mark]

- (ii) Namakan hasil yang terbentuk pada elektrod P.

Name the product formed at electrode P.

.....
[1 mark]

8(a)(i)	
	1

8(a)(ii)	
	1

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SULIT

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use

8(a)(iii)	
	1

- (iii) Terangkan jawapan anda berdasarkan pemilihan ion yang dinyahcas di 8(a)(ii).

Explain your answer based on the selection of ions to be discharged in 8(a)(ii).

.....
[1 mark]

- (iv) Huraikan satu ujian kimia bagi menentukan hasil yang terbentuk pada elektrod P.

Describe a chemical test to verify the product formed at P electrode.

8(a)(iv)	
	2

.....
[2 marks]

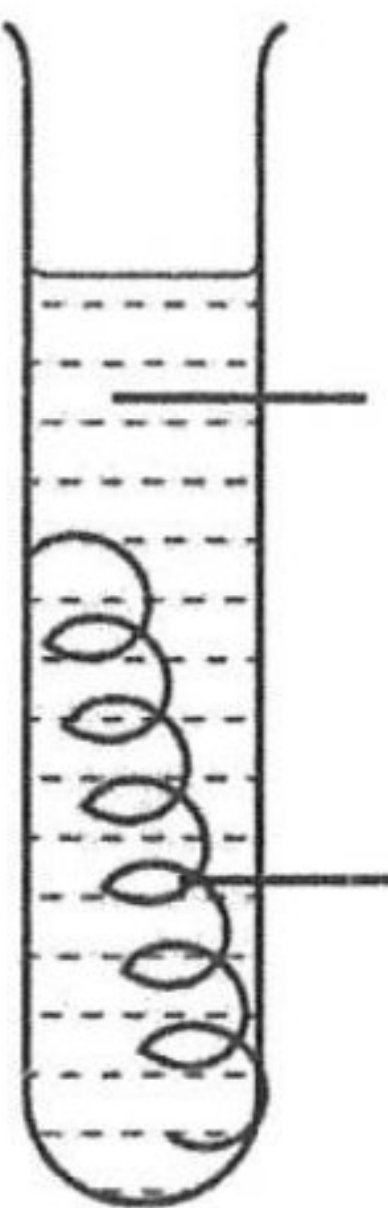
- (b) Tuliskan setengah persamaan pada elektrod R dalam Sel II.
Write half equation at R electrode in Cell II.

8(b)	
	1

.....
[1 mark]

- (c) Jadual 8 menunjukkan suatu eksperimen untuk mengkaji tindak balas penyesaran logam.

Table 8 shows an experiment to investigate the displacement of metals.

Tabung uji Test tube	I	II
	 Larutan plumbum(II) nitrat, $\text{Pb}(\text{NO}_3)_2$ <i>Lead(II) nitrate,</i> $\text{Pb}(\text{NO}_3)_2$ solution Dawai besi <i>Iron wire</i>	 Larutan plumbum(II) nitrat, $\text{Pb}(\text{NO}_3)_2$ <i>Lead(II) nitrate,</i> $\text{Pb}(\text{NO}_3)_2$ solution Dawai kuprum <i>Copper wire</i>
Pemerhatian Observation	Pepejal kelabu terbentuk <i>Grey solid formed</i>	Tiada perubahan <i>No changes</i>

Jadual 8
Table 8

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use

- (i) Berdasarkan Jadual 8,
Bandingkan dan terangkan perbezaan dalam pemerhatian.

Based on Table 8,

Compare and explain the difference in the observations.

.....

.....

.....

.....

[3 marks]

8(c)(i)	
	3

- (ii) Berdasarkan jawapan anda di 8(c)(i), cadangkan satu langkah yang perlu diambil bagi memastikan tindak balas berlaku dalam tabung uji II.

Based on your answer in 8(c)(i), suggest an action to be taken to ensure reaction occurs in test tube II.

.....

.....

[1 mark]

8(c)(ii)	
	1

TOTAL A8	
	10

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SULIT

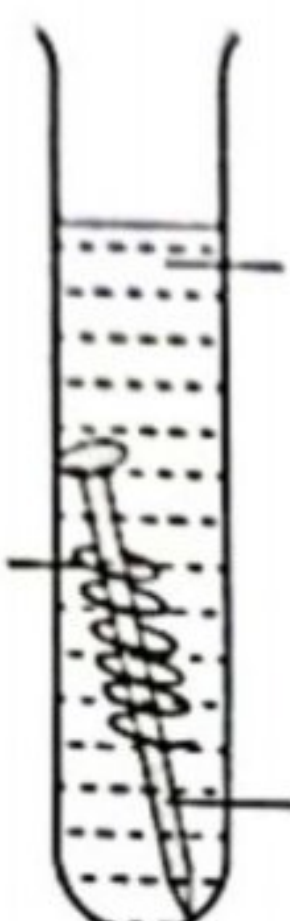
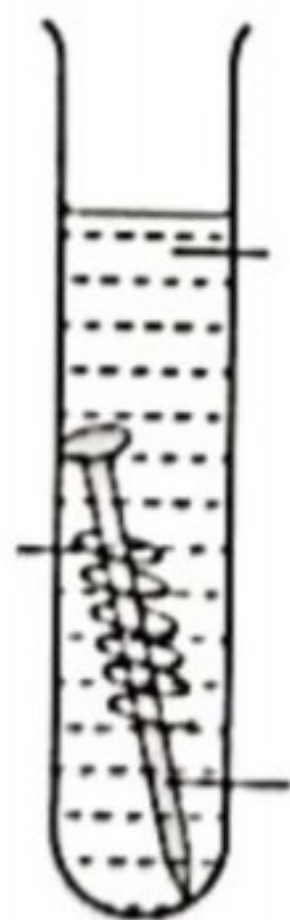
Bahagian C

[20 markah]

Jawab semua soalan daripada bahagian ini

- 11 (a) Jadual 3.1 menunjukkan dua set eksperimen yang dijalankan untuk mengkaji kesan logam lain terhadap pengurangan besi.

Table 3.1 shows two sets of experiment which are carried out to study the effect of other metals on rusting of iron.

Set	Eksperimen <i>Experiment</i>	Pemerhatian <i>Observation</i>
I	 Larutan agar-agar + larutan kalium heksasianoferat(III) + fenolftalein <i>Jelly solution + potassium hexacyanoferrate(III) + phenolphthalein</i> Paku besi <i>Iron nail</i> Logam P <i>Metal P</i>	Keamatan warna biru tua yang tinggi terbentuk <i>High intensity of dark blue colour is formed</i> Keamatan warna merah jambu yang rendah terbentuk <i>Low intensity of pink colour is formed</i>
II	 Larutan agar-agar + larutan kalium heksasianoferat(III) + fenolftalein <i>Jelly solution + potassium hexacyanoferrate(III) + phenolphthalein</i> Paku besi <i>Iron nail</i> Logam Q <i>Metal Q</i>	Keamatan warna merah jambu yang tinggi terbentuk <i>High intensity of pink colour is formed</i> Tiada biru tua yang terbentuk <i>No blue colour is formed</i>

Jadual 3.1

Table 3.1

- (i) Apakah yang dimaksudkan dengan kakisan logam?
What is meant by metal corrosion?

[1 markah / 1 mark]

Berdasarkan pemerhatian dalam Jadual 3.1,
Based on the observations in Table 3.1,

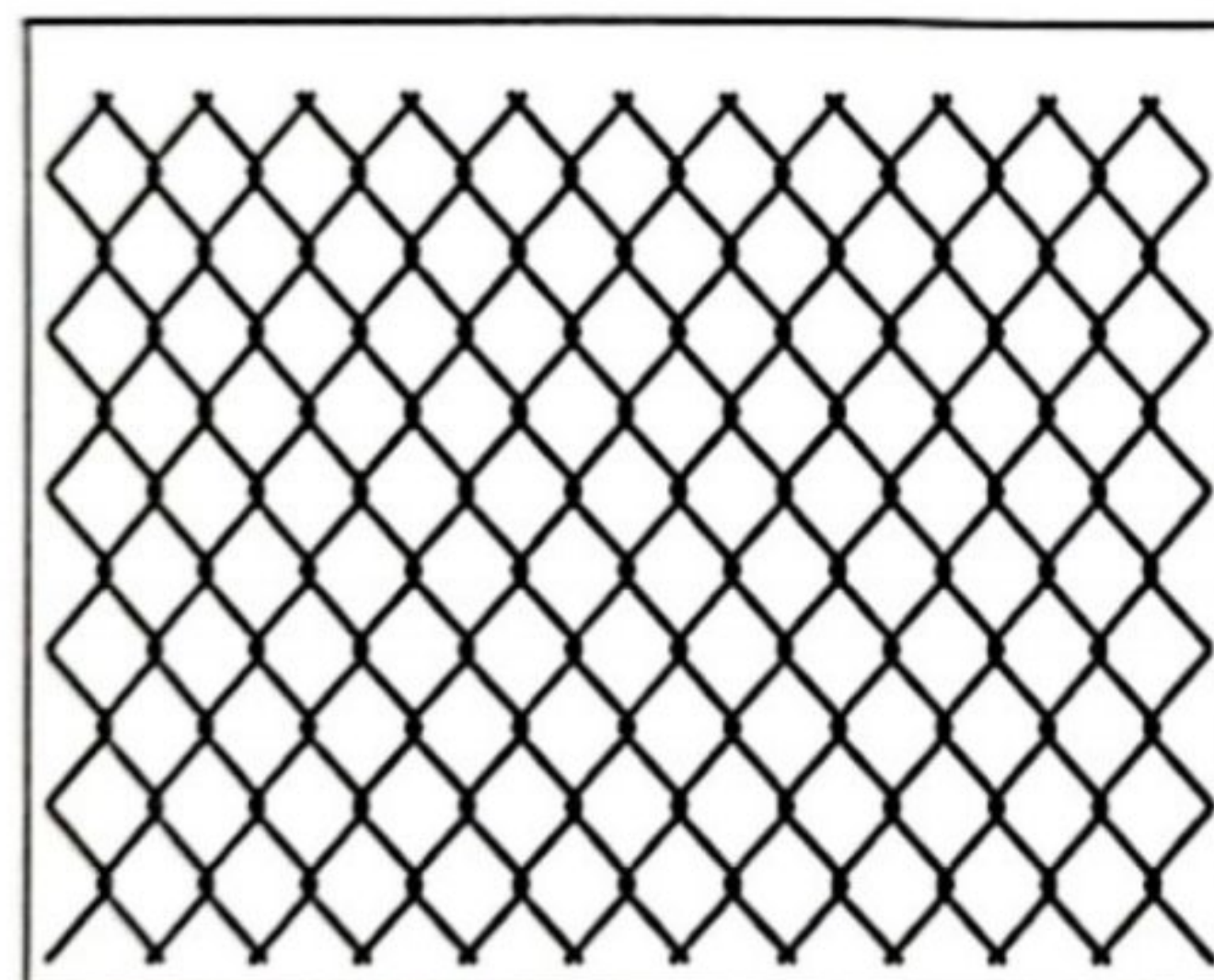
- (ii) nyatakan nama logam P dan logam Q.
Tuliskan setengah persamaan bagi proses pengoksidaan dan penurunan dalam Set I dan Set II.
state the name of metal P and Q.
Write the half equations for the oxidation and reduction processes in Set I and Set II.

[6 markah / 6 marks]

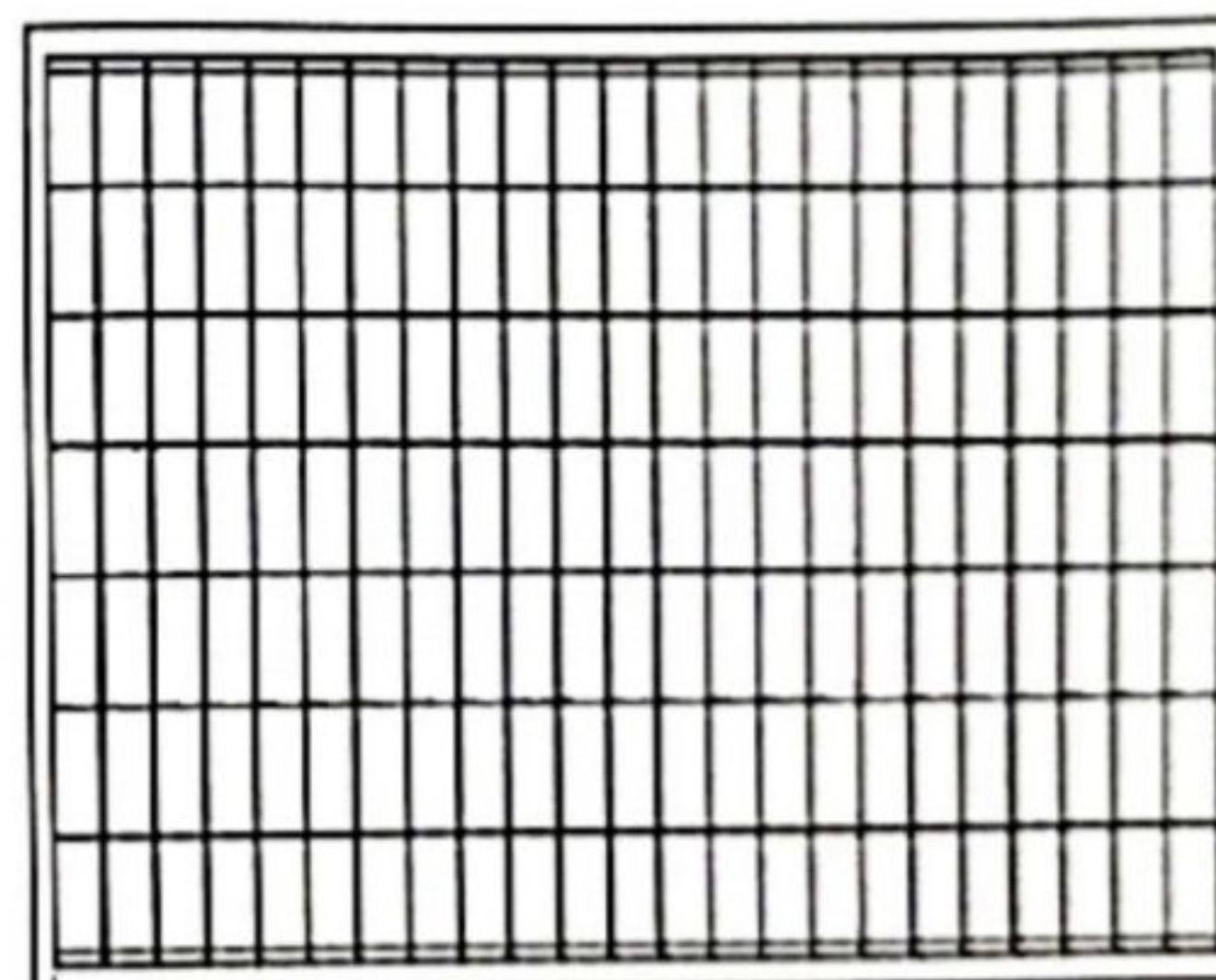
- (iii) Terangkan mengapa terdapat perbezaan dalam pemerhatian.
Explain why there is a difference in observations.

[4 markah / 4 marks]

- (b) Rajah 10.1 menunjukkan dua jenis dawai pagar.
Diagram 10.1 shows two types of fence wire.



Disalut dengan plastik
Covered with plastic



Disadur dengan zink
Plated with zinc

Rajah 10.1
Diagram 10.1

Anda ditugaskan untuk menilai dua jenis dawai pagar untuk dipasang di rumah bagi kegunaan jangka masa panjang dan tidak mudah terkakis.

Nyatakan pilihan anda dan wajarkan jawapan anda.

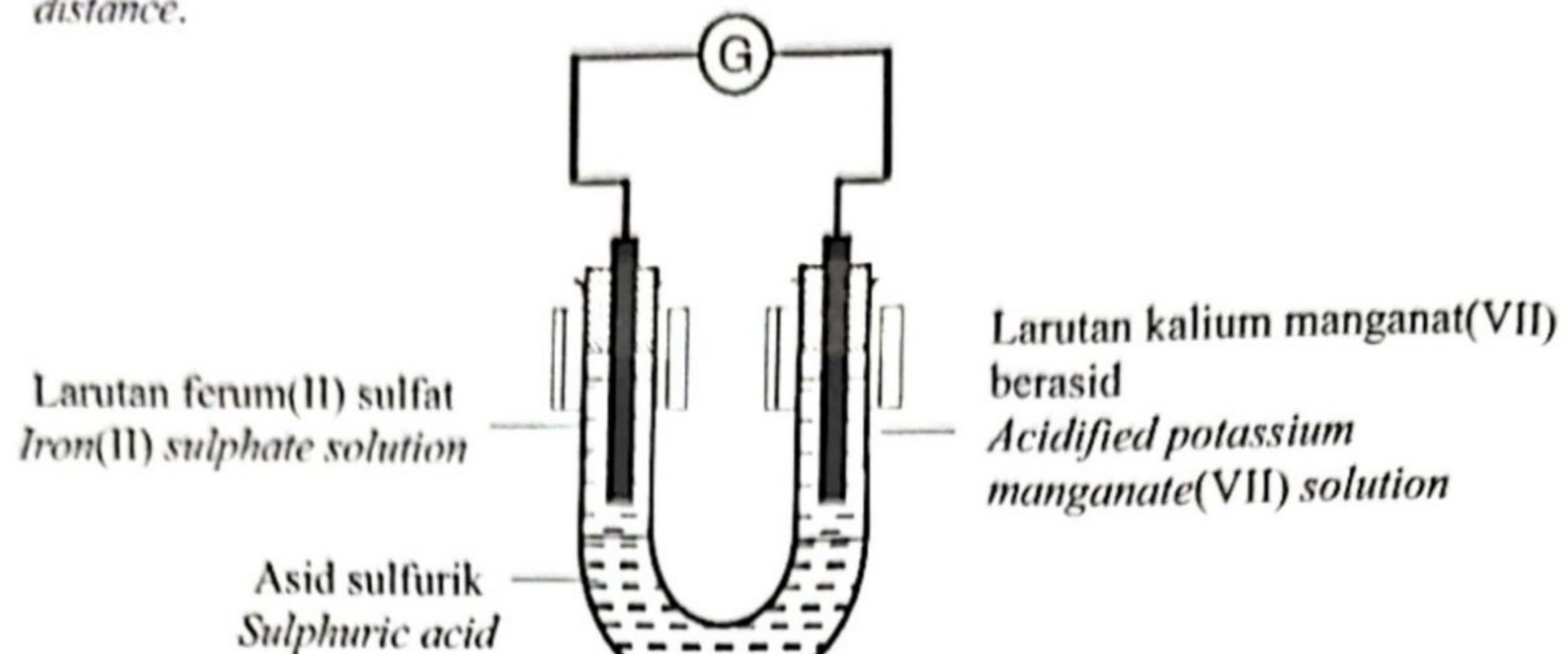
You are assigned to evaluate two types of fence wire to be installed in a house for long-term use and not easily corroded.

State your choice and justify your answer.

[3 markah / 3 marks]

- (c) Rajah 10.2 menunjukkan susunan radas bagi mengkaji pemindahan elektron pada satu jarak.

Diagram 10.2 shows the apparatus set-up to investigate electron transfer at a distance.



Rajah 10.2
Diagram 10.2

Sekumpulan murid telah menggantikan asid sulfurik kepada larutan glukosa, didapati jarum galvanometer tidak terpesong.

Wajarkan tindakan kumpulan murid tersebut.

A group of students have replaced sulphuric acid with glucose solution, it was found that the galvanometer needle does not deflect.

Justify the actions of the group of students.

[3 markah / 3 marks]

- (d) Jadual 3.2 menunjukkan senarai radas dan bahan.
Table 3.2 shows a list of apparatus and materials.

Radas dan bahan <i>Apparatus and materials</i>		
• Bikar <i>Beaker</i> • Wayar penyambung <i>Connecting wire</i>	• Voltmeter <i>Voltmeter</i> • Pasu berliang <i>Porous pot</i> • Titian garam <i>Salt bridge</i>	• Kepingan zink <i>Zinc plate</i> • Kepingan kuprum <i>Copper plate</i> • Larutan zink nitrat <i>Zinc nitrate solution</i> • Larutan kuprum(II) sulfat <i>Copper(II) sulphate solution</i>

Jadual 3.2

Table 3.2

Lukis satu rajah berlabel untuk menunjukkan susunan radas bagi mengkaji pemindahan elektron pada satu jarak menggunakan radas dan bahan diberikan dalam Jadual 3.2. Tandakan arah pengaliran elektron dalam rajah.

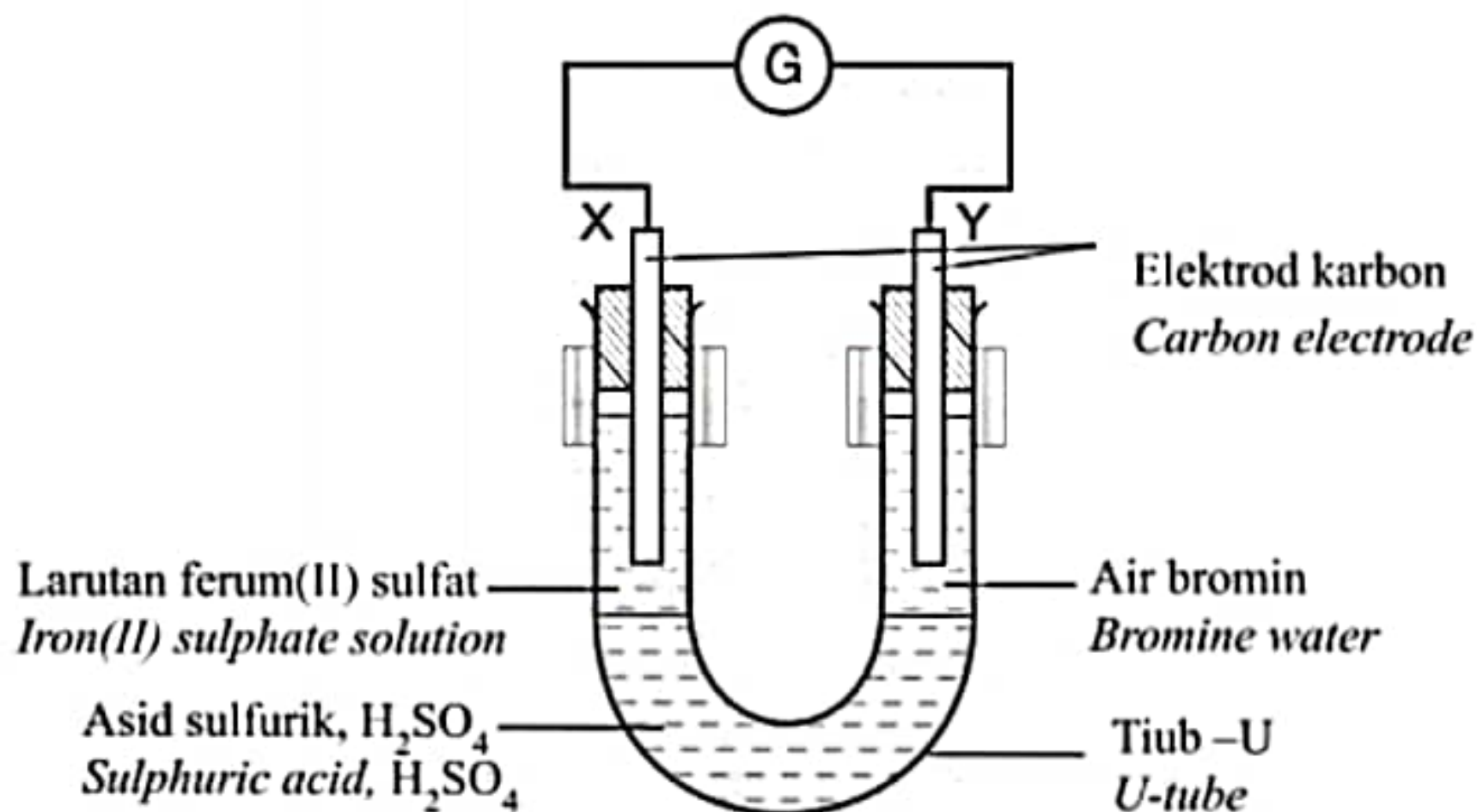
Draw a labelled diagram to show the apparatus set-up to investigate electron transfer at a distance by using the apparatus and materials given in Table 3.2. Mark in the diagram the direction of the electron flow.

[3 markah / 3 marks]

KERTAS PEPERIKSAAN TAMAT

8. (a) Rajah 8.1 menunjukkan susunan radas untuk mengkaji pemindahan elektron pada satu jarak dalam tindak balas redoks.

Diagram 8.2 shows the apparatus set-up to investigate electron transfer at a distance in redox reactions.



Rajah 8.1 / Diagram 8.1

Berdasarkan Rajah 8.1,
Based on Diagram 8.1,

- (i) Apakah fungsi asid sulfurik, H_2SO_4 ?
What is the function of sulphuric acid, H_2SO_4 ?

.....

[1 markah / 1 mark]

- (ii) Tuliskan setengah persamaan pada elektrod X dan elektrod Y
Write the half equations for electrode X and electrode Y

Elektrod X / Electrode X:

Elektrod Y / *Electrode Y*:

[2 markah / 2 marks]

- (iii) Nyatakan perubahan nombor pengoksidaan bagi air bromin.

State the change in oxidation number for bromine water.

.....

[1 markah / 1 mark]

- (b) Lukis satu susunan radas berlabel yang dapat digunakan untuk eksperimen untuk mengkaji pemindahan elektron pada suatu jarak dengan menggunakan semua bahan dan radas dalam Rajah 8.1, kecuali tiub-U dan kaki retort. Anda juga dibekalkan dengan larutan kalium iodida dan larutan kalium manganat(VII) berasid bagi menggantikan larutan ferum(II) sulfat dan air bromin. Beberapa radas lain yang sesuai boleh digunakan bagi mengubahsuai eksperimen ini.

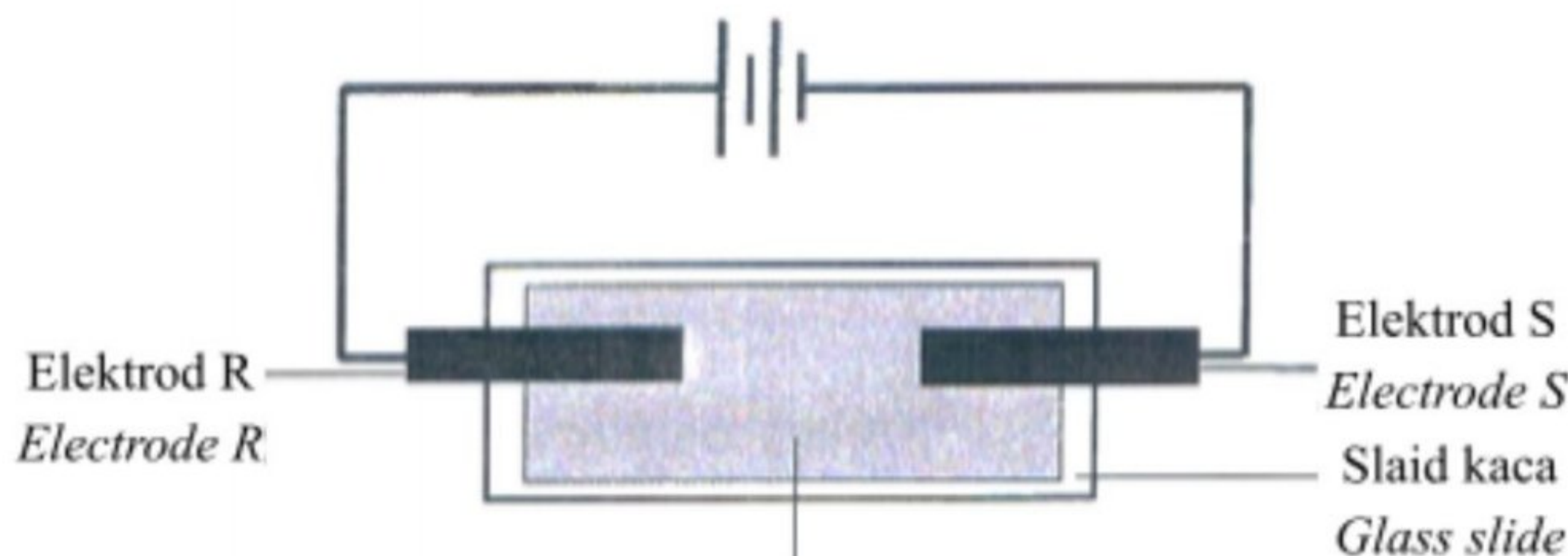
Tunjukkan arah pengaliran elektron dalam rajah yang dilukis.

Draw labelled set-up of apparatus that could be used for an experiment to investigate the transfer of electrons at a distance using all the materials and apparatus in Diagram 8.1, except the U-tube and the retort stand. You are also supplied with potassium iodide solution and acidified potassium manganate(VII) solution to replace iron(II) sulphate solution and bromine water. Any other suitable apparatus can be used to modify this experiment. Show the direction of electron flow in the drawn diagram.

[3 markah / 3 marks]

- (c) Sehelai kertas litmus biru dicelupkan ke dalam larutan natrium klorida pekat, NaCl dan diletakkan di atas sekeping slaid kaca. Dua elektrod karbon, R dan S diletakkan di atas kertas litmus itu. Elektrod-elektrod itu disambungkan kepada bateri seperti yang ditunjukkan dalam Rajah 8.2.

A piece of blue litmus paper is dipped into a concentrated sodium chloride solution, NaCl and placed on a piece of glass slide. Two carbon electrodes, R and S are placed on the litmus paper. The electrodes are connected to the battery as shown in Diagram 8.2.



Kertas litmus biru dicelup ke dalam larutan natrium klorida pekat, NaCl
Blue litmus paper soaked in concentrated sodium chloride solution, NaCl

Rajah 8.2/ Diagram 8.2

Jadual 8 menunjukkan pemerhatian pada kertas litmus biru selepas 15 minit.
Table 8 shows the observation on the blue litmus paper after 15 minutes.

Elektrod <i>Electrode</i>	Pemerhatian pada kertas litmus biru selepas 15 minit <i>Observation on blue litmus paper after 15 minutes</i>
R	Kertas litmus biru bertukar merah dan kemudian dilunturkan. <i>The blue litmus paper turns red and then bleached.</i>
S	Warna kertas litmus biru tidak berubah. <i>The colour of blue litmus paper remains unchanged.</i>

Jadual 8/ Table 8

Nilai E^0 / E^0 value:



Berdasarkan Jadual 8, terangkan perbezaan pemerhatian bagi kertas litmus biru pada elektrod R dan elektrod S selepas 15 minit.

Based on Table 8, explain the differences in the observation of the blue litmus paper at the electrode R and the electrode S after 15 minutes.

.....

.....

.....

.....

[3 markah / 3 marks]

Bahagian C
Section C

[20 markah]

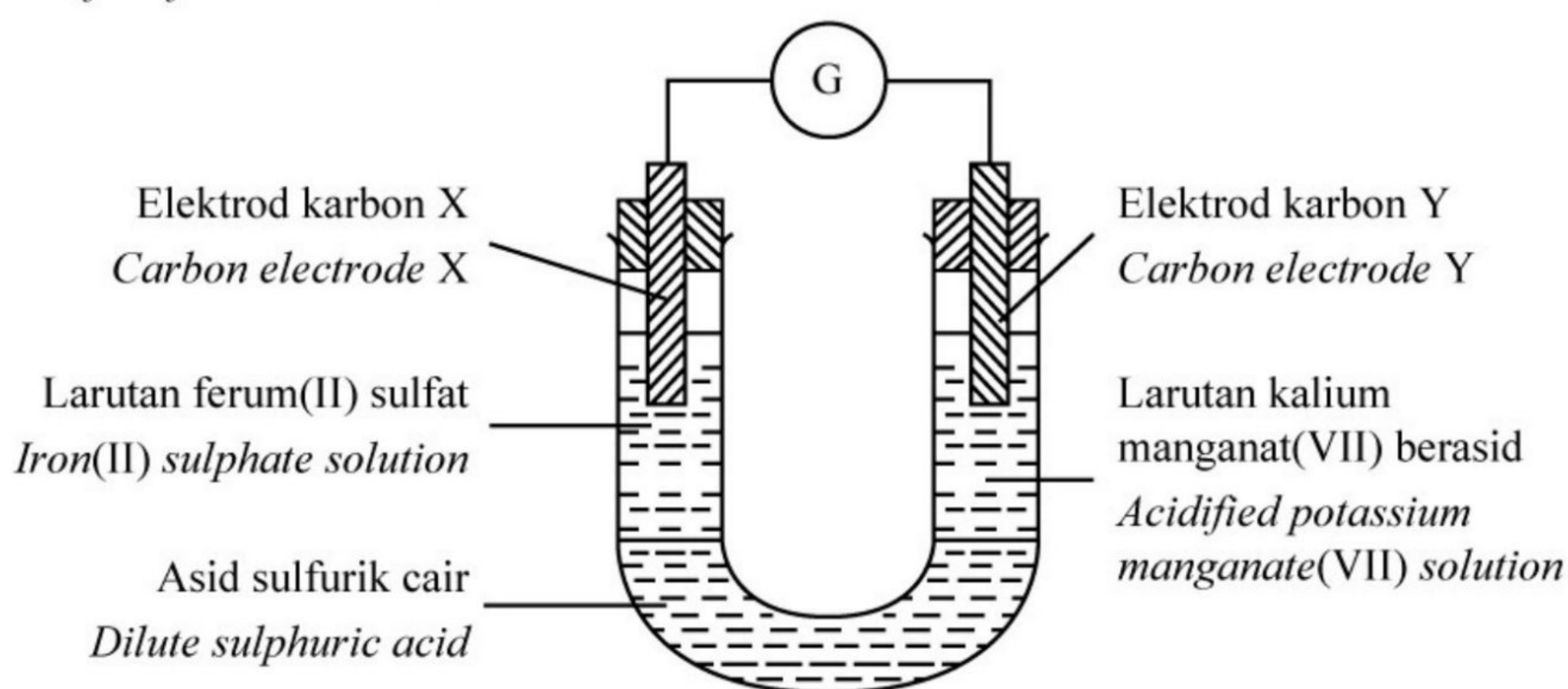
[20 marks]

Jawab **semua** soalan dalam bahagian ini.

Answer all question in this section.

- 11 (a)** Rajah 11.1 menunjukkan susunan radas untuk menyiasat tindak balas redoks antara larutan ferum(II) sulfat dan larutan kalium manganat(VII) berasid melalui pemindahan elektron pada suatu jarak.

Diagram 11.1 shows the set-up of apparatus to investigate the redox reaction between iron(II) sulphate solution and acidified potassium manganate(VII) solution through the transfer of electrons at a distance.



Rajah 11.1
Diagram 11.1

Berdasarkan Rajah 11.1,

Based on Diagram 11.1,

- (i) nyatakan maksud tindak balas redoks.
state the meaning of redox reaction.

[1 markah]

[1 mark]

- (ii) nyatakan fungsi larutan ferum(II) sulfat dan larutan kalium manganat(VII) berasid. Tulis setengah persamaan bagi tindak balas yang berlaku di elektrod karbon Y.

state the function of iron(II) sulphate solution and acidified potassium manganate(VII) solution.

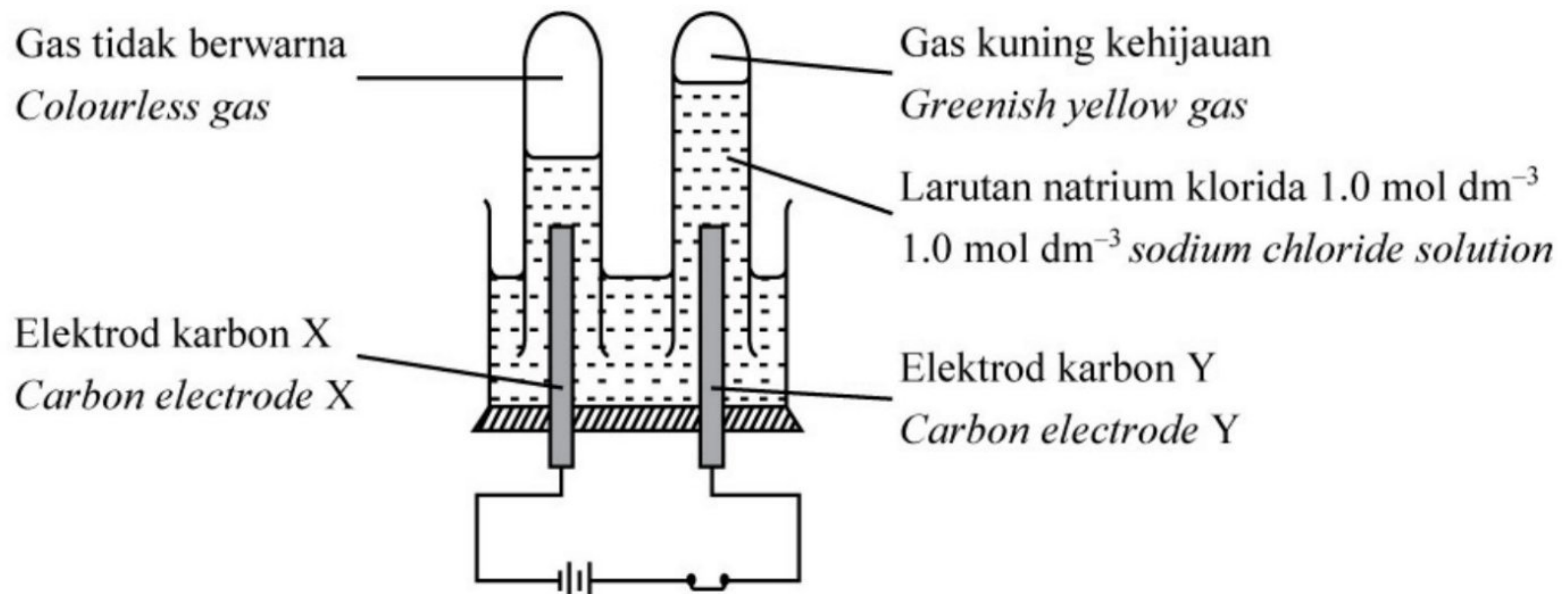
Write the half equation for the reaction occurs at carbon electrode Y.

[4 markah]

[4 marks]

- (b) Rajah 11.2 menunjukkan susunan radas untuk elektrolisis larutan natrium klorida dengan menggunakan elektrod karbon.

Diagram 11.2 shows the apparatus set-up for the electrolysis of sodium chloride solution by using carbon electrodes.



Rajah 11.2
Diagram 11.2

Berdasarkan Rajah 11.2, nyatakan faktor yang mempengaruhi hasil yang terbentuk pada elektrod karbon X dan elektrod karbon Y.

Terangkan tindak balas yang berlaku di elektrod karbon X dan elektrod karbon Y.

Penerangan anda hendaklah merangkumi:

- Ion-ion yang tertarik ke elektrod
- Ion yang dipilih untuk dinyahcas dan sebab ion tersebut dipilih untuk dinyahcas pada elektrod
- Setengah persamaan bagi tindak balas yang berlaku di elektrod

Based on Diagram 11.2, state the factor that affect the products formed at carbon electrode X and carbon electrode Y.

Explain the reactions occur at carbon electrode X and carbon electrode Y.

Your explanation must include:

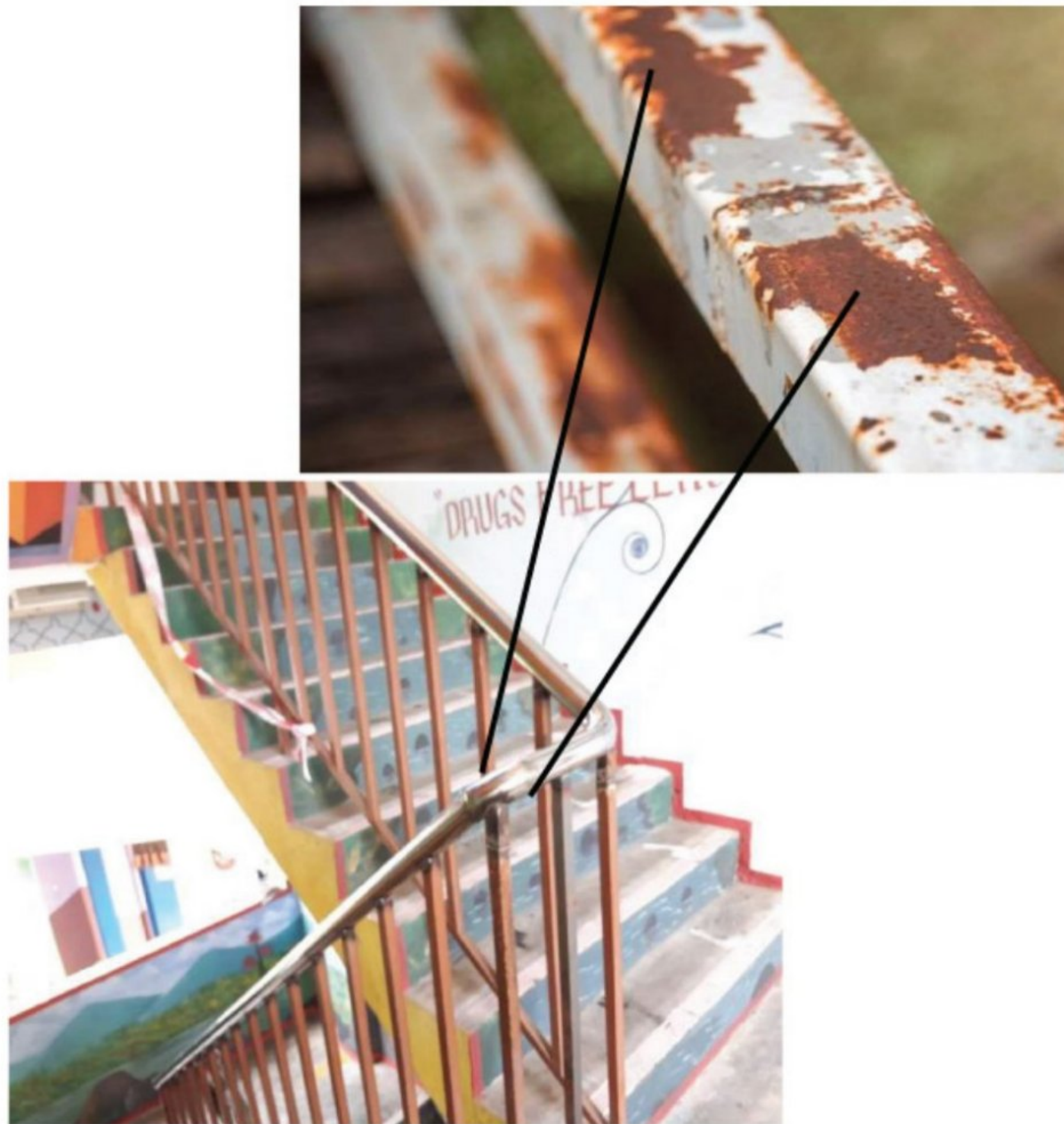
- *Ions that attracted to electrodes*
- *Ions that are selectively discharged and the reason ions are selectively discharged at electrodes*
- *Half equations for the reaction occurs at electrodes*

[10 markah]

[10 marks]

- (c) Rajah 11.3 menunjukkan selusur tangga yang diperbuat daripada besi di sekolah yang kelihatan berkarat.

Diagram 11.3 shows the stair handrail made from iron in school that look rusty.



Rajah 11.3
Diagram 11.3

Sempena Minggu Kokurikulum, ahli-ahli Persatuan Kimia telah ditugaskan untuk menambah baik keadaan selusur tangga tersebut.

In conjunction of Co-curricular Week, Chemistry Society members have been assigned to improve the condition of the stair handrail.

Cadang dan terangkan cara untuk menyelesaikan tugas tersebut supaya selusur tangga itu kelihatan seperti baharu semula.

Suggest and explain way to solve the task so that the stair handrail looks like new again.

[5 markah]
[5 marks]

KERTAS PEPERIKSAAN TAMAT
END OF QUESTION PAPER

5. Jadual 1 menunjukkan penerangan dan pemerhatian bagi dua eksperimen, I dan II.
Table 1 shows the description and observation for two experiments, I and II.

Eksperimen <i>Experiment</i>	Penerangan <i>Description</i>	Pemerhatian <i>Observation</i>
I	Elektrolisis larutan natrium sulfat 1mol dm^{-3} dengan menggunakan elektrod karbon. <i>Electrolysis of 1mol dm^{-3} sodium sulphate solution using carbon electrodes.</i>	Gelembung gas terbebas di anod dan di katod. <i>Gas bubbles are released at the anode and cathode.</i>
II	Pembakaran 1.2g serbuk magnesium dalam oksigen berlebihan. <i>Combustion of 1.2g magnesium powder in excess oxygen.</i>	Nyalaan putih berkilau dan serbuk putih dihasilkan. <i>Glaring white flame is seen and white powder is formed.</i>

Jadual 1
Table 1

(a) Berdasarkan Eksperimen I:
Based on experiment I

- (i) Senaraikan kesemua ion yang terdapat dalam larutan natrium sulfat.
List all ions are present in sodium sulphate solution.

[1 mark]

- (ii) Namakan gas yang terbebas di katod. Nyatakan bagaimana anda mengesahkan gas tersebut.
Name the gas liberated at the cathode. State how you would verify the gas.

[2 marks]

- (iii) Terangkan bagaimana gas tersebut terhasil di katod.
Explain how the gas is formed at the cathode.

[3 marks]

(b) Berdasarkan Eksperimen II:

Based on experiment I

- (i) Namakan serbuk putih yang terhasil.
Name the white powder formed.

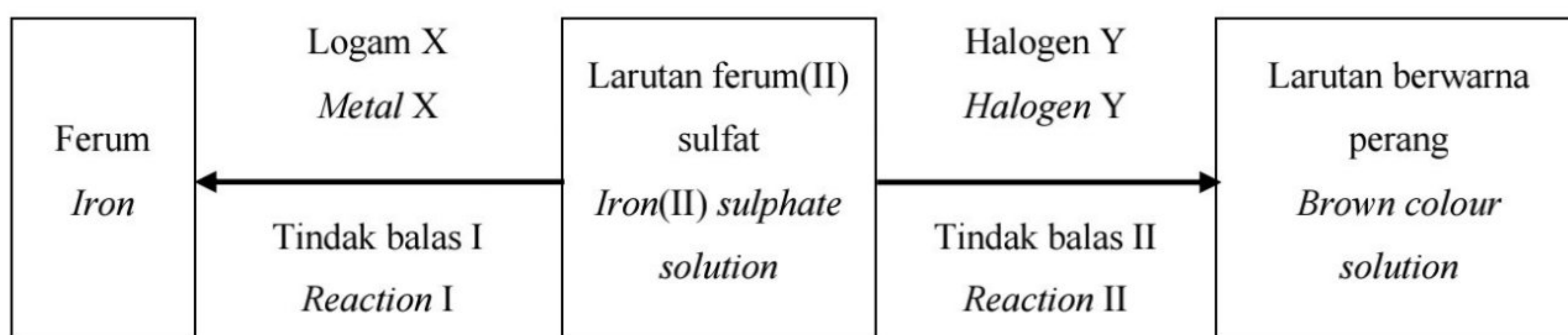
[1 mark]

- (ii) Nyatakan perubahan nombor pengoksidaan bagi magnesium
State the change in oxidation number for magnesium.

[1 mark]

- 9 (a) Rajah 8 menunjukkan carta alir pertukaran ferum(II) sulfat melalui tindak balas redoks.

Diagram 8 shows a flow chart for the conversion of iron(II) sulphate through redox reactions.



Rajah / Diagram 8

- (i) Nyatakan definisi bagi tindak balas redoks dan warna bagi ferum(II) sulfat.

State the definition of redox reaction and the colour of iron(II) sulphate.

[2 markah / marks]

- (ii) Berdasarkan Tindak balas II, kenal pasti halogen Y dan kation yang hadir dalam larutan perang. Terangkan mengapa tindak balas itu adalah tindak balas redoks dari segi pemindahan elektron **atau** perubahan nombor pengoksidaan.

*Based on Reaction II, identify halogen Y and the cation present in the brown solution. Explain why the reaction is a redox reaction in terms of electron transfer **or** change in oxidation number.*

[6 markah / marks]

- (iii) Kenal pasti logam X dan tulis persamaan kimia bagi Tindak balas I. Jika 50 cm³ larutan ferum(II) sulfat 2.0 mol dm⁻³ dan logam X secara berlebihan digunakan, hitung jisim ferum yang terhasil.

[Jisim atom relatif : Fe = 56]

Identify metal X and write the chemical equation for Reaction I. If 50 cm³ of 2.0 mol dm⁻³ iron(II) sulphate solution and excess metal X are used, calculate the mass of iron produced.

[Relative atomic mass : Fe = 56]

[5 markah / marks]

- (b) Seorang murid sedang menjalankan satu eksperimen untuk mengkaji elektrolisis 1.0 mol dm⁻³ asid hidroklorik di dalam makmal kimia. Selepas 10 minit, murid tersebut berasa pening dan sukar bernafas, akibat terhidu gas W berwarna kuning kehijauan yang terhasil di anod semasa elektrolisis berlaku. Kenal pasti gas W. Terangkan bagaimana gas W dihasilkan di anod dan tulis setengah persamaan bagi tindak balas ini.

A student is carried out an experiment to investigate the electrolysis of 1.0 mol dm⁻³ hydrochloric acid in a chemistry lab. After 10 minutes, the student felt dizzy and difficulty in breathing, as a result of inhaling the greenish yellow gas W produced at the anode during electrolysis. Identify gas W. Explain how gas W is produced at the anode and write the half equation for the reaction.

[4 markah / marks]

Jadual 6 menunjukkan pemerhatian bagi eksperimen untuk mengkaji kesan logam lain ke atas pengaratan paku besi.

Table 6 shows the observation for the experiment of the effects of other metals on the rusting of iron nail.

Set	Eksperimen <i>Experiment</i>	Pemerhatian <i>Observation</i>
I	Paku besi dililit dengan logam P + larutan kalium heksasianoferat(III) + agar-agar <i>Iron nail coiled with metal P + potassium hexacyanoferrate(III) solution + agar</i>	Warna biru tua <i>Dark blue colour</i>
II	Paku besi dililit dengan logam Q + larutan kalium heksasianoferat(III) + agar-agar <i>Iron nail coiled with metal Q + potassium hexacyanoferrate(III) solution + agar</i>	Tiada perubahan <i>No change</i>

Jadual / Table 6

Berdasarkan maklumat dalam Jadual 6, terangkan mengapa terdapat perbezaan pemerhatian antara set I dan set II.

Based on the information in Table 6, explain why there is a difference in the observation of set I and set II.

[3 markah / marks]