ChemQuest 2022

disusun mengikut bab KSSM

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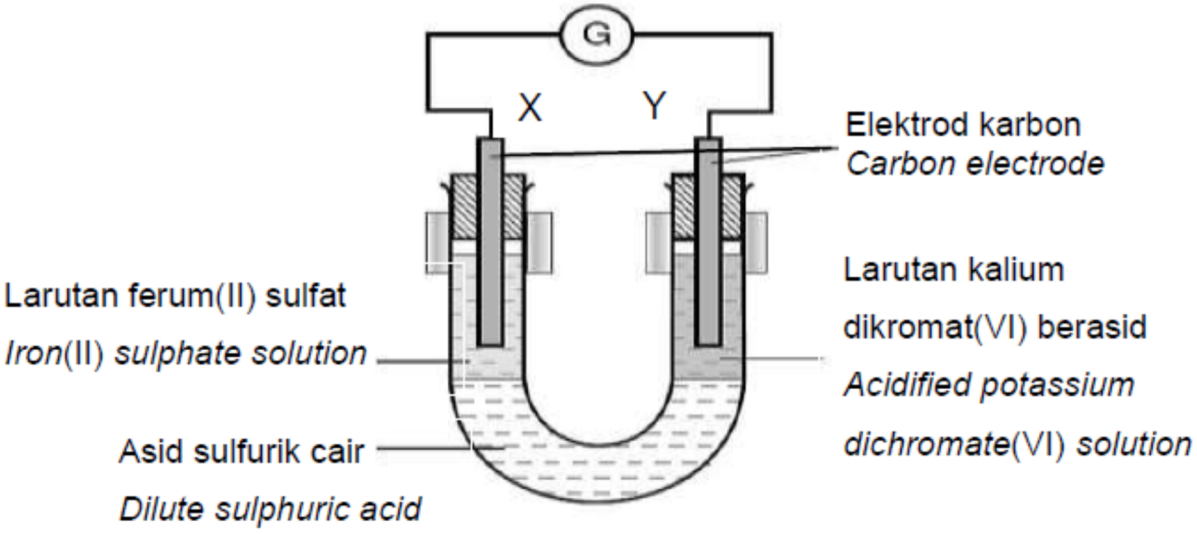
Bab 1 – 5 Tingakatan 5

Kompilasi Soalan Kertas 2 Percubaan SPM 2021

[SBP | Perlis | Kedah 2 set | Selangor 2 set]
[Melaka | Johor | Kelantan | Terengganu]

Tingkatan 5 Bab 1

[Kelantan2021-03]
3. (a) Rajah 3 menunjukkan susunan radas bagi satu eksperimen untuk mengkaji pemindahan elektron pada suatu jarak dalam tindak balas redoks.
Diagram 3 shows the apparatus set-up for an experiment to investigate electron transfer at a distance in redox reaction.



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

..... [1M]

(b) Apabila litar dilengkapkan, galvanometer menunjukkan satu pesongan.
When the circuit is completed, the galvanometer shows a deflection.

(i) Tulis setengah persamaan bagi tindak balas di X.
Write the half equation for the reaction at X.

..... [1M]

(ii) Nyatakan jenis tindak balas di (b)(i).
State the type of reaction in (b)(i).

..... [1M]

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

(i) Nyatakan pemerhatian kepada larutan kalium dikromat(VI) berasid.
State the observation for acidified potassium dichromate(VI) solution.

..... [1M]

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

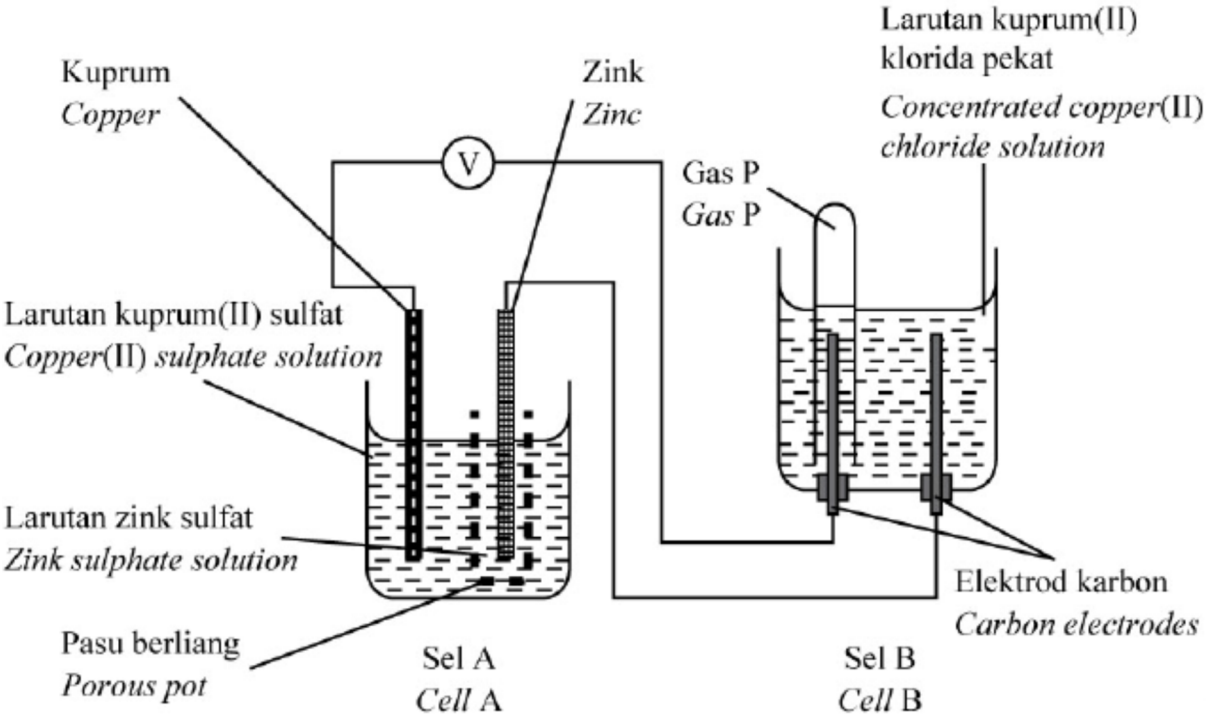
..... [1M]

(iii) Berdasarkan jawapan di (b) (i) dan (c) (i) **pada Rajah 3**, lukiskan anak panah untuk menunjukkan arah aliran elektron.
Based on the answers in (b) (i) and (c) (i), **on Diagram 3,** draw the arrows to show the direction of electron flow.

[1M]

[Selangor2021-Set01-05]

5 Rajah 5 menunjukkan susunan radas bagi Sel A dan Sel B. Larutan zink sulfat, larutan kuprum(II) sulfat dan larutan kuprum(II) klorida pekat digunakan sebagai elektrolit dalam eksperimen ini.
Diagram 5 shows apparatus set-up of Cell A and Cell B. Zinc sulphate solution, copper(II) sulphate solution and concentrated copper(II) chloride solution are used as electrolytes in this experiment.



Senarai nilai keupayaan elektrod piawai:
List of standard electrode potential values:

Tindak balas sel setengah Half-cell reaction	E° / V
$S_2O_8^{2-}$ (ak/aq) + 2e → $2SO_4^{2-}$ (ak/aq)	+ 2.01
Cl_2 (g) + 2e → $2C1^-$ (ak/aq)	+ 1.36
O_2 (g) + $2H_2O$ (ce/l) + 4e → $4OH^-$ (ak/aq)	+ 0.40
Cu^{2+} (ak/aq) + 2e → Cu (p/s)	+ 0.34
$2H^+$ (ak/aq) + 2e → H_2 (g)	0.00
Zn^{2+} (ak/ aq) + 2e → Zn (p/v)	-0.76

(a) Merujuk kepada Sel A,/ Referring to Cell A,

(i) nyatakan logam yang bertindak sebagai terminal positif. Terangkan jawapan anda.
state the metal that acts as positive terminal.
Explain your answer.

.....

..... [2M]

(ii) tulis persamaan ion bagi tindak balas yang berlaku dalam sel itu.
write the ionic equation for the reaction that occurs in the cell.

..... [1M]

(iii) hitung voltan bagi sel, E°se|.
calculate the voltage of cell, E°sel.

[1M]

(b) Merujuk kepada Sel B,/ Referring to Cell B,

(i) namakan gas P. / name the gas P.

..... [1M]

(ii) terangkan bagaimana gas P dihasilkan berdasarkan pemilihan ion untuk dinyahcas.
explain how gas P is produced based on the selection of ion to be discharged.

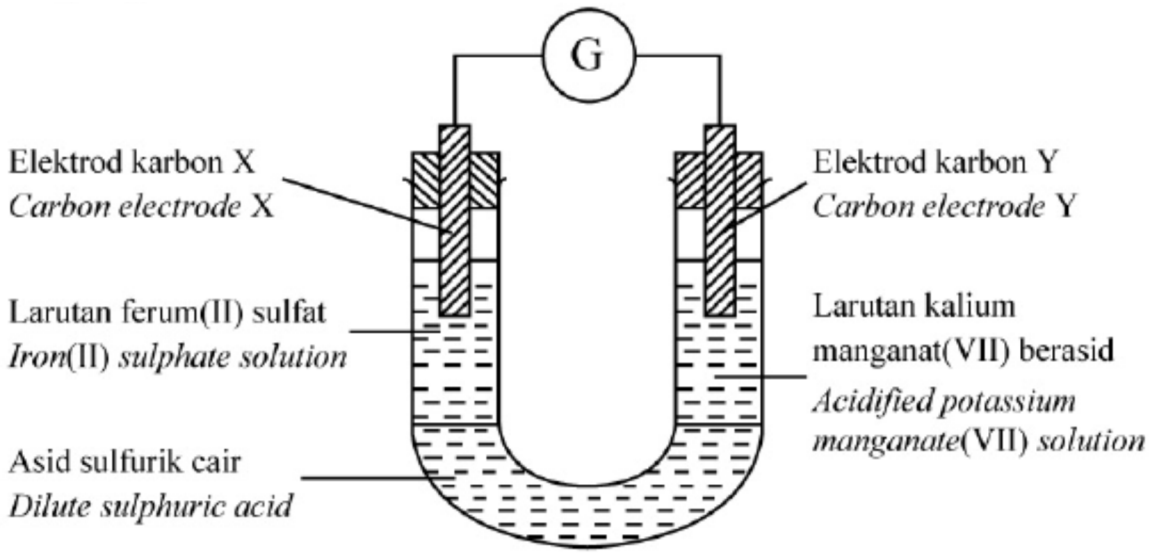
.....

..... [2M]

(iii) tulis setengah persamaan bagi tindak balas di katod.
write the half equation for the reaction at cathode.

..... [1M]

[Selangor2021-Set01-01]
5. Rajah 5 menunjukkan susunan radas untuk menyiasat tindak balas antara larutan ferum(II) sulfat dan larutan kalium manganat(VII) berasid melalui pemindahan elektron pada suatu jarak.
Diagram 5 shows the set-up of apparatus to investigate the reaction between iron(II) sulphate solution and acidified potassium manganate(VII) solution through the transfer of electrons at a distance.



(a) Apakah fungsi asid sulfurik cair dalam Rajah 5?
What is the function of dilute sulphuric acid in Diagram 5?

..... [1M]

(b) Nyatakan perubahan warna larutan kalium manganat(VII) berasid selepas 30 minit.
State the change of colour of acidified potassium manganate(VII) solution after 30 minutes.

..... [1M]

(c) Hitung nombor pengoksidaan mangan dalam ion manganat(VII).
Calculate the oxidation number of manganese in manganate(VII) ion.

[1M]

(d) Tulis setengah persamaan di elektrod karbon Y.
Write the half equation at carbon electrode Y.

..... [2M]

(e) Huraikan secara ringkas ujian kimia untuk menentusahkan kation yang terhasil dalam larutan pada elektrod karbon X.
Describe briefly a chemical test to verify the cation produced in the solution at carbon electrode X.

.....

.....

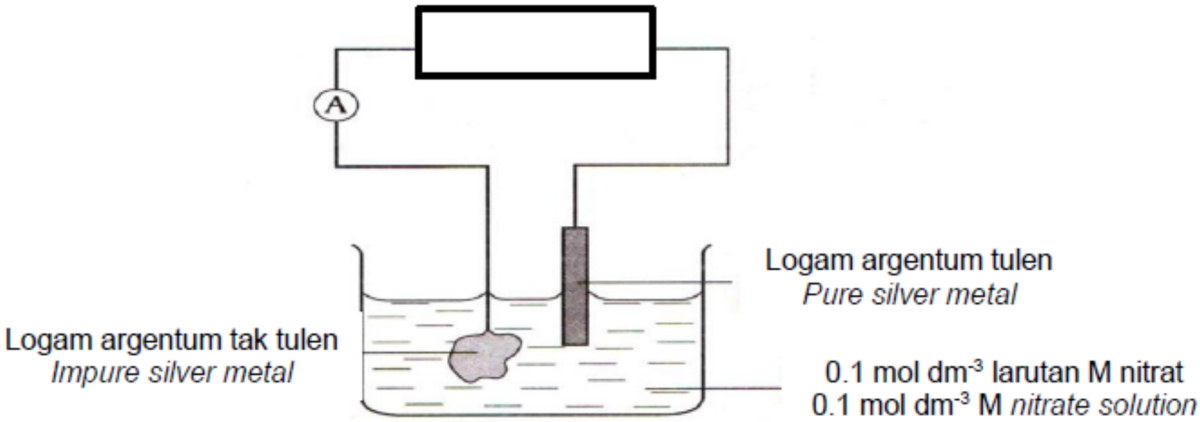
.....

..... [2M]

(f) Cadangkan bahan lain yang boleh menggantikan larutan ferum(II) sulfat dalam Rajah 5.
Suggest another substance that can replace iron(II) sulphate solution in Diagram 5.

..... [1M]

[Kedah2021-Set02-05]
5. Rajah 5 menunjukkan susunan radas untuk menulenkan argentum tak tulen yang mengandungi kuprum sebagai bendasing melalui proses elektrolisis.
Diagram 5 shows the set-up of apparatus to purify impure silver that containing copper as impurities by electrolysis process.



(a) Namakan satu elektrolit yang sesuai digunakan dalam eksperimen ini.
Name a suitable electrolyte used in this experiment.

..... [1M]

(b) Lukis simbol bateri pada ruang yang disediakan **pada Rajah 5** untuk menyambung logam argentum tulen dan logam argentum tak tulen.
Draw the symbol of battery at the space provided **in Diagram 5** to connect the pure silver metal and impure silver metal.

[1M]

(c) Sekiranya jisim awal bagi elektrod logam argentum tulen yang digunakan adalah 25.3 g dan setelah 30 minit didapati jisim akhir bagi logam argentum tulen meningkat menjadi 36.1 g.
Hitungkan bilangan mol bagi argentum yang telah diekstrakkan dari logam argentum tak tulen tersebut. [Jisim Atom Relatif , Ag=108]
If the initial mass of the pure silver metal electrode used is 25.3 g and after 30 minutes it is found that the final mass of the pure silver metal increases to 36.1 g.
Calculate the number of moles of silver that have been extracted from the impure silver metal. [Relative Atomic Mass, Ag=108]

[2M]

(d) Tulis setengah persamaan untuk tindak balas yang berlaku di anod dan katod.
Write the half equation for the reaction that occurs at the anode and cathode.

Anod/Anod : .....

Katod/Cathode : ....

[2M]

(e) Seorang pelajar menjalankan elektrolisis dua asid yang berbeza. Pemerhatian bagi kedua-dua eksperimen ditunjukkan dalam Jadual 5.
A student carried out electrolysis for two different acids. The observations for both experiments are shown in Table 5.

Jenis asid Type of acid	Pemerhatian Observation	
	Anod Anode	Katod Cathode
Asid Diprotik R Diprotic acid R	Gas tidak berwarna dibebaskan Colourless gas is released	Gas tidak berwarna dibebaskan Colourless gas is released
Asid Monoprotik M Monoprotic acid M	Gas kuning kehijauan dibebaskan Greenish yellow gas is released	Gas tidak berwarna dibebaskan Colourless gas is released

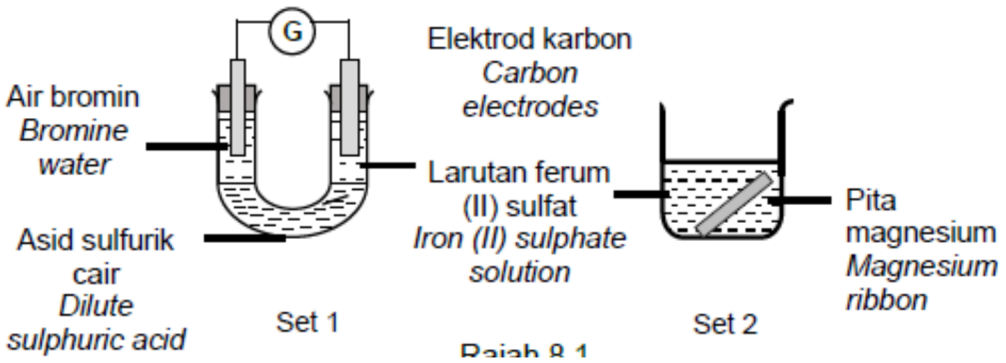
Cadangkan nama asid yang digunakan
Suggest the names of the acids used

Asid R/Acid R : .....

Asid M/Acid M : .....

[2M]

[Melaka2021-08]
8. (a) Rajah 8.1 menunjukkan susunan radas yang digunakan dalam dua set eksperimen untuk menyiasat tindak balas redoks.
Diagram 8.1 shows the apparatus setup used in two sets of experiment to investigate redox reaction.



Rajah 8.1

(i) Apakah yang dimaksudkan dengan tindak balas redoks?
What is meant by redox reaction?

.....

..... [1M]

(ii) Nyatakan fungsi air bromin dan larutan ferum(II) sulfat di dalam Set I.
State the function of bromine water and ferum(II) sulphate in Set 1.

Air bromin : .....
Bromine water

Larutan ferum(II) sulfat : .....
Ferum (II) sulphate solution

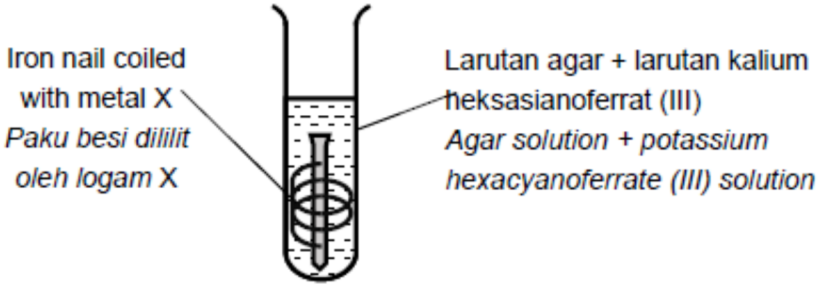
[2M]

(iii) Selepas 15 minit, larutan ferum (II) sulfat dalam Set I bertukar warna dari hijau ke perang tetapi dalam Set II, ia bertukar warna dari hijau ke tanpa warna. Pepejal kelabu terbentuk di dasar bikar itu. Lengkapkan Jadual 8.1 untuk menerangkan pemerhatian ini.
After 15 minutes, the iron (II) sulphate solution in Set I changes colour from green to brown but in Set II, it changes from green to colourless. A grey solid formed at the base of the beaker.
Complete Table 8.1 to explain the observation.

Set	I	II
Perubahan nombor pengoksidaan Ferum Change in oxidation of iron		
Setengah persamaan bagi ferum Half equation of iron		

Jadual 8.1/ Table 8.1 [4M]

(b) Satu lagi eksperimen redoks dijalankan untuk mengkaji kesan logam X ke atas pengaratan ferum, Fe. Rajah 8.2 menunjukkan susunan radas yang digunakan.
Another redox experiment is carried out to investigate the effect of metal X on the rusting of iron, Fe. Diagram 8.2 shows the setup of apparatus used



Selepas tiga hari keputusan menunjukkan tompokon biru terbentuk di dalam tabung uji.
After three days the result of this experiment show the blue spot produced in the test tube.

(i) Cadangkan logam yang sesuai bagi X.
Suggest a suitable metal for X.

..... [1M]

(ii) Terangkan pemerhatian yang dilihat bagi logam X dalam Jadual 8.2.
Explain the observation seen for metal X in Table 8.2.

.....

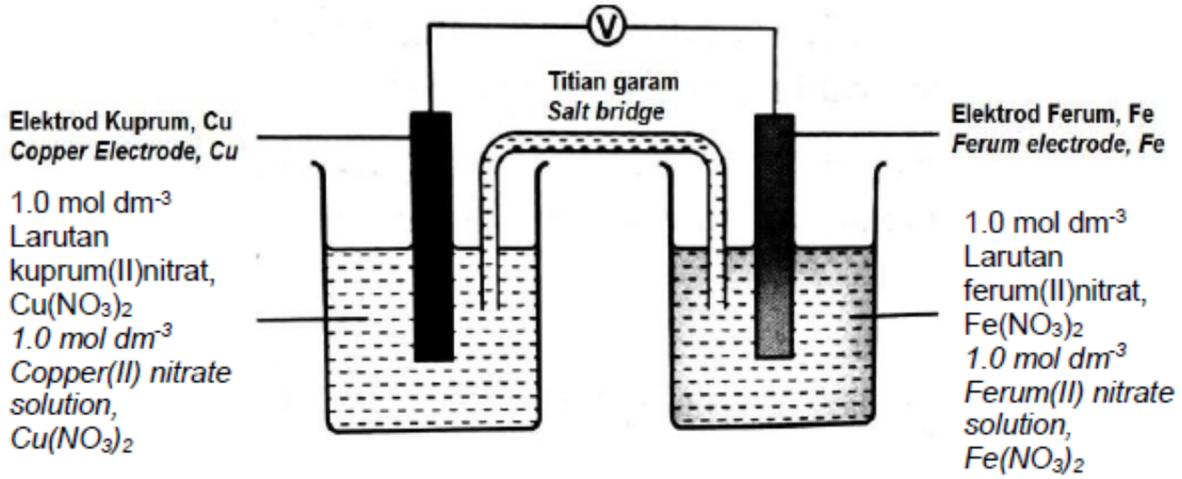
.....

..... [2M]

Esei/ Essay

[Melaka2021-09]

9. Rajah 9.1 menunjukkan susunan radas bagi satu sel kimia ringkas.
Diagram 9.1 shows the apparatus set-up for a simple chemical cell.



(a) Berdasarkan rajah 9.1, dan dengan merujuk kepada nilai keupayaan elektrod piawai sel setengah:
Based on Figure 9.1, and referring to the standard electrode potential of a half-cell:

(i) Nyatakan terminal positif dan terminal negatif bagi sel ini.
State the positive terminal and negative terminal of this cell.

(ii) Tuliskan notasi sel bagi sel kimia itu.
Write the cell notation for the voltaic cell.

(iii) Hitungkan voltan sel.
Calculate the voltage of the cell.

[4M]

(b) Eksperimen tersebut diulangi dengan menggunakan pasangan logam argentum dan magnesium dengan larutan akueus yang mengandungi ion logam masing-masing. Jadual 9.1 menunjukkan nilai keupayaan elektrod piawai sel setengah dalam eksperimen itu.
The experiment is repeated by using pair of silver electrode and magnesium electrode with aqueous solution containing metal ion respectively. Table 9.1 shows the standard electrode potential of a half-cell in the experiment.

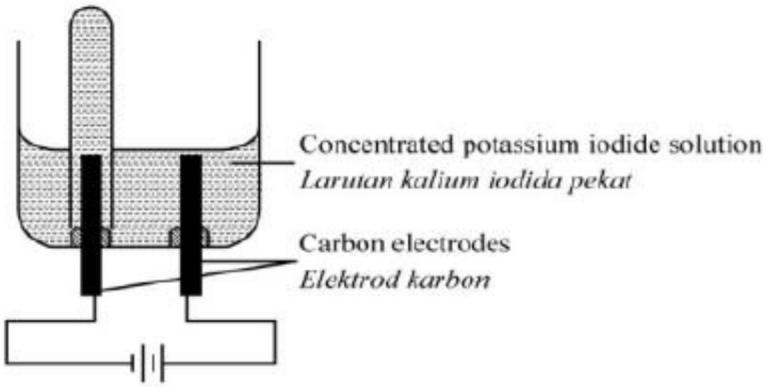
$Mg^{2+} + 2e^- \rightleftharpoons Mg$	E° = -2.38 V
$Ag^+ + e^- \rightleftharpoons Ag$	E° = +0.80 V
$2H^+ + 2e^- \rightleftharpoons H_2$	E° = 0.00 V

(i) Nyatakan pemerhatian di terminal positif dan terminal negatif.
State an observation at positive terminal and negative terminal.

(ii) Tuliskan setengah persamaan pengoksidaan dan setengah persamaan penurunan bagi eksperimen ini. Jelaskan jawapan anda.
Write half equation of oxidation and half equation of reduction for this experiment. Explain your answer.

[6M]

(c) Rajah 9.2 menunjukkan susunan radas untuk menjalankan elektrolisis larutan kalium iodida pekat menggunakan elektrod karbon.
Diagram 9.2 shows the apparatus set-up to conduct electrolysis of concentrated potassium iodide solution using carbon electrodes.



Jadual 9.2 menunjukkan nilai keupayaan elektrod piawai, E° bagi anion dan kation yang terlibat dalam elektrolisis ini.
Table 9.2 shows the standard electrode potential for anions and cations involved in the electrolysis.

Keupayaan elektrod piawai sel setengah Half-cell standard electrode potential	E° (V)
$O_2 + 2H_2O + 4e^- \rightleftharpoons 4OH^-$	+ 0.40
$I_2 + 2e^- \rightleftharpoons 2I^-$	+ 0.54
$2H^+ + 2e^- \rightleftharpoons H_2$	0.00
$K^+ + e \rightleftharpoons K$	- 2.92

Berdasarkan Rajah 9.2 dan Jadual 9.2, terangkan tindak balas yang berlaku di anod dan katod. Penerangan anda perlu merangkumi aspek-aspek berikut:
Based on Diagram 9.2 and Table 9.2, explain the reaction that occurs at anode and cathode. Your explanation must include this following aspects:

- Ion yang dipilih untuk dinyahcas/ Ion that is selectively discharged

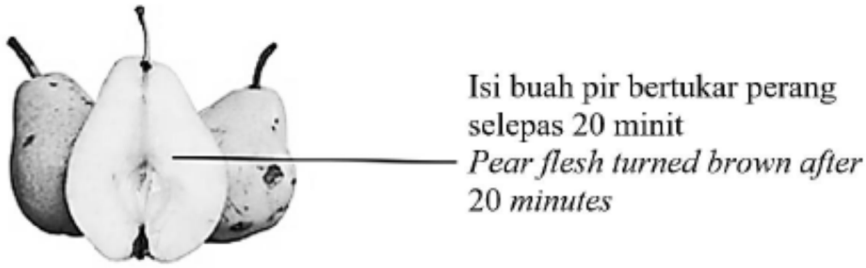
- Sebab ion ini dipilih untuk dinyahcas
Reason why the ion is selectively discharged

- Setengah persamaan bagi tindak balas yang berlaku
Half equation for the reaction that occured

- Pemerhatian/ Observation
- Hasil/ Product [10M]

[Perlis2021-10]

10. (a) Rajah 9.1 menunjukkan situasi tindak balas redoks yang berlaku dalam kehidupan seharian.
Diagram 9.1 shows the situation of a redox reaction that occurs in daily life.



Berdasarkan perubahan yang ditunjukkan dalam Rajah 9.1, nyatakan jenis tindak balas yang berlaku dan keadaan yang menyebabkan perubahan tersebut.
Cadangkan satu cara untuk mengurangkan perubahan tersebut.
Based on the changes shown in the Diagram 9.1, state the type of reaction and the condition caused the changes.
Suggest one method to slow down the changes.

[3M]

(b) Iodin boleh diekstrak dari rumpai laut melalui tindak balas redoks berikut.
Iodine can be extracted from seaweed through the following redox reaction.

$$2I^- + H_2O_2 + 2H^+ \rightarrow I_2 + 2H_2O$$

(i) Berdasarkan persamaan yang diberikan, tentukan:
● nombor pengoksidaan bagi oksigen dalam hidrogen peroksida, H_2O_2.
● agen pengoksidaan dan agen penurunan. Jelaskan jawapan anda dari segi pemindahan elektron.

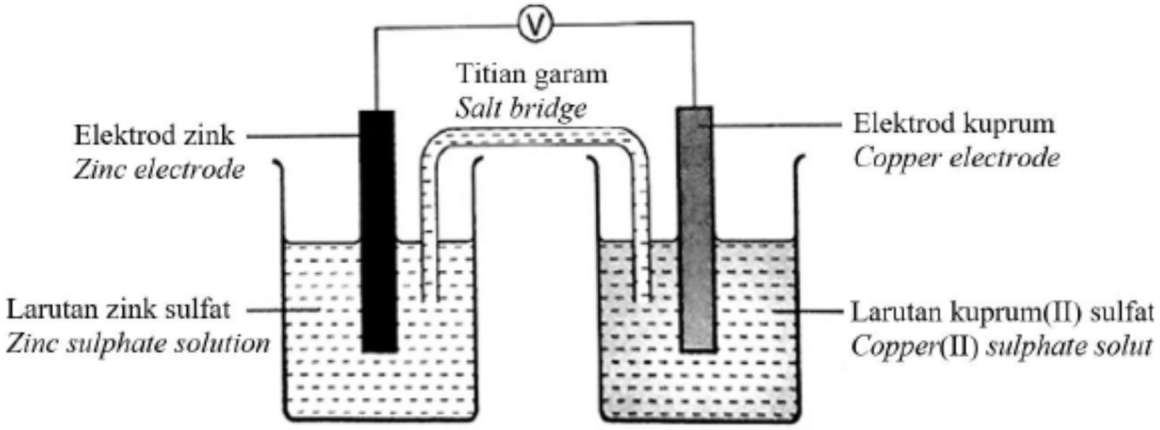
Based on the equation given, determine:
● the oxidation number of oxygen in hydrogen peroxide, H_2O_2.
● the oxidising agent and reducing agent. Explain your answer in terms of transfer of electrons.

[5M]

(ii) Tuliskan setengah persamaan bagi tindak balas pengoksidaan dan tindak balas penurunan.
Write the half equations for the oxidation reaction and reduction reaction.

[2M]

(c) Rajah 9.2 menunjukkan susunan radas bagi satu sel kimia.
Diagram 9.2 shows an apparatus set-up for a chemical cell.



(i) Dengan merujuk kepada keupayaan elektrod piawai, E° setengah sel berikut:
With reference to the following standard electrode potential of a half-cell, E°:

$$Zn^{2+}(ak/aq) + 2e \rightleftharpoons Zn(p/s) \qquad E° = -0.76V$$
$$Cu^{2+}(ak/aq) + 2e \rightleftharpoons Cu(p/s) \qquad E° = +0.34V$$

kenal pasti terminal negatif dan terminal positif bagi sel kimia tersebut. Jelaskan jawapan anda.
identify the negative and positive terminals of the chemical cell. Explain your answer.

[4M]

(ii) tuliskan notasi sel dan hitungkan voltan sel bagi sel kimia tersebut.
write the cell notation and calculate the voltage of the chemical cell.

[2M]

(d) Jadual 7 menunjukkan keputusan bagi dua eksperimen untuk mengkaji penyesaran logam dari larutan garamnya.
Table 7 shows results of two experiments to study the displacement of a metal from its salt solution.

Set Set	Eksperimen Experiment	Pemerhatian Observation
I	Satu jalur logam Y dimasukkan ke dalam tabung uji yang mengandungi 2.0 cm^3 larutan X nitrat 0.1 mol dm^{-3}. A strip of Y metal is added into a test tube containing 2.0 cm^3 of 0.1 mol dm^{-3} X nitrate solution.	• Larutan tanpa warna bertukar menjadi biru. The colourless solution turns blue.

		• Jalur logam Y menipis. The Y metal strip becomes thinner. • Pepejal kelabu berkilat terenap. A shiny grey solid deposited.
II	Satu jalur logam Y dimasukkan ke dalam tabung uji yang mengandungi 2.0 cm^3 larutan magnesium nitrat 0.1 mol dm^{-3} A strip of Y metal is added into a test tube containing 2.0 cm3 of 0.1 mol dm^{-3} magnesium nitrate solution.	• Tiada perubahan No changes

(i) Berdasarkan Jadual 7, namakan ion yang membentuk larutan berwarna biru dan cadangkan logam Y dan larutan X nitrat.
Based on Table 7, name the ion that formed the blue solution and suggest a suitable Y metal and X nitrate solution .

(ii) Tuliskan persamaan ion bagi tindak balas redoks yang berlaku.
Write the ionic equation for the redox reaction that takes place.

[4M]

[Kelantan2021-10]
10. (a) Berikut adalah formula bagi dua sebatian.
The following are the formulae of two compounds.

MgO Cu_2O

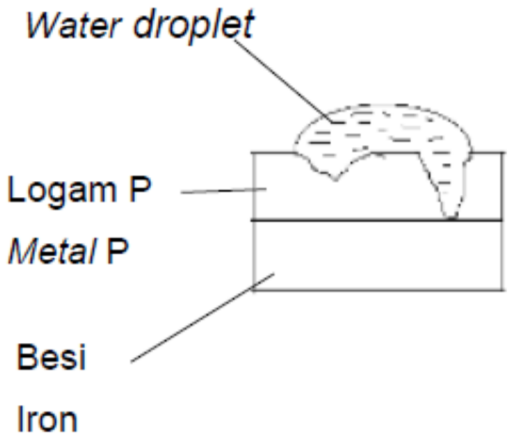
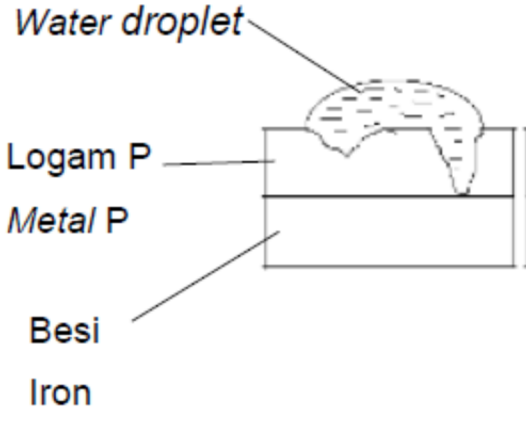
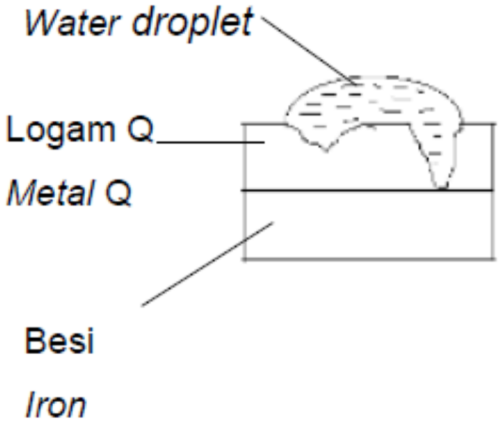
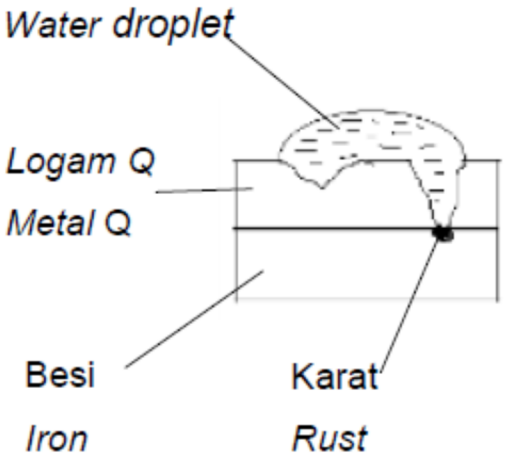
Berdasarkan kepada formula itu,
Based on the formulae,

(i) Nyatakan nombor pengoksidaan bagi magnesium dan kuprum.
State the oxidation numbers for magnesium and copper.

(ii) Nyatakan nama bagi sebatian-sebatian itu.
State the name of the compounds.

[4M]

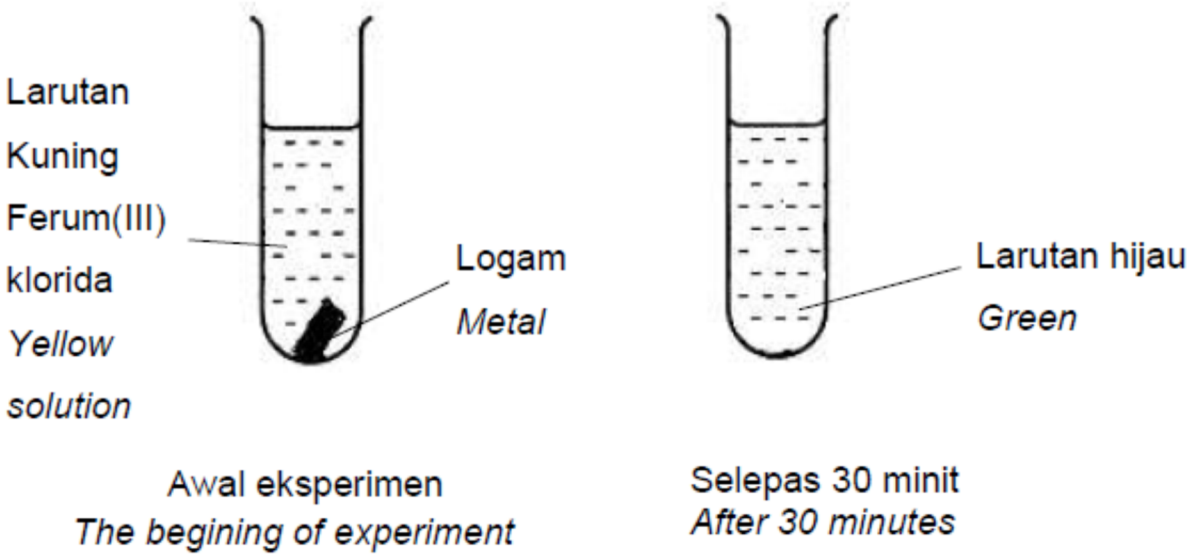
(b) Rajah 10.1 menunjukkan pemerhatian bagi dua set eksperimen apabila besi bersentuhan dengan dua logam yang berlainan, iaitu logam P dan logam Q. Apabila lapisan logam P dan logam Q tercalar, besi terdedah kepada oksigen dan air.
Diagram 10.1 shows the observations of two sets of experiment when irons are in contact with two different metals, P and Q. When the layer of metal P and metal Q are scratched, the irons are exposed to oxygen and water.

Set	Pemerhatian Observation	
	Awal Initial	Selepas 2 minggu After 2 weeks
I		
II		

Berdasarkan Rajah 10.1, cadangkan logam P dan logam Q.
Kemudian terangkan perbezaan pemerhatian dalam set I dan set II.
Based on Diagram 10.1, suggest metal P and metal Q.
Then explain the differences in the observations in Set I and Set II.

[6M]

(c) Rajah 10.2 menunjukkan radas dan pemerhatian bagi satu tindak balas redoks antara larutan ferum(III) klorida dan sekeping logam.
Diagram 10.2 shows the apparatus and observations for a redox reaction between iron(III) chloride solution and a metal.



Berdasarkan pemerhatian yang ditunjukkan dalam Rajah 10.2 , cadangkan logam yang sesuai untuk digunakan dalam eksperimen ini. Ramalkan anion yang hadir dalam larutan berwarna hijau itu dan jelaskan jawapan berdasarkan aspek-aspek berikut:
Based on the observation shown in Diagram 10.2 , suggest a suitable metal to be used in this experiment.
Predict the anion that present in the green coloured solution and explain the answers based on the following aspects :

(i) Perubahan dalam nombor pengoksidaan bagi kedua-dua bahan tindak balas.
The change in oxidation number for both the reactants.

(ii) Jenis tindak balas yang berlaku pada setiap bahan tindak balas.
The type of reaction that is occurred to each reactant.

(iii) Peranan setiap bahan tindak balas dalam tindak balas redoks tersebut.
The role of each reactant in the redox reaction.

(iv) Setengah persamaan yang terlibat dalam tindak balas redoks tersebut.
The half equations involved in the redox reaction.

[10M]

[Kedah2021-Set02-10]
10. Persamaan kimia berikut mewakili tindak balas antara dua larutan yang berlainan.
The following chemical equation represents the reaction between two different solutions.

$$NaCl\ (ak) + AgNO_3\ (ak) \rightarrow NaNO_3\ (ak) + AgCl\ (p)$$
$$NaCl\ (aq) + AgNO_3\ (aq) \rightarrow NaNO_3\ (aq) + AgCl\ (s)$$

(a) Nyatakan maksud tindak balas redoks. Tentukan sama ada tindak balas tersebut merupakan tindak balas redoks atau tidak. Terangkan jawapan anda dari segi perubahan nombor pengoksidaan.
State the meaning of redox reaction. Determine whether the reaction is a redox or not. Explain your answer in terms of change in oxidation number.
[4M]

(b) Besi diekstrak daripada bijih besi, Fe_2O_3 menggunakan arang kok, C. Penghasilan besi dalam industri diwakili dengan persamaan kimia di bawah.
Iron is extracted from iron ore, Fe_2O_3 using coke, C. The production of iron in industry is represented by the following chemical equation.

$$\mathbf{3C + 2Fe_2O_3 \rightarrow 4Fe + 3CO_2}$$

(i) Jika kilang tersebut mampu memproses 800 kg bijih besi sehari dengan menggunakan karbon yang berlebihan, hitung jisim besi yang dihasilkan.
[Jisim atom relatif: O = 16; Fe = 56]
If the factory is able to process 800 kg iron ore per day by using excess carbon, calculate the mass of the iron produced.
[Relative atomic mass: O = 16; Fe = 56]
[4M]

(ii) Tentukan nombor pengoksidaan bagi besi dalam sebatian Fe_2O_3 dan nyatakan penamaan IUPAC bagi sebatian itu.
Determine the oxidation number of iron in compound Fe_2O_3 and state the IUPAC nomenclature of the compound.
[2M]

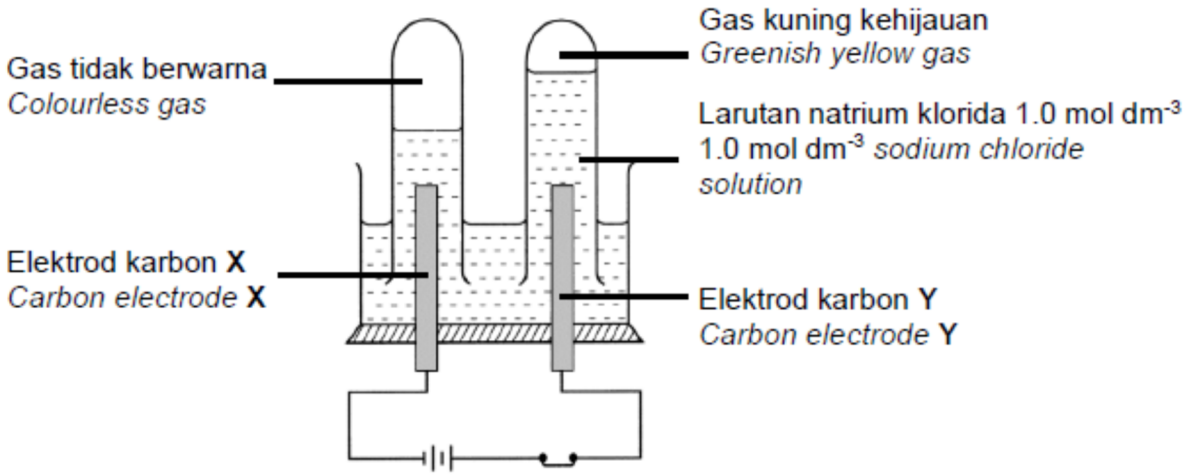
(c) Dua set eksperimen dijalankan untuk mengkaji kesan logam lain terhadap pengaratan besi. Bagi Set I, sebatang paku besi dililit dengan logam P manakala Set II sebatang paku besi dililit dengan logam Q. Kedua-dua paku besi yang dililit dengan logam itu dimasukkan ke dalam larutan agar-agar panas yang mengandungi larutan kalium heksasianoferat(III) dan fenolftalein. Keputusan eksperimen ditunjukkan dalam Jadual 10.
Two sets of an experiment are carried out to study the effect of other metals on rusting of iron. For Set I, an iron nail is coiled with metal P whereas in Set II iron nail is coiled with metal Q. Both coiled iron nails are dipped into hot jelly solution containing potassium hexacyanoferrate(III) solution and phenolphthalein. The results of the experiment are shown in Table 10.

Set Set	Eksperimen Experiment	Pemerhatian Observation
I	Larutan agar-agar + kalium heksasianoferat(III) + fenolftalein *Jelly solution + potassium hexacyanoferrate (III) solution and phenolphthalein*  Paku besi dililit dengan logam **P** *Iron nail coil with metal* **P**	Warna merah jambu terbentuk Pink colour formed
II	Larutan agar-agar + kalium heksasianoferat(III) + fenolftalein *Jelly solution + potassium hexacyanoferrate (III) solution and phenolphthalein*  Paku besi dililit dengan logam **Q** *Iron nail coil with metal* **Q**	Warna biru tua terbentuk Dark blue colour formed

Berdasarkan pemerhatian, cadangkan logam P dan logam Q. Terangkan mengapa terdapat perbezaan dalam pemerhatian. Sertakan dalam jawapan anda setengah persamaan bagi tindak balas pengoksidaan dan nyatakan logam yang dioksidakan.
Based on the observations, suggest metal P and metal Q. Explain why there is a difference in the observations. Include in your answer the half-equations for oxidation reaction and state the metals that are oxidised.

[10M]

[Kedah2021-Set01-10]
10. (a) Rajah 10 menunjukkan susunan radas untuk elektrolisis larutan natrium klorida dengan menggunakan elektrod karbon.
Diagram 10 shows the apparatus set-up for the electrolysis of sodium chloride solution using carbon electrode.



Berdasarkan Rajah 10.1,/ Based on Diagram 10.1,

(i) Nyatakan faktor yang menentukan hasil yang terbentuk pada elektrod X dan elektrod Y.
State the factors that determine the products formed at electrode X and electrode Y.

[2M]

(ii) Terangkan tindak balas pada elektrod X dan Y. Penerangan anda perlu mengandungi:
Explain the reactions at electrodes X and Y. Include the following in your explanation:

• Senarai ion-ion yang tertarik ke setiap elektrod, X dan Y.
List of ions attracted to each of electrodes, X and Y

• Nama ion-ion yang dipilih untuk dinyahcaskan di setiap elektrod.
Names of the ions selectively discharged at each electrode

• Sebab ion-ion dipilih untuk dinyahcas.
The reason why the ions are selectively discharged

• Setengah persamaan bagi setiap tindak balas.
Half equation for each reaction

[8M]

(b) Jadual 10.1 menunjukkan nilai keupayaan elektrod piawai sel setengah beberapa logam.
Table 10.1 shows the standard electrode potential values of half cells for some metals.

$P^{2+}(ak) + 2e^- \rightleftharpoons P(p)$ $P^{2+}(aq) + 2e^- \rightleftharpoons P(s)$	$E° = +0.34$ V
$Mg^{2+}(ak) + 2e^- \rightleftharpoons Mg(p)$ $Mg^{2+}(aq) + 2e^- \rightleftharpoons Mg(s)$	$E° = -2.38$ V
$Q_{+}(ak) + e^- \rightleftharpoons Q(p)$ $Q_{+}(aq) + e^- \rightleftharpoons Q(s)$	$E° = +0.80$ V
$Zn^{2+}(ak) + 2e^- \rightleftharpoons Zn(p)$ $Zn^{2+}(aq) + 2e^- \rightleftharpoons Zn(s)$	$E° = -0.76$ V

(i) Susun atom-atom dan ion-ion dalam Jadual 10.1 mengikut turutan menaik kekuatan
• agen pengoksidaan
• agen penurunan.
Cadangkan logam P dan Q.

Arrange the atoms and ions in Table 10.1 in an ascending order of the strength of
• oxidising agents
• reducing agents
Suggest metal P and Q.

[4M]

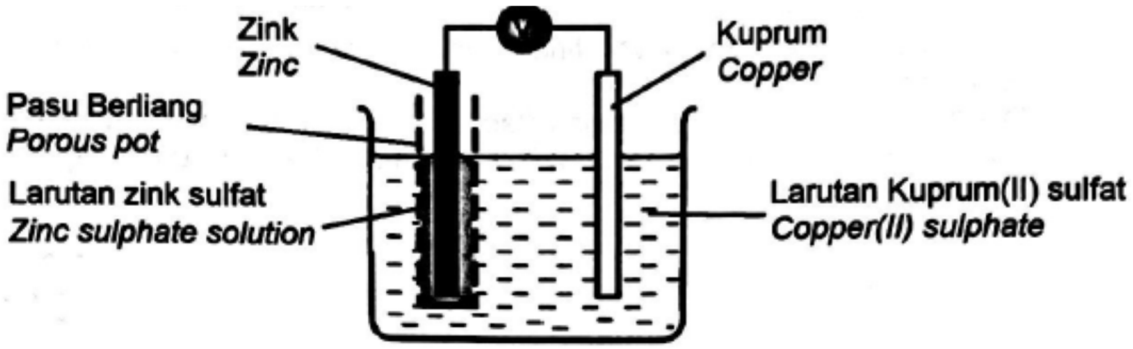
(ii) Jadual 10.2 menunjukkan bahan tindak balas bagi dua set tindak balas penyesaran logam.
Table 10.2 shows reactants of two sets of displacement reaction of metal.

Set Set	Bahan tindak balas Reactants
I	Mg(p) + Zn^{2+} (ak) Mg(s) + Zn^{2+} (aq)
II	P(p) + Zn^{2+} (ak) P(s) + Zn^{2+} (aq)

Berdasarkan jawapan anda dalam 10(b)(i), kenalpasti sama ada tindak balas akan berlaku atau tidak bagi Set I dan Set II . Terangkan jawapan anda.
Based on your answer in 10(b)(i), identify whether the reaction will occur or not for Set I and Set II. Explain your answer.

[6M]

[Johor2021-11]
11. Rajah 11.1 menunjukkan susunan radas bagi mengkaji tindak balas redoks.
Diagram 11.1 shows the apparatus set-up to study a redox reaction.



Siri keupayaan elektrod piawai:
Standard electrode potential series:

Zn^{2+} (ak) + 2e → Zn (p) E° = -0.76 V
Cu^{2+} (aq) + 2e → Cu(p) E° = +0.34 V

(a) Apakah maksud tindak balas redoks?
What is the meaning of redox reaction? [1M]

(b) Berdasarkan maklumat dalam Rajah 11.1 dan Siri Keupayaan Elektrod Piawai:
Based on Diagram 11.1 and Standard Electrode Potential Series:

(i) Kenal pasti terminal negatif dan terminal positif bagi sel tersebut.
Identify the negative terminal and positive of the cell.

[2M]

(ii) Tuliskan persamaan ion keseluruhan.
Write the overall ionic equation.

[2M]

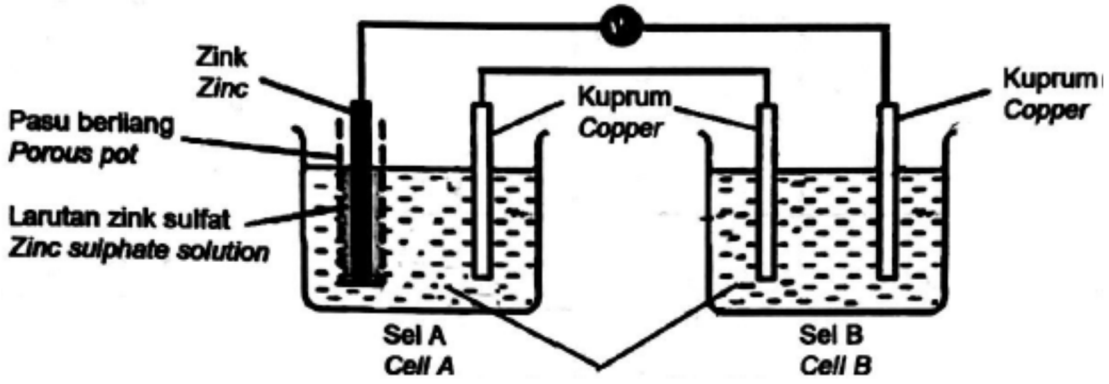
(iii) Tulis notasi sel bagi sel kimia pada Rajah 11.1
Write cell notation chemical cell in Diagram 11.1

[2M]

(iv) Hitungkan E° sel / Calculate the E° cell

[1M]

(c) Rajah 11.2 menunjukkan susunan radas sel A dan sel B.
Diagram 11.2 shows the apparatus setup for cell A and cell B.



(i) Bandingkan sel A dan sel B dari segi hasil yang terbentuk, pemerhatian dan setengah persamaan di anod.
Compare cell A and cell B in terms of product formed observation and half equation at anode.

[6M]

(ii) Rumah Faridah terletak di kawasan persisiran pantai. Dia selalu menghadapi masalah apabila tombol pintu keluli rumahnya sering diganti kerana pengaratan berlaku dengan cepat di kawasan tersebut. Sebagai rakan Faridah, cadangkan satu cara bagi menyelesaikan masalah tersebut dengan menggunakan konsep elektrolisis.
Faridah's house is located at seaside. She has a problem when her steel doorknob always need to be replaced due to rusting that occurred faster at that area. As Faridah's friend, suggest a way to solve the problem by using electrolysis concept.

[6M]

[Terengganu2021-11]
11. (a) Sekumpulan pelajar telah menjalankan eksperimen untuk mengkaji pemindahan elektron pada satu jarak dalam tindak balas redoks.
A group of students conducted an experiment to investigate the transfer of electrons at a distance in a redox reaction.

(i) Apakah yang dimaksudkan dengan tindak balas redoks?
What is meant by redox reaction?

[1M]

(ii) Jadual 11.1 menunjukkan senarai radas dan bahan yang diperlukan oleh pelajar-pelajar itu.
Table 11.1 shows the lists of apparatus and material needed by the students.

Radas dan bahan Apparatus and material	
Tiub - U U-Tube	Elektrod-elektrod karbon Carbon electrodes
Wayar penyambung Connecting wire	Air bromin Bromine water
Galvanometer Galvanometer	Larutan kalium iodida Potassium iodide solution
	Asid sulfurik Sulphuric acid

Lukis satu rajah berlabel untuk menunjukkan susunan radas bagi menjalankan eksperimen itu. Rajah itu hendaklah menggunakan radas dan bahan yang diberikan dalam Jadual 11.1. Dalam rajah itu, lukis anak panah untuk menunjukkan arah pengaliran elektron. Seterusnya, tulis setengah persamaan pengoksidaan dan setengah persamaan penurunan.
Draw one labelled diagram to show the apparatus set-up to conduct the experiment. The diagram must include the apparatus and materials given in Table 11.1. In your diagram, draw the arrows to show the direction of electron flow. Then, write half equation for oxidation and half equation for reduction.

[5M]

(b) Jadual 11.2 menunjukkan pemerhatian bagi tindak balas di antara togam X dengan dua larutan garam yang berbeza.
Table 11.2 shows the obsen/ation for the reaction between metal X with two different salt solutions.

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

Nilai keupayaan elektrod piawai sel setengah beberapa logam diberikan seperti berikut:
Given the standard electrode of potential values of half-cells of some metals:

$X^{2+} + 2e \rightarrow X$ $E° = - 0.13$ V
$Cu^{2+} + 2e \rightarrow Cu$ $E° = + 0.34$ V
$Zn^{2+} + 2e \rightarrow Zn$ $E° = - 0.76$ V

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

Susun atom atau ion dalam tertib menaik kekuatan agen pengoksidaan dan agen penurunan.
Arrange the atoms or ions in an ascending order of the strength of oxidising agents and reducing agents.

Seterusnya, terangkan mengapa terdapat perbezaan dalam pemerhatian yang diperolehi di dalam Jadual 11.2.
Next, explain why there are differences in observation obtained in the Table 11.2.

[7M]

(c) Seorang pelajar telah menjalankan eksperimen untuk mengkaji salah satu faktor yang mempengaruhi elektrolisis.
Jadual 11.3 menunjukkan pemerhatian bagi dua set eksperimen. Kedua-dua eksperimen itu menggunakan elektrod karbon.
A student carried out an experiment to study one of the factors affecting electrolysis. Table 11.3 shows the observation for two sets of experiment. Both experiments use carbon electrodes.

Set	Katod Cathode	Anod Anode
Set I	Gelembung gas tanpa warna terbebas Colourless gas released	Gelembung gas kuning kehijauan terbebas Greenish yellow gas bubbles bubbles released
Set II	Gelembung gas tanpa warna terbebas Colourless gas bubbles released	Gelembung gas tanpa warna terbebas Colourless gas bubbles released

(i) Dengan menggunakan elektrolit yang sesuai, huraikan satu eksperimen yang dapat dijalankan bagi memperolehi pemerhatian seperti di dalam Jadual 11.3.
By using a suitable electrolyte, describe an experiment that can be carried out to obtain the observation as in the Table 11.3.

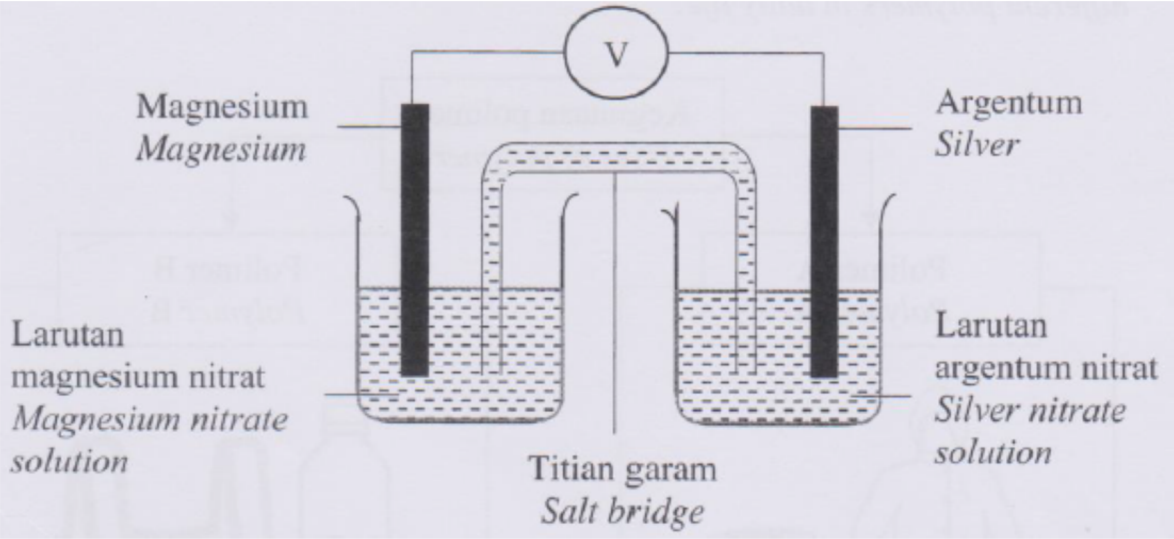
(ii) Terangkan mengapa terdapat perbezaan dalam pemerhatian di anod.
Explain why there are differences in the observation at anode.

Diberi E°:
E° is given:

$O_2 + 2H_2O + 4e \rightarrow 4OH^-$ E° = + 0.40 V
$Cl_2 + 2e \rightarrow 2Cl^-$ E° = + 1.36 V

[7M]

[SBP2021-11]
11. Rajah 11.1 menunjukkan susunan radas bagi satu sel kimia.
Diagram 11.1 shows the apparatus set-up for a chemical cell.



(a) Apakah yang dimaksudkan dengan tindak balas redoks?
What is meant by redox reaction?

[1M]

(b) Berdasarkan Rajah 11.1,/ Based on Diagram 11.1,

(i) Kenal pasti terminal negatif dan terminal positif bagi sel itu.
Identify the negative terminal and positive terminal of the cell.

(ii) Tuliskan persamaan ion keseluruhan bagi tindak balas itu.
Write the overall ionic equation for the reaction.

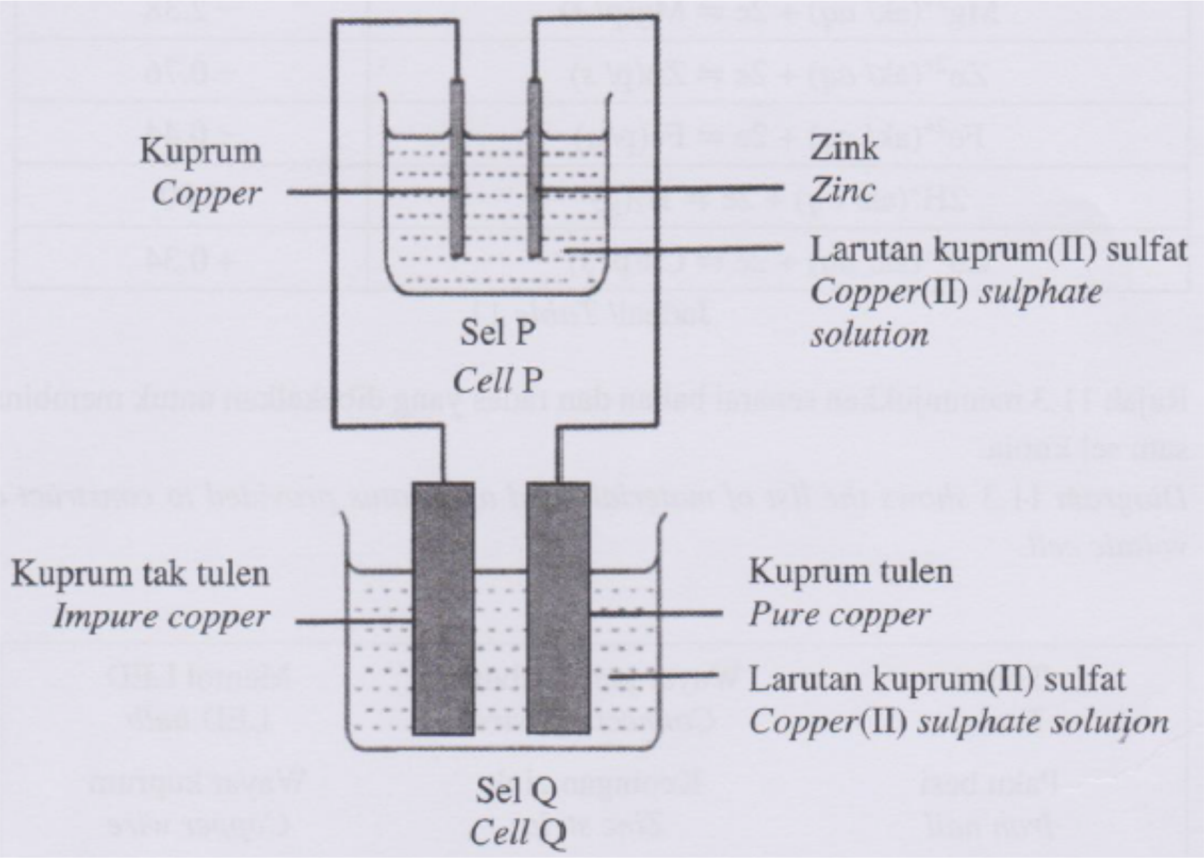
(iii) Tuliskan notasi sel bagi sel itu.
Write the cell notation of the cell.

Nilai E°bagi dua sel setengah itu adalah:
The E° value for the two half-cells are:

Mg^{2+}(ak/ aq) + 2e → Mg(p/ s)	E° = -2.38 V
Ag^{+}(ak/ aq) + e → Ag(p/ s)	E° = +0.80 V

[6M]

(c) Rajah 11.2 menunjukkan susunan radas untuk menulenkan logam kuprum.
Diagram 11.2 shows the apparatus set-up to purify copper metal.



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.

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

Zn^{2+} (ak/ aq) + 2e → Zn(p/ s)	E° = -0.76 V
$2H^{+}$ (ak/ aq) + 2e → H_2(g)	E°= 0.00 V
O_2(g) + $2H_2O$(ce/1) + 4e → $4OH^{-}$ (ak/ aq)	E° = +0.40 V
$S_2O_8^{2-}$(ak/ aq) + 2e → $2SO_4^{2-}$ (ak/ aq)	E° = +2.01 V

[5M]

(d) Jadual 11 menunjukkan sebahagian daripada siri keupayaan elektrod piawai.
Table 11 shows part of the standard electrode potential series.

Persamaan sel setengah Half-cell equation	E° / V (298 K)
Mg^{2+}(ak/ aq) + 2e → Mg(p/ s)	-2.38
Zn^{2+}(ak/ aq) + 2e → Zn(p/ s)	-0.76
Fe^{2+}(ak/ aq) + 2e → Fe(p/ s)	-0.44
$2H^{+}$(ak/ aq) + 2e → H2(g)	0.00
Cu^{2+}(ak/ aq) + 2e → Cu(p/ s)	+0.34

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.

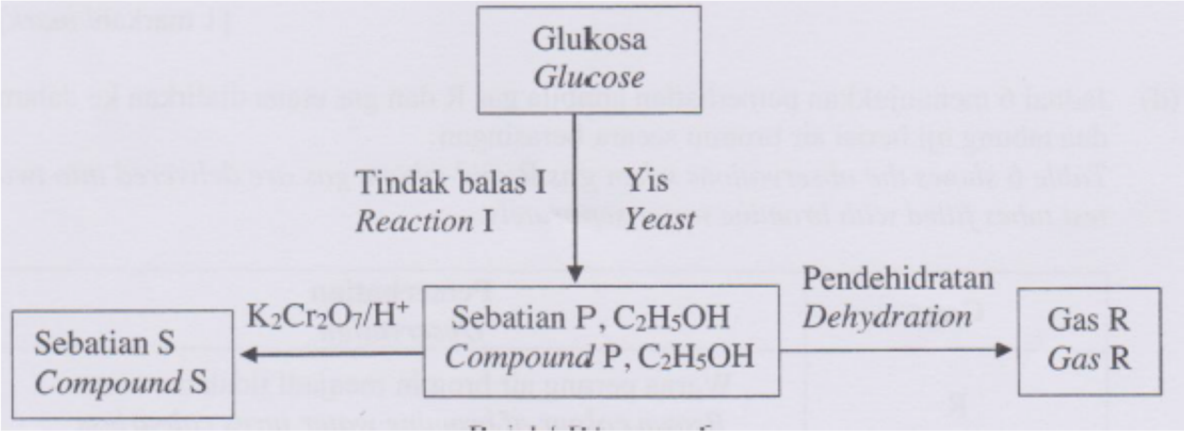
Tomato Tomato	Wayar penyambung Connecting wire	Mentol LED LED bulb
Paku besi Iron nail	Kepingan zink Zinc strip	Wayar kuprum Copper wire
Sudu plastik Plastic spoon	Kepingan magnesium Magnesium strip	Rod karbon Carbon rod
Kertas pasir Sandpaper		

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 daripada senarai dalam Rajah 11.3. Huraikan secara ringkas langkah pembinaan sel kimia itu dan terangkan tindak balas redoks yang berlaku. Kemudian, tentukan nilai bacaan voltan yang diperolehi.
By using your chemistry knowledge, draw the apparatus set-up of a voltaic cell that can light up an LED bulb. The apparatus set-up constructed should use suitable materials and apparatus given in Diagram 113. Describe briefly the steps of constructing the voltaic cell and explain the redox reaction that takes place. Then, determine the value of the voltage reading obtained.

[8M]

Tingkatan 5 Bab 2

[SBP2021-06]
6. Rajah 6 menunjukkan siri tindak balas melibatkan sebatian P, C_2H_5OH.
Diagram 6 shows series of reactions involving compound P, C_2H_5OH.



Berdasarkan Rajah 6,/ Based on Diagram 6,

(a) (i) Nyatakan nama tindak balas I.
State the name of reaction I.

..... [1M]

(ii) Nyatakan nama sebatian P, C_2H_5OH.
State the name of compound P, C_2H_5OH.

..... [1M]

(b) Tulis persamaan kimia bagi pembakaran lengkap sebatian P.
Write a chemical equation for complete combustion of compound P.

..... [2M]

(c) (i) Berdasarkan Rajah 6, pilih dua bahan yang boleh bertindak balas untuk menghasilkan satu sebatian yang berbau wangi.
Based on Diagram 6, choose two substances that can react to produce a compound with sweet smell.

..... [1M]
(ii) Lukis formula struktur bagi sebatian yang terbentuk itu.
Draw the structural formula for the compound formed.

[1M]

(d) Jadual 6 menunjukkan pemerhatian apabila gas R dan gas etana dialirkan ke dalam dua tabung uji berisi air bromin secara berasingan.
Table 6 shows the observations when gas R and ethane gas are delivered into two test tubes filled with bromine water separately.

Gas	Pemerhatian Observation
R	Warna perang air bromin menjadi tidak berwarna Brown colour of bromine water turns colourless
Etana	Warna perang air bromin tidak berubah Ethane Brown colour of bromine water unchanged

Terangkan perbezaan pemerhatian dalam Jadual 6.
Explain the differences in the observation in Table 6.

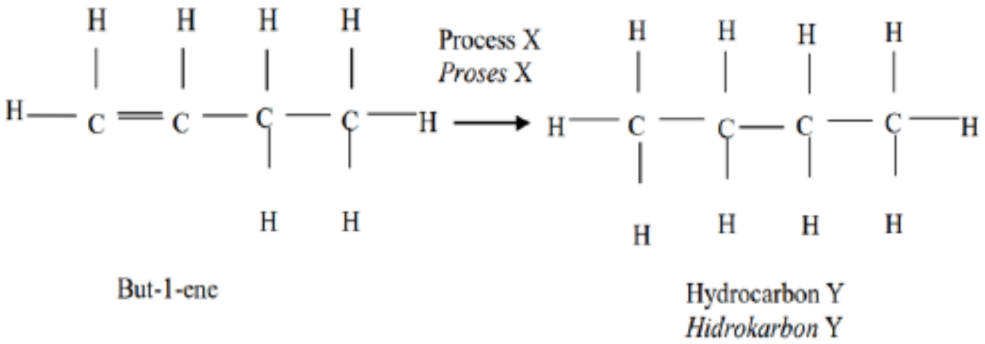
.....

.....

.....

..... [3M]

[Melaka2021-06]
6. Rajah 6.1 menunjukkan pertukaran but-1-ena kepada hidrokarbon Y melalui proses X pada 180 °C dengan kehadiran nikel sebagai mangkin.
Diagram 6.1 shows the conversion of but-1-ene to hydrocarbon Y through process X at 180 °C with the presence of nickel as a catalyst.



(a) Namakan proses X/ Name process X

..... [1M]

(b) Tulis persamaan kimia untuk mewakili proses X.
Write the chemical equation to represent process X.

..... [1M]

(c) 29 g hidrokarbon Y terbakar dengan lengkap dalam oksigen seperti dalam persamaan di bawah.
29 g of hidrokarbon Y is completely burnt in oxygen as in the equation below.

$$C_4H_{10} + 13/2\ O_2 \rightarrow 4CO_2 + 5H_2O$$

(i) Hitung jisim gas karbon dioksida yang terhasil.
Calculate the mass of carbon dioxide gas produced .
[Jisim atom relatif: C = 12, O = 16, H = 1]
[Relative atomic mass: C = 12, O = 16, H = 1]

[4M]

(d) Hitung peratusan peratus karbon per molekul antara But-1-ena dan hidrokarbon Y dan nyatakan yang manakah menghasilkan jelaga lebih tinggi.
Calculate the percentage of carbon per molecule between But-1-ene and hydrocarbon Y, state which one produced the highest sooth.
[Jisim atom relatif: C = 12, O = 16, H = 1]
[Relative atomic mass: C = 12, O = 16, H = 1]

[3M]

[Terengganu2021-07]
7. Rajah 7 menunjukkan sebotol cecair pembasmi kuman yang mengandungi sebatian X. Selain daripada sebatian X, sebatian Y yang berbau wangi buah- buahan juga terdapat dalam cecair pembasmi kuman itu.
Diagram 7 shows a bottle of liquid disinfection that contain compound X. Besides compound X, compound Y with a fruity smell is also found in the liquid disinfection.

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

..... [1M]

(ii) Nyatakan nama bagi sebatian X.
State the name of compound X.

..... [1M]

(iii) Sebatian X dikenali sebagai bahan api bersih. Pembakaran sebatian X menghasilkan nyalaan biru tanpa jelaga.
Tulis persamaan kimia bagi pembakaran sebatian X.
Compound X is known as a clean fuel. The combustion of compound X produces blue flame without soot.
Write a chemical equation for the combustion of compound X.

..... [2M]

(b) Sebatian Y iaitu propil butanoat boleh disediakan melalui tindak balas Z antara alkohol P dengan sebatian Q.
Compound Y which is propyl butanoate can be prepared through reaction Z between alcohol P and compound Q.

(i) Namakan tindak balas Z. /Name the reaction Z.

..... [1M]

(ii) Namakan sebatian Q./ State the name of compound Q.

..... [1M]

(iii) Write a chemical equation for the reaction Z.
Tulis persamaan kimia bagi tindak balas Z.

..... [2M]

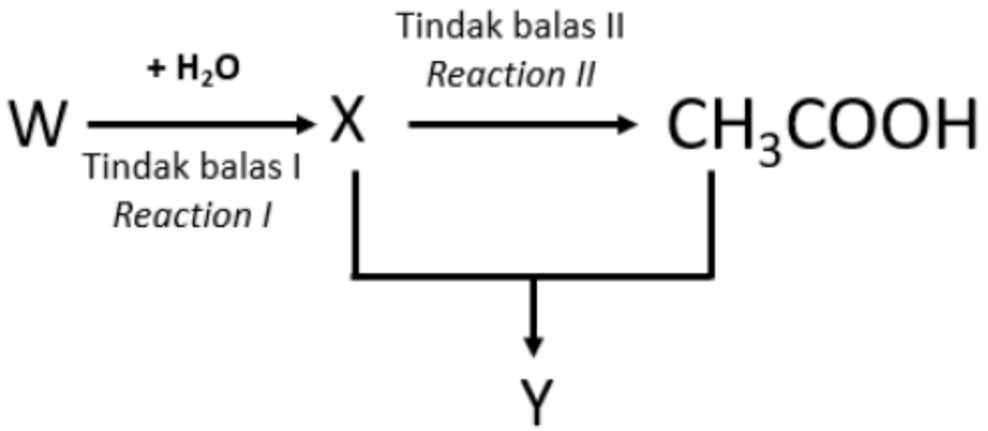
(c) Semasa pandemik Covid-19, penggunaan cecair pembasmi kuman yang mengandungi sehingga 70% sebatian X di gunakan secara meluas sebagai salah satu usaha untuk mencegah jangkitan kuman kepada badan kita. Walau bagaimanapun menurut pakar perubatan, amalan membasuh tangan menggunakan air dan sabun lebih berkesan berbanding penggunaan cecair pembasmi kuman. Cadangkan mengapa penggunaan cecair pembasmi kuman menjadi pilihan berbanding amalan membasuh tangan dengan air dan sabun.
During Cow'd-19 pandemic, usage of liquid sanitizer that contains up to 70% of X compound is necessary measure to prevent spreading of germs. Based on medical expert, washing hand routine using soap and water is more effective than using liquid sanitizer. Suggest why liquid sanitizer is preferred than traditional soap and water routine?

.....

.....

..... [2M]

[Kelantan2021-08]
8. Rajah 8 menunjukkan pertukaran W kepada X. W adalah ahli daripada siri homolog alkena yang mempunyai 2 atom karbon.
Diagram 8 shows the conversion of W to X. W is a member of the homologous series of alkenes having 2 carbon atoms.



(a) (i) Namakan W./ Name W.

..... [1M]

(ii) Tuliskan persamaan kimia bagi tindakbalas I.
Write the chemical equation for reaction I.

..... [2M]

(b) X boleh ditukarkan kepada asid etanoik, CH_3COOH melalui tindak balas II, terangkan bagaimana penukaran ini berlaku.
X can be converted to ethanoic acid, CH_3COOH via reaction II, explain how this conversion occurs.

.....

..... [2M]

(c) Jadual 8.1 menunjukkan pemerhatian bagi tindak balas antara asid etanoik, CH_3COOH dan sebatian Y dengan kalsium karbonat.
Table 8.1 shows the observations for the reaction between ethanoic acid, CH_3COOH and compound Y with calcium carbonate.

Prosedur Procedure	Pemerhatian Observation
Asid etanoik, CH_3COOH ditambahkan kepada ketulan kalsium karbonat Ethanoic acid, CH_3COOH is added to the chips of calcium carbonate.	Gelembung gas terbebas dan mengeruhkan air kapur Gas bubbles are released and cloud the lime water
Y ditambahkan kepada ketulan kalsium karbonat Y is added to the chips of calcium carbonate	

Cadangkan pemerhatian apabila Y ditambahkan kepada ketulan kalsium karbonat. Jelaskan.
Suggest an observation when Y is added to the chips of calcium carbonate. Explain.

.....

..... [2M]

(d) Sebatian W dan X mempunyai bilangan atom karbon yang sama.
Jadual 8.2 menunjukkan takat didih dan keadaan fizik sebatian W dan X pada suhu bilik.
Compounds W and X have the same number of carbon atoms.
Table 8.2 shows the boiling points and physical states of compounds W and X at room temperature.

	Sebatian W Compound of W	Sebatian X Compound of X
Takat didih °C Boiling point °C	- 42	78
Keadaan fizik pada suhu bilik Physical state at room temperature		

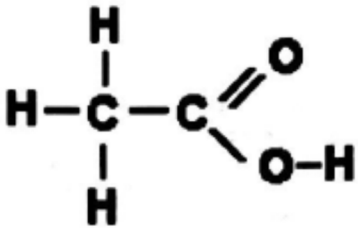
Nyatakan keadaan fizik sebatian W dan X pada suhu bilik. Jelaskan.
State the physical state of compounds W and X at room temperature. Explain.

.....

.....

..... [3M]

[Johor2021-08]
8. Rajah 8.1 menunjukkan formula struktur bagi satu sebatian karbon X.
Diagram 8.1 shows the structural formula for a carbon compound X.



(a) (i) Nyatakan maksud sebatian karbon.
State the meaning of carbon compound.

.....

..... [1M]

(ii) Nyatakan kumpulan berfungsi sebatian X.
State the functional group of compound X.

..... [1M]

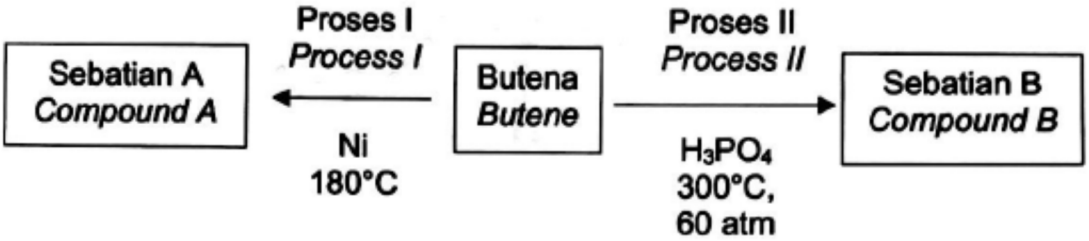
(b) (i) Sebatian X bertindak balas dengan sebatian Y untuk menghasilkan metil etanoat.
Apakah formula kimia sebatian Y?
Compound X reacts with compound Y to produce methyl ethanoate. What is the chemical formula of compound Y?

..... [1M]

(ii) Tuliskan persamaan kimia yang seimbang bagi jawapan b(i).
Write a balanced chemical equation for the answer in b(i).

..... [2M]

(c) Rajah 8.2 menunjukkan carta alir bagi satu siri perubahan yang berlaku antara ahli-ahli siri homolog itu.
Diagram 8.2 shows a flow chart of a series of changes that occur between some members of the homologous series.



Berdasarkan Rajah 8.2,/ Based on Diagram 8.2,

(i) Nyatakan formula am sebatian A dan B.
State the general formula of compound A and B.

Sebatian A:/ Compound A: .....

Sebatian B:/ Compound B: .....

[2M]

(ii) Huraikan satu ujian kimia untuk membezakan antara sebatian A dan butena.
Describe a chemical test to differentiate between compound A and butene?

.....

.....

..... [3M]

Esei// Essay

[Kedah2021-Set01-11]

11. (a) Jadual 11 menunjukkan maklumat mengenai tiga jenis sebatian carbon P, Q dan R.
Table 11 shows information of three type of carbon compounds P, Q and R.

Compound	Ciri Characteristic
P	• Mempunyai kurang daripada empat atom karbon per molekul Has less than four carbon atoms per molecule • P boleh bertindak balas dengan larutan kalium manganat(VII) berasid untuk menghasilkan suatu sebatian yang berbau masam P can react with acidified potassium manganate(VII) to produce compound with sour smell • pH = 7 pH = 7
Q	• Mempunyai kurang daripada tiga atom karbon per molekul Has less than three carbon atoms per molecule • Q boleh bertindak balas dengan larutan kalium karbonat untuk menghasilkan gas tanpa warna Q can react with potassium carbonate solution to produce colourless gas • Mengkonduksi elektrik dalam bentuk larutan Conduct electricity in solution form
R	• Bau buah-buahan Fruity smell • Terhasil daripada tindak balas P dan Q Formed from reaction between P and Q

Berdasarkan Jadual 11,/ Based on Table 11,

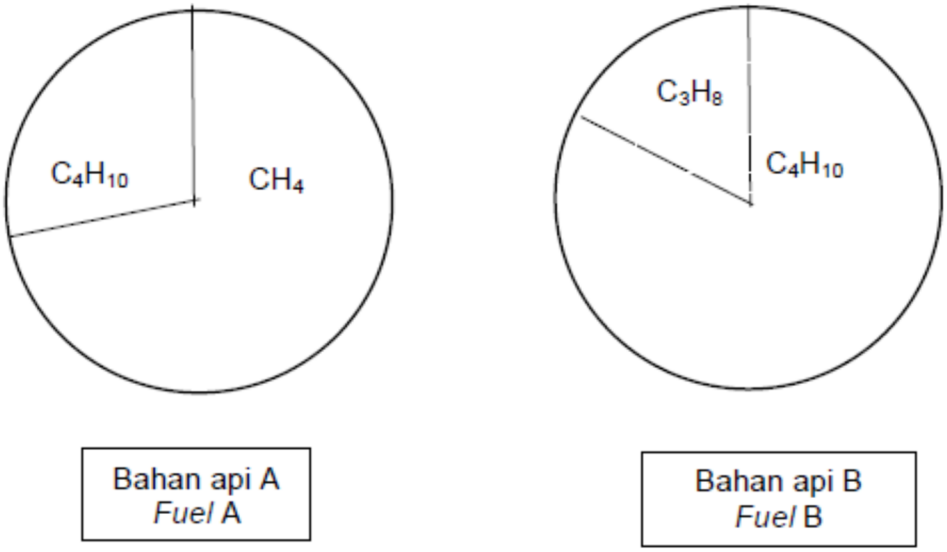
(i) Nyatakan siri homolog bagi sebatian R dan formula am bagi sebatian P dan Q.
State the homologous series of compound R and general formula of compound P and Q.

[3M]

(ii) Dengan menamakan sebatian P, Q dan R, huraikan secara ringkas bagaimana anda menyediakan sebatian R dalam makmal. Dalam huraian anda, sertakan persamaan kimia bagi tindak balas tersebut.
By naming compound P, Q and R, describe briefly how you can prepare the compound R in school laboratory. In your description, include the chemical equation for the reaction.

[8M]

(b) Rajah 11 menunjukkan dua jenis bahan api A dan B mengikut komposisi yang biasa digunakan di Malaysia.
Diagram 11 shows two types of fuel A and B according to the composition commonly used in Malaysia.



Kedua-dua bahan api tersebut terdiri daripada campuran hidrokarbon yang terbakar dengan lengkap dalam oksigen untuk menghasilkan gas karbon dioksida dan air.
Both fuels made up of mixture of hydrocarbons that burns completely in oxygen to produce carbon dioxide gas and water.

(i) Tuliskan suatu persamaan kimia apabila komponen utama bagi bahan api A dan B terbakar lengkap dalam oksigen.
Write a chemical equation when the major component of fuel A and B burnt completely in oxygen.

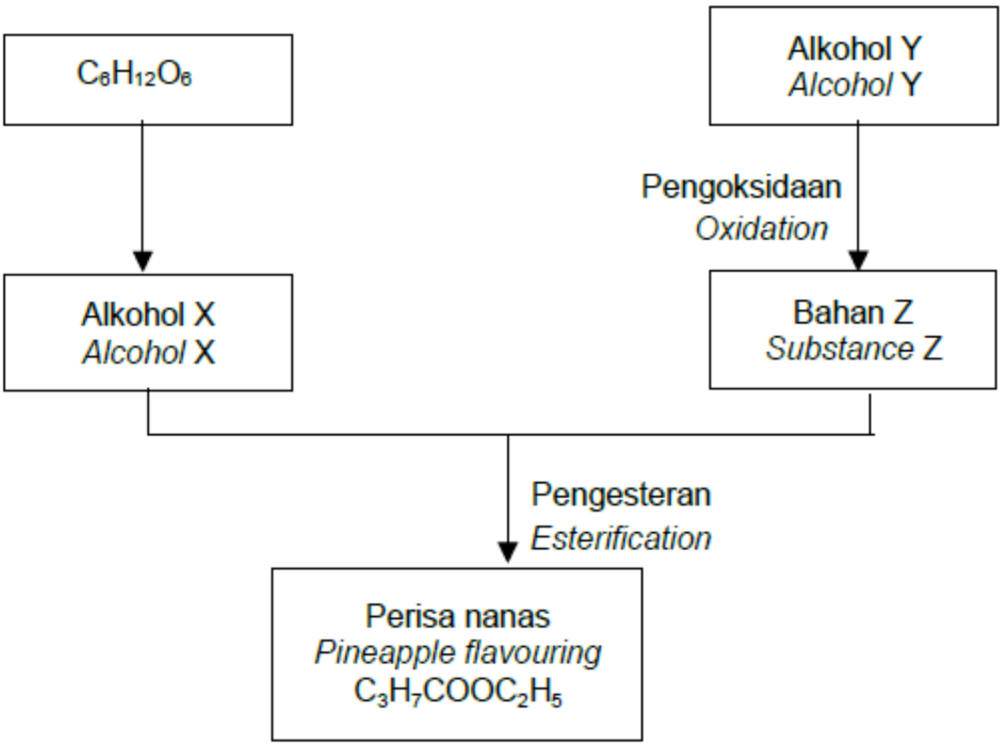
[4M]

(ii) Puan Marissa ingin membeli gas memasak untuk dapur di rumahnya. Antara bahan api A dan B, yang manakah patut dibeli olehnya. Wajarkan jawapan anda daripada aspek pembebasan tenaga dan isu alam sekitar.
Madam Marissa wants to buy cooking gas for the kitchen in her house. Between fuels A and B, which one should she buy. Justify your answer from the aspect of energy release and environmental issues.

[5M]

[Kedah2021-Set02-11]

11. (a) Rajah 11.1 menunjukkan carta alir bagi pembentukan perisa nanas dengan alkohol X dan bahan Z.
Diagram 11.1 shows the flow chart for the formation of pineapple flavouring using alcohol X and substance Z.



(i) Tulis formula am bagi alkohol dan kenal pasti alkohol X, Y dan bahan Z.
Write the general formula for alcohol and identify alcohols X, Y and substance Z.

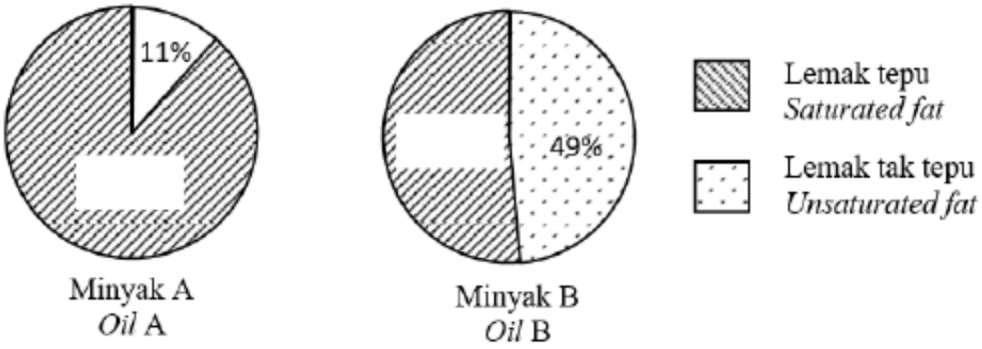
[4M]

(ii) Dengan menggunakan alkohol X dan bahan Z yang dikenalpasti di (a)(i), huraikan secara ringkas bagaimana anda menyediakan perisa nanas. Dalam huraian anda, sertakan persamaan kimia bagi tindak balas pengesteran.
Using alcohol X and substance Z identified in (a)(i), describe briefly how you can prepare the pineapple flavouring. In your description, include the chemical equation for the esterification reaction.

[8M]

(iii) Nyatakan kumpulan berfungsi dan lukis formula struktur bagi perisa nanas. Hitung jisim perisa nanas yang terhasil apabila 0.03 mol alkohol X digunakan dalam tindak balas pengesteran.
[Jisim molar perisa nanas = 116 g mol-1]
State the functional group and draw the structural formula of pineapple flavouring. Calculate the mass of pineapple flavouring produced when 0.03 moles of alcohol X is used in the esterification reaction.
[Molar mass of pineapple flavouring = 116 g mol-1] [4M]

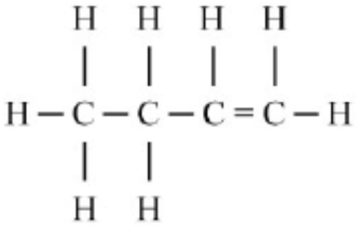
(b) Rajah 11.2 menunjukkan carta pai bagi komposisi lemak tepu dan lemak tak tepu dalam minyak A dan minyak B.
Diagram 11.2 shows the pie charts for the composition of saturated fat and unsaturated fat in oil A and oil B.



Lemak tepu mengandungi ikatan kovalen tunggal antara atom karbon. Lemak tepu boleh meningkatkan aras kolesterol dalam darah tetapi boleh menghalang pengoksidaan pada suhu tinggi. Lemak tak tepu mengandungi ikatan kovalen ganda dua antara atom karbon. Lemak tak tepu mudah dioksidakan pada suhu tinggi untuk menghasilkan bahan berkarsinogen. Puan Aminah memilih minyak B untuk menggoreng kilas sayur campuran dan menggoreng ayam secara goreng jeluk. Adakah Puan Aminah membuat pemilihan yang betul? Berikan sebab berdasarkan kesan lemak ke atas kesihatan.
Saturated fat contains single covalent bonds between carbon atoms. It can increase the level of cholesterol in blood stream but resist the oxidation at high temperature. Unsaturated fat contains double covalent bonds between carbon atoms. It is easily oxidised at high temperature to form carcinogenic substances.
Puan Aminah chooses oil B to stir fry the mixed vegetable and to deep fry the chicken. Does Puan Aminah make the correct choice? Give the reason with reference to the effect of fats on health.

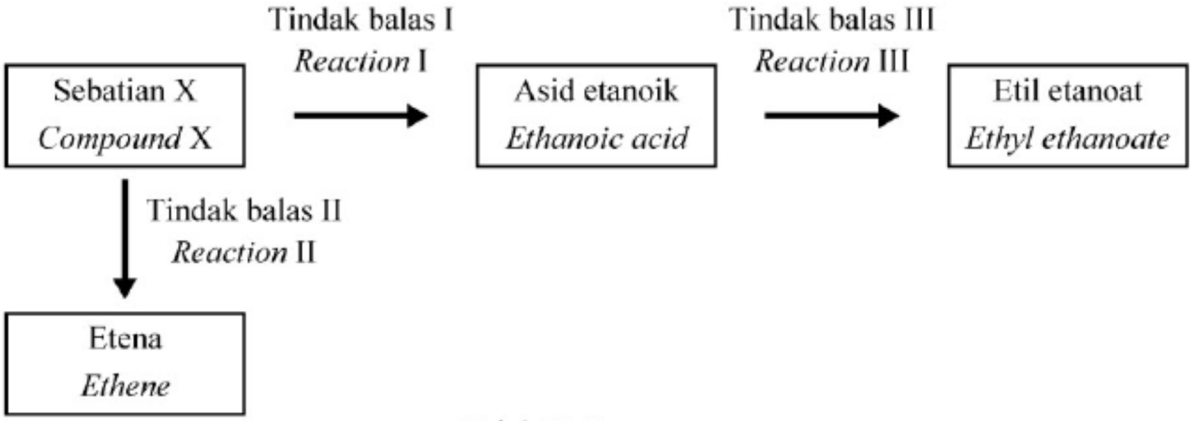
[4M]

[Selangor2021-Set01-11]
11. (a) Rajah 11.1 menunjukkan satu formula struktur bagi butena.
Diagram 11.1 shows a structural formula of butene.



Lukis formula struktur bagi dua lagi isomer bagi butena dan namakan setiap isomernya mengikut penamaan 1UPAC.
Draw the structural formulae for another two isomers of butene and name each isomer according to the 1UPAC nomenclature. [4M]

(b) Rajah 11.2 menunjukkan penukaran bagi beberapa sebatian organik.
Diagram 11.2 shows the conversions of several organic compounds.



(i) Nyatakan nama bagi Tindak balas 1, Tindak balas II dan Tindak balas 111. Nyatakan nama, siri homolog dan formula molekul bagi sebatian X. Lukis susunan radas bagi Tindak balas 11.
State the name of Reaction I, Reaction II and Reaction III.
State the name, homologous series and molecular formula of compound X.
Draw an apparatus set-up for Reaction II.

[8M]

(ii) Etil etanoat mempunyai bau manis buah-buahan.
Huraikan satu eksperimen makmal untuk menyediakan etil etanoat di dalam makmal melalui Tindak balas III.
Huraian anda hendaklah mengandungi perkara berikut:
Ethyl ethanoate has sweet fruity smell.
Describe an experiment to prepare ethyl ethanoate in laboratory through Reaction III. Your description should contain the following'.

• Prosedur/ Procedures
•Persamaan kimia/ Chemical equation

[8M]

[Selangor2021-Set01-01] B10 Ester

11. (a) Rajah 11 menunjukkan penemuan terbaharu Kamal.
Diagram 11 shows Kamal's recent discovery.

Hai, kawan-kawan! Adakah anda tahu bahawa sebilangan bahan kimia berbau harum? Yang saya ada di sini adalah propil etanoat terhasil daripada alkohol P dan asid karboksilik Q.
Hi, friends! Do you know that some chemicals smell fragrant? This one I have here is propyl ethanoate produced from alcohol P and carboxylic acid Q.

(i) Cadangkan nama alkohol P dan asid karboksilik Q yang boleh digunakan untuk menghasilkan propil etanoat.
Nyatakan kumpulan berfungsi bagi propil etanoat dan lukis formula struktur propil etanoat.
Suggest the name of alcohol P and carboxylic acid Q that can be used to produce propyl ethanoate.
State the functional group of propyl ethanoate and draw the structural formula of propyl ethanoate.

[4M]

(ii) Propil etanoat boleh disediakan melalui proses X. Kenal pasti proses X.
Huraikan satu eksperimen bagaimana untuk menyediakan propil etanoat dalam makmal?
Dalam huraian anda, masukkan persamaan kimia seimbang bagi proses ini.
Propyl ethanoate can be prepared through process X.
Identify process X.
Describe an experiment on how to prepare propyl ethanoate in the laboratory?
In your description, include the balanced chemical equation for this process.

[9M]

(iii) Hitung jisim alkohol P yang digunakan apabila 5.1 g propil etanoat terhasil dalam proses X.
[Jisim atom relatif: H = 1, C = 12, O = 16]
Calculate the mass of alcohol P that is used when 5.1 g of propyl ethanoate is produced in process X.
[Relative atomic mass: H = 1, C = 12,0= 16]

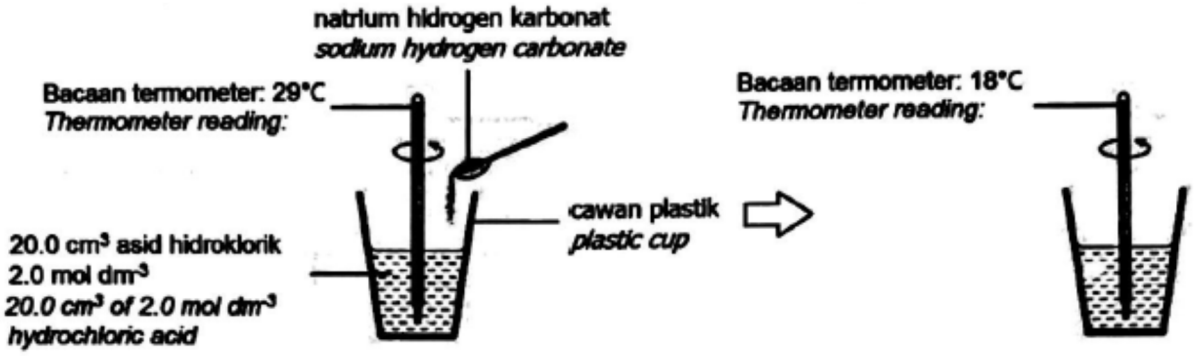
[3M]

(b) En. Metiren merancang untuk membeli kereta baharu. Tetapi dia keliru antara enjin petrol dan diesel. Bukan dia sahaja yang menghadapi dilema ini. Ini adalah soalan yang paling biasa diajukan oleh orang yang ingin membeli kereta baharu.
Selepas beliau mengetahui diesel, $C_{15}H_{28}$ adalah hidrokarbon yang mempunyai bilangan atom karbon per molekul yang lebih banyak berbanding petrol, C_8H_{18}. En. Metiren memilih untuk membeli kereta dengan enjin diesel.
Pada pendapat anda, adakah beliau membuat keputusan yang betul? Justifikasikan jawapan anda.
Mr. Metiren plans to buy a new car. But he was confused between petrol and diesel engines. He is not the only one facing this dilemma. It is the most common question asked by people who want to buy a new car.
After he learned that diesel, $C_{15}H_{28}$ is a hydrocarbon that has a greater number of carbon atoms per molecule than petrol, C_8H_{18}. Mr. Metiren choose to buy a car with a diesel engine.
In your opinion, did he make the right decision?
Justify your answer.

[4M]

<u>Tingkatan 5 Bab 3</u>

[Johor2021-05]
5. Rajah 5 menunjukkan susunan radas yang digunakan untuk menentukan haba tindak balas di antara natrium hidrogen karbonat, $NaHCO_3$ dengan asid hidroklorik, HCI.
Diagram 5 shows the apparatus set-up used to determine the heat of reaction between sodium hydrogen carbonate, $NaHCO_3$ and hydrochloric acid, HCI.



20.0 cm^3 asid hidroklorik 2.0 mol dm^{-3} dituang ke dalam sebuah cawan plastik. Suhu awal larutan asid hidroklorik direkodkan. Kemudian satu spatula serbuk natrium hidrogen karbonat, $NaHCO_3$ ditambah kepada asid itu. Campuran dikacau dan suhu akhir direkodkan.
20.0 cm^3 of 2.0 mol dm^{-3} hydrochloric acid is poured into a plastic cup. The initial temperature of hydrochloric acid is recorded. Then, one spatula of sodium hydrogen carbonate, $NaHCO_3$ powder is added into the acid. The mixture is stirred and the final temperature is recorded.

Persamaan kimia tindak balas I:
Chemical equation for reaction I:

$NaHCO_3$ (p) + HCI(ak) → NaCI(ak) + H_2O(ce) + CO_2(g)
$NaHCO_3$ (s) + HCI(aq) → NaCI(aq) + H_2O(l) + CO_2(g)

(a) Nyatakan satu sebab mengapa cawan plastik digunakan dalam eksperimen ini.
State one reason why plastic cup is used in this experiment.

.....

..... [1M]

(b) Nyatakan jenis tindak balas yang berlaku berdasarkan perubahan suhu.
State the type of reaction occurred based on the change in temperature.

..... [1M]

(c) Berdasarkan maklumat dan keputusan eksperimen:
Based on the information's and results of experiment:

(i) Hitungkan perubahan haba, Q bagi tindak balas ini.
Calculate the heat change, Q for this reaction.
[Muatan haba tentu larutan, c = 4.2 J g^{-1} °C^{-1}; ketumpatan larutan =1gcm^{-3}]
[Specific heat capacity of solution,c=4.2 Jg^{-1}°C^{-1}; Density of solution=1gcm^{-3}]

[1M]

(ii) Hitung haba tindak balas, ΔH bagi tindak balas ini.
Calculate the heat of reaction, ΔH for this reaction.

[3M]

(d) Eksperimen ini kemudiannya diulangi dengan menggunakan serbuk natrium karbonat, Na_2CO_3 bagi menggantikan serbuk natrium hidrogen karbonat, $NaHCO_3$.
The experiment is then repeated using sodium carbonate, Na_2CO_3 powder to replace sodium hydrogen carbonate, $NaHCO_3$ powder.

Persamaan kimia tindak balas II:
Chemical equation for reaction II:

Na_2CO_3 (p) + 2HCI(ak) → 2NaCI(ak) + H_2O(ce) + CO_2(g)
Na_2CO_3 (s) + 2HCI(aq) → 2NaCI(aq) + H_2O(ce) + CO_2(g)

Haba tindak balas, ΔH yang diperoleh adalah -36.0 kJ mol^{-1}.
The heat of reaction, ΔH obtained is -36.0 kJ mol^{-1}.

Bandingkan tindak balas I dan tindak balas II berdasarkan perubahan jumlah kandungan tenaga bahan tindak balas dan jumlah kandungan tenaga hasil tindak balas.
Compare reaction I and reaction II based on the change in the total energy content of reactants and the total energy content of products.

.....

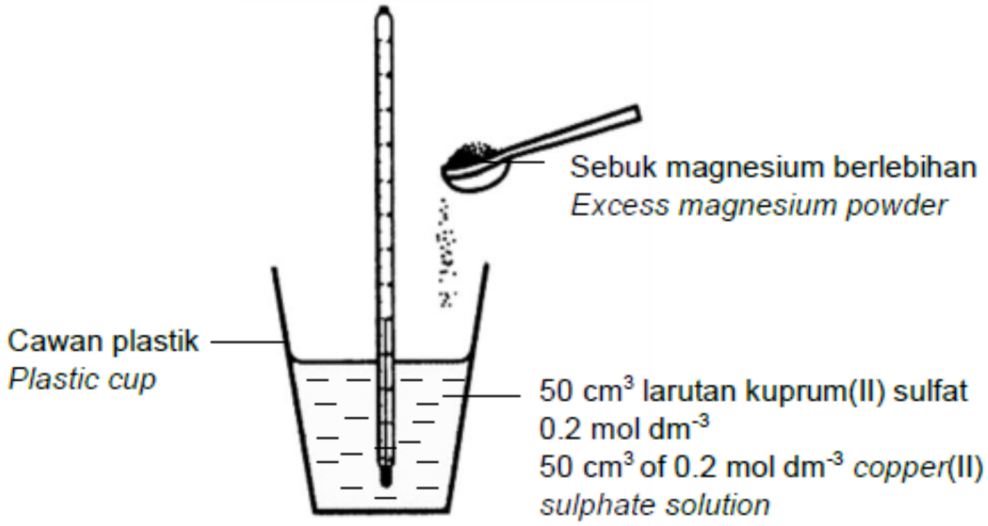
.....

.....

..... [2M]

[Kedah2021-Set01-06]

6. (a) Seorang murid telah menjalankan satu eksperimen untuk menentukan nilai haba penyesaran.
Rajah 6 menunjukkan susunan radas yang digunakan dalam eksperimen itu.
A student carried out an experiment to determine the value of heat of displacement.
Diagram 6 shows the set-up of the apparatus used in the experiment.



Data berikut telah diperolehi:
The following data was obtained:

Suhu awal larutan kuprum(II) sulfat, θ_1 = 28°C
Initial temperature of copper(II) sulphate solution, θ_1

Suhu tertinggi campuran, θ_2 = 48°C
Highest temperature of mixture, θ_2

(i) Berdasarkan eksperimen itu, apakah maksud haba penyesaran?
Based on the experiment, what is meant by the heat of displacement?

.....

..... [1M]

(ii) Mengapa cawan polistirena digunakan dalam eksperimen ini?
Why polystyrene cup is used in this experiment?

..... [1M]

(iii) Lengkapkan persamaan ion untuk tindak balas yang berlaku.
Complete the ionic equation for the reaction that occurred.

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

[1M]

(iv) Hitungkan haba penyesaran dalam eksperimen ini.
Diberi muatan haba tentu larutan ialah 4.2 J g^{-1} °C^{-1} dan ketumpatan larutan ialah 1.0 g cm^{-3}.
Calculate the heat of displacement in the experiment.
Given that the specific heat capacity of the solution is 4.2 J g^{-1} °C^{-1} and the density of the solution is 1.0 g cm^{-3}.

[3M]

(b) Jadual 6 menunjukkan haba peneutralan bagi dua set eksperimen yang menggunakan asid berlainan yang bertindak balas dengan larutan kalium hidroksida.
Table 6 shows the heat of neutralization for two sets of experiment using different acids reacting with potassium hydroxide solution.

Set	Bahan tindak balas Reactants	Haba peneutralan Heat of neutralization (kJ mol^{-1})
I	Asid J + larutan kalium hidroksida Acid J + potassium hydroxide solution	-55
II	Asid K + larutan kalium hidroksida Acid K + potassium hydroxide solution	-57

Terangkan perbezaan bagi nilai haba peneutralan antara set I dan set II.
Explain the difference in the values of heat of neutralization between set I and set II.

.....

.....

..... [3M]

[Kedah2021-Set02-06]
6. Seorang pelajar telah menjalankan satu eksperimen untuk menentukan haba penyesaran bagi tindak balas antara kuprum dengan larutan argentum nitrat. Dalam eksperimen ini, serbuk kuprum berlebihan ditambah kepada 100 cm^3 larutan argentum nitrat 0.2 mol dm^{-3}. Haba penyesaran dalam eksperimen itu ialah – 105 kJ mol-1.
A student carried out an experiment to determine the heat of displacement for the reaction between copper and silver nitrate solution. In this experiment, excess copper powder was added to 100 cm3 of silver nitrate solution 0.2 mol dm-3. The heat of displacement in this experiment was -105 kJ mol-1.

(a) Apakah yang dimaksudkan dengan haba penyesaran?
What is meant by heat of displacement?

.....

..... [1M]

(b) Nyatakan satu pemerhatian dalam eksperimen ini
State one observation in this experiment.

..... [1M]

(c) Tulis persamaan ion bagi tindak balas yang terlibat.
Write an ionic equation for the reaction occurred.

..... [1M]

(d)Berdasarkan maklumat daripada eksperimen ini, hitungkan
Based on the information from this experiment, calculate

(i) bilangan mol ion argentum yang bertindak balas.
the number of moles of silver ions reacted.

..... [1M]

(ii) haba yang dibebaskan. [Muatan haba tentu larutan ialah 4.2 J g-1 °C-1; ketumpatan larutan ialah =1 g cm-3]
heat released. [Specific heat capacity of the solution = 4.2 J g-1 °C-1; density of the solution =1 g cm-3]

[1M]

(iii) perubahan suhu.
the change in temperature.

[1M]

(e) Eksperimen diulang dengan menggunakan 100 cm^3 larutan argentum nitrat 0.4 mol dm^{-3} dan serbuk kuprum berlebihan. Ramalkan perubahan suhu dalam eksperimen ini. Terangkan mengapa perubahan suhu ini berbeza daripada yang berlaku di (d)(iii).
The experiment is repeated by using 100 cm^3 of 0.4 mol dm^{-3} silver nitrate solution and excess copper powder. Predict the temperature change in this experiment. Explain why this change of temperature is different from that in (d)(iii).

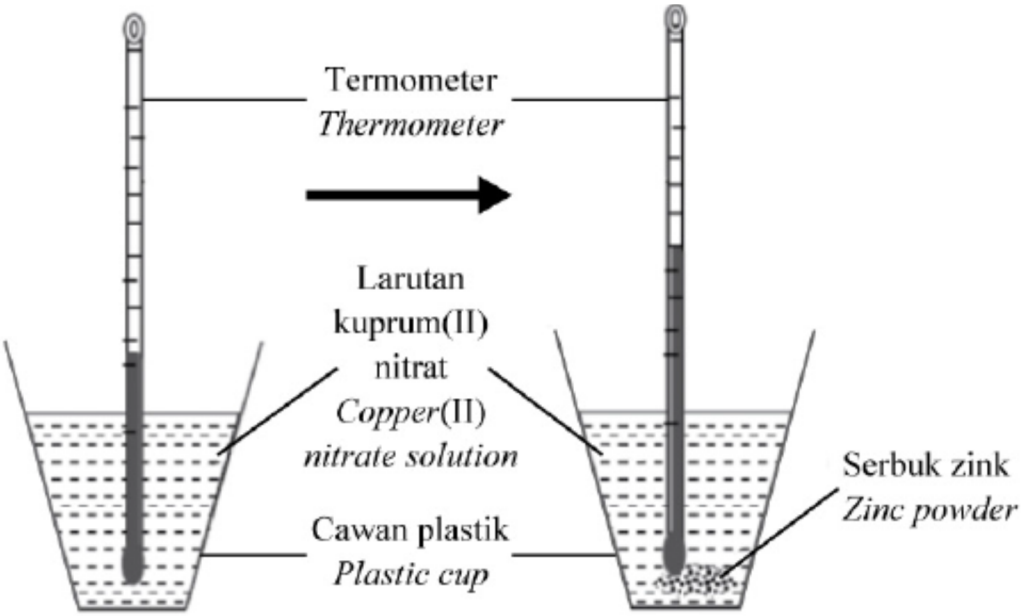
.....

.....

..... [3M]

[Selangor2021-Set01-06]

6. Rajah 6 menunjukkan satu eksperimen yang dijalankan untuk menentukan haba penyesaran bagi suatu tindak balas.
50 cm^3 larutan kuprum(II) nitrat 1.0 mol dm^{-3} dituang ke dalam sebuah cawan plastik dan suhu awal larutan dicatat. Serbuk zink berlebihan dicampurkan ke dalam cawan plastik yang sama. Campuran dikacau perlahan-lahan dan suhu tertinggi dicatatkan.
Diagram 6 shows an experiment carried out to determine the heat of displacement for a reaction.
50 cm^3 of 1.0 mol dm^{-3} copper(II) nitrate solution is poured into a plastic cup and the initial temperature is recorded. The excess zinc powder is added to the same plastic cup. The mixture is stirred slowly and the highest temperature is recorded.



Suhu awal = 28.0 °C
Initial temperature = 28.0 °C

Suhu tertinggi campuran = 34.0 °C
Highest temperature of the mixture = 34.0 °C

(a) Apakah maksud haba penyesaran bagi eksperimen ini?
What is the meaning of heat of displacement of the experiment?

..... [1M]

(b) Tulis persamaan ion bagi tindak balas yang berlaku dalam eksperimen ini.
Write the ionic equation for the reaction that took place in this experiment.

..... [1M]

(c) Berdasarkan eksperimen itu, hitung:
Based on the experiment, calculate'.

(i) perubahan haba dalam tindak balas itu.
[Muatan haba tentu bagi larutan,c=4.2Jg^{-1}°C^{-1},Ketumpatan larutan =1gcm^{-3}]
the heat change in the reaction.
[Specific heat capacity of solution,c=4.2Jg^{-1}°C^{-1}; Density of solution=1gcm^{-3}]

[1M]

(ii) bilangan mol kuprum(II) nitrat yang berlindak balas.
number of moles of copper(II) nitrate that reacted.

[1M]

(iii) haba penyesaran dalam tindak balas ini.
heat of displacement in this reaction.

[1M]

(d) Lukis gambar rajah aras tenaga bagi tindak balas ini.
Draw an energy level diagram for the reaction.

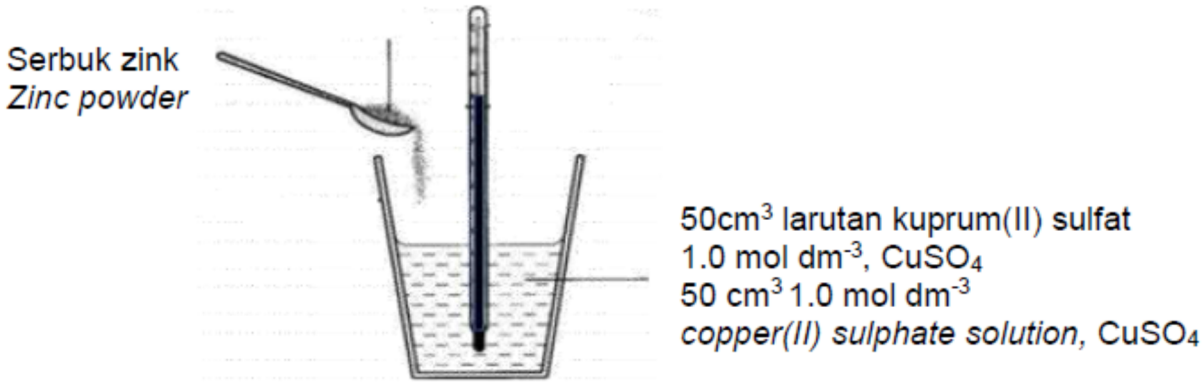
[2M]

(e) Apakah nilai haba penyesaran jika eksperimen diulangi dengan menggunakan serbuk magnesium? Terangkan jawapan anda.
What is the value of heat of displacement if the experiment is repeated using magnesium powder? Explain your answer.

.....

..... [2M]

[Kelantan2021-06]
6. Rajah 6 menunjukkan susunan radas yang digunakan dalam eksperimen untuk menentukan haba penyesaran kuprum oleh zink.
Diagram 6 shows the apparatus set up used in experiment to determine heat of displacement of copper by zinc.



Jadual 6 menunjukkan keputusan eksperimen ini.
Table 6 shows the results of this experiment

Penerangan Description	Suhu Temperature °C
Suhu awal larutan kuprum(II)sulfat Initial temperature of copper(II) sulphate solution	29.0
Suhu tertinggi campuran Highest temperature of mixture	35.0

(a) Apakah yang dimaksudkan dengan haba penyesaran?
What is the meaning of heat of displacement?

.....

..... [1M]

(b) Apakah perubahan warna larutan kuprum(II) sulfat dalam tindak balas ini?
What is the colour change of copper(II) sulphate solution in this reaction?

..... [1M]

(c) (i) Hitungkan haba yang dibebaskan semasa tindak balas.
[Muatan haba tentu larutan, c = 4.2 J g^{-1} $°C^{-1}$; Ketumpatan larutan =1gcm^{-3}]
Calculate the heat released during the reaction
[Specific heat capacity of solution,c=4.2Jg^{-1}°C^{-1};Density of solution=1gcm^{-3}]

[1M]

(ii) Haba penyesaran kuprum oleh zink
The heat of displacement of copper by zinc

[2M]

(iii) Tuliskan persamaan kimia bagi tindak balas penyesaran dalam eksperimen ini.
Write the chemical equation for the displacement reaction in this experiment.

..... [1M]

(d) Nilai haba penyesaran yang telah dihitung bagi tindak balas ini adalah lebih rendah berbanding dengan nilai sebenar. Berikan satu sebab.
The calculated value of the heat of displacement for this reaction is less than the actual value. Give a reason.

.....

..... [1M]

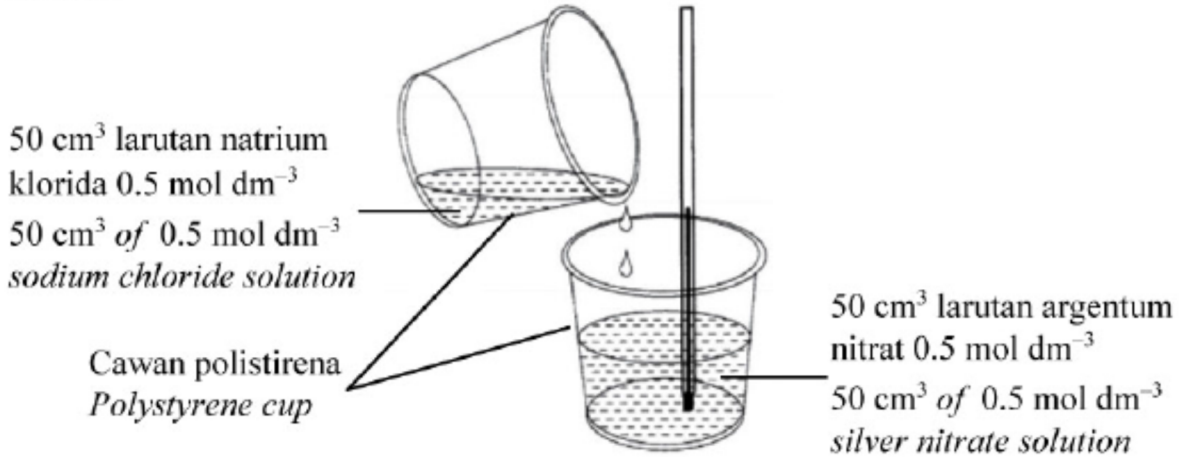
(e) Eksperimen diulang dengan menggunakan serbuk magnesium untuk menggantikan serbuk zink.
Bandingkan haba penyesaran yang akan diperolehi dan jelaskan jawapan anda.
The experiment is repeated by using magnesium powder to replace zinc powder.
Compare the heat of displacement that will be obtained and explain your answer.

.....

.....

..... [1M]

[Selangor2021-Set01-06]
6. Rajah 6 menunjukkan susunan radas untuk menentukan haba pemendakan bagi argentum klorida.
Diagram 6 shows the apparatus set-up to determine the heat of precipitation for silver chloride.



Jadual 6 menunjukkan keputusan eksperimen.
Table 6 shows the results of experiment.

Penerangan Description	Suhu (°C) Temperature (°C)
Suhu awal larutan argentum nitrat Initial temperature of silver nitrate solution	29.0
Suhu awal larutan natrium klorida Initial temperature of sodium chloride solution	29.0
Suhu tertinggi campuran Highest temperature of the mixture	32.0

(a) Apakah yang dimaksudkan dengan haba pemendakan dalam eksperimen ini?
What is meant by heat of precipitation in this experiment?

.....

..... [1M]

(b) Nyatakan satu pemerhatian dalam eksperimen tersebut.
State one observation in the experiment.

..... [1M]

(b) Persamaan kimia bagi pemendakan argentum klorida adalah seperti berikut: The chemical equation for the precipitation of silver chloride is as follow.

$$AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$$

Hitung,/ Calculate,

(i) perubahan haba dalam tindak balas itu.
[Muatan haba tentu bagi larutan,c=4.2Jg^{-1} °C^{-1};Ketumpatan larutan=1gcm^{-3}]
the heat change in the reaction.
[Specific heat capacity of solution,c=4.2Jg^{-1}°C^{-1};Density of solution=1gcm^{-3}]

[1M]

(ii) haba pemendakan bagi argentum klorida.
heat ofprecipitation for silver chloride.

[3M]

(d) Berdasarkan perubahan suhu dalam Jadual 6, nyatakan jenis tindak balas itu.
Based on the change in temperature in Table 6, state the type of the reaction.

..... [1M]

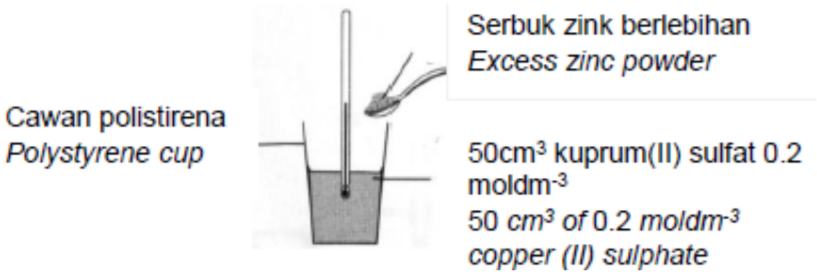
(e) Eksperimen itu diulangi dengan menggunakan 50 cm^3 larutan kalium klorida 0.5 mol dm^{-3} bagi menggantikan larutan natrium klorida.
Apakah perubahan suhu untuk tindak balas ini?
Terangkan jawapan anda.
The experiment is repeated by using 50 cm^3 of 0.5 mol dm^{-3} potassium chloride solution to replace the sodium chloride solution.
What is the change in temperature for this reaction? Explain your answer.

.....

.....

..... [2M]

[Melaka2021-07]
7. Rajah 7.1 menunjukkan susunan radas bagi satu eksperimen untuk menentukan haba penyesaran
Diagram 7.1 shows the apparatus set-up for an experiment to determine the heat of displacement



(a) Nyatakan maksud haba penyesaran
State the meaning of heat of displacement

.....

..... [1M]

(b) Beri satu sebab mengapa cawan polistirena digunakan dalam eksperimen ini
Give one reason why polystyrene cup is used in the experiment.

.....

..... [1M]

(c) Persamaan termokimia di bawah mewakili tindak balas penyesaran itu
The thermochemical equation below represents the dsplacement reaction

$$\mathbf{Zn + CuSO_4 \rightarrow ZnSO_4 + Cu;\ \Delta H = -210\ kJ\ mol^{-1}}$$

Hitung:/ Calculation :

i. bilangan mol ion kuprum(II)
the number of moles of copper (II) ion

[1M]

(ii) Haba yang dibebaskan semasa tindak balas
The heat released during the reaction

[2M]

(iii) Perubahan suhu dalam eksperimen ini.
[Muatan haba tentu larutan = 4.2 J $g^{-1}°C^{-1}$ Ketumpatan larutan =1 g cm^{-1}]
The changes of temperature n the experiment
[Specific heat capacity of solutions=4.2J$g^{-1}°C^{-1}$,Density of solution= 1 g cm^{-1}]

[1M]

(d) Eksperimen diulang dengan menggunakan serbuk magnesium untuk menggantikan serbuk zink. Isi padu dan kepekatan kuprum (II) sulfat yang digunakan adalah kekal sama
The experiment is repeated using magnesium powder to replace zinc powder.The volume and concentration of copper (II) sulphate used is remained the same.

(i) Ramalkan haba penyesaran bagi tindak balas tu.
Predict the heat of displacement for the reaction

.....

..... [1M]

(ii) Beri sebab bagi jawapan anda di 4(d)(i)
Give a reason for your answer in 4(d)(i)

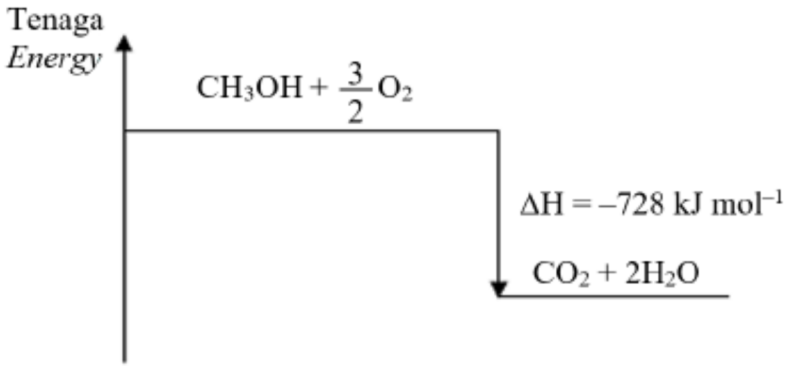
.....

..... [1M]

(e) Lukis rajah aras tenaga bagi tindak balas itu
Draw the energy level diagram for the reaction

[2M]

[Perlis2021-07]
7. Rajah 6 menunjukkan gambar rajah aras tenaga bagi pembakaran metanol.
Diagram 6 shows the energy level diagram for the combustion of methanol.



(a) Nyatakan satu maklumat yang boleh diperolehi daripada gambar rajah aras tenaga dalam Rajah 6.
State one information that can be obtained from the energy level diagram in Diagram 6.

..... [1M]

(b) Lukis gambar rajah susunan radas yang berlabel bagi menentukan haba pembakaran metanol.
Draw a labelled diagram of the setup of apparatus to determine the heat of combustion of methanol.

[2M]

(c) Haba yang terbebas daripada pembakaran lengkap 1.6 g metanol digunakan untuk memanaskan 200 cm^3 air.
Heat energy released from the complete combustion of 1.6 g methanol is used to heat 200 cm^3 of water.

(i) Hitung tenaga haba yang dibebaskan dalam tindak balas ini.
Calculate the heat energy released in the reaction.
[Jisim molar metanol, CH_3OH = 32] [Molar mass of methanol, CH_3OH = 32]

[2M]

(ii) Hitung perubahan suhu dalam tindak balas ini.
Calculate the temperature change in the reaction.
[Muatan haba tentu air: 4.2 J g^{-1} °C^{-1}]
[Specific heat capacity of water: 4.2 J g^{-1} °C^{-1}]

[1M]

(d) Nilai haba pembakaran metanol yang diperoleh daripada eksperimen biasanya lebih rendah daripada nilai teori.
Cadangkan satu langkah berjaga-jaga yang perlu diambil untuk memperoleh keputusan yang lebih tepat.
The value of the heat of combustion of methanol obtained from the experiment is always less than the theoretical value.
Suggest one precaution step that should be taken in order to get a more accurate result.

..... [1M]

(e) Jadual 5 menunjukkan formula molekul dan haba pembakaran propanol dan butanol.
Table 5 shows the molecular formula and heat of combustion of propanol and butanol.

Alkohol Alcohol	Formula molekul Molecular formula	Haba pembakaran/ kJ mol^{-1} Heat of combustion/ kJ mol^{-1}
Propanol Propanol	C_3H_7OH	–2016
Butanol Butanol	C_4H_9OH	–2678

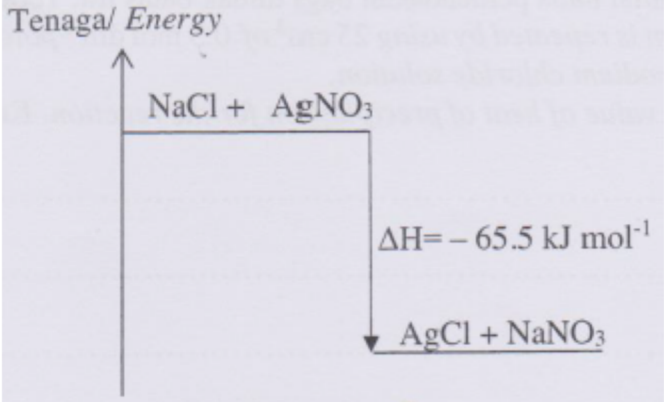
Berdasarkan maklumat dalam Jadual 5, terangkan mengapa terdapat perbezaan nilai haba pembakaran antara propanol dan butanol.
Based on the information in Table 5, explain why there is a difference in the value of heat of combustion between propanol and butanol.

.....

.....

..... [3M]

[SBP2021-07]
7. Rajah 7 menunjukkan aras tenaga bagi suatu tindak balas pemendakan.
Diagram 1 shows an energy level for a precipitation reaction.



(a) Nyatakan maksud haba pemendakan.
State the meaning of heat of precipitation.

.....

..... [1M]

(b) Nyatakan warna mendakan yang terbentuk.
State the colour of the precipitate formed.

..... [1M]

(c) Hitungkan perubahan suhu apabila 25 cm^3 larutan argentum nitrat 0.5 mol dm^{-3} bertindak balas dengan 25 cm^3 larutan natrium klorida 0.5 mol dm^{-3}.
[Muatan haba tentu larutan = 4.2 J g^{-1} °C^{-1}, Ketumpatan larutan = 1 g cm^{-3}]
Calculate the temperature change when 25 cm^3 of 0.5 mol dm^{-3} silver nitrate solution reacts with 25 cm^3 of 0.5 mol dm^{-3} sodium chloride solution.
[Specific heat capacity of solution = 4.2 J g^{-1} °C^{-1}, Density of solution = 1 g cm^{-3}]

[3M]

(d) Tindak balas diulangi dengan menggunakan 25 cm^3 larutan kalium klorida 0.5 mol dm^{-3} bagi menggantikan larutan natrium klorida.
Ramalkan nilai haba pemendakan bagi tindak balas itu. Terangkan jawapan anda.
The reaction is repeated by using 25 cm^3 of 0.5 mol dm^{-3} potassium chloride solution to replace sodium chloride solution.
Predict the value of heat of precipitation for the reaction. Explain your answer.

.....

.....

.....

..... [3M]

(e) Jadual 7 menunjukkan nilai bahan api bagi beberapa jenis bahan api.
Table 7 shows the fuel values of a few types of fuels.

Bahan api Fuel	Nilai bahan api (kJ g^{-1}) Fuel value (kJ g^{-1})
Etanol Ethanol	30
Petrol Petrol	34
Gas asli Natural gas	50
Gas hidrogen Hydrogen gas	143

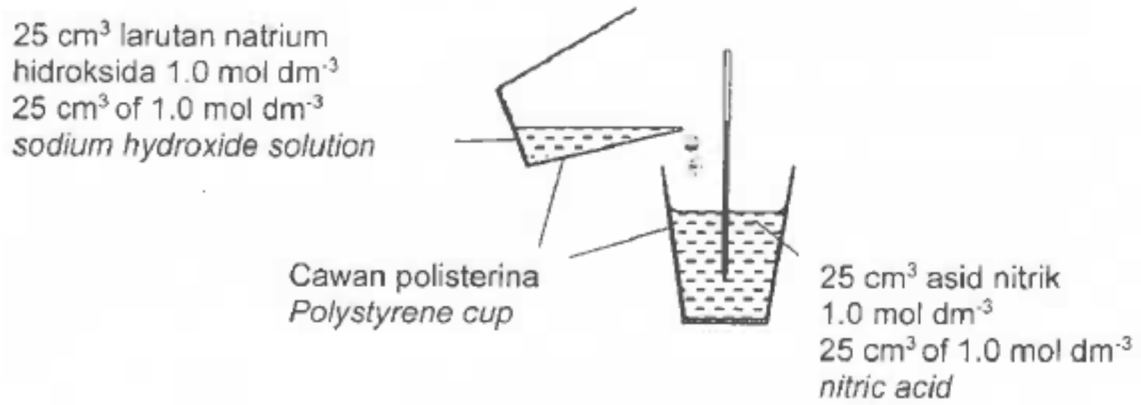
Berdasarkan Jadual 7, bahan api yang manakah yang sesuai untuk menggantikan petrol dalam kenderaan? Berikan alasan bagi jawapan anda.
Based on Table 7, which fuel is the most suitable to replace petrol in vehicles? Give reason for your answer.

.....

.....

..... [2M]

[Terengganu2021-08]
8. Rajah 8 menunjukkan susunan alat radas oleh seorang pelajar untuk menjalankan satu eksperimen bagi menentukan haba peneutralan antara asid nitrik dan larutan natrium hidroksida.
Diagram 8 shows the apparatus set-up by a student to carried out an experiment to determine the heat of neutralisation between nitric acid and sodium hydroxide solution.



Keputusan eksperimen adalah seperti dalam Jadual 8 di bawah.
The result of the experiment is shown in Table 8 below.

Keterangan Description	Suhu (°C) Temperature(°C)
Suhu awal larutan asid nitrik Initial temperature of nitric acid	28.0
Suhu awal larutan natrium hidroksida Initial temperature of sodium hydroxide solution	28.0
Suhu tertinggi campuran tindak balas Highest temperature of the reaction mixture	34.0

(a) Apakah maksud haba peneutralan bagi eksperimen ini?
What is the meaning of heat of neutralization for this experiment?

.....

..... [1M]

(b) Cadangkan satu radas yang boleh digunakan bagi menggantikan cawan polisterina dalam eksperimen ini.
Suggest one apparatus that can be used to replace polystyrene cup in this experiment.

..... [1M]

(c) Berdasarkan kepada eksperimen:
Based on the experiment

(i) Hitungkan perubahan haba dalam tindak balas itu.
[Muatan haba tentu = 4.2 J g^{-1} °C^{-1}]
Calculate the heat change in the reaction.
[Specific heat capacity = 4.2 J g^{-1} °C^{-1}]

[1M]

(ii) Hitung haba peneutralan bagi eksperimen itu.
Calculate the heat of neutralization of the experiment.

[3M]

(d) Eksperimen itu diulangi dengan menggunakan 25 cm^3 larutan asid sulfurik 1.0 mol dm^{-3} menggantikan asid nitrik.
The experiment is repeated by using 25 cm^3 of 1.0 mol dm^{-3} of sulphuric acid to replace the nitric acid.

(i) Ramalkan nilai haba peneutralan bagi eksperimen itu.
Predict the value of heat of neutralization for the experiment.

..... [1M]

(ii) Terangkan jawapan anda di 8(d)(i)/ Explain your answer in 8(d)(i)

.....

..... [1M]

(e) Seorang pendaki gunung ingin menghangatkan tangan dan kaki. Beliau telah menggunakan satu pek khas yang mengandungi bahan kimia. Di dapati, dalam pek tersebut mengandungi kalsium klorida kontang yang larut dalam air dan membebaskan haba sebanyak 85 kJ mol^{-1}.

$CaCl_2(p) \rightarrow Ca^{2+}(ak) + 2Cl^-(ak)$

Lukis gambar rajah aras tenaga bagi menunjukkan perubahan haba yang telah berlaku.

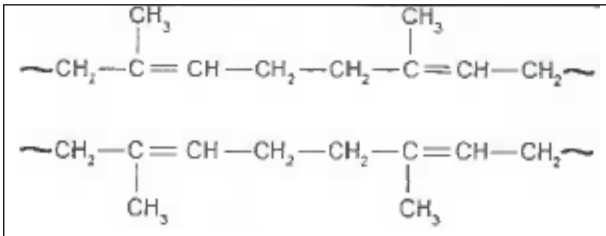
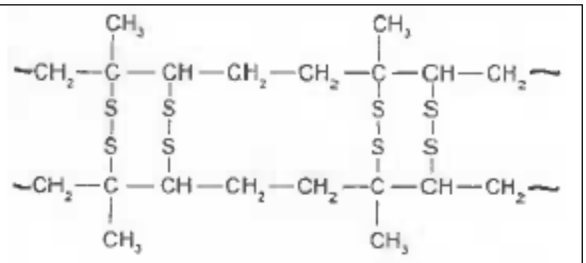
A mountain climber went to warm his hands and feet. He used a special pack that contains chemicals. Hence, in the pack contains anhydrous calcium chloride that dissolves in water and releases heat of 85 kJ mol^{-1}.

$CaCl_2(s) \rightarrow Ca^{2+}(aq) + 2Cl^-(aq)$

Draw the energy level diagram that shows the heat change occurred.[2M]

<u>Tingkatan 5 Bab 4</u>

[Terengganu2021-01]
1. Rajah 1 menunjukkan formula struktur bagi dua jenis getah yang berbeza.
Diagram 1 shows the structural formula of two different types of rubber.

	
Getah X Rubber X	Getah Y Rubber Y

(a) Nyatakan jenis bagi getah X dan getah Y.
State the types of rubber X and rubber Y.

X : .....

Y : .....

[2M]

(b) Nyatakan satu contoh produk yang diperbuat daripada getah Y.
State one example of product made of rubber Y.

..... [1M]

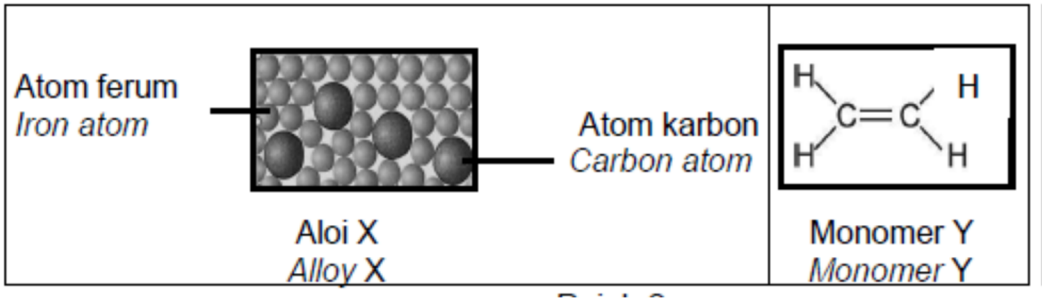
(c) Apabila getah X dipanaskan bersama sulfur, getah Y dapat dihasilkan. Namakan proses itu
When rubber X is heating with sulphur, rubber Y is produced.
Name the process.

..... [1M]

(d) Nyatakan satu perbezaan sifat bagi getah X dan getah Y.
State one different characteristic between rubber X and rubber Y.

..... [1M]

[Kedah2021-Set02-02]
2. Rajah 2 menunjukkan susunan atom dalam aloi X dan formula struktur monomer Y.
Diagram 2 shows the arrangement of atoms in alloy X and the structural formula of monomer Y.



(a) Nyatakan maksud aloi./ State the meaning of alloy.

.....

..... [1M]

(b) (i) Nyatakan nama bagi aloi X./ State the name of alloy X.

..... [1M]

(ii) Nyatakan kekerasan aloi X berbanding dengan logam kuprum tulen.
State the hardness of alloy X compared to pure copper metal.

..... [1M]

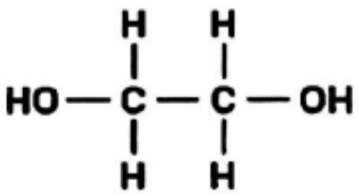
(c) (i) Nyatakan nama monomer Y./ State the name of monomer Y.

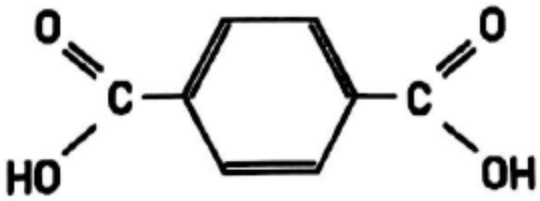
..... [1M]

(ii) Lukis formula struktur bagi polimer yang terhasil daripada monomer Y.
Draw the structural formula of polymer formed from monomer Y.

[1M]

[Johor2021-04]
4. Rajah 4 menunjukkan monomer-monomer bagi terilena.
Diagram 4 shows the monomers of terylene.





(a) Apakah jenis pempolimeran bagi terilena?
What type of polymerisation for terylene?

..... [1M]

(b) (i) Lukiskan formula struktur bagi polimer yang terbentuk dari monomer-monomer tersebut.
Draw the structural formula of the polymer that is formed by these two monomers.

[2M]

(ii) Terangkan mengapa polimer yang terbentuk di (b)(i) juga dinamakan polyester.
Explain why polymer formed in (b)(i) also named as polyester.

.....

..... [1M]

(c) Terilena digunakan secara meluas dalam industri tekstil. Namun pencemaran sumber air telah beriaku disebabkan pembuangan air sisa.
Terylene is widely used in the textile industry. However, water pollution has occurred due to wastewater disposal.

(i) Terangkan impak terhadap alam sekitar sekiranya air sisa tidak diuruskan dengan baik.
Explain the impact on the environment if wastewater is not well managed.

.....

..... [1M]

(ii) Penggunaan pewarna dalam industri batik telah menyebabkan pencemaran air sungai. Bagaimanakah masalah itu dapat diatasi dengan menggunakan konsep teknologi hijau?
The use of dyes in batik industry in has caused the river pollution. How to solve the problem by using the green technology concept?

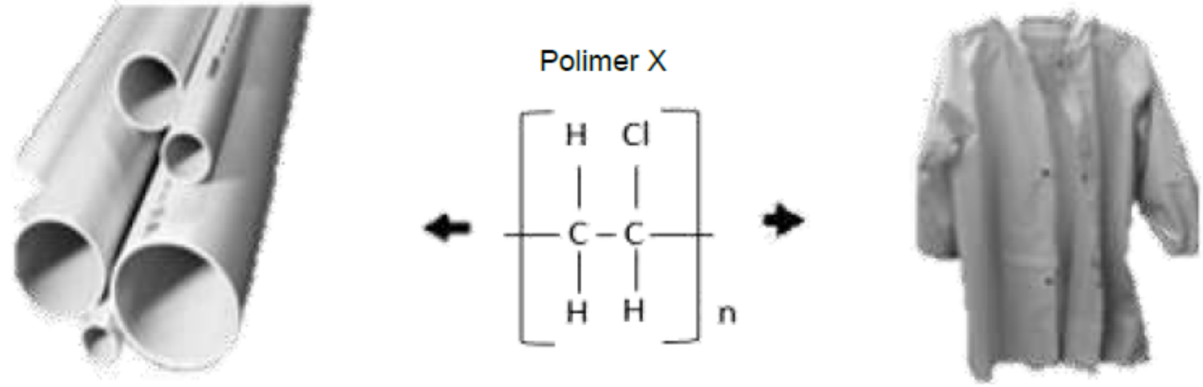
.....

.....

..... [2M]

[Kelantan2021-05]

5. (a) Paip dan baju hujan diperbuat daripada polimer X. Formula struktur bagi polimer X ditunjukkan dalam Rajah 5.1
Pipes and raincoats are made from polymer X. The structural formula of polymer X is shown in the Diagram 5.1



(i) Apakah maksud polimer?/ What is the meaning of polymer?

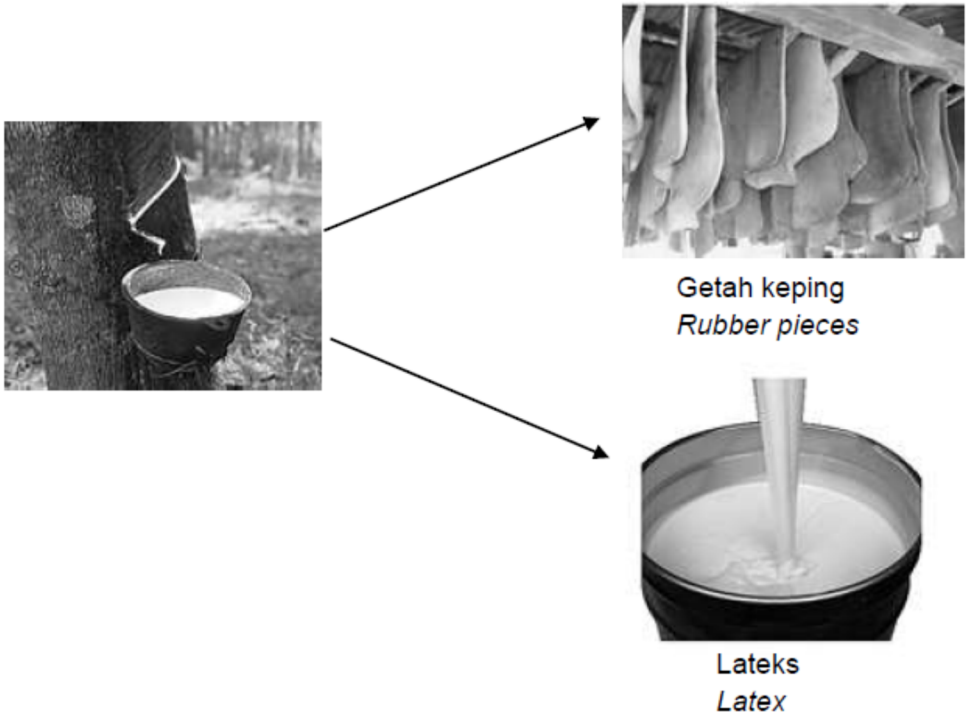
.....

..... [1M]

(ii) Nyatakan nama bagi monomer yang membentuk polimer X.
State the name of the monomer that makes up polymer X.

..... [1M]

(b) Rajah 5.2 menunjukkan lateks yang diperolehi daripada pokok getah boleh disimpan dalam bentuk cecair dan juga pepejal.
Diagram 5.2 shows that latex obtained from rubber trees can be stored in liquid as well as solid form.



(i) Terangkan bagaimana lateks yang diperolehi daripada pokok getah boleh dikekalkan sifat cecairnya.
Explain how latex obtained from rubber trees can retain its liquid properties.

.....

.....

.....

..... [2M]

(ii) Rajah 5.3 menunjukkan beberapa produk boleh dihasilkan daripada getah, antaranya ialah sarung tangan getah dan tayar kereta.
Diagram 5.3 shows that some products can be made from rubber, among of them are rubber gloves and car tires.

Bandingkan perbezaan antara dua jenis getah ini.
Compare the differences between these two types of rubber.

.....

..... [2M]

Esei// Essay

[Selangor2021-Set01-10]

10. (a) (i) Polimer terdiri daripada polimer semula jadi atau polimer sintetik. Nyatakan satu contoh polimer semula jadi dan satu contoh polimer sintetik.
Polymer consists of natural polymer or synthetic polymer.
State one example of natural polymer and one example of synthetic polymer.
[2M]

(ii) Rajah 10.1 menunjukkan formula struktur bagi dua monomer untuk menghasilkan nilon di dalam makmal.
Diagram 10.1 shows the structural formula of two monomers to produce nylon in the laboratory.

$H-\overset{H}{\overset{\vert}{N}}-(CH_2)_6-\overset{H}{\overset{\vert}{N}}-H$	$Cl-\overset{O}{\overset{\Vert}{C}}-(CH_2)_8-\overset{O}{\overset{\Vert}{C}}-Cl$
1,6-diaminoheksana 1,6-diaminohexane	Dekanadioil diklorida Decanedioyl di chloride

Tulis persamaan kimia bagi pembentukan nilon.
Write the chemical equation for the formation of nylon.
[2M]

(b) Rajah 10.2 menunjukkan lateks yang terhasil daripada torehan pada pokok getah.
Diagram 10.2 shows latex which is produced from tapping the rubber tree.

Lateks
Latex

Getah asli terdapat di dalam lateks dan merupakan sejenis polimer semula jadi yang dinamakan poliisoprena.
Natural rubber is found in the latex and it is a type of natural polymer known as polyisoprene.

(i) Lukis formula struktur monomer getah asli dan berikan nama IUPAC.
Nyatakan tiga ciri yang terdapat pada getah asli.

Draw the structural formula for the monomer of natural rubber and give its IUPAC name.
State th rec characteristics of natural rubber.

[5M]

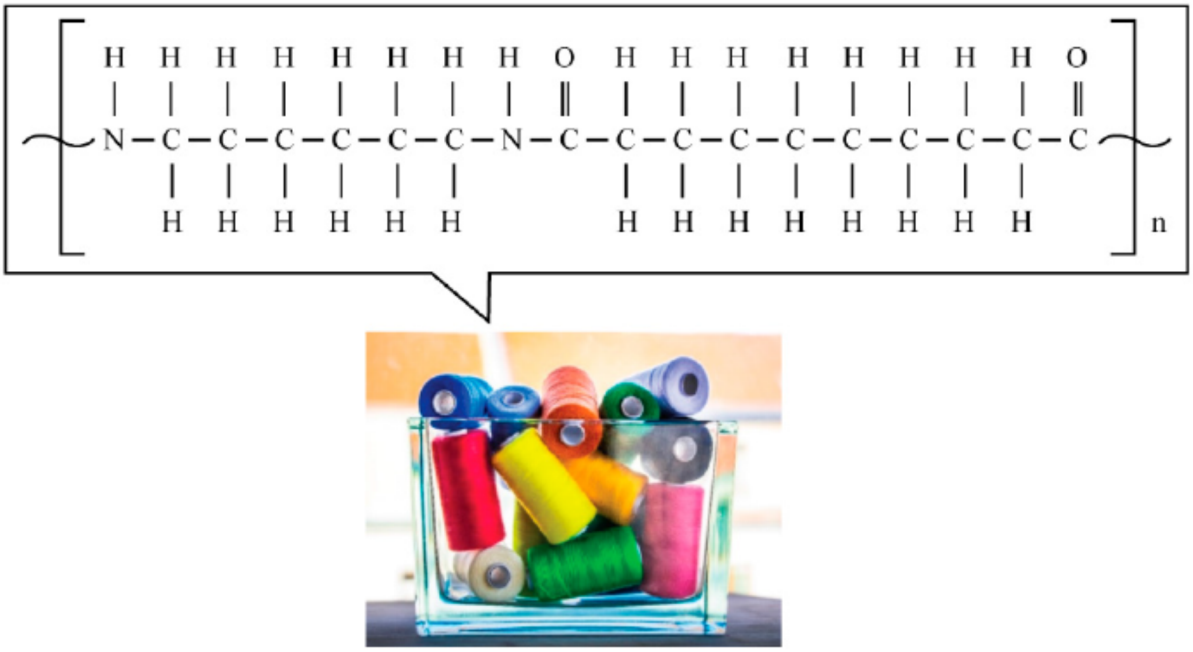
(ii) Lateks yang diperoleh daripada pokok getah yang ditoreh akan dikutip dengan segera untuk mengelakkan lateks daripada menggumpal.
Terangkan bagaimana lateks tersebut boleh menggumpal.
Huraikan satu kaedah yang sesuai untuk mengelakkan lateks daripada menggumpal. Terangkan jawapan anda.
Latex obtained from tapped rubber trees will be collected immediately to prevent latex from coagulate. Explain how the latex can coagulate.
Describe one suitable method to prevent the latex from coagulate.
Explain your answer.

[8M]

(iii) Getah asli tidak sesuai digunakan untuk membuat tayar kenderaan.
Justifikasikan pernyataan di atas. Cadangkan satu proses yang boleh dilakukan agar getah asli boleh digunakan untuk membuat tayar kenderaan.
Natural rubber is not suitable for making vehicle tires. Justify the above statement. Suggest a process that can be done so that natural rubber can be used to make vehicle tires.

[3M]

[Selangor2021-Set01-10] B12 Polimer
10. (a) Rajah 10.1 menunjukkan benang yang diperbuat daripada nilon yang digunakan dalam industri tekstil.
Diagram 10.1 shows threads made of nylon used in textile industry.



Nilon dibuat daripada pempolimeran campuran dua monomer.
Nyatakan jenis pempolimeran yang terlibat.
Lukis formula struktur bagi dua monomer tersebut.
Nyatakan satu sifat nilon.
Nylon is made from polymerisation of the mixture of two monomers.
State the type of polymerisation involved.
Draw the structural formula of the two monomers.
State one property of nylon.

[4M]

(b) Politena merupakan salah satu contoh polimer. Politena digunakan secara meluas sebagai beg plastik. Nyatakan dua ciri-ciri politena yang menjadikannya sesuai untuk digunakan sebagai beg plastik. Kemudian, cadangkan dua cara untuk mengurangkan pencemaran polimer ini.
Polythene is one of the examples of polymer. Polythene is widely used as plastic bags. State two characteristics of polythene that make it suitable to be used as plastics bags. Then, suggest two ways to reduce the pollution of this polymer.

[4M]

(c) Rajah 10.2 menunjukkan carta alir untuk menyediakan getah dalam dua keadaan fizikal berbeza dan proses penghasilan tayar kereta.
Diagram 10.2 shows a flow chart to prepare the rubber in two different physical state and car tyre production process.

Berdasarkan Rajah 10.2,/ Based on Diagram 10.2,

(i) cadangkan proses Z. Bagaimanakah proses Z boleh meningkatkan kekenyalan getah asli?
suggest process Z. How process Z can increase the elasticity of natural rubber?

[3M]

(ii) kenal pasti larutan X dan larutan Y.
Terangkan mengapa keadaan fizikal lateks berbeza apabila larutan X dan larutan Y ditambahkan ke dalam lateks segar.
identify solution X and solution Y.
Explain why the physical state of latex different when solution X and solution Y are added into fresh latex.

[9M]

[SBP2021-10]
10. (a) Seorang penoreh getah ingin mengumpul lateks dalam bentuk cecair. Namun begitu, dia mendapati cecair lateks menjadi pepejal putih selepas ditinggalkan untuk beberapa jam.
Apakah yang perlu dilakukan oleh penoreh getah itu bagi mengatasi masalah ini? Terangkan jawapan anda.
A rubber tapper intends to collect latex in liquid form. However, he found the liquid latex turns into white solid after being left for a few hours.
What should the rubber tapper do to overcome this problem?
Explain your answer.

[3M]

(b) Suatu eksperimen telah dijalankan untuk mengkaji kekenyalan getah tervulkan dan tak tervulkan. Jadual 10 menunjukkan keputusan eksperimen tersebut.
An experiment was carried out to investigate the elasticity of vulcanised and unvulcanised rubber. Table 10 shows the result of the experiment.

Jenis getah Type of rubber	Set	Panjang asal kepingan getah (cm) Initial length of rubber strip (cm)	Panjang kepingan getah dengan pemberat 100 g (cm) Length of rubber strip with 100 g weight (cm)	Panjang kepingan getah apabila pemberat 100 g dialihkan (cm) Length of rubber strip when 100 g weight is removed (cm)
Getah X Rubber X	I	12.00	12.35	12.10
	II	12.00	12.25	12.10
	III	12.00	12.30	12.15
Getah Y Rubber Y	I	12.00	12.05	12.00
	II	12.00	12.10	12.05
	III	12.00	12.00	12.00

Berdasarkan Jadual 10,/ Based on Table 10,

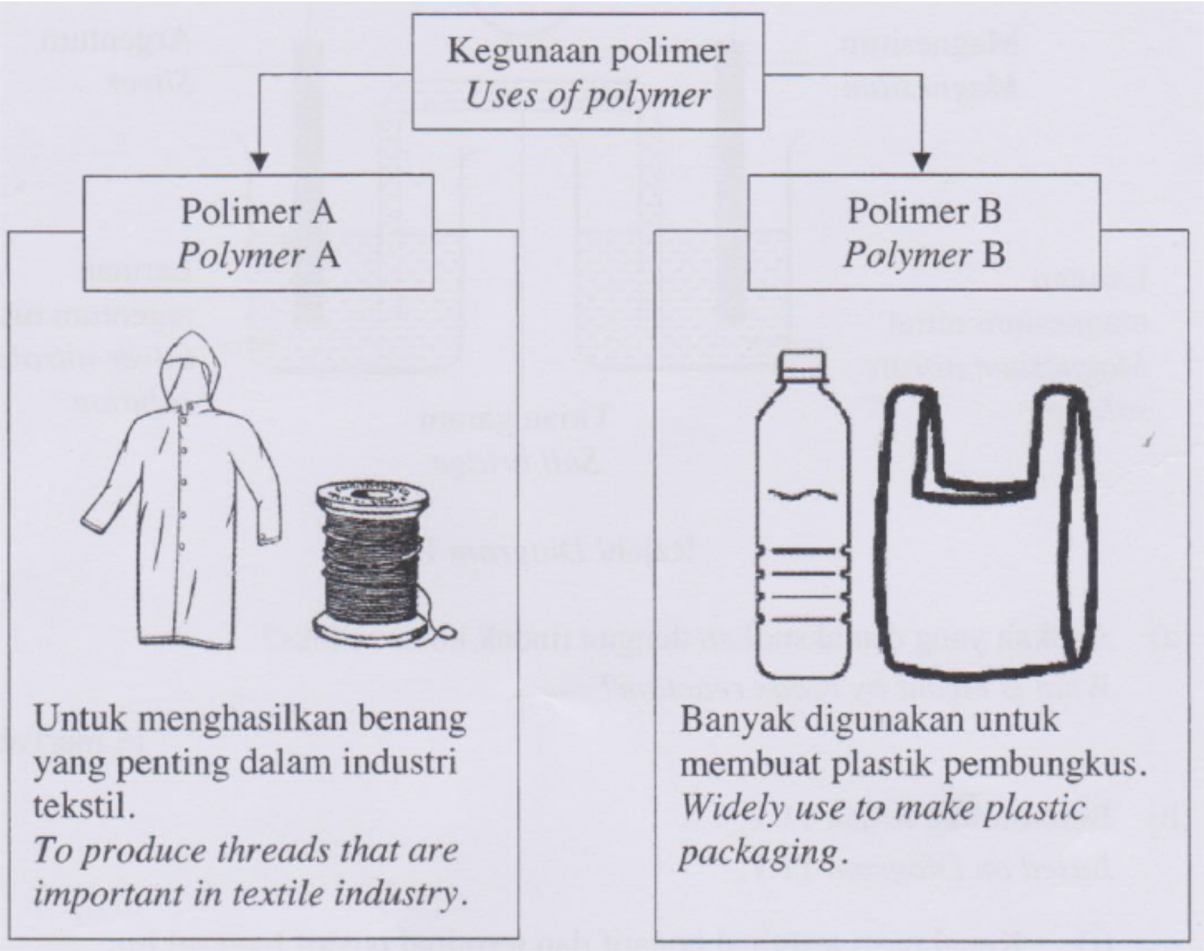
(i) Nyatakan jenis getah X dan getah Y. Banding dan terangkan perbezaan purata peningkatan panjang getah selepas pemberat dialihkan.
State the type of rubber X and rubber Y. Compare and explain the differences in average increase in the length of rubber after weight is removed.

[6M]

(ii) Tapak kasut boleh diperbuat daripada getah X dan getah Y. Getah manakah yang sesuai untuk membuat tapak kasut yang tahan lebih lama? Berikan dua sebab kepada jawapan anda.
Shoe soles can be made of rubber X and rubber Y. Which rubber is suitable to make shoe soles that can last longer?
Give two reasons for your answer.

[3M]

(c) Polimer digunakan dengan sangat meluas dalam kehidupan seharian kita. Rajah 10 menunjukkan kegunaan dua polimer yang berbeza dalam kehidupan seharian.
Polymers are widely used in our daily life. Diagram 10 shows the uses of two different polymers in daily life.



(i) Nyatakan maksud polimer dan berikan satu contoh polimer semula jadi. Lukiskan formula struktur dan namakan polimer B mengikut sistem penamaan IUPAC.
State the meaning of polymer and give one example of natural polymer. Draw the structural formula and name polymer B according to IUPAC nomenclature.

[4M]

(ii) Banding dan bezakan polimer A dan polimer B dari segi jenis tindak balas pempolimeran dan ciri-ciri monomer yang terlibat.
Compare and contrast polymer A and polymer B in terms of types of polymerisation reaction and characteristics of the monomer involved.

[4M]

<u>Tingkatan 5 Bab 5</u>

[Kedah2021-Set01-02]
2. Rajah 2 menunjukkan beberapa contoh bahan kosmetik.
Diagram 2 below shows a few sample of cosmetics.

(a) (i) Nyatakan maksud kosmetik.
State the meaning of cosmetics.

..... [1M]

(ii) Nyatakan dua bahan asas dalam pembuatan kosmetik.
State two basic ingredients of cosmetic production.

.....

..... [2M]

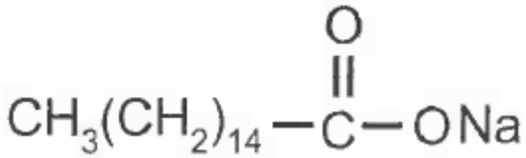
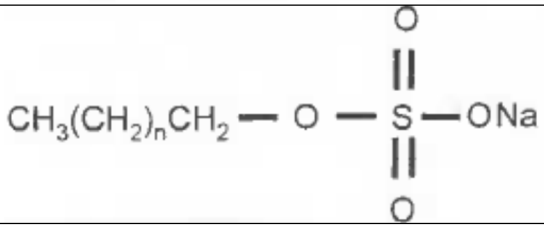
(b) Botol-botol plastik dan tali nilon adalah contoh barangan yang dihasilkan daripada polimer. Nyatakan dua jenis polimer.
Plastics bottles and nylon are example of products made from polymer.
State two types of polymer.

.....

..... [2M]

[Terengganu2021-04]
4. (a) Siti dan Ayu mencuci sehelai baju menggunakan air laut. Siti menggunakan agen pencuci A manakala Ayu menggunakan agen pencuci B,
Siti and Ayu wash a shirt using sea water. Siti using cleaning agent A while Ayu using cleaning agent B.

Jadual 4.1 menunjukkan formula molekul bagi agen pencuci A dan agen pencuci B.
Table 4.1 shows the molecular formula of cleaning agent A and cleaning agent B.

Agen pencuci Cleaning agent	Formula molekul Molecular formula
A	
B	

(i) Agen pencuci yang manakah merupakan sabun?
Which of the cleansing agent is soap?

..... [1M]

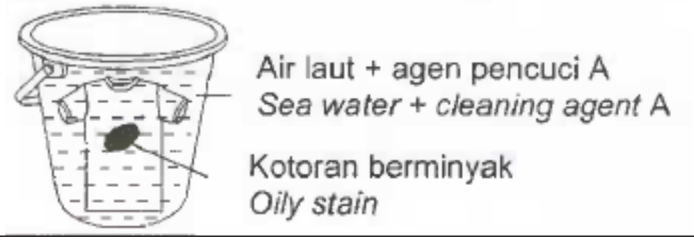
(ii) Nyatakan nama bagi proses pembuatan sabun.
State the name of the process of making soap.

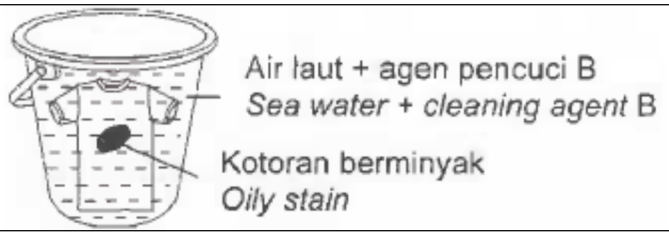
..... [1M]

(iii) Tindak balas antara asid palmitik, $CH_3(CH_2)_{14}COOH$ dalam minyak masak dan natrium hidroksida adalah tindak balas bagi proses pembuatan sabun. Tuliskan persamaan kimia yang terlibat.
The reaction between palmitic acid, $CH_3(CH_2)_{14}COOH$ in cooking oil and sodium hydroxide is a process of making soap. Write the chemical equation involved.

..... [2M]

(b) Rajah 4.2 menunjukkan situasi I dan situasi II terhadap tindakan pencucian agen pencuci A dan agen pencuci B ke atas pakaian kotor dalam air laut,
Diagram 4.2 shows situation l and situation II on cleansing action of cleaning agent A and cleaning agent B on dirty clothes in sea water.

Situasi Situation	Susunan radas Apparatus set up	Pemerhatian Observation
I		

II		

Berdasarkan Rajah 4.2, situasi manakah tindakan agen pencucian yang kurang berkesan? Terangkan jawapan anda.
Based on Diagram 4.2, which situation the cleaning agent action is less effective? Explain your answer.

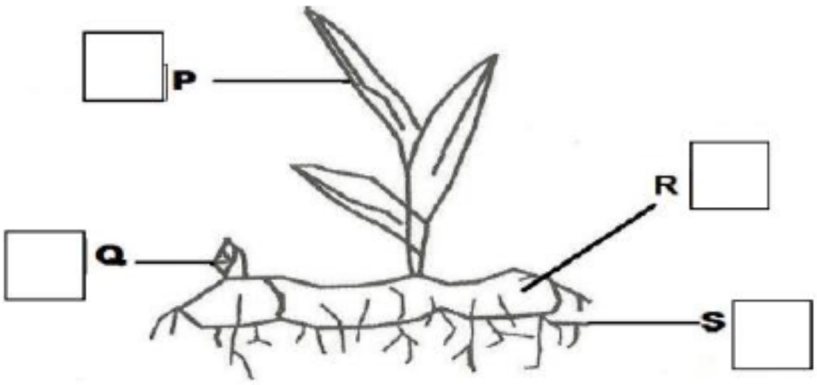
.....

.....

.....

..... [3M]

[Melaka2021-05]
5. Rajah 5.1 menunjukkan satu pokok halia. Halia boleh digunakan sebagai ubat tradisional.
Diagram 5.1 shows a ginger plant. Ginger can be used as a traditional medicine



(a) Antara bahagian P,Q,R,S yang manakah digunakan sebagai sumber utama ubat? Tandakan (√) untuk jawapan anda dalam kotak yang disediakan dalam rajah 5.1
Which of the parts P,Q,R,S used as the main source of medicine? Mark (√) for your answer in the box provided in diagram 5.1

..... [1M]

(b) Apakah penyakit yang boleh diubati menggunakan halia?
What illness can be cured by using ginger?

..... [1M]

(c) Bagaimanakah cara halia digunakan untuk merawat penyakit (b) ?
How is ginger used to treat the illness in (b)?

..... [1M]

(d) Jadual 5.1 menunjukkan fungsi tiga jenis ubat moden.
Table 5.1 shows the function of three types of medicine

Fungsi Function	Jenis ubat Type of medcine
Menghalang rasa sakit Prevents pain	X : _____
Membunuh atau menghalang pembiakan bakteria Kill or prevent the reproduction of bacteria	Y: _____
Mengubah perasaan dan kelakuan pesakit Changes the emotions and behavior of the patient	Z: _____

(i) Lengkapkan jadual 5.1 untuk menunjukkan ubat yang mempunyai fungsi yang dinyatakan dalam jadual itu.
Complete table 5.1 to show which medicines have the function given in the table.

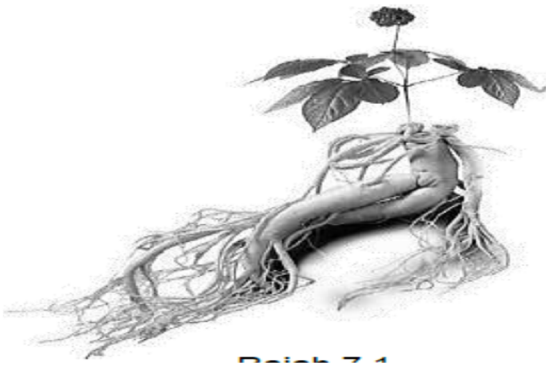
[3M]

(ii) Seorang pesakit yang dirawat menggunakan ubat jenis Y perlu menghabiskan semua bekalan ubat yang diberi oleh doktor untuk memastikan semua bakteria telah dibunuh. Apakah akan berlaku sekiranya tidak semua bakteria dibunuh?
A patient treated by medicine of type Y must complete all the supply given by the doctor in order to make sure all the bacteria are killed. What will happen if not all the bacteria are killed?

.....

..... [2M]

[Kelantan2021-07]
7. (a) Rajah 7.1 menunjukkan pokok ginseng yang digunakan dalam perubatan tradisional sejak zaman berzaman.
Diagram 7.1 shows the ginseng tree, used in traditional medicine since ancient times.



(i) Nyatakan satu penyakit yang boleh diubati dengan ginseng.
State one disease that can be cured with ginseng.

..... [1M]

(ii) Bagaimanakah ginseng digunakan untuk merawat penyakit?
How is ginseng used to treat disease?

..... [1M]

(b) Terdapat kosmetik yang dikomersialkan mengandungi bahan kimia terlarang yang boleh mengakibatkan kemudaratan kepada pengguna.
Some of the commercialized cosmetics contain banned chemicals that can cause harm to consumers.

(i) Nyatakan dua kesan penggunaan bahan kimia terlarang kepada pengguna.
State two effect of banned chemicals substance to consumers.

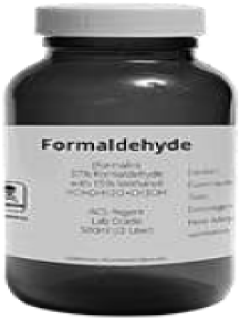
.....

..... [2M]

(ii) Berikan satu cara untuk mengelakkan keadaan di (b) (i) berlaku
Give one solution to prevent the situation in (b) (i) from happening

..... [1M]

(c) Rajah 7.2 menunjukkan garam biasa yang digunakan dalam industri makanan dan folmaldehid yang digunakan dalam industri kosmetik.
Diagram 7.2 shows the table salt used in the food industry and formaldehyde used in the cosmetics industry.



Apakah persamaan fungsi kedua-dua bahan dalam Rajah 7.2 ?
Bagaimanakah bahan-bahan ini menjalankan fungsinya?
What is the functional similarity of the two substances in Diagram 7.2?
How do these substances perform their function?

.....

.....

..... [3M]

(d) Penggunaan garam dan gula yang berlebihan dalam gizi seharian akan menyebabkan kesan buruk kepada kesihatan manusia, terutama kepada penghidap penyakit diabetes dan juga tekanan darah tinggi.
Excessive consumption of salt and sugar in the daily diet will cause adverse effects on human health, especially to people with diabetes and high blood pressure.

Cadangkan alternatif lain bagi penghidap penyakit diabetes dan tekanan darah tinggi untuk menikmati makanan yang enak tanpa memudaratkan lagi kesihatan mereka.
Suggest other alternatives for people with diabetes and high blood pressure to enjoy tastier food without further endangering their health.

.....

.....

..... [2M]

[Kedah2021-Set02-08]

8. Semasa melaksanakan PBD Kimia, Anas dan rakan-rakannya menjalankan eksperimen untuk menyediakan sabun. Minyak sawit dihidrolisiskan kepada asid palmitik, CH3(CH2)14COOH dan gliserol. Kemudian, asid palmitik akan bertindak balas dengan larutan natrium hidroksida, NaOH untuk menghasilkan sabun. Akhirnya, natrium klorida ditambahkan untuk memendakkan sabun.
In Chemistry PBD project, Anas and his friends carried out the preparation of soap experiment. Palm oil is hydrolysed to palmitic acid, CH3(CH2)14COOH and glycerol. Then, palmitic acid reacts with sodium hydroxide solution, NaOH to form soap. Finally, sodium chloride is added to precipitate the soap.

(a) Nyatakan nama bagi proses penyediaan sabun.
State the name for the process of preparing soap.

..... [1M]

(b) Cadangkan bahan kimia lain yang boleh digunakan untuk menggantikan larutan natrium hidroksida?
Suggest another chemical that can be used to replace sodium hydroxide solution?

..... [1M]

(c) Tuliskan persamaan kimia untuk menunjukkan pembentukan sabun.
Write the chemical equation to show the formation of soap.

..... [2M]

(d) Hitung jisim sabun yang terhasil jika 0.05 mol sabun dihasilkan.
[Jisim molar sabun = 278 g mol-1]
Calculate the mass of soap produced if 0.05 mol soap is produced.
[Molar mass of soap = 278 g mol-1]

[1M]

(e) Jadual 8 menunjukkan maklumat mengenai agen pembersih W dan agen pembersih X.
Table 8 shows information on cleaning agent W and cleaning agent X.

Agen pembersih Cleaning agents	W	X
Tindakan pencucian dalam air liat Cleaning action in hard water	Kotoran kekal *Stain remains* 	Kotoran hilang *Stain disappears* 

Agen pembersih yang manakah adalah sabun? Berikan satu sebab bagi jawapan anda.
Which cleaning agent is soap? Give a reason for your answer.

.....

..... [2M]

(f) Anda dibekalkan dengan dua bikar, P dan Q yang masing-masing diisi dengan larutan sabun atau larutan detergen.
You are given two separate beakers, P or Q containing soap solution or detergent solution respectively.

	
Bikar P Beaker P	Bikar Q Beaker Q

Dengan menggunakan bahan-bahan berikut, huraikan secara ringkas bagaimana anda dapat membezakan antara sabun dengan detergen.
With the use of the following materials, describe briefly how you can distinguish between soap and detergent.

• Larutan kalsium nitrat 0.5 mol dm-3
Calsium nitrate solution 0.5 mol dm-3

• Tabung didih
Boiling Tubes

• Gabus Getah
Rubber stopper

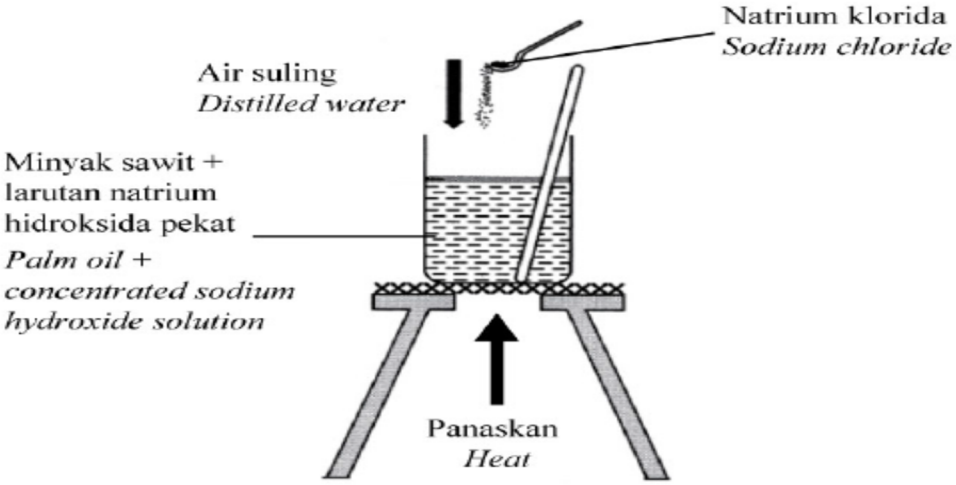
.....

.....

.....

..... [3M]

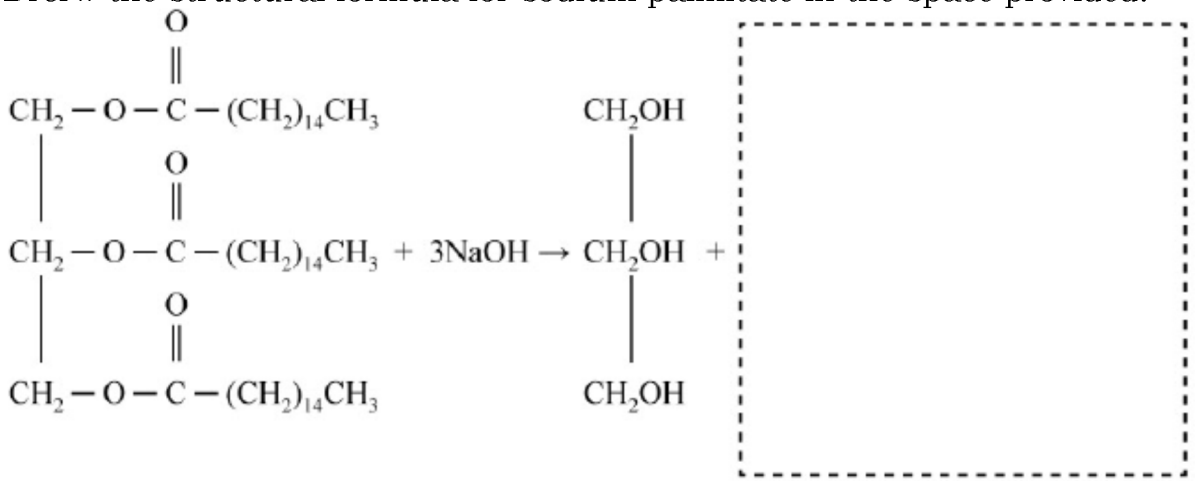
[Selangor2021-Set01-08]
8. (a) Rajah 8 menunjukkan susunan radas yang digunakan untuk menyediakan sabun di makmal sekolah.
Diagram 8 shows the apparatus set-up used to prepare soap in a school laboratory.



(i) Nyatakan nama bagi tindak balas yang digunakan dalam penyediaan sabun.
State the name of the reaction used in the preparation of soap.

..... [1M]

(ii) Persamaan berikut menunjukkan tindak balas dalam penyediaan sabun. Lukis formula struktur bagi natrium palmitat dalam ruangan yang disediakan.
The following equation shows the reaction in the preparation of soap. Drcrw the structural formula for sodium palmitate in the space provided.



[1M]

(iii) Hitung jisim sabun yang terhasil jika 0.05 mol sabun dihasilkan.
[Jisim atom relatif: H = 1, C = 12, O = 16, Na = 23]
Calculate the mass of soap produced //0.05 mol soap is produced.
[Relative atomic mass: H = I, C = 12, O = 16, Na = 23]

[2M]

(iv) Seorang murid ingin menyediakan sabun kalium palmitat. Apakah alkali yang harus digunakan?
A student wishes to prepare potassium palmitate soap. What alkali should be used?

..... [1M]

(b) Jadual 8 menunjukkan dua set eksperimen untuk membandingkan keberkesanan tindakan pencucian agen pencuci A dan B dalam air liat.
Table 8 shows two sets of experiment to compare the effectiveness for the cleansing action of cleaning agent A and B in hard water.

Agen pencuci Cleaning agent	A	B
Tindakan pencucian dalam air liat Cleansing action in hard water	 Air liat + agen pencuci A *Hard water +* *cleaning agent* A Kotoran bergris *Grease stain*	 Air liat + agen pencuci B *Hard water +* *cleaning agent* B Kotoran bergris *Grease stain*
Keputusan Result	 Kotoran bergris ditanggalkan *Grease stain removed*	 Masih terdapat sedikit kotoran bergris *Some grease stain still remain*

(i) Agen pencuci manakah yang lebih berkesan dalam air liat? Terangkan jawapan anda.
Which cleaning agent is more effective in hard water? Explain your answer.

.....

..... [2M]

(ii) Dengan menggunakan bahan-bahan berikut, huraikan secara ringkas bagaimana membezakan antara sabun dan detergen.

- 1 g sabun
- 1 g detergen
- Air liat
- Dua tabung didih

By using the following materials, describe briefly how to differentiate between soap and detergent.

- 1 g soap
- 1 g detergent
- Hard water
- Two boiling tubes

.....

.....

.....

..... [3M]

[Selangor2021-Set01-08]

8. Rajah 8 menunjukkan formula struktur bagi dua jenis agen pencuci.
Diagram 8 shows the structural formula of two types of cleaning agents.

Agen pencuci A Cleaning agent A	Agen pencuci B Cleaning agent B
$CH_3(CH_2)_{14}-\overset{\overset{\displaystyle O}{\|}}{C}-ONa$	$CH_3(CH_2)_{10}CH_2O-\overset{\overset{\displaystyle O}{\|}}{\underset{\underset{\displaystyle O}{\|}}{S}}-ONa$

(a) Nyatakan nama bagi proses untuk menyediakan agen pencuci A.
State the name of the process to prepare cleaning agent A.

..... [1M]

(b) Semasa penyediaan agen pencuci A, serbuk natrium klorida ditambah kepada campuran minyak dan larutan natrium hidroksida pekat.
Apakah tujuannya?
During preparation of cleaning agent A, sodium chloride powder is added into the mixture of oil and concentrated sodium hydroxide solution.
What is the purpose?

..... [1M]

(c) Nyatakan ion yang terdapat dalam air liat.
State the ion contains in hard water.

..... [1M]

(d) Nyatakan agen pencuci manakah yang lebih berkesan dalam air laut.
Terangkan jawapan anda.
State which cleaning agent is more effective in sea water.
Explain your answer.

.....

..... [2M]

(e) Agen pencuci yang manakah lebih mesra alam sekitar?
Terangkan jawapan anda.
Which cleaning agent is more environmentally friendly?
Explain your answer.

.....

..... [2M]

(f)Dengan menggunakan bahan-bahan berikut, huraikan secara ringkas bagaimana membezakan antara agen pencuci A dan agen pencuci B.

- 1 g agen pencuci A
- 1 g agen pencuci B
- Air liat
- Dua tabung didih

By using the following materials, describe briefly how to differentiate between cleaning agent A and cleaning agent B.

- 1 g of cleaning agent A
- 1 g o f cleaning agent B
- Hard water
- Two boiling tubes

.....

.....

.....

..... [3M]