BAB 1: KESEIMBANGAN REDOKS

SOALAN OBJEKTIF

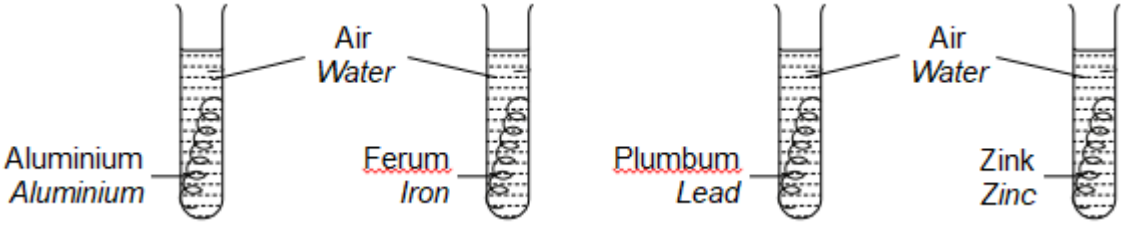
SPM 2019 Q9

1 Apakah nombor pengoksidaan bagi oksigen dalam hidrogen peroksida, H_2O_2?
What is the oxidation number of oxygen in hydrogen peroxide, H_2O_2?

A -2 **B** -1
C 0 **D** +1

SPM 2018 Q29

2 Rajah 1 menunjukkan empat tabung uji yang mengandungi logam yang berbeza direndam di dalam air.
Diagram 1 shows four test tubes that contain different metals immersed in water.



Rajah 1 / *Diagram 1*

Buku Teks Kimia Tingkatan 5 m/s 53

Logam manakah yang paling cepat terkakis.
Which metal is the fastest to corrode?

A Aluminium
Aluminium
B Ferum
Iron
C Plumbum
Lead
D Zink
Zinc

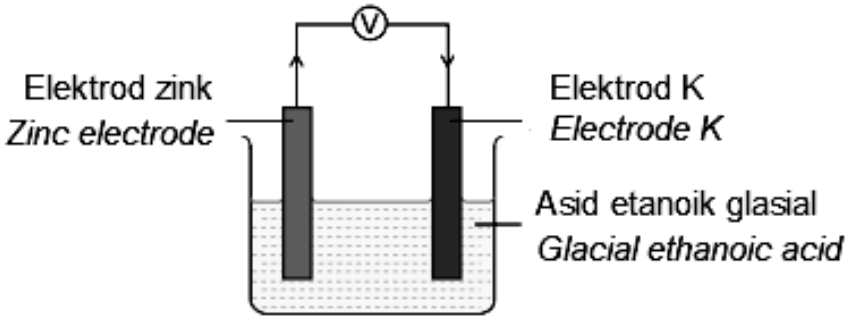
SPM 2008, Q5

3 Bahan-bahan manakah adalah elektrolit?
Which substances are electrolytes?

I Natrium klorida
Sodium chloride
II Naftalena
Naphtalena
III Asid etanoik
Ethanoic acid
IV Propanol
Propanol
A I dan III
B I dan IV
C II dan III
D II dan IV

SPM 2018, 11

4 Rajah 2 menunjukkan susunan radas untuk membina sel kimia.
Diagram 2 shows the set-up of the apparatus to build a chemical cell.



Buku Teks Kimia Tingkatan 5, 27

Rajah 2/ *Diagram 2*

Logam yang manakah yang sesuai digunakan sebagai elektrod K untuk menghasilkan nilai voltan yang paling tinggi?
Which metal is suitable to be used as the electrode K to produce the highest voltage value?

A Stanum
Tin

B Aluminium
Aluminium

C Magnesium
Magnesium

D Kuprum
Copper

5 Air laut merupakan Tenaga Boleh Baharui yang boleh menghasilkan tenaga elektrik.
Seawater is a Renewable Energy that can generate electricity.
Logam manakah yang sesuai dijadikan sebagai anod jika air laut dijadikan sebagai elektrolit manakala logam aluminium dijadikan sebagai katod dalam suatu sel kimia ringkas.
Which metal is suitable as anode if seawater is used as electrolyte while aluminum metal is used as cathode in a simple voltaic cell.

A Stanum
Tin

B Magnesium
Magnesium

C Platinum
Platinum

6 Logam manakah yang boleh diekstrak daripada bijihnya melalui proses penurunan oleh karbon?
Which metal can be extracted from its ore through the process of reduction by carbon?

A. Argentum
Argentum

B. Zink
Zinc

C. Aluminium
Aluminium

SPM 2015, Q16

7 Bahan manakah yang digunakan untuk menukarkan ion ferum (II) kepada ion ferum (III)?
Which substance is used to change iron (II) ion to iron (III) ion?

A Zink
Zinc

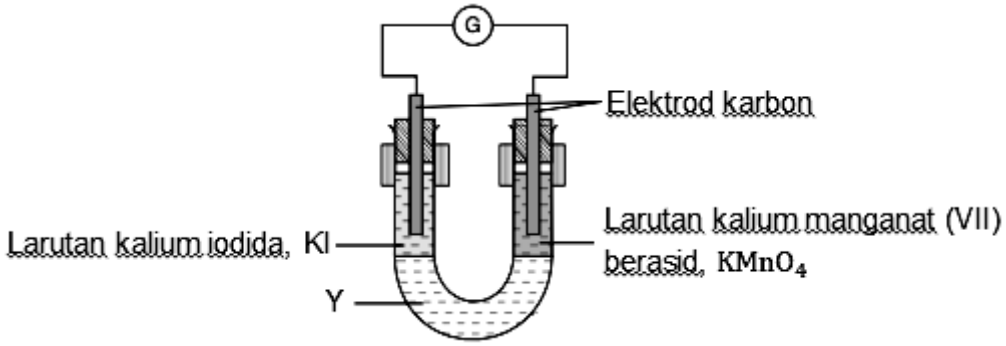
B Sulfur dioksida
Sulphur dioxide

C Air bromin
Bromine water

D Larutan kalium iodida
Potassium iodide solution

SPM 2019, Q22

8 Rajah 3 menunjukkan susunan radas bagi pemindahan elektron pada suatu jarak dalam tiub-U.
Diagram 3 shows the apparatus set-up for the transfer of electrons at a distance in U-tube.



(Buku Teks Kimia Tingkatan 5, m/s 7)

Rajah 3/ *Diagram 3*

Nyatakan fungsi bagi Y.
State the function of Y.

A Membenarkan pemindahan elektron dari terminal negatif kepada terminal positif.
Allows the transfer of electrons from negative terminal to positive terminal.

B Menerima elektron dari larutan kalium iodida.
Accepts electrons from potassium iodide solution.

C Bertindak sebagai agen pengoksidaan.
Act as an oxidizing agent.

D Membenarkan pengaliran ion dari kedua-dua larutan.
Allows the flow of ions from both solutions.

9 Berdasarkan nilai E° berikut, susun ion berikut dalam tertib menaik kekuatan agen pengoksidaan.
Based on the E° values, arrange those ions in ascending order of strength as oxidizing agents.

Tindak balas sel setengah	E°
$Ni^{2+}(ak) + 2e^- \rightleftharpoons Ni(p)$	-0.25
$Ca^{2+}(ak) + 2e^- \rightleftharpoons Ca(p)$	-2.87
$Sn^{2+}(ak) + 2e^- \rightleftharpoons Sn(p)$	-0.14

A Ni^{2+}, Ca^{2+}, Sn^{2+}

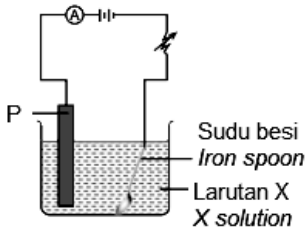
B Ca^{2+}, Ni^{2+}, Sn^{2+}

C Sn^{2+}, Ca^{2+}, Ni^{2+}

D Ni^{2+}, Sn^{2+}, Ca^{2+}

SPM 2016 Q32

10 Rajah 4 menunjukkan suatu susunan radas bagi penyaduran sudu besi.
Diagram 4 show the apparatus set-up for electroplating of iron spoon.



(Buku Teks Kimia Tingkatan 5, m/s 45)

Rajah 4/ *Diagram 4*

Apakah P dan larutan X?
What are P and X solution?

	P	**Larutan X** ***X solution***
A	Ferum *Iron*	Argentum nitrat *Silver nitrate*
B	Argentum *Silver*	Argentum nitrat *Silver nitrate*
C	Argentum *Silver*	Ferum (II) nitrat *Iron (II) nitrate*
D	Ferum *Iron*	Ferum (II) nitrat *Iron (II) nitrate*

11 Persamaan kimia berikut merupakan suatu tindak balas redoks.
The following chemical equation is a redox reaction.

$$Mg + 2HCl \rightarrow MgCl_2 + H_2$$

Apakah perubahan nombor pengoksidaan magnesium?
What is the change in oxidation number of magnesium?

A 0 → +2 **B** +2 → 0
C 0 → -2 **D** -2 → 0

12 Antara berikut, tindak balas yang manakah berlaku dalam relau bagas semasa pengekstrakan bijih besi.
Which of the reaction occurs in furnace during extraction of iron ore?

I Kalsium karbonat bertindak sebagai agen penurunan
Calcium carbonate acts as reducing agent
II Bijih besi bertindak sebagai agen pengoksidaan
Iron ore acts as oxidising agent
III Karbon dioksida dioksidakan oleh kok kepada karbon monoksida
Carbon dioxide is oxidized to carbon monoxide by coke
IV Kok menurunkan bijih besi kepada besi
Iron ore reduced to iron by coke

A. I dan III B. I dan IV
C. II dan III D. II dan IV

SPM 2015, 22

13 Persamaan ion berikut mewakili suatu tindak balas redoks.
The following ionic equation represents a redox reaction.

$$Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$$

Pernyataan manakah yang betul?
Which statement is correct?

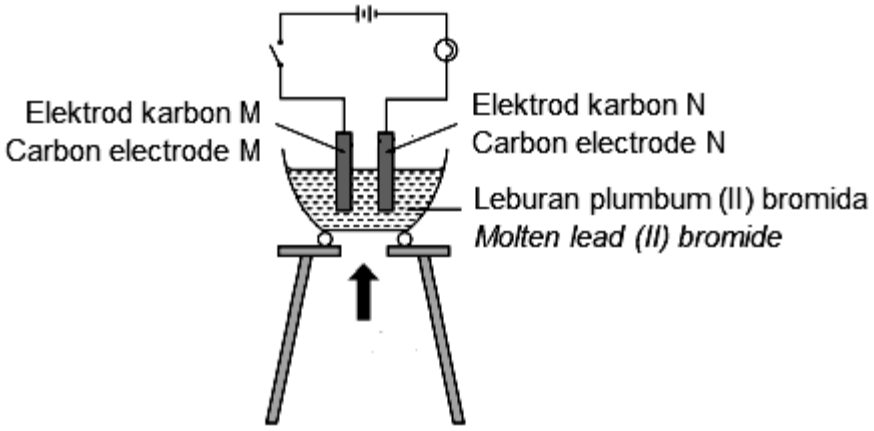
A Ion kuprum (II) kehilangan elektron
Copper (II) ion losts electron

B Ion kuprum (II) dioksidakan
Copper (II) ion is oxidized

C Atom zink mengalami penurunan
Zinc atom undergoes reduction

D Atom zink merupakan agen penurunan
Zinc atom is a reduction agent

14 Rajah 5 menunjukkan susunan radas bagi elektrolisis leburan plumbum (II) bromida, $PbBr_2$.
Diagram 5 shows the apparatus set-up for the electrolysis of molten lead (II) bromide, $PbBr_2$.



(Buku Teks Kimia Tingkatan 5, m/s 34)

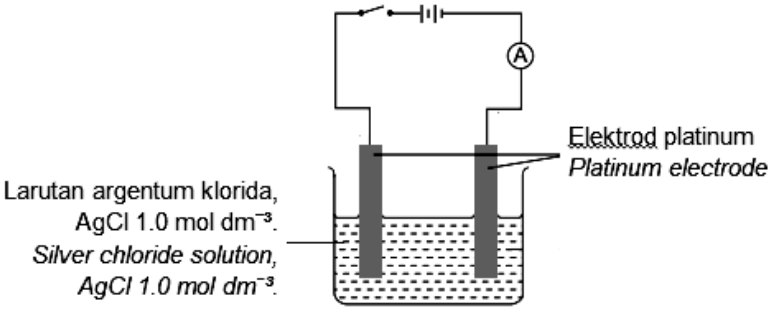
Rajah 5/ *Diagram 5*

Apakah hasil tindak balas pada elektrod karbon M dan N?
What are the products at carbon electrode M and N?

	M	N
A	Logam plumbum *Lead metal*	Gas bromin *Bromine gas*
B	Gas hidrogen *Hydrogen gas*	Gas oksigen *Oxygen gas*
C	Gas hidrogen *Hydrogen gas*	Gas bromin *Bromine gas*
D	Gas bromin *Bromine gas*	Logam plumbum *Lead metal*

SPM 2008, Q39

15 Rajah 6 menunjukkan elektrolisis bagi larutan argentum klorida, AgCl 1.0 mol dm^{-3}.
Diagram 6 shows the electrolysis of silver chloride solution, AgCl 1.0 mol dm^{-3}.



(Buku Teks Kimia Tingkatan 5, 43)

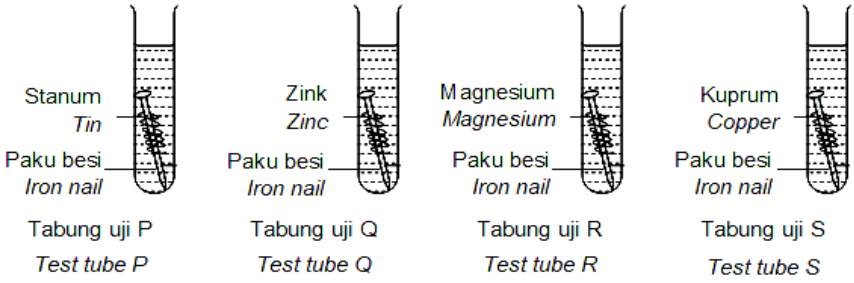
Rajah 6/ *Diagram 6*

Setengah persamaan manakah yang mewakili tindak balas di anod dan di katod?
Which half equation represents the reactions at the anode and the cathode?

	Anod ***Anode***	**Katod** ***Cathode***
A	$2Cl^- \rightarrow Cl_2 + 2e^-$	$2H^+ + 2e^- \rightarrow H_2$
B	$2Cl^- \rightarrow Cl_2 + 2e^-$	$Ag^+ + e^- \rightarrow Ag$
C	$4OH^- \rightarrow O_2 + 2H_2O + 4e^-$	$2H^+ + 2e^- \rightarrow H_2$
D	$4OH^- \rightarrow O_2 + 2H_2O + 4e^-$	$Ag^+ + e^- \rightarrow Ag$

SPM 2005,Q19

16 Rajah 7 menunjukkan paku besi yang dililit dengan logam yang berlainan dimasukkan ke dalam tabung uji yang mengandungi campuran agar-agar, larutan kalium heksasianoferat (III), $K_2Fe(CN)_6$ dan fenolftalein.
Diagram 7 shows an iron nail coated with different metals inserted into a test tube containing a mixture of agar, potassium hexacyanoferrate (III) solution, $K_2Fe(CN)_6$ *and phenolphthalein.*



(Buku Teks Kimia Tingkatan 5, 55)

Rajah 7/ *Diagram 7*

Selepas sehari, larutan dalam tabung uji manakah yang bertukar menjadi warna biru?
After a day, solution in which test tube will turns blue?

I. Tabung uji P
Test tube P

II Tabung uji Q
Test tube Q

III Tabung uji R
Test tube R

IV Tabung uji S
Test tube S

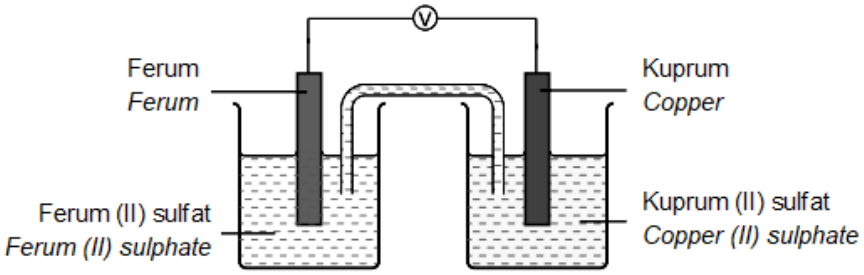
A I dan III

B I dan IV

C II dan III

D II dan IV

17 Rajah 8 menunjukkan susunan radas bagi suatu sel kimia.
Diagram 8 shows the apparatus set-up for a voltaic cell.



Rajah 8/ *Diagram 8*

Hitung nilai E° sel bagi sel kimia tersebut jika E° bagi dua sel setengah adalah seperti berikut:
Calculate the E° sel value for this voltaic cell, if E° half cells are:

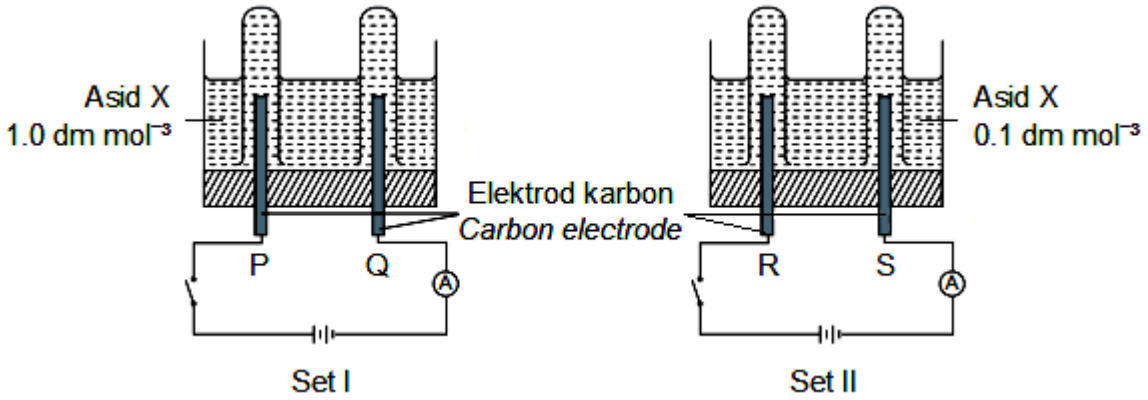
$Fe^{2+}(ak) + 2e^- \rightleftharpoons Fe(p)$	-0.44
$Cu^{2+}(ak) + 2e^- \rightleftharpoons Cu(p)$	+0.34

A -0.1
B 0.1
C -0.78
D 0.78

SOALAN STRUKTUR

SPM 2018, Q4

1 Rajah 9 menunjukkan susunan radas bagi mengkaji elektrolisis bagi asid yang sama tetapi mempunyai kepekatan yang berbeza.
Diagram 9 shows the apparatus set-up to study electrolysis of an acid with different concentrations.



(Buku Teks Kimia Tingkatan 5, 41)

Rajah 9/ *Diagram 9*

Pemerhatian bagi Set I dan Set II ditunjukkan dalam Jadual 1.
The observation for Set I dan Set II is shown in Table 1.

	Pemerhatian ***Observation***	
	Anod **Anode**	**Katod** **Cathode**
Set I	Gas kuning kehijauan dibebaskan *Greenish yellow gas is released*	Gas tidak berwarna dibebaskan *Colourless gas is released*
Set II	Gas tidak berwarna dibebaskan *Colourless gas is released*	Gas tidak berwarna dibebaskan *Colourless gas is released*

Jadual 1/ *Table 1*

(a) Apakah yang dimaksudkan dengan elektrolisis?
What is the meaning of electrolysis?

(1 markah/ *1 mark*)

(b) Nyatakan nama bagi asid X.
State the name of acid X.

(1 markah/ *1 mark*)

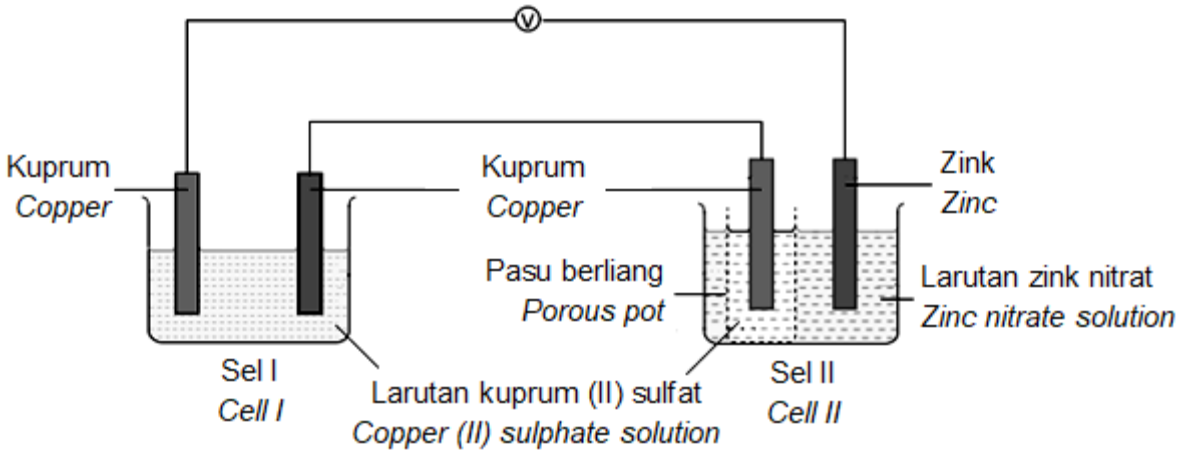
(c) Nyatakan nama gas yang terhasil pada elektrod P dan R.
State the name of gasses produced at electrode P and S.
Elektrod P / *Electrode P*:
Elektrod S / *Electrode S*:

(2 markah/ *2 marks*)

(d) Tulis setengah persamaan bagi elektrod:
Write half equation for electrodes:
Q:
R:

(2 markah/ *2 marks*)

2. Rajah 10 menunjukkan susunan radas bagi gabungan sel I dan sel II.
Diagram 10 shows the apparatus set-up for the combination of cell I and cell II.



Rajah 10/ *Diagram 10*

(a) Pada Rajah 10, tanda X pada terminal positif bagi Sel I.
In Diagram 10, mark X at the positive terminal in cell I.

(1 markah/ *1 mark*)

(b) Tuliskan notasi sel bagi Sel II
Write cell notation for Cell II.

(1 markah/ *1 mark*)

(c) Selepas dua puluh minit,
After twenty minutes,

(i) nyatakan pemerhatian pada elektrod zink di sel II
state the observation at zinc electrode in cell II.

*(*1 markah/ *1 mark)*

(ii) tuliskan setengah persamaan bagi tindak balas yang berlaku di elektrod zink di sel I.
write half equation for the reaction occurred at the zinc electrode in cell I.

(1 markah/ *1 mark*)

(d) Nyatakan perubahan warna bagi larutan kuprum (II) sulfat dalam sel I dan sel II.
State the change in colour of copper (II) sulphate solution in cell I and cell II.

(2 markah/ *2 marks*)

(e) Seorang pelajar telah mendapati kunci besinya telah berkarat.
A student found that his iron key has rusted.

(i) Nyatakan satu kaedah yang boleh digunakan untuk mengatasi masalah ini.
State the method that can be used to solve this problem.

(1 markah/ *1 mark*)

(ii) Lukis rajah berlabel untuk susunan radas bagi (e)(i).
Draw a labelled diagram for the apparatus set-up for (e)(i)

(3 markah/ *3 marks*)

SOALAN ESEI

SPM 2017, Q10a, SPM 2019, Q7b SPM 2019, Q7c

1. (a) Jadual 1 menunjukkan persamaan bagi dua tindak balas
Table 1 shows the equation of two reactions.

Tindak balas ***Reaction***	**Persamaan Kimia** ***Chemical Equation***
X	$FeSO_4 + Mg \rightarrow Fe + MgSO_4$
Y	$AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$

Jadual 1/*Table 1*

Tentukan sama ada setiap tindak balas tersebut merupakan tindak balas redoks atau tidak. Terangkan jawapan anda berdasarkan perubahan nombor pengoksidaan.
Determine whether each reaction is a redox reaction or not. Explain your answer in terms of change of oxidation number.

(4 markah/ *4 marks*)

(b) Petikan di bawah menunjukkan perbualan antara dua orang pekerja di sebuah pasar raya.

Pekerja A	: Pastikan semua tin makanan yang telah kemik diasingkan dari rak kerana tidak lagi selamat untuk dimakan
Pekerja B	: Baiklah, tetapi kenapa ia tidak lagi selamat untuk dimakan?

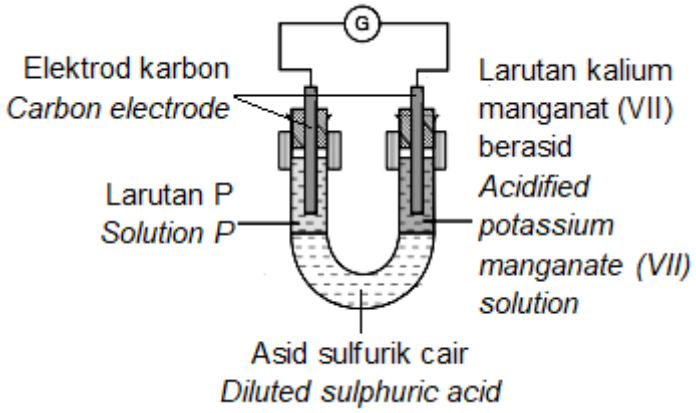
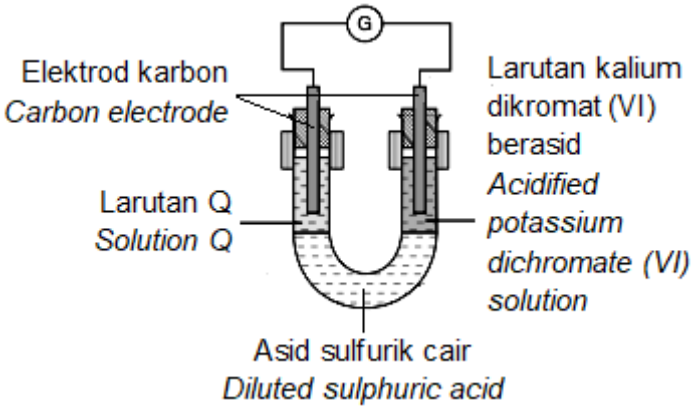
Statement shows the conversation between two workers in a supermarket.

Worker A	*: Please make sure all dented food can are separated from the rack, because they are no longer safe to be consumed.*
Worker B	*: Alright, but why are they no longer safe to be consumed?*

Tin makanan diperbuat daripada ferum yang disaluti dengan stanum. Mengapakah makanan dalam tin yang sudah kemik tidak selamat di makan? Terangkan.
A food can is made from iron that is coated with tin. Why food in a dented can is not safe to be consumed. Explain.

(6 markah/ *6 marks*)

(c) Satu eksperimen dijalankan untuk mengkaji tindak balas redoks melalui pemindahan elektron pada suatu jarak. Keputusan eksperimen ditunjukkan dalam Jadual 2.
An experiment is carried out to study the redox reactions by the transfer of electrons at a distance. The result of the experiment is shown in Table 2.

Set	**Eksperimen** ***Experiment***	**Pemerhatian** ***Observation***
I		Bagi Larutan P: - Larutan hijau bertukar kepada perang. - Apabila larutan kalium tiosianat, KSCN ditambah, larutan merah darah terbentuk *For Solution P:* *- Green solution turns brown.* *- When a potassium thiocyanate solution, KSCN is added, a blood red solution is formed.*
II		Bagi Larutan Q: - Larutan tidak berwarna bertukar kepada perang. - Apabila larutan kanji ditambah, mendakan biru tua terbentuk. *For Solution Q:* *- Colourless solution turns brown.* *- When a starch solution is added, dark blue precipitate is formed.*

(Buku Teks Kimia Tingkatan 5, 7)

Jadual 2/*Table 2*

Berdasarkan pemerhatian pada Jadual 2,

i. cadangkan larutan P dan Q

ii. bagi setiap set eksperimen,
- nyatakan bahan yang diturunkan
- tulis setengah persamaan bagi tindak balas penurunan
- nyatakan agen pengoksidaan dan agen penurunan

(10 markah)

Based on the observations in Table 2,

i. suggest solutions P and Q

ii. *for each set of experiment,*

- state the substance that is reduced

- write the half equation of reduction reaction

- state the oxidizing and reducing agents.

(10 marks)

SPM 2017, Q8(c)

2. (a) (i) Jadual 3 menunjukkan elektrod, elektrolit dan pemerhatian di anod bagi tiga sel elektrolisis.
Table 3 shows electrodes, electrolytes and observations at anode for three electrolytic cells.

Sel ***Cell***	**Elektrolit** ***Electrolyte***	**Elektrod** ***electrode***		**Pemerhatian di anod** ***Observation at anode***
		Katod ***Cathode***	**Anod** ***Anode***	
I	Larutan kuprum (II) klorida 0.001 mol dm^{-3} *0.001 mol dm^{-3} of copper (II) chloride solution*	Karbon *Carbon*	Karbon *Carbon*	Gas tidak berwarna terbebas *Colourless gas is released*
II	Larutan kuprum (II) klorida 0.001 mol dm^{-3} *0.001 mol dm^{-3} of copper (II) chloride solution*	Kuprum *Copper*	Kuprum *Copper*	Anod semakin menipis *Anode becomes thinner*
III	Larutan kuprum (II) klorida 1.0 mol dm^{-3} *1.0 mol dm^{-3} of copper (II) chloride solution*	Karbon *Carbon*	Karbon *Carbon*	Gas kuning kehijauan terbebas *Greenish yellow gas released*

Jadual 3/ *Table 3*

Berdasarkan Jadual 3,
Terangkan pemerhatian di anod bagi
Based on Table 3,
Explain observation at anode for

- Sel I dan Sel II
  Cell I and Cell II
- Sel I dan Sel III
  Cell I and Cell III

(8 markah/ 8 marks)

(ii) Terangkan mengapa warna biru larutan kuprum (II) klorida tidak berubah dalam Sel II.
Explain why the blue colour of copper (II) chloride solution remains unchanged in Cell II.

(2 markah / *2 marks*)

(b)

"Kajian awal ke atas air sisa yang dihasilkan oleh premis pembuatan batik menunjukkan bahawa effluen yang terhasil dari aktiviti pemprosesan batik mengandungi pepejal terampai, pewarna organik dan bukan organik serta logam berat yang memberi kesan negatif kepada alam sekitar."

"Studies on wastewater produced by batik manufacturer show that these effluents contain suspended solids, organic and inorganic dyes and heavy metals that have a negative impact on the environment."

Norazah Masrom (2012)
Projek Integrasi Pengeluaran Bersih Pembuatan Batik

Anda dibekalkan dengan radas berikut:

Bikar 500ml, wayar penyambung dengan klip buaya, bateri, dan air sisa dari perusahaan batik, pH meter.

Cadangkan elektrod yang sesuai dan huraikan satu eksperimen untuk mengolah air sisa dari pembuatan batik ini.

You are given the following apparatus:

Beaker 500ml, connecting wire with alligator clips, batteries, wastewater from batik manufacturer, pH meter

Suggest a suitable electrode and describe one experiment to treat wastewater produced by batik manufacturer.

(10 markah/ *10 marks*)

BAB 2: SEBATIAN KARBON

SOALAN OBJEKTIF

Klon SPM 2011, Q2

1 Sebatian manakah adalah suatu hidrokarbon tak tepu?
Which compound is unsaturated hydrocarbon?

A Propena
Propene

B Propana
Propane

C Kloropropana
Chloropropane

D Propanol
Propanol

2 Antara yang berikut, yang benar mengenai proses peretakan petroleum?
Which of the following is correct about petroleum cracking process?

A Mengasingkan berdasarkan kepada perbezaan takat didih.
Separation is based on differences of boiling point.

B Digunakan untuk menghasilkan hidrokarbon bermolekul besar.
Use to produce large molecules of hydrocarbon.

C Menggunakan mangkin.
Use catalyst.

D Bitumen ialah contoh hasil proses peretakan.
The example of the product of cracking process is bitumen.

Klon SPM 2014, Q6

3 Antara yang berikut, yang mana betul tentang alkuna?
Which of the following is correct about alkynes?

A Sebatian mempunyai kumpulan karboksil.
The compound has carboxyl group.

B Sebatian mempunyai formula am C_nH_{2n-2}.
The compound has general formula of C_nH_{2n-2}.

C Sebatian adalah satu hidrokarbon tepu.
The compound is a saturated hydrocarbon.

D Sebatian mengandungi hanya ikatan tunggal antara atom-atom karbon.
The compound consists of only single bond between carbons atoms.

SPM 2012, Q35

4 Pernyataan manakah yang menunjukkan perbezaan antara butena dengan butana?
Which statement shows the difference between butene and butane?

A Butena terlarut dalam air tetapi butana tidak terlarut dalam air.
Butene dissolved in water but butane does not.

B Peratus karbon per molekul bagi butena lebih tinggi.
The carbon percentage per molecule of butane is higher.

C Bilangan atom hidrogen per molekul butena lebih tinggi.
The number of hydrogen atoms per molecule of butene is higher.

D Butana menyahwarnakan warna perang air bromin tetapi butena tidak menyahwarnakan warna perang air bromin.
Butane decolourised the brown colour of bromine water but butene does not.

SPM 2013, Q29

5 Persamaan berikut menunjukkan penukaran butanol kepada butena.
The following equation shows the conversion of butanol to butene.

$$C_4H_9OH \xrightarrow[\text{Panaskan / } \textit{Heat}]{\text{Proses X / } \textit{Process X}} C_4H_8 + H_2O$$

Apakah proses X?
What is process X?

A Pengoksidaan
Oxidation

B Hidrolisis
Hydrolisis

C Pendehidratan
Dehydration

D Penghidrogenan
Hydrogenation

6 Antara sebatian yang berikut, manakah mempunyai dua isomer?
Which of the following compounds have two isomers?

A Etana
Etane

B Propana
Propane

C Butana
Butane

D Pentana
Pentane

7 Antara sebatian berikut, manakah akan bertindak balas dengan zink dan membebaskan gas hidrogen?
Which of the following compounds will react with zinc to give off hydrogen gas?

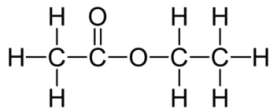
A CH_3CH_2OH

B CH_3COOCH_3

C CH_3CHCH_2

D CH_3COOH

8 Rajah 1 mewakili formula struktur satu sebatian karbon.
Diagram 1 shows the structural formula of a carbon compound.



Rajah 1 / *Diagram* 1

Manakah antara pasangan berikut adalah bahan tindak balas untuk menghasilkan sebatian karbon dalam Rajah 1?
Which of the following is the correctly paired of reactants to produce the carbon compound in Diagram 1?

	Asid karboksilik ***Carboxylic acid***	**Alkohol** ***Alcohol***
A	Asid etanoik *Ethanoic acid*	Propanol *Propanol*
B	Asid propanoik *Propanoic acid*	Propanol *Propanol*
C	Asid etanoik *Ethanoic acid*	Etanol *Ethanol*
D	Asid propanoik *Propanoic acid*	Etanol *Ethanol*

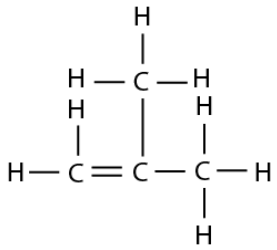
SPM 2017, Q19

9 Etena bertindak balas dengan stim pada suhu 300^0C untuk menghasilkan sebatian M. Asid fosforik pekat digunakan sebagai mangkin dalam tindak balas ini. Apakah M?
Ethene reacts with steam at the temperature of 300^0C to produce compound M. Concentrated phosphoric acid is used as a catalyst in this reaction. What is M?

A C_2H_4 **B** C_2H_6
C C_2H_5OH **D** C_2H_5COOH

SPM 2016, Q 37

10 Rajah 2 menunjukkan formula struktur satu sebatian T.
Diagram 2 shows the structural formula of compound T.

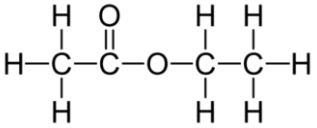


Rajah 2 / *Diagram* 2

Berapakah peratus jisim karbon dalam sebatian T?
[Jisim atom relative: H = 1; C = 12]
What is the percentage of carbon by mass in compound T?
[*Relative atomic mass*: H = 1; C = 12]

A 20.69% **B** 21.42%
C 82.76% **D** 85.71%

11 Rajah 3 mewakili formula struktur satu sebatian karbon.
Diagram 3 shows the structural formula of a carbon compound.



Rajah 3 / *Diagram* 3

Sifat fizik manakah benar mengenai sebatian karbon dalam Rajah 3?
Which physical properties is true about the carbon compound in Diagram 3?

I. Berbau wangi / *Sweet smelling*
II. Cecair berwarna / *Coloured liquid*
III. Larut dalam air / *Dissolve in water*
IV. Tidak larut dalam air / *Does not dissolve in water*

A I dan II
I and II
B I dan III
I and III
C II dan IV
II and IV
D III dan IV
III and IV

SOALAN STRUKTUR

1 Jadual 1 menunjukkan ahli-ahli dalam satu hidrokarbon.
Table 1 shows the members of a hydrocarbon

Sebatian ***Compound***	**Formula molekul** ***Molecular formulae***	**Takat lebur (^{0}C)** ***Melting point (^{0}C)***	**Takat didih (^{0}C)** ***Boiling point (^{0}C)***
Etena *Etene*	C_2H_4	-199	-104
Propena *Propene*	C_3H_6	-185	-47
Butena *Butene*	C_4H_8	-175	-6
Pentena *Pentene*	C_5H_{10}	-165	30

Jadual 1 / *Table* 1

(a) Ahli dalam keluarga ini dikelaskan di bawah satu siri homolog. Namakan siri homolognya dan nyatakan formula amnya.
Members of this family are classified under a homologous series. Name the homologous series and state its general formulae.
Siri homolog: _____
Homologous series

[1 markah / 1 *mark*]

Formula am: _____
General formulae

[1 markah / 1 *mark*]

(b) Lukis formula struktur untuk dua isomer bagi butena, C_4H_8.
Draw the structural formulae for two isomers of butene, C_4H_8.

[2 markah / 2 *marks*]

(c) (i) Apakah keadaan fizik bagi pentena pada suhu bilik?
What is the physical state of pentene at room temperature?

[1 markah / 1 *mark*]

(ii) Nyatakan pemerhatian apabila propena dialirkan melalui air bromin.
State the observation when propene is passed through into bromine water.

[1 markah / 1 *mark*]

(iii) Tulis persamaan kimia seimbang bagi tindak balas dalam 1(b)(ii).
Write the balanced chemical equation for the reaction in 1(b)(ii).

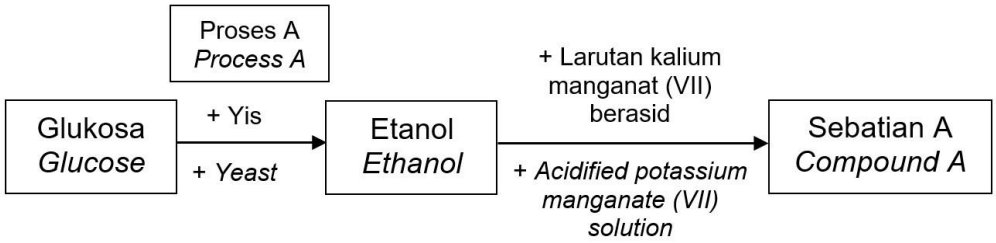
[2 markah / 2 *marks*]

(d) Terangkan mengapa takat lebur dan takat didih semakin bertambah daripada etena kepada pentena
Explain why the melting points and boiling points increase from etene to pentane.

[2 markah / 2 *marks*]

Klon SPM 2018, Q6

2 Rajah 1 menunjukkan satu proses bagi pembentukan sejenis asid.
Diagram 1 shows a process of formation of and acid.



Rajah 1 / *Diagram* 1

(a) (i) Nyatakan siri homolog bagi sebatian A tersebut
State the homologous series of the compound A.

[1 markah / 1 *mark*]

(ii) Nyatakan kumpulan berfungsi bagi siri homolog yang dinyatakan di 2(a)(i).
State the functional group for the homologous series stated in 2(a)(i)

[1 markah / 1 *mark*]

(iii) Nyatakan formula molekul bagi asid A.
State the molecular formulae for acid A.

[1 markah / 1 *mark*]

(b) (i) Etanol ialah sejenis alcohol. Nyatakan formula am bagi alcohol.
Etanol is an alcohol.State the general formula of alcohol.

[1 markah / 1 *mark*]

(ii) Nyatakan nama proses A.
Stated the name of process A.

[1 markah / 1 *mark*]

(iii) Tuliskan satu persamaan kimia seimbang bagi pembentukan etanol daripada glukosa.
Write a balance chemical equation for the formation of ethanol from glucose.

[2 markah / 2 *marks*]

(c) Tindak balas antara asid A dan etanol akan menghasilkan sebatian X.
The reaction between acid A and ethanol will produced compound X

(i) Berikan satu sifat fizik bagi sebatian X.
Give one physical property of compound X.

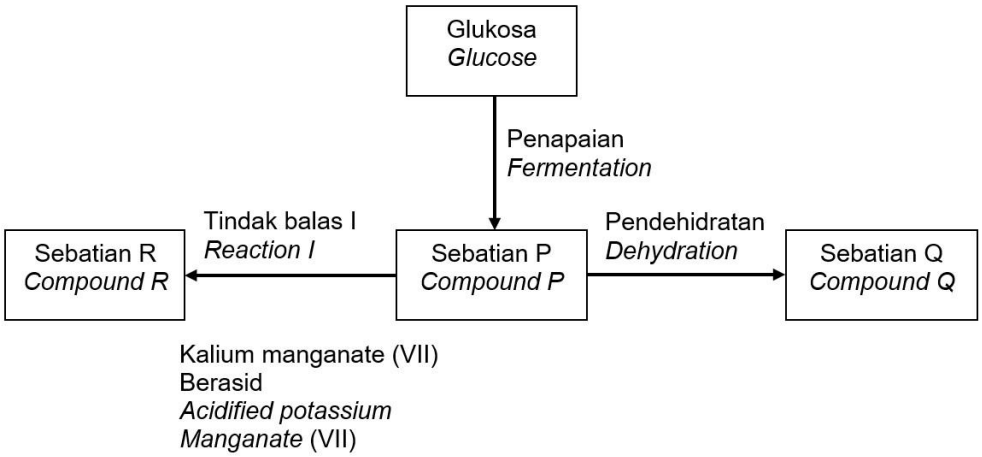
[1 markah / 1 *mark*]

(ii) *Nyatakan nama dan lukiskan formula struktur bagi sebatian X.*
State the name and draw the structural formula for compound X.

[2 markah / 2 *marks*]

SOALAN ESEI

1 Rajah 1 menunjukkan penukaran sebatian P kepada sebatian Q dan R. Sebatian P adalah cecair tidak berwarna yang boleh dihasillkan melalui penapaian glukosa.
Diagram 1 shows the conversion of compound P into compounds Q and R. Compound P is a colourless liquid that can be produced from the fermentation of glucose.



Rajah 1 / *Diagram* 1

(a) Nyatakan nama bagi Tindak balas I dan formula molekul bagi sebatian P, sebatian Q dan sebatian R.
State the name of reaction I and the molecular formula of compounds P, Q, and R.

[4 markah / 4 *marks*]

(b) Sebatian Q dan sebatian R dapat bertindak balas untuk menghasilkan sebatian X yang mempunyai bau yang wangi. Huraikan bagaimana sebatian X boleh disediakan di dalam makmal. Dalam huraian anda, sertakan:

a. Senarai bahan dan radas
b. Prosedur
c. Pemerhatian

Compound Q and compound R can react to form compound X that have a sweet smell. Describe how compound X can be prepared in the laboratory. In your description, include:

a. List of materials and apparatus.
b. Procedure
c. Observations

[8 markah / 8 *marks*]

c) Lukiskan formula struktur dan namakan sebatian Q yang terbantuk.
Draw the structural formula and name the compound Q that was formed.

[2 markah / 2 *marks*]

d) Sebatian Q terbakar dengen lengkap dalam oksigen berlebihan.
Compound Q burns completely in excess oxygen.

i. Tulis persamaan kimia yang seimbang bagi tindak balas tersebut.
Write the balance chemical equation for the reaction.

[2 markah / 2 *marks*]

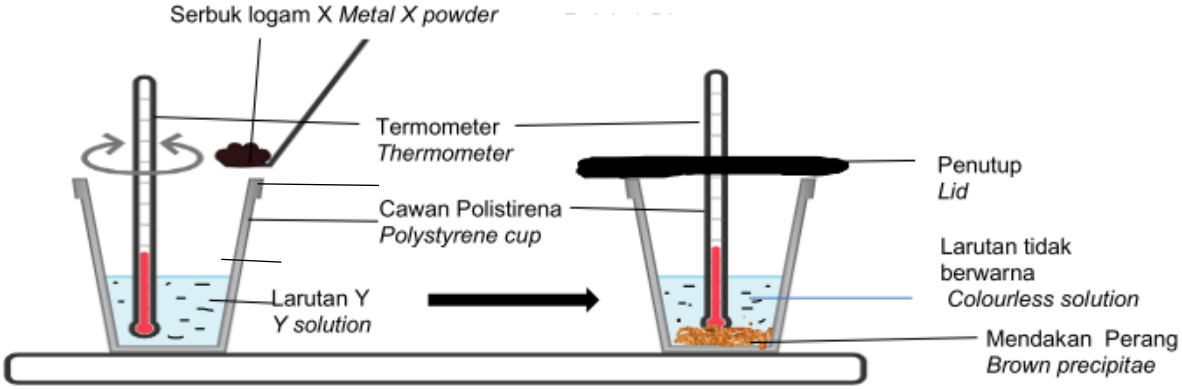
ii. Jika 14 g sebatian Q mengalami pembakaran lengkap pada suhu bilik, hitungkan isipadu gas karbon dioksida yang dibebaskan.
[1 mol gas menempati isi padu 24 dm^3 pada keadaan bilik.
Jisim atom relative: H = 1; C = 12]
If 14g of compound Q burned completely in room temperature, calculate the volume of carbon dioxide gas released.
[1 mole of gas occupies a volume of 24 dm^3 at room condition.
Relative atomic mass: H = 1; C = 12]

[4 markah / 4 *marks*]

BAB 3: TERMOKIMIA

SOALAN OBJEKTIF

1 Rajah 1 menunjukkan serbuk logam X ditambahkan ke dalam ke dalam larutan Y yang berwarna biru.
Diagram 1 shows metal X powder is added into the blue colour of Y solution.



Rajah 1 / *Diagram* 1

Berdasarkan Rajah 1, apakah haba tindak balas yang terhasil?
Based on Diagram 1, what is the heat of reaction formed?

A Haba peneutralan
Heat of neutralization

B Haba penyesaran
Heat of displacement

C Haba pemendakan
Heat of precipitation

D Haba pembakaran
Heat of combustion

2 Antara berikut yang manakah menunjukkan padanan yang betul?
Which of the following that shows correctly matched?

A

Tindak balas eksotermik
Exothermic reaction

B

Tindak balas endotemik
Endothermic reaction

C

Tindak balas eksotermik
Exothermic reaction

D

Tindak balas endotermik
Endothermic reaction

3. Antara berikut yang manakah adalah merupakan benar mengenai ciri-ciri tindak balas endotermik?
Which of the following statement is shows the characteristic of endothermic reaction?

A Tenaga haba yang diserap untuk pembentukan ikatan adalah kurang daripada tenaga haba yang dibebaskan semasa pemecahan ikatan, tenaga haba diserapkan dari persekitaran
Heat energy absorbed for bond formation is less than the heat energy released during bond breaking, heat energy absorbed from the surrounding

B Tenaga haba yang diserap untuk pembentukan ikatan adalah lebih daripada tenaga haba yang dibebaskan semasa pemecahan ikatan, tenaga haba dibebaskan dari persekitaran
Heat energy absorbed for bond formation is more than the heat energy released during bond breaking, heat energy release to the surroundings

C Tenaga haba yang diserap untuk pemecahan ikatan adalah lebih daripada tenaga haba yang dibebaskan semasa pembentukan ikatan, tenaga haba diserapkan dari persekitaran
Heat energy absorbed for bond breaking is more than the heat energy released during bond formation, heat energy absorbed from the surrounding

D Tenaga haba yang diserap untuk pemecahan ikatan adalah kurang daripada tenaga haba yang dibebaskan semasa pembentukan ikatan, tenaga haba dibebaskan ke persekitaran
Heat energy absorbed for bond breaking is less than the heat energy released during bond formation, heat energy release to the surroundings

4. Jadual 1 menunjukkan nilai bahan api bagi tiga jenis bahan api.
Table 1 shows fuel value of three types of fuel

Bahan Api ***Fuel***	**Nilai bahan api (kJg^{-1})** ***Fuel value*** **(kJg^{-1})**
Kayu *Wood*	20
Petrol *Petrol*	34
Gas asli *Natural gas*	50

Jadual 1 *Table 1*

Bahan api yang manakah sesuai digunakan menggoreng pisang?
Which fuel is suitable used to fried banana?

A Kayu
Wood

B Petrol
Petrol

C Gas asli
Natural gas

5 Antara berikut yang manakah merupakan padanan yang betul?
Which of the following that shows correctly matched?

	Proses ***Process***	**Perubahan haba** ***Heat changed***	**Jenis Tindak Balas** ***Type of reaction***
A	Membuat kek *Baking Cake*	Tenaga haba dibebaskan *Heat is released*	Endotermik *Endothermic*
B	Fotosintensis *Photosynthesis*	Tenaga haba diserapkan *Heat is absorbed*	Endotermik *Endothermic*
C	Membakar kertas *Burning Paper*	Tenaga haba dibebaskan *Heat is released*	Endothermik *Endothermic*

6 100 cm^3 air di dalam sebuah bekas logam dipanaskan dengan membakar 0.5 g propanol. Suhu air meningkat sebanyak 40°C. Hitung haba tindak balas bagi pembakaran lengkap yang berlaku.
[Muatan haba tentu = 4.2 $Jg^{-1}c^{-1}$; ketumpatan air = 1.0g cm^{-3}]
100 cm^3 of water is heated in metal container by burning membakar 0.5 g propanol. The themparature of water is increase by 40°C. Calculate the heat of reaction which given out by the complete combustion of propanol.
[*Specific heat capacity of water* = 4.2 $Jg^{-1}°c^{-1}$; *density of water* = 1.0g cm^{-3}]

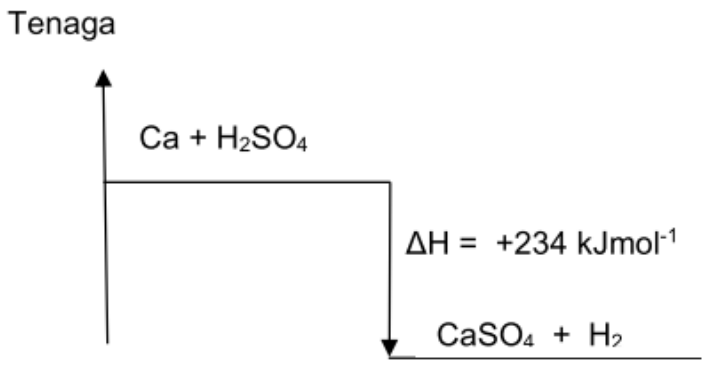
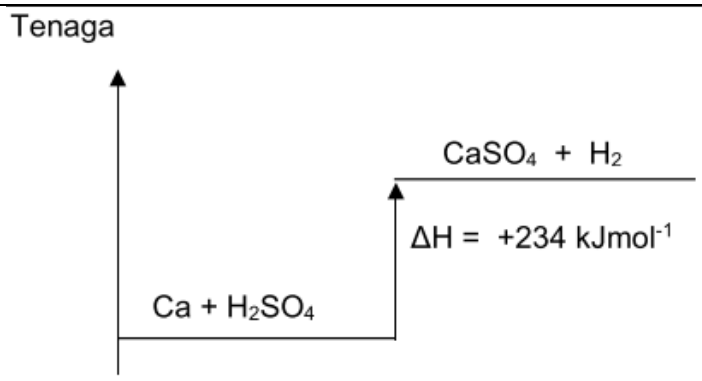
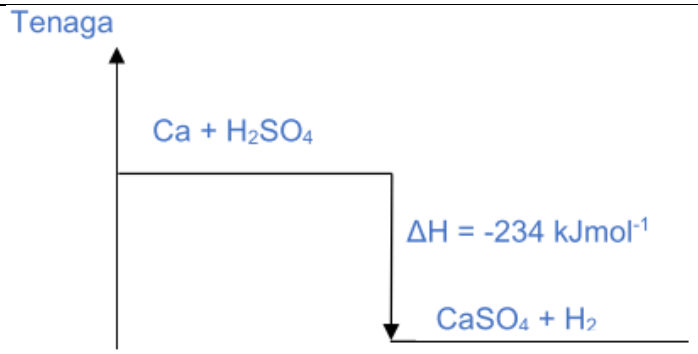
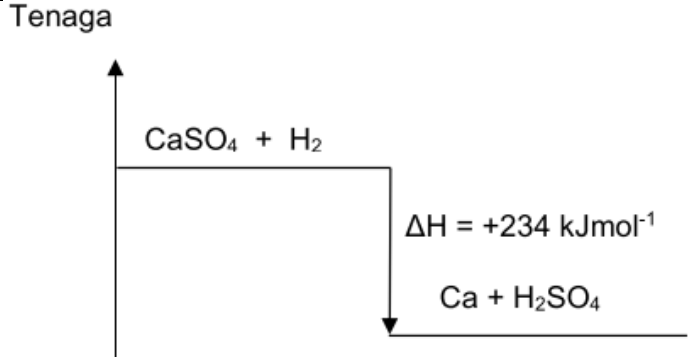
A 1680 $kJmol^{-1}$ **B** 0.1008 $kJmol^{-1}$
C 16.80$kJmol^{-1}$ **D** 10.080 $kJmol^{-1}$

7 Persamaan termokimia berikut menunjukkan tindak balas antara 100 cm^3 larutan natrium klorida 1.0 mol dm^{-3} dengan 100 cm^3 larutan argentum nitrat 1.0 mol dm^{-3}.
The thermochemical equation shows the reaction between 100 cm^3 sodium chloride solution 1.0 mol dm^{-3} and 100 cm^3 argentum nitrat solution 1.0mol dm^{-3}.

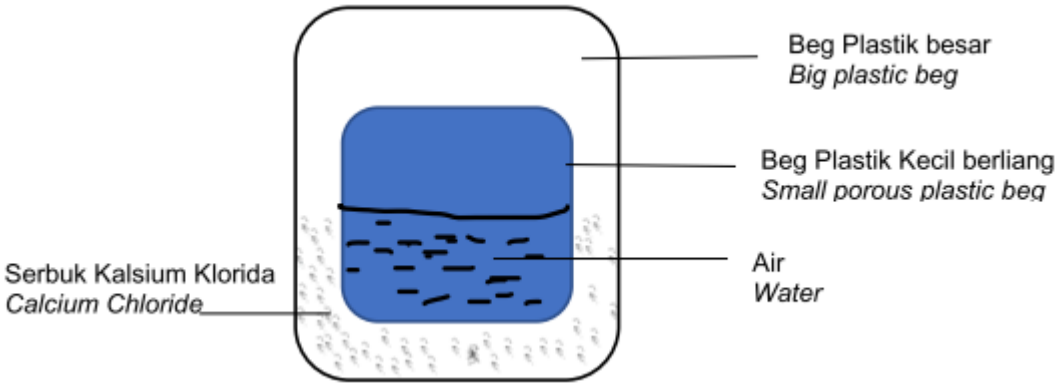
$$NaCl + AgNO_3 \longrightarrow AgCl + NaNO_3 \quad \Delta H = -121.4 kJmol^{-1}$$

Hitungkan perubahan haba bagi tindak balas tersebut.
[muatan haba tentu = 4.2 $Jg^{-1}c^{-1}$; ketumpatan air = 1.0g cm^{-3}]
Calculate the heat of change for this reaction.
[*Specific heat capacity of water* = 4.2 $Jg^{-1}°c^{-1}$; *density of water* = 1.0g cm^{-3}]

A 121.4J **B** 1214J
C 1.214J **D** 12.14J

8	Tindak balas antara Kalsium, Ca dan asid sulfurik, H_2SO_4 membentuk calcium sulfat, $CaSO_4$ dan gas hidrogen, H_2 telah membebaskan sebanyak 234 kJ tenaga haba ke persekitaran. Antara gambar rajah aras tenaga berikut, yang manakah mewakili tindak balas tersebut? *The reaction between calcium and sulfuric acid, H_2SO_4 form calcium sulphate and hydrogen gas which release 234kJ heat to surrounding. Which of the following energy level diagrams represents the reaction?*	
	A	
	B	
	C	
	D	

9 Rajah 2 menunjukkan sebuah pek panas yang digunakan untuk melegakan kekejangan otot. Tindak balas antara serbuk kalsium klorida dan air membebaskan haba ke persekitaran.
Diagram 2 shows a hot pack to reduce the musle pain. The reaction between Calcium Chloride and water released the heat to surrounding.



Rajah 2 / *Diagram* 2

Antara berikut yang manakah yang boleh menggantikan serbuk kalsium klorida?
Which of the following substance can be used to replace the calcium chloride powder?

I Garam / *Salt*
II Ketulan ais / *Ice cube*
III Serbuk pencuci kain / C*leaning agent powder*
IV Minyak makan / *Cooking oil*

A I dan III
I *and* III
B I dan IV
I *and* IV
C II dan III
II *and* III
D II dan IV
II *and* IV

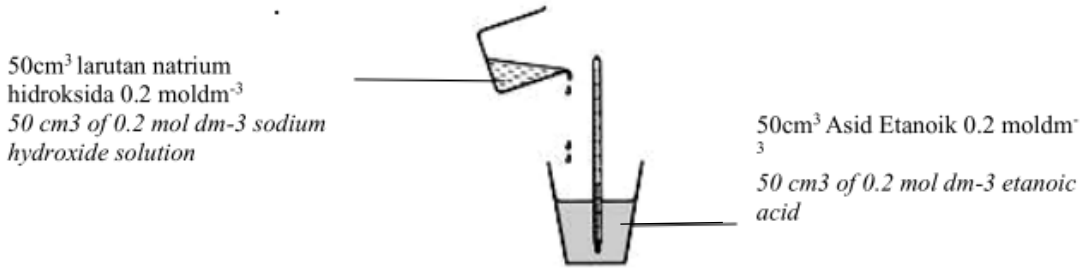
10 Antara berikut yang manakah merupakan anggapan yang dibuat semasa perhitungan haba tindak balas?
Which of the following are the assumptions made during calculating heat of reaction?

I Ketumpatan sebarang larutan akues adalah sama dengan ketumpatan air, 1.0 g cm^{-3}
Density of the aqueous solution is equal to density of water, 1.0 g cm^{-3}
II Tiada haba diserap oleh radas eksperimen
No amount of heat energy is absorbed by the apparatus
III Muatan haba tentu sebarang larutan akues adalah sama dengan muatan haba tentu minyak
Specific heat capacity of the aqueous solution is equivalent to specific heat capacity of oil.
IV Sebahagian haba hilang ke persekitaran
Small amount of heat energy is lost to the surrounding

A I dan II
I *and* II
B I dan III
I *and* III
C II dan IV
II *and* IV
D III dan IV
III *and* IV

SOALAN STRUKTUR

1 Rajah 1 menunjukkan susunan radas untuk menentukan haba peneutralan antara $50cm^3$ larutan natrium hidroksida 0.2 $moldm^{-3}$ dan 50 cm^3 asid etanoik 0.2 mol dm^{-3}.
Diagram1 shows the apparatus set-up to determine the heat of neutralisation between 50 cm^3 of 0.2 mol dm^{-3} sodium hydroxide solution and 50 cm^3 of 0.2 mol dm^{-3} ethanoic acid.



Rajah 1 / *Diagram* 1

Keputusan daripada eksperimen ditunjukkan dalam Jadual 1.
Result from the experiment is shown in Table 1.

Suhu awal larutan natrium hidroksida (°C) *Initial temperature of sodium hydroxide solution (°C)*	28.0
Suhu awal larutan asid etanoik (°C) *Initial temperature of ethanoic acid (°C)*	29.0
Suhu tertinggi campuran (°C) *Highest temperature of mixture (°C)*	35.5

Jadual 1 / *Table 1*

(a) Nyatakan definisi bagi haba peneutralan
State the definition of heat of neutralisation

_____

[1 markah /1 m*ark*]

(b) Tuliskan persamaan kimia yang seimbang bagi tjndak balas peneutralan yang berlaku.
Write a balanced chemical equation of heat of of neutralisation.

_____

[2 markah / 2 *marks*]

(c) (i) Hitungkan perubahan haba tindak balas bagi tindak balas di atas
Calculate the heat change for the above reaction

[2 markah / 2 *marks*]

(ii) Hitungkan haba peneutralan bagi tindak balas di atas
Calculate the heat of neutralisation for the above reaction
[Muatan haba tentu air=4.2 J g^{-1}°C, Ketumpatan air = 1.0 g cm^{-3}]
[Specific heat capacity of water =4.2 J g^{-1}°C, *density of water = 1.0 g* cm^{-3}*]*

[2 markah / 2 *marks*]

(iii) Lukiskan gambar rajah aras tenaga bagi tindak balas di atas
Draw the energy level diagram heat for the above reaction

[2 markah / 2 *marks*]

(d) Ramalkan nilai haba peneutralan jika asid etanoik digantikan dengan asid nitrik dalam tindak balas peneutralan dengan larutan natrium hidroksida?
Predict the value of heat of neutralisation if nitric acid is replaced with ethanoic acid to react with natrium hydroxide solution.

_____

[1 markah / 1 *mark*]

SOALAN ESEI

Percubaan SPM Pulau Pinang 2020 Q9

1 Jadual 1 menunjukkan haba peneutralan bagi dua set eksperimen yang menggunakan asid monoprotik , yang berlainan, P dan Q yang bertindak balas dengan lautan natrim hidroksida..

Diagram 1 shows the heat of neutralisation for two sets of experiment using different monoprotic acids, P and Q reacting with sodium hydroxide solution.

Set	**Bahan tindak balas** ***Reactants***	**Haba Peneutralan ($kJmol^{-1}$)** ***Heat of neutralisation ($kJmol^{-1}$)***
I	25 cm^3 2.0 mol dm^{-3} asid monoprotik P + 25 cm^3 2.0 mol dm^{-3} larutan natrium hidroksida *25 cm^3 2.0 mol dm^{-3} of monoprotic acid P* + *25 cm^3 2.0 mol dm^{-3} of sodium hydroxide solution*	*-57*
II	25 cm^3 2.0 mol dm^{-3} asid monoprotik Q + 25 cm^3 2.0 mol dm^{-3} larutan natrium hidroksida *25 cm^3 2.0 mol dm^{-3} of monoprotic acid Q* + *25 cm^3 2.0 mol dm^{-3} of sodium hydroxide solution*	*-55*

Jadual 1 / *Table 1*

(i) Berdasarkan Jadual 1, namakan satu contoh asid P dan asid Q.
Based on Table 1, name one example of acid P and acid Q

[2 markah / 2 *marks*]

(b) Jelaskan mengapa terdapat perbezaan nilai haba peneutralan itu..
Explain why there is a difference in the values of the heat of neutralisation.

[4 markah / 4 *marks*]

(c) (i) Hitungkan perubahan suhu bagi campuran dalam set I
[Muatan haba tentu larutan: 4.2 J g^{-1} $^{o}C^{-1}$]
Calculate the change in temperature of the mixture in set I
[Specific heat capacity of solution: 4.2 J g^{-1} $^{o}C^{-1}$]

[4 markah / 4 *marks*]

(ii) Dengan menggunakan sama ada asid P atau asid Q, huraikan satu eksperimen untuk menentukan haba peneutralan.
Dalam huraian anda,sertakan
• Prosedur eksperimen
• Persamaan termokimia yang terlibat.
• Rajah aras tenaga bagi tindak balas itu

[10 markah]

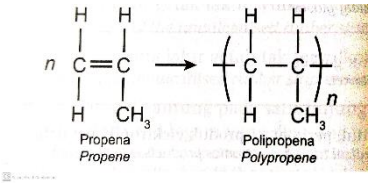
By using either acid P or acid Q, describe an experiment to determine the heat of
neutralisation.
In your description include:
• Procedure of the experiment
• The thermo chemical equation involved
• Energy level diagram for the reaction

[10 marks]

BAB 4: POLIMER

SOALAN OBJEKTIF

1 Rajah 1 menunjukkan suatu proses pempolimeran.
Diagram 1 shows a polymerization process.



Rajah *1 / Diagram 1*

Antara yang berikut, yang manakah serupa bagi propena dan polipropena?
Which of the following is identical for propene and polypropene?

A Ketumpatan/ *Density*
B Formula empirik/ *Empirical formula*
C Takat lebur/ *Melting point*
D Jisim molekul relative/ *Relative molecular mass*

Klon SPM 2020

2 Yang manakah antara berikut berlaku semasa pemvulkanan getah?
Which of the following occurs during vulcanization of rubber?

A Rangkai silang terbentuk antara rantai polisoprena
Cross-link formed between chains of polyisoprene
B Membran protein diliputi oleh ion hidroksida
Protein membrane is covered with hydroxide ion
C Rantaian panjang polimer getah bergabung secara rawak
Long chains of rubber polimers are entangled randomly
D Pempolimeran penambahan berlaku apabila monomer isoprene bergabung antara satu sama lain
Addition polymerization takes place when isoprene monomers combine with each other.

Klon SPM 2015

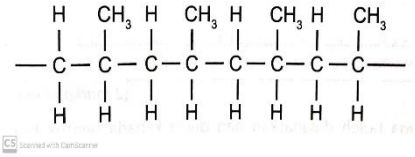
3 Lateks boleh disimpan dalam keadaan cecair deangan menambahkan
Latex can be kept in liquid state by adding

A Asid formik/ *Formic acid*
B Asid etanoik/ E*thanoic acid*
C Ammonium sulfat/ *Ammonium sulphate*
D Ammonium hidroksida/ *Ammonium hydroxide*

4 Antara yang berikut, yang manakah polimer semula jadi?
Which of the following is a natural polymer?

A Polisterena / *Polystrene*
B Polipropena/ *Polypropene*
C Poliisoprena/ *Polyisoprene*
D Polifeniletena/ P*olyphenylethene*

5 Rajah 2 menunjukkan struktur polimer.
Diagram 2 shows the structure of polymer



Rajah 2 / *Diagram 2*

Antara yang berikut, yang manakah monomer bagi polimer tersebut?
Which of the following is the monomer of the polymer?

A Etena / *Ethene*
B Butena / *Butene*
C Propena/ *Propene*

6 Antara yang berikut, yang manakah bukan contoh polimer semula jadi?
Which of the following is not an example of natural polymer?

A Susu getah/ *Latex* **B** Selulosa/ *Cellulose*
C Nilon/ *Nylon* **D** Kanji / *Starch*

7 Rajah 3 menunjukkan pakaian yang dipakai oleh anggota bomba. Namakan bahan P yang digunakan untuk menghasilkan pakaian ini.
Diagram 3 shows the outfit used by fireman. Name the material P used to make this outfit.

Bahan P/ Material P

Rajah 3/ Diagram 3

A Nomex
B Teflon
C Kevlar
D Mylar

8 Antara berikut, yang manakah betul mengenai ciri-ciri termoplastik?
Which are the following are correct abaout the characteristics of thermoplastic?

I Ringan / *Light*
II Tidak kenyal dan tidak fleksibel/ *Not elastic and not flexible*
III Tahan haba / *heat resistant*
IV Boleh dibentuk berulang kali/ *Can be moulded repeatly*

A I dan III **B** I dan IV
C II dan III **D** II dan IV

9 Antara berikut, yang manakah sfat fizikal getah sintetik?
Which of the following are the physical properties of synthetic rubber?

I *Boleh dibentuk apabila dipanaskan*
Can be moulded when heated

II *Lembut dan tahan lama*
Soft and durable

III *Kurang tahan lama tetapi fleksibel*
Less durable but flexible

IV *Tahan panas dan bahan kimia*
Resistant to heat and chemicals

A I dan III / I *and* III
B I dan IV / I *and* IV
C II dan III / I *and* III
D II dan IV / II *and* IV

10 Rajah 4 menunjukkan kegunaan sejenis polimer
Diagram 4 shows the use of a type of polymer

Rajah 4/ *Diagram 4*

Antara berikut, yang manakah boleh digunakan untuk melupuskan polimer dalam Rajah 4?
Which of the following can be use to dispose the polymer in Diagram 4?

I


II


III

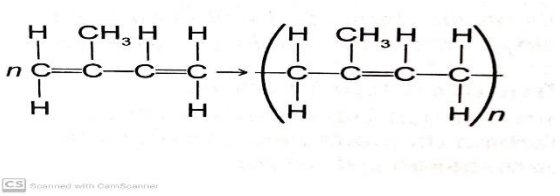

IV


A I dan III / I *and* III
B I dan IV / I *and* IV
C II dan III / I *and* III
D II dan IV / II *and* IV

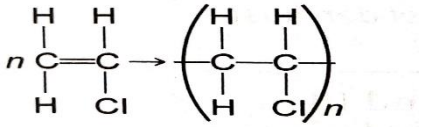
SOALAN STRUKTUR

1 Rajah 1 menunjukkan tindak balas pempolimeran untuk membentuk polimer A dan polimer B. Diketahui bahawa salah satunya ialah polimer semula jadi dan yang lain ialah polimer sintetik.
Diagram 1 shows the polymerization reaction to form polymer A and polymer B. knowing that one of them is natural and the other is a synthetic polymer.

Pempolimeran A/ Polymerisation A :



Pempolimeran B/ Polymerisation B:



Rajah 1/ Diagram 1

(a) (i) Nyatakan satu persamaan antara tindak balas pempolimeran A dengan tindak balas pempolimeran B.
State one similarity between polymerization A and polymerization B.

[1 markah / 1 *mark*]

(ii) Namakan kedua-dua monomer/ *Name both monomers*

[2 markah / 2 *marks*]

(iii) Namakan polimer semula jadi dan polimer sintetik
Name the natural polymer and synthetic polymer

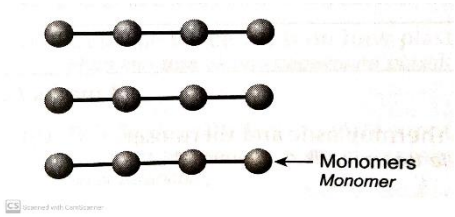
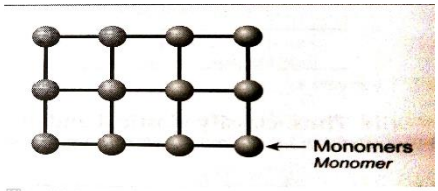
[2 markah / 2 *marks*]

(b) (i) Cadangkan dua kegunaan polimer sintetik yang dinamakan di 1(a)(iii)
Suggest two uses of the named synthetic polymer in 1(a)(iii)

[2 markah / 2 *marks*]

2 (a) Rajah 2 menunjukkan dua jenis plastic yang bebeza iaitu temoplastik dan

thermoset serta strukturnya. Diketahui bahawa thermoset lebih tahan lama.

Plastik A/ *Plastic A*	**Plastik B/ *Plastic B***
	
	

Rajah 2/ *Diagram 2*

(a) Apakah bahan tidak balas utama yang digunakan untuk menghasilkan kedua-kedua jenis plastik dalam Rajah 2?
What is the main reactant to produce both types of plastic in Diagram 2?

[1 markah / 1 *mark*]

(b) (i) Nyatakan perbezaan utama antara struktur plastic A dengan plastic B
State the main difference between the structure of plastic A and plastic B.

[2 markah / 2 *marks*]

(ii) Bagaimanakah perbezaan utama yang dinyatakan di 2(b)(i) membezakan rintangan haba antara dua jenis plastic tersebut?
How does the main difference mentioned in 2(b)(i) differentiate the heat resistance between the two types of plastics?

[2 markah / 2 *marks*]

(c) (i) Senaraikan tiga perbezaan ciri-ciri antara termoplastik dan temoset.

List three differences in the characteristics of the thermoplastic and thermoset.

[3 markah / 3 *marks*]

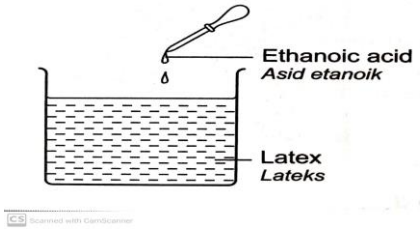
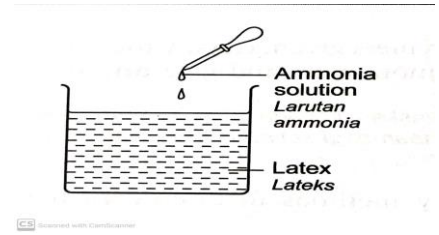
(ii) Oleh itu, kelaskan plastik A dan plastik B kepada termoplastik dan thermoset.
Thus, classify plastic A and plastic B into thermoplastic and thermoset.

[2 markah / 2 *marks*]

SOALAN ESEI

1 Jadual 1 menunjukkan hasil dua eksperimen untuk mengkaji kesan larutan asid etanoik dan larutan ammonia tehadap penggumpalan getah asli

Table 1 shows the result of two experiment to investigate the effecs of dilute ethanoic acid and ammonia solution on the coagulation of natural rubber

Eksperimen ***Experiment***	**Pemerhatian** ***Observation***
I 	Pepejal putih terbentuk. *White solid formed*
II 	Cecair putih kekal putih. *White liquid remains white.*

Jadual 1/ *Table 1*

(a) Pemerhatian diperoleh selepas 3 jam. Berdasarkan pengetahuan anda dalam bidang kimia, terangkan pemerhatian anda.

The observations are obtained after 3 hours. Based on your knowledge in Chemistry, explain your observations.

[10 markah / 10 *marks*]

(b)

Getah tervulkan lebih kuat berbanding getah tak tervulkan *Vulcanized rubber is stronger than unvulcanised rubber*

Berdasarkan pernyataan yang diberikan, terangkan satu eksperimen untuk membandingkan kekerasan getah tervulkan dan getah tak tervulkan. Dalam penerangan anda, sertakan :

Based on the given statement, describe one experiment to compare the hardness of vulcanized rubber and unvulcanised rubber. In your description, include:

[10 markah / 10 *marks*]

BAB 5: KIMIA KONSUMER DAN INDUSTRI

SOALAN OBJEKTIF

1. Pernyataan manakah yang berikut adalah betul tentang lemak tak tepu?
Which of the following statements about unsaturated fats is correct?

A Tindak balas penambahan menghasilkan lemak tak tepu.
Addition reaction produces unsaturated fats.

B Contoh asid lemak tak tepu ialah asid oleik, asid linoleik dan asid linolenik
Examples of unsaturated fatty acids are oleic acid, linoleic acid and linolenic acid

C Lemak tak tepu mengandungi ikatan kovalen tunggal sahaja
Unsaturated fats contain only single covalent bond

D Lemak tak tepu wujud sebagai pepejal pada suhu bilik
Unsaturated fats exist as solids at room temperature

2 Apakah proses yang menghasilkan marjerin daripada minyak tumbuhan?
Which process produces margarine from vegetable oils?

A Pengesteran
Esterification

B Hidrolisis
Hydrolysis

C Penghidrogenan
Hydrogenation

D Saponifikasi
Saponification

3 Persamaan perkataan berikut menunjukkan satu tindak balas kimia:
The following word equation shows a chemical reaction:

Minyak zaitun + kalium hidroksida → gliserol + garam kalium

Olive oil + potassium hydroxide → glycerol + potassium salt

Apakah jenis tindak balas kimia ini?
What type of chemical reaction is this?

A Peneutralan
Neutralisation

B Pengesteran
Esterification

C Saponifikasi
Saponification

D Hidrolisis
Hydrolysis

4. Yang manakah antara berikut memberikan penerangan yang terbaik tentang keberkesanan pencucian datergen dan sabun?
Which of the following provides the best explanation about the cleansing effectiveness of detergent and soap?

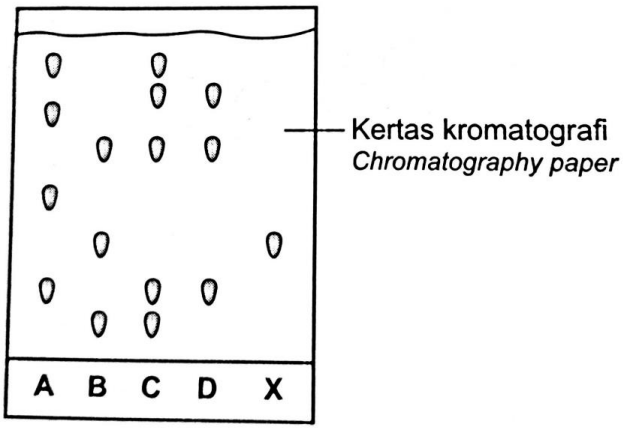
A Detergen dan sabun larut dalam air.
Detergent and soap are soluble in water.

B Detergen dan sabun larut dalam gris
Detergent and soap are soluble in grease

C Sabun adalah terbiodegradasikan tetapi detergen tidak
Soap is biodegradable, but detergent is not

D Sabun membentuk kekat dalam air liat tetapi detergen tidak.
Soap forms scum in hard water but detergent does not

5 Empat sampel pewarna makanan A, B, C dan D serta pewarna makanan X yang diharamkan telah dijalani ujian kromatografi. Rajah 1 menunjukkan keputusan ujian.
Four different samples of food colouring A, B, C and D as well as a banned food colouring X are subjected to a chromatography test. Diagram 1 shows the test result.



Rajah 1 / *Diagram 1*

Pewarna makanan yang manakah berbahaya kepada kesihatan pengguna?
Which food colouring is harmful to the consumers?

A Pewarna makanan A
Food colouring A

B Pewarna makanan B
Food colouring B

C Pewarna makanan C
Food colouring C

D Pewarna makanan D
Food colouring D

6 Antara ubat berikut, yang manakah digunakan untuk memberi kelegaan kawasan radang?
Which of the following medications is used to relieve the inflamed area?

A Prednisolon
Prednisolone

B Kodeina
Codeine

C Parasetamol
Paracetamol

D Klozapin
Clozapine

7 Antara ubat berikut, yang manakah digunakan untuk merawat jangkitan tuberculosis (TB)?
Which of the following medicines is used to treat tuberculosis (TB) infection?

A Aspirin.
Aspirin.

B Barbiturat
Barbiturate

C Kortison
Cortisone

D Streptomisin
Streptomycin

8 Yang manakah menunjukkan pengelasan bahan-bahan kosmetik yang betul?
Which of the following shows the correct classification of cosmetics?

I Serum rambut
Hair serum

II Pelembab kulit
Skin moisturiser

III Deodoran
Deodorant

IV Krim bedak
Foundation cream

A I dan II
I and II

B I dan III
I and III

C II dan III
II and III

D III dan IV
III and IV

9. Yang manakah bahan cemar yang biasa dijumpai dalam air sisa?
Which of the following is a common pollutant found in the wastewater?

A Batu kapur
Limestone

B Karbon dioksida
Carbon dioxide

C Sulfur dioksida
Sulphur dioxide

D Baja fosfat
Phosphate fertiliser

10 Yang manakah menunjukkan sifat-sifat fizik grafen yang betul?
Which shows the correct physical properties of graphene?

I Kuat dan keras
Strong and hard

II Lutsinar
Transparent

III Rintangan elektrik yang sangat tinggi
Very high electrical resistance

IV Telap
Permeable

A I dan II
I and II

B I dan III
I and III

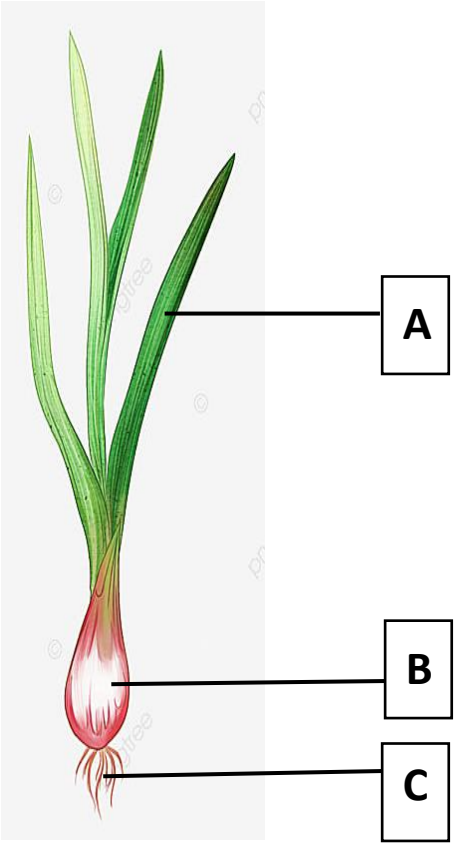
C II dan III
II and III

D III dan IV
III and IV

SOALAN STRUKTUR

1 Bapa perubatan Barat, Hippocrates pernah mempreskripsikan bawang putih untuk merawat pelbagai penyakit. Kajian terkini menunjukkan bahawa ciri-ciri perubatan bawang putih bergantung kepada bahan aktif sulfur yang dikenali sebagai alisin.
The father of western medicine, Hippocrates used to prescribe garlic to treat a variety of medical conditions. Recent research shows that the medicinal properties of garlic rely on its sulphur-containing active ingredient known as allicin.

(a) Rajah 1 menunjukkan pokok bawang putih.
Diagram 1 shows a garlic plant.



Rajah 1
Diagram 1

Antara bahagian A, B dan C bawang putih, yang manakah digunakan sebagai sumber utama ubat tradisional?
Which of the parts A, B and C is used as the main source of the tradisional medicine?

_____

[1 markah / *1 mark*]

(b) Apakah penyakit yang boleh diubati menggunakan bawang putih?
What is the illness that can be cured using the garlic?

_____

[1 markah / *1 mark*]

(c) Bagaimanakah bawang putih digunakan untuk merawat penyakit yang dinyatakan di 1 (b)?
How is the garlic used to treat the illness stated in 1 (b)?

_____

_____

[1 markah / *1 mark*]

(d) Nyatakan satu perbezaan antara perubatan tradisional dan perubatan moden.
State one difference between the traditional medicine and modern medicine.

_____

_____

_____

[1 markah / *1 mark*]

(e) Rajah 2 menunjukkan ramuan makanan yang tertera pada bungkusan kerepek berperisa bawang putih.
Diagram 2 shows the food ingredients printed on the packaging of the garlic flavoured crackers.

Rajah 2

Kerepek Bawang Putih

Garlic Crackers

Tepung gandum, minyak kelapa, pengantioksida, garam bawang putih, lesitin soya, susu tepung skim, kanji jagung dan sirap glukosa.

Wheat flour, coconut oil, antioxidant, garlic salt, soy lecithin, skimmed milk powder, corn starch and glucose syrup.

Diagram 2

Selain garam bawang putih, pilih satu ramuan makanan lain yang digunakan sebagai bahan tambah makanan. Nyatakan fungsi bahan tambah makanan tersebut.
Beside garlic salt, choose one ingredient which acts as a food additive. State the function of this food additive.

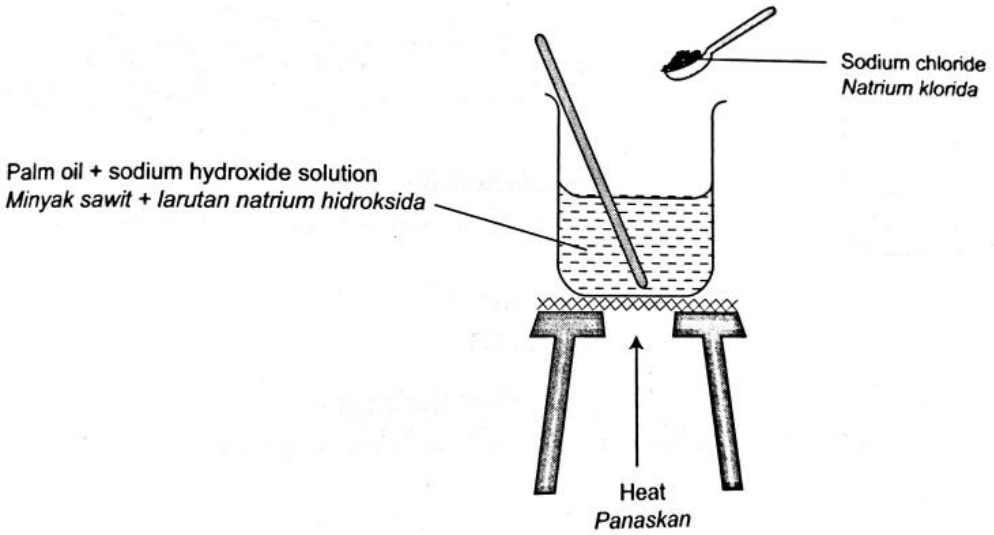
_____

_____

_____

[2 markah / *2 marks*]

2 Rajah 3 menunjukkan susunan radas bagi penyediaan sabun.
Diagram 3 shows the apparatus set-up for soap preparation.



Rajah 3 / *Diagram 3*

(a) Namakan proses penyediaan sabun.
Name the process of soap preparation.

_____

[1 markah / *1 mark*]

(b) Mengapakah sabun kurang berkesan sebagai bahan pencuci dalam air liat berbanding dengan detergen?
Why is soap less effective as a cleaning agent in hard water compared to detergent?

_____

[1 markah / *1 mark*]

(c) Cadangkan satu pasangan bahan lain yang boleh digunakan untuk menyediakan sabun di dalam makmal.
Suggest another pair of substances that can be used to prepare soap in the laboratory.

_____

_____

[2 markah / 2 *marks*]

(d) Rajah 4 menunjukkan label pada botol sos tomato.
Diagram 4 shows a label on a bottle of tomato sauce.

Bahan: Mononatrium glutamate, asid benzoik, merah 40
Ingredients: Monosodium glutamate, benzoic acid, red 40
Rajah 4 / *Diagram 4*

(i) Padankan bahan tambah makanan dalam Rajah 4 dengan jenisnya.
Match the food additives in Diagram 4 to their type.

Bahan tambah makanan ***Food additive***		**Jenis bahan tambah makanan** ***Type of food additive***
Mononatrium glutamat *Monosodium glutamate*		Pewarna *Dye*
Asid benzoik *Benzoic acid*		Perisa *Flavouring*
Merah 40 *Red 40*		Bahan pengawet *Preservative*

[3 markah / *3 marks*]

(ii) Nyatakan satu kesan sampingan penggunaan bahan 'merah 40' secara berlebihan.
State one side effect of excessive use of the 'red 40' substance.

_____

[1 markah / *1 mark*]

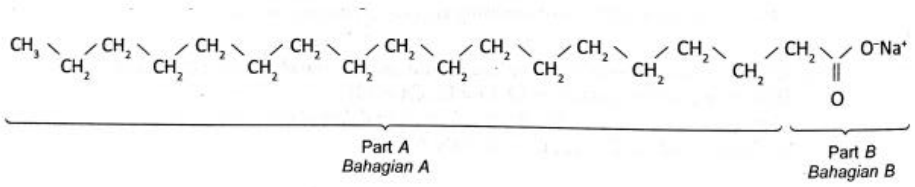
(iii) Namakan sejenis bahan tambah makanan semula jadi yang memberikan warna kepada makanan.
Name one type of natural food additive that gives colour to food.

_____

[1 markah / *1 mark*]

SOALAN ESEI

1 (a) (i) Rajah 1 menunjukkan formula struktur bagi suatu sabun.
Diagram 1 shows the structural formula of a soap.

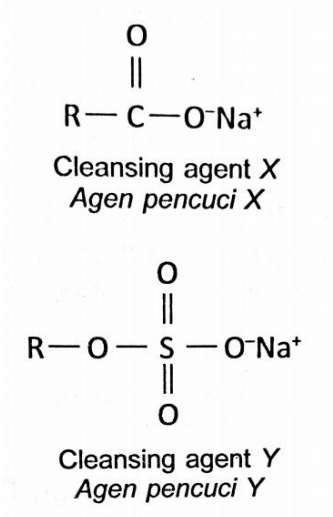


Rajah 1 / *Diagram 1*

Namakan Bahagian A dan Bahagian B
Nyatakan sifat-sifatnya
Name Part A and Part B
State their properties.

[4 markah / *4 marks*]

(ii) Rajah 2 menunjukkan dua jenis agen pencuci
Diagram 2 shows two types of cleansing agents



Rajah 2 / *Diagram 2*

Bandingkan antara agen pencuci X dan Y.
Compare between cleansing agents X and Y.

[8 markah / *8 marks*]

(b) (i) Maklumat berikut ditulis pada label di belakang sebuah tin minuman ringan.
The following information is written on the label at the back of a soft drink can.

Ramuan: Air, aspartam, asid sitrik, oktil butanoat dan tartrazin ***Ingredients:*** *Water, aspartame, citric acid, octyl butanoate and tartrazine*

Berdasarkan label yang ditunjukkan, kelaskan jenis bahan tambah makanan yang terkandung dalam minuman ringan ini.
Based on the label shown, classify the types of food additives used in this soft drink.

[4 markah / *4 marks*]

(ii) Rajah 3 menunjukkan Samad yang mengalami batuk berpanjangan.
Diagram 3 shows Samad who experiences persistent cough.

Rajah 3
Diagram 3

Selepas pemeriksaan doktor, dia didapati mmenghidap batuk kering yang disebabkan oleh sejenis bakteria.
Apakah jenis ubat yang boleh digunakan untuk merawat Samad? Jelaskan mengapa dia mesti menghabiskan kesemua ubat yang dipreskripsikan kepadanya walaupun dia telah sembuh.
After a check-up, he is found to be suffering from tuberculosis that is caused by a certain type of bacteria.
What type of medicine can be used to treat Samad?
Explain why he must complete the whole course of the medicine prescribed to him even though he already feels better.

[4 markah / *4 marks*]

2 Minyak sawit adalah minyak sayuran yang paling popular di dunia. Selain digunakan sebagai minyak masak, minyak kelapa sawit boleh didapati dengan mudah di pasar raya, termasuk pencuci pakaian, gula-gula, produk kosmetik dan juga makanan tambahan.
Palm oil is the most popular vegetable oil in the world. Besides being used as cooking oil, palm oil can be easily found in the supermarket items, including laundry detergents, confectioneries, cosmetic products as well as supplements.

(a) Minyak kelapa sawit mentah mempunyai tekstur halus yang berkrim dan wujud sebagai separa cecair pada suhu bilik. Minyak kelapa sawit terdiri daripada kira-kira 50% asid lemak tepu, 40% asid lemak mono-tak tepu dan 10% asid lemak poli-tak tepu.
Crude palm oil has a smooth creamy texture and exists as a semi-liquid at room temperature. Palm oil consists of about 50% of saturated fatty acids, 40% of monounsaturated fatty acids and 10% of polyunsaturated fatty acids.

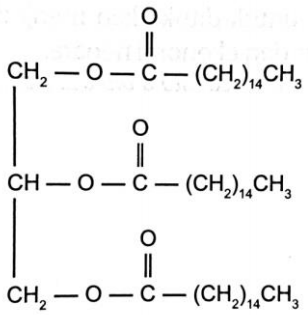
(i) Terangkan maksud asid lemak tepu.
Explain the meaning of saturated fatty acids.

[2 markah / *2 marks*]

(ii) Mengapakah minyak kelapa sawit berkeadaan separa cecair, manakala minyak tumbuhan yang lain berkeadaan cecair pada suhu bilik?
Why does palm oil exist as a semi-liquid, while most other vegetable oils exist as liquids at room temperature?

[4 markah / *4 marks*]

(b) Rajah 4 menunjukkan formula struktur minyak kelapa sawit.
Diagram 4 menunjukkan the structural formula of palm oil.



Rajah 4 / *Diagram 4*

Lukis formula struktur hasil tindak balas saponifikasi menggunakan minyak kelapa sawit dengan kehadiran larutan natrium hidroksida pekat. Namakan hasil tindak balas saponifikasi tersebut.
Draw the structural formula of the products of saponification reaction using palm oil with the presence of concentrated sodium hydroxide solution. Name the products of the saponification reaction.

[4 markah / *4 marks*]

(c) Dato Seri Vida dan Dato Seri Alif Syukri merupakan jutawan terkenal di Malaysia menjual barang kecantikan dan kosmetik. Antara bahan asas yang mereka gunakan ialah minyak kelapa sawit untuk menghasilkan asid lemak dan alkohol yang biasanya digunakan dalam industri kosmetik. Senarai di bawah menunjukkan beberapa bahan terbitan kimia daripada minyak kelapa sawit.
Dato Seri Vida dan Dato Seri Alif Syukri are a well-known millionaire in Malaysia selling beauty products and cosmetics. Palm oil is among the basic ingredients they used to synthesize fatty acids and alcohols which are widely used in the cosmetic industry. The list below shows some of the chemical derivatives of palm oil.

Natrium lauril sulfat *Sodium lauryl sulphate* Lesitin *Lecithin* Gliserin *Glyserin*

(i) Huraikan tujuan penambahan lesitin dan glyserin dalam kosmetik.
Describe the purpose of adding lecithin and glycerine in cosmetics.

[2 markah / *2 marks*]

(d) Penghasilan dan penjualan bahan kosmetik di Malaysia tertakluk kepada Peraturan-peraturan Kawalan Dadah dan Kosmetik 1984 bagi menjamin keselamatan semua pengguna. Pewangi merupakan salah satu daripada tiga kumpulan utama kosmetik. Nyatakan dua lagi jenis kosmetik yang ada.
The production and sale of cosmetics in Malaysia is subject to the Drugs and Cosmetics Control Regulations 1984 to ensure the safety of all consumers. Fragrances are one of the three main groups of cosmetics. State two other types of cosmetics available.

[2 markah / *2 marks*]

(e) Peningkatan populasi penduduk dunia meningkatkan permintaan minyak kelapa sawit. Walau bagaimanapun, penggunaan nanoteknologi dalam industri kelapa sawit masih terhad.
Huraikan kebaikan mengamalkan nanoteknologi dalam penanaman kelapa sawit.
The rise of the global population increases the demand of palm oil. However, the utilisation of nanotechnology in the oil palm industry is still limited. Describe the advantages of applying nanotechnology in farming oil palms.

[4 markah / *4 marks*]

(f) Sisa buah kelapa sawit digunakan untuk ditukarkan menjadi bahan api bio. Terangkan manfaat penggunaan bahan api bio terhadap alam sekitar dan ekonomi negara.
The residue of palm fruits is used to be converted into a biofuel. Describe the benefits of using biofuels to the environment and national economy.

[2 markah / *2 marks*]

3 (a) Kadmium ialah bahan kimia yang digunakan dalam bateri boleh dicas semula. Kadmium ialah logam berat yang boleh mencemarkan air apabila dibuang ke dalam sungai.
Cadmium is a chemical used in rechargeable batteries. Cadmium is a heavy metal that causes water pollution when it is disposed into the river.

(i) Dengan menggunakan bahan dan radas berikut, bina sebuah sel elektrolisis untuk menghasilkan air bersih daripada air sisa yang tercemar oleh kadmium.
Using the following apparatus and materials, build an electrolytic cell to produce the clean water from the wastewater contaminated by cadmium.

Bateri 6V dengan wayar penyambung *6V battery with connecting wires* Rod platinum / *Platinum rod* Rod grafen / *Graphene rod* Bikar yang mengandungi air sisa yang tercemar dengan kadmium *A beaker containing the wastewater contaminated by cadmium*

Dalam penjelasan anda, sertakan rajah berlabel dan persamaan setengah yang berlaku di katod. Cadangkan satu sebab penggunaan rod grafen dalam sel elektrolisis yang dibina.
In your explanation, include a labelled diagram and a half-equation that takes place at the cathode. Suggest a reason for the use of graphene rod in the electrolytic cell built.

[7 markah / *7 marks*]

(ii) Banding dan bezakan struktur dan ciri grafen dan grafit.
Compare and contrast the structure and properties of graphene and graphite.

[4 markah / *4 marks*]

(b) Namakan satu sisa kimia daripada aktiviti domestik di tempat tinggal anda yang mungkin mencemari air bawah tanah. Huraikan kesan negatif sisa tersebut terhadap alam sekitar.
Name one chemical waste from the domestic activities at your dwelling that might contaminate the groundwater. Describe the negative effects of the waste you name on the environment.

[5 markah / *5 marks*]

(c) Rajah 5 menunjukkan bangunan Exchange 106 di Tun Razak Exchange merupakan satu daripada bangunan tertinggi di Malaysia yang menerima anugerah platinum Green Building Index (GBI). Bangunan bertingkat 106 ini berfungsi sebagai hab kewangan utama di Malaysia. Pada pendapat anda, apakah ciri-ciri yang membolehkan The Exchange 106 dikenali sebagai Bangunan Hijau?

Diagram 5 shows The Exchange 106 within Tun Razak Exchange is one of the tallest buildings in Malaysia which receives the Green Building Index (GBI) platinum rating. This 106-storey tall building serves as a major finalcial hub in Malaysia. In your opinion, what are the features of The Exchange 106 that allow it to be known as a Green Building?

Rajah 5 / *Diagram 5*

[4 markah / *4 marks*]