Essay {Paper02}

[SBPtrial04-10] {Translate}

(a)(i) 1.[Dapat menyatakan contoh tindak balas yang sesuai]
contoh : Tindak balas magnesium dengan larutan kuprum(II) sulfat
2. logam magnesium mengalami pengoksidaan dengan kehilangan 2é
3. $Mg \rightarrow Mg^{2+} + 2$ é
4 Ion kuprum(II) mengalami penurunan dengan menerima 2é daripada magnesium
5. $Cu^{2+} + 2$ é $\rightarrow$ Cu

(ii) 1.Magnesium dioksidakan kepada ion Mg^{2+}.
2. Perubahan no. pengoksidaan dari 0 ke +2
3. Ion Cu^{2+} diturunkan kepada atom kuprum
4. Perubahan no. Pengoksidaan dari +2 ke 0

(b)(i) Tabung uji A
1. Mg lebih elektropositif daripada besi
2. Atom Mg akan melepaskan 2 e untuk membentuk ion Mg^{2+}
3. $Mg \rightarrow Mg^{2+} + 2$ é
4. Magnesium terkakis //besi dilindungi daripada terkakis
Tabung uji B
5. Besi lebih elektropositif daripada kuprum
6 Ferum melepaskan 2 e utk membentuk ion Fe^{2+}/ $Fe \rightarrow Fe^{2+} + 2e$
7 Ion Fe^{2+} bergabung dengan ion hidroksida daripada air membentuk Fe(II) hidroksida.
8 $Fe^{2+} + 2OH^- \rightarrow Fe(OH)_2$
9 $Fe(OH)_2$ ini dioksidakan oleh oksigen membentuk karat/persamaan

(ii) 1. Menyapu minyak atau gris
2. mengecat logam
3. menyalut dengan plastik
4. kaedah penggalvanian
mana-mana 2 betul

----------oooOO aĎaŽ OOooo----------

[SBPtrial05-08] {Translate}

(a) 1. Warna ungu larutan kalium manganat(VII) menjadi tak berwarna/semakin pudar
2. Warna hijau muda ferum(II) sulfat menjadi kuning/perang
3. Larutan tak berwarna kalium iodida menjadi kuning/perang

(b) 1. $x + (-2)(4) = -1$
2. $x = +7$

(c) 1. Nombor pengoksidaan ferum bertambah daripada +2 ke +3,
2. maka tindak balas pengoksidaan berlaku
3. Nombor pengoksidaan mangan berubah dariapda +7 ke +2,
4. tindak balas penurunan berlaku
5. setengah persamaan : $MnO_4^- + 8H^+ + 5e \rightarrow Mn^{2+} + 4H_2O$

6. setengah persamaan : $Fe^{2+} \rightarrow Fe^{3+} + e$

atau

1. Nombor pengoksidaan iodin bertambah daripada -1 ke 0,
2. tindak balas pengoksidaan berlaku
3. Nombor pengoksidaan mangan berubah dariapda +7 ke +2,
4. maka tindak balas penurunan berlaku
5. setengah persamaan : $MnO_4^- + 8H^+ + 5e \rightarrow Mn^{2+} + 4H_2O$
6. setengah persamaan : $2I^- \rightarrow I_2 + 2e^-$

(d) [Gambar rajah susunan radas]
1. Susunan radas [Tiub U, litar lengkap, galvanometer(ammeter, voltmeter) elektrod-elektrod dan larutan berlorek]
2. label [asid sulfurik, larutan kalium manganat(VII) berasid, larutan ferum(II) sulfat / larutan kalium iodida, elektrod karbon]

[Kaedah]
3. masukkan asid sulfurik cair ke dalam tiub U
4. titiskan larutan kalium iodida pada satu lengan tiub U dan larutan kalium manganat(VII) berasid pada lengan tiub U yang satu lagi
5. celup elektrod karbon ke dalam larutan dan <u>lengkapkan litar</u>
6. Jarum ammeter /galvanometer/voltmeter terpesong menunjukkan bacaan
7. ion iodida membebaskan elektron membentuk iodin/ion ferum(II) membebaskan elektron membentuk ion ferum(III)
8. elektron mengalir melalui wayar dari kalium iodida ke kalium manganat(VII)
9. ion manganat(VII) menerima elektron membentuk ion mangan(II)

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[SBPtrial06-09] {Translate}

(a) 1.Pengoksidaan –tindak balas melibatkan kehilangan elektron
2. Penurunan – tindak balas menerima electron

(b) Nyatakan contoh tindak balas // persamaan kimia
Mengira nombor pengoksidaan setiap unsur dalam bahan
Mengira nombor pengoksidaan setiap unsur dalam hasil tindak balas
Menyatakan tiada perubahan nombor pengoksidaan – bukan redoks

Contoh:
1. Tindak balas peneutralan larutan natrium hidroksida dan asid Hidroklorik
Atau persamaan
. $NaOH + HCl \rightarrow NaCl + H_2O$

2 . (+1)(-2) (+1) (+1)(-1)
3. (+1)(-1) (+1)(-2)

4. Nombor pengoksidaan setiap bahan tidak berubah – bukan redoks

(c) Kaedah:
1. Masukkan 2 cm^3 larutan ferum(II) sulfat ke dalam tabung uji
2. Tambahkan air bromin(agen pengoksidaan yang sesuai) titis demi titis sehingga tiada perubahan
3. Goncangkan dan hangatkan perlahan-lahan
4. Larutan natrium hidroksida dicampurkan

1. Warna perang air bromin menjadi tidak warna(pemerhatian yang sepadan dengan agen pengoksidaan yang digunakan)
2. Warna larutan berubah daripada hijau muda kepada kuning keperangan.
3. Mendakan perang dengan larutan natrium hidroksida mengesahkan kehadiran ion Fe^{3+}
4. $Fe^{2+} \rightarrow Fe^{3+} + e$
5. ion Fe^{2+} dioksidakan kepada ion Fe^{3+}
6. kerana kehilangan elektron
7. $Br_2 + 2e \rightarrow 2Br^-$ / persamaan untuk agen pengoksidaan
8. Bromin diturunkan kepada ion bromida/Br^-
9. kerana menerimaan elektron.
10. $2\ Fe^{2+} + Br_2 \rightarrow 2Br^- + Fe^{3+}$/ persamaan yang sepadan dengan agen pengoksidaan yang digunakan

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[MRSM10-08d]

(*d*) In experiment 1:
1. iron(II) ion change to iron(III) ions is oxidation because
2. iron(II) ion releases electron// increases oxidation number from +2 to +3
3. iron(II) ion act as reducing agents

In experiment II:
1. iron(II) ion change to iron atom is reduction because
2. iron(II) ion gain electrons// decreases oxidation number from +2 to 0
3. iron(II) ion act as oxidising agents

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[SBPtrial07-09]

(a)
1. Oxidation - increase in oxidation number
2. Reduction – decrease in oxidation number

(b)(i)
1. $Fe^{+2} \rightarrow Fe^{+3} + e$
2. $Br_2 + 2e \rightarrow 2Br^-$
3. Iron(II) ions lose electrons to become iron(III) ions. Iron(II) ions are oxidised
4. Bromine molecules gain electrons to form bromide ions. Bromine molecules are reduced

(a: any suitable reducing agent)

1. $Fe^{+3} + e \rightarrow Fe^{+2}$
2. $Zn \rightarrow Zn^{+2} + 2e$
3. Iron(III) ions gain electrons to become iron(II) ions. Iron(III) ions are reduced
4. Zinc atoms lose electrons to form zinc ions. Zinc atoms are oxidised

(a: any suitable reducing agent)

(c) Diagram:
1. label
2. functional apparatus

Procedure:
1. Pour dilute sulphuric acid into a U-tube
2. Using a dropper, add iron(II) sulphate solution at one side
3. and acidified potassium manganate(VII) solution at another side
4. Place carbon electrode in each side of the U-tube
5. Connect the electrodes to a galvanometer by using connecting wires//Complete the external circuit
6. Record any change that can be observed after a few minutes

Observations:
The green colour of iron(II) solution turns to brown
The purple colour of acidified potassium manganate(VII) solution is decolourised/change to colourless

(a: any suitable cell)

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[MRSM08-09]

(a) 1. When food can dented, the tin plate is crack and the iron is exposed
2. iron will donate/released 2 electrons to formed iron(II) ions
3. In food can also have water and some oxygen gas. The water and oxygen gas gain electron to formed hydroxide ion
4. iron(II) ion will combine hydroxide ion to form iron(II) hydroxide and continue until formed iron(III) oxide, the rust.

(b) **Similar**
1. The cell used two electrode and the electrolyte
2. The electrical energy to chemical energy
3. The product at cathode is same, silver atom

Different :
1. Used different electrode, in experiment I used silver (pure silver and impure silver) and experiment II used carbon
2. The product at anode is different. In Experiment I will produce silver ions and experiment II will released oxygen gas
3. the observation in experiment I, the anode will thinner and experiment II will released a bubbles.

(c) Procedure
1. 2 cm^3 of potassium iodide was poured into test tube
2. 2 cm^3 of chlorine water was added into the test tube
3. The test tube was shake
4. The observation was be make and recorded

Confirmatory test
1. The 2 cm^3 of product solution was added into test tube
2. Add 1,1,1 – trichlomethane and shake
3. The purple layer formed, confirm that iodine present

Explanation on oxidation and reduction processes
1. Iodide ion will releases a electrons and formed iodine
2. iodide ion will be Oxidation and acts as reducing agent
3. Chlorine water will receive electron and formed chloride
4. Chlorine water will be reduction and acts as oxidising agent

Ionic equation: $Cl_2 + 2\ I^- \rightarrow I_2 + Cl^-$

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[MRSM07-09]

(a) 1. Reaction I is not redoks
2. because there are no change of oxidation of element in the reaction
3. Reaction II is redoks
4. because increase oxidation of Zinc from 0 to + 2 and decreases oxidation number of Copper from +2 to 0

(b). 1. in P, Zinc more electropositive than Iron
2. When zinc was crack, exposed the iron inside, zinc will corrode first than iron
3. Iron is protected

4. In Q, Iron more electropositive than Tin
5. When Tin is crack, exposed the iron inside, iron will be corrode first than tin
6. Iron is not protected

(c) **A. Conversion Fe^{2+} to Fe^{3+}**

Chemicals required : Iron(II) sulphate and bromine water

Procedure of the experiment
1. Poured 2 cm^3 of iron(II) sulphate into a test tube
2. then added 2 cm^3 of bromine water into the test tube
3. shake the test tube.
4. observe the reaction

Observation : green to brown

Overall chemical equation involved in the reaction
$Fe^{2+} + Br_2 \rightarrow Fe^{3+} + 2Br^-$

B.Conversion Fe^{3+} to Fe^{2+}

Chemicals required : Iron(I1I) sulphate and magnesium

Procedure of the experiment
1. Poured 2 cm^3 of iron(II) sulphate into a test tube
2. then added 1 spatula of magnesium into the test tube
3. shake the test tube.
4. observe the reaction

Observation : brown change to green and the grey powder dissolve in the solution

Overall chemical equation involved in the reaction
$Fe^{3+} + Mg \rightarrow Fe^{2+} + Mg^{2+}$

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[SBPtrial08-10]

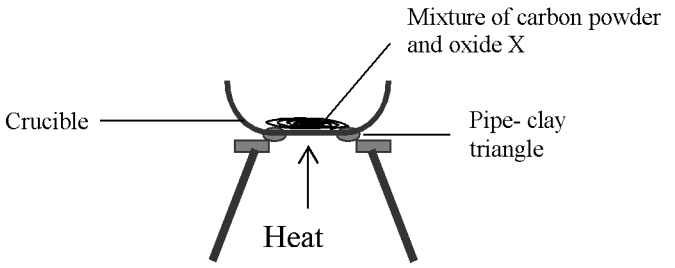
(a) Oxidation is a loss of electrons.
Reduction is a gain of electrons

(b) (i)
- Magnesium / zinc / iron / lead / tin
[accept symbol]
[reject Na, K, Ca]

(ii)
- W is more electropositive than Cu.
- W has higher tendency to donate electrons.
- W is located above Cu in the electrochemical series
- W is able to displace Cu from its salt solution
- W is able to reduce Cu^{2+} ion.
- W is stronger than Cu as a reducing agent.
[*Any three correct questions*]

(ii)
- Oxidation number of W increases from 0 to +2
- W undergoes oxidation
- Oxidation number of Z decreases from +2 to 0
- Z undergoes reduction

(c)



Correct set up of apparatus
- Label correctly

Procedure:
1. A spatula of carbon powder and a spatula of solid oxide of X are mixed throughly in a crucible.
2. The mixture is heated strongly.
3. Any changes that occur are observed.
4. Step a to 3 are repeated using oxide of Y.

Result:

Mixture	Observation
Carbon + oxide of X	The mixture burns with a bright flame / The mixture glow brightly.
Carbon + oxide of Y	No visible change

Conclusion: Carbon is more reactive than X but less reactive than Y.

Equation: $C + 2XO \longrightarrow 2X + CO_2$

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[MRSM04-10]

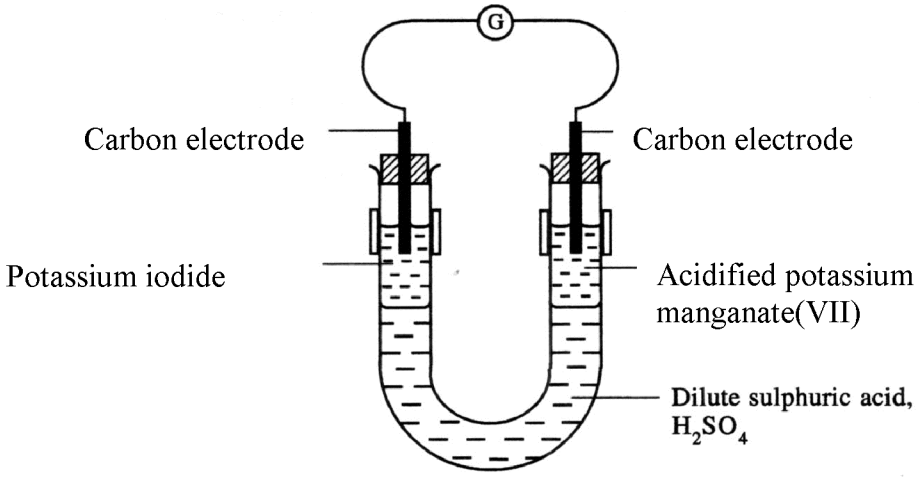
(a) . 1. Acidic gases released in industries dissolved in rain water / water vapour
2. to form electrolyte which increases the rate of rusting

(b) In Step I
1. iron(II) ion releases electron// increases oxidation number from +2 to +3
2. iron(II) ion act as reducing agents
3. green colour change to brown
4. $Fe^{2+} \rightarrow Fe^{3+} + e$

In Step II
1. iron(III) ion gain electrons// decreases oxidation number from +3 to +2
2. iron(III) ion act as oxidising agents
3. Brown change to green
4. $Fe^{3+} + e \rightarrow Fe^{2+}$

In Step III
1. Iron(II) ions gains electron // decreases oxidation number from +2 to 0
2. Iron(II) ion act as oxidising agents
3. Green change to grey metal
4. $Fe^{2+} + 2e \rightarrow Fe$

(c) Diagram



Procedure
1. Dilute sulphuric acid is poured into U-tube and clamped to a retort stand.
2. a dropper is used to fill one arm of the U-tube with potassium iodide.
3. acidified potassium manganate (VII) is added carefully to the other arm of U-tube by using different dropper.
4. both arm of the u-Tube is fitted with a carbon electrode each as shown in the diagram above.
5. The apparatus is left for about 20 minutes and the changes are recorded.

Verification of statement
Reducing agent : KI
At negative electrode, colourless of KI solution becomes yellow
Because iodide ion, I- released electron to formed iodine, I_2
$2I^- \rightarrow I_2 + 2e$ - Oxidation

Oxidising agent : acidified $KMnO_4$
At positive electrode, purple of permanganate(VII) ion solution becomes colourless
Because permanganate(VII) ion, MnO_4^- gain electron and formed manganate(II) ion, Mn^{2+}
$8H^+ + MnO_4^- + 5e \rightarrow 4H_2O + Mn^{2+}$ - reduction

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[SBPtrial11-10]

(a) 1. Acidic gases released in industries dissolved in rain water / water vapour
2. to form electrolyte which increases the rate of rusting

(b) 1. Reaction I is not a redox reaction
2. No change in oxidation number for all elements before and after the reaction. //

	HCl +	NaOH	→	H_2O +	NaCl
Oxidation No:	+1-1	+1-2 +1		+1 -2	+1 -1

3. Reaction II is a redox reaction

4. Oxidation numbers of magnesium increases (from 0 to +2) and copper decreases (from + 1 to 0) //

	Mg(s)	+	$CuSO_4$(aq)	→	$MgSO_4$ +	Cu
Oxidation No.	0		+2		+2	0

(c)

Step	Chemicals used	Observation
I	Any suitable oxidising agent / e.g : Copper(II) sulphate solution	Correct corresponding observation / Blue solution of Copper(II) sulphate solution becomes paler or colourless.
II	Any suitable reducing agent / e.g : zinc powder	Correct corresponding observation / zinc powder dissolves // brown colour of iron(III) ions becomes pale green.

(d) Sample answer
Labeled diagram :
1. Functional apparatus
2. Label (consists of one reducing agent and one oxidizing agent in solution form separated by a salt bridge)

Sample answer
Procedure :
3. Filled the "U-tube" with dilute H_2SO_4 until 5 cm from the mouth of each arm
4. Add potassium iodide solution carefully to one arm and bromine water to another arm until 3 cm height
5. Immersed the carbon electrodes to each arm and connect to the galvanometer using connecting wire.
6. Record the observation.

Half-equations involved :
7. Electrode in KI / Anode : $2\ I \rightarrow I_2 + 2e$
8. Electrode in Br2 / Cathode : $Br_2 + 2e \rightarrow 2\ Br^-$

Observation :
9. Electrode in KI / Anode : colourless solution of KI becomes brown
10. Electrode in Br2 / Cathode : Brown colour of bromine becomes colourless.

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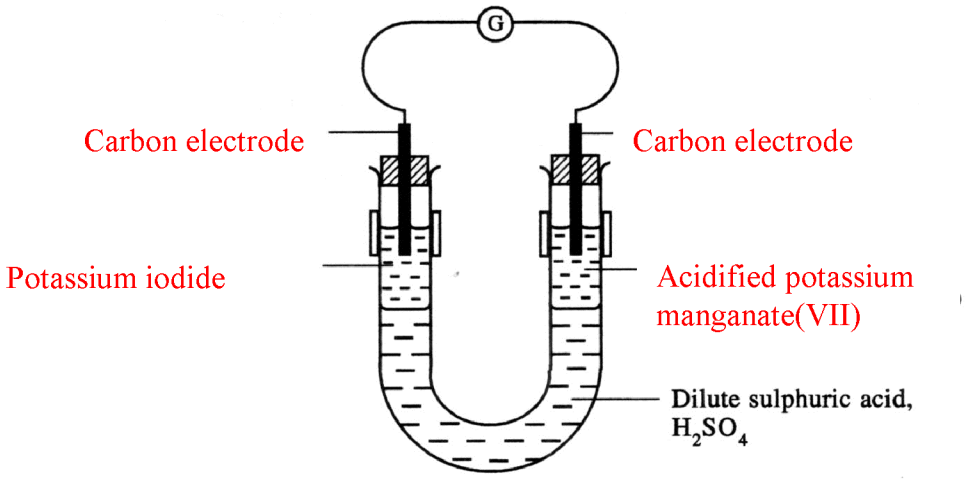
[SPM09-09]

(a) 1. Suggested metal : Magnesium
2. The ion present in the green solution are Fe^{2+} (and H+ and OH- from water)
Change in oxidation number for :

$Fe^{2+} \rightarrow Fe^{3+} + e$
3. Fe^{3+} to Fe^{2+} is from +3 to +2 (reduction occur)
4. Fe^{2+} is oxidising agent

$Mg \rightarrow Mg^{2+} + 2e$
5. Mg to Mg^{2+} is from 0 to +2 (oxidation occur)
6. Mg is reducing agent

(b) Diagram



Procedure
1. Dilute sulphuric acid is poured into U-tube and clamped to a retort stand.
2. a dropper is used to fill one arm of the U-tube with potassium iodide.
3. acidified potassium manganate (VII) is added carefully to the other arm of U-tube by using different dropper.
4. both arm of the u-Tube is fitted with a carbon electrode each as shown in the diagram above.
5. The apparatus is left for about 20 minutes and the changes are recorded.

Verification of statement
Reducing agent : KI
At negative electrode, colourless of KI solution becomes yellow
Because iodide ion, I- released electron to formed iodine, I_2
$2I^- \rightarrow I_2 + 2e$ - Oxidation

Oxidising agent : acidified $KMnO_4$
At positive electrode, purple of permanganate(VII) ion solution becomes colourless
Because permanganate(VII) ion, MnO_4^- gain electron and formed manganate(II) ion, Mn^{2+}
$8H^+ + MnO_4^- + 5e \rightarrow 4H_2O + Mn^{2+}$ - reduction

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[SPM08-09]

(a) M is sodium.
[Alternate Answer: any other Group 1 metals]

Sodium burns with a yellow flame to produce a white solid.

Oxidation: $Na \rightarrow Na^+ + e$
Reduction: $0_2 + 4e \rightarrow 2O^{2-}$

(b) X is copper.
[Alternate Answer: any other metal less electropositive than iron.
Copper is less electropositive than iron.
Therfore, iron rusts.

Y is magnesium.
[Alternate Answer: aluminium or zinc]
Magnesium is more electropositive than iron.
Therefore, magnesium prevents iron from rusting.

(c) **Fe^{3+} → Fe^{2+}**
Reducing agent is magnesium.
Add magnesium to a solution containing Fe^{3+}.
Heat the mixture.
Filter the mixture.
Add sodium hydroxide solution.
A green precipitate is formed.

Fe^{2+} → Fe^{3+}
Halogen is bromine.
Add bromine water to a solution containing Fe^{2+}.
Shake the mixture.
Add sodium hydroxide solution.
Brown precipitate is formed.

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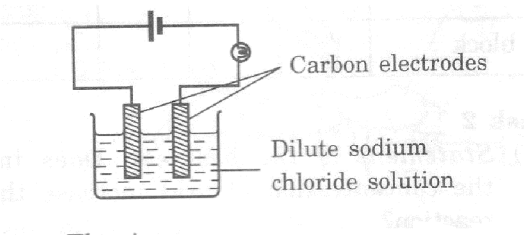
[SPM05-09]

(a) The iron key can be electroplated with nickel by electrolysis.
The iron key is made the cathode.
Nickel is made the anode.
Nickel(II) sulphate is used as the electrolyte.

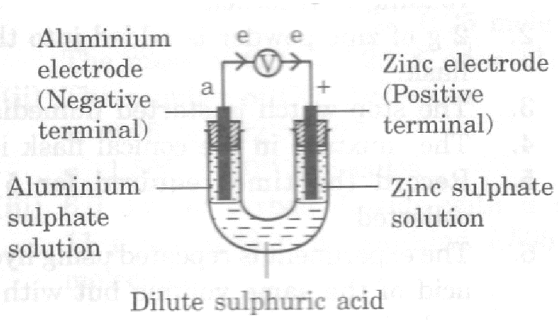
(b)



Ions present in sodium chloride solution are Na^+, Cl^- , H^+, OH^- ions.
Na^+ and H^+ ions are attracted to the cathode.
Cl^- and OH^- ions are attracted to the anode.
At the cathode, H^+ ions are selected to be discharged because it is lower than Na^+ ions in the electrochemical series.
Hydrogen gas is produced at the cathode.

At the anode, OH^- ions are selected to be discharged because it is llower than Cl^- ions in the electrochemical series.
Oxygen gas is produced at the anode.

(c)



Dilute sulphuric acid is filled into a U-tube.
Aluminium sulphate solution is added into one arm of the U-tube and zinc sulphate solution is added into the other arm of the U-tube, slowly.
Aluminium and zic plates are immersed respectively into aluminium sulphate and zinc sulphate solution.
The wire is connected to complete the circuit.

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[SPM04-10]

(a) Redox reaction is a reaction in which oxidation and reduction occur simultaneously.
E.g: $Mg + Cu^{2+} \rightarrow Mg^{2+} + Cu$

(b) (i) In Experiment I,
Iron is oxidised to Fe^{2+} ions.
Electrons flow from iron to P because iron is more electropositive than P.
Blue solution shows the presence of Fe^{2+} ions.

In Experiment II,
Q is oxidised.
Electrons flow from Q to Fe because Q is more electropositive than Fe.
Water and oxygen receive electrons to form OH^- ions.
The pink spots show the presence of OH^- ions.

(ii) Q, iron, P

(c)

Salt Solution / Metal	W	X	Y	Z
W		√	√	√
X	X		√	√
Y	X	X		√
Z	X	X	X	

√ = Metal deposited X = No deposit

Fill 4 test tubes with salt solutions of metal W, X, Y and Z.
Clean the metal strips with sandpaper.
Put metal W in to every test tube.
Leave for a few minutes

Repeat the steps above using metals X, Y and Z.

Observation:
For metal W:
Metal deposition occur when metal W is immersed into salt solutions of X, Y and Z.
Therefore, W is the most electropositive.

For metal Z:
No metal deposition when metal Z is immersed into salt solutions of W, X and Y.
Therefore, Z is the least electropositive.

For metal X:
There is metal deposition when metal X is immersed into salt solutions of Y and Z.
There is no metal deposition when metal X is immersed into salt solution of W.
Therefore, X is more electropositive than Y and Z.

For metal Y:
There is metal deposition when metal Y is immersed into salt solution of Z.
No metal deposition occur when metal Y is immersed into salt solutions of W and X.
Therefore, Y is more electropositive than Z.

Descending order: W, X, Y, Z

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[SPM06-07]

(a) (i) Oxidation number of Al = +3
Oxidation number of Cu = +2

(ii) Al_2O_3 = aluminium oxide
Cu_2O = copper(II) oxide

(iii) Copper exhibits more than one oxidation number. Therefore the roman number is used in naming copper(II) oxide.
This is not required to name aluminium oxide because aluminium only exhibits one oxidation number.

(b) (i) acidified potassium manganate(VII) solution

(ii) At positive terminal:
$MnO_4^- + 8H^+ + 5e \rightarrow Mn^{2+} + 4H_2O$

(iii) At positive terminal, MnO_4^- ions receive electrons and are reduced to Mn^{2+} ions.
At the negative terminal, Fe^{2+} ions donate electrons and are oxidised to Fe^{3+} ions.
The purple colour of potassium manganate(VII) solution fades.
The green colour of iron(II) sulphate solution to brown.