

SULIT

4541/2

4541/2

KIMIA

KERTAS 2

OGOS 2025

2 ½ JAM

NO KAD PENGENALAN

						-			-				
--	--	--	--	--	--	---	--	--	---	--	--	--	--

Nama Pelajar :

Tingkatan :



**MAJLIS PENGETUA SEKOLAH MALAYSIA (MPSM)
(CAWANGAN KELANTAN)**

**MODUL KOLEKSI ITEM
PERCUBAAN SPM**

2025 aDin

KIMIA

KERTAS 2

MASA : DUA JAM TIGA PULUH MINIT

MNZ@MAHER CHEMISTRY 2025

1. Tulis nama dan tingkatan pada ruang yang disediakan.
2. Kertas soalan ini mengandungi tiga bahagian, Bahagian **A**, **B** dan **C**.
3. Jawapan hendaklah ditulis pada ruang jawapan yang disediakan di dalam kertas ini.
4. Kertas ini dalam bahasa Melayu dan bahasa Inggeris.
5. Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
6. Kerja mengira anda hendaklah ditunjukkan dengan jelas bagi mengelak kehilangan markah.
7. Kertas ini hendaklah diserahkan kepada Guru.

BAHAGIAN	SOALAN	MARKAH PENUH	MARKAH DIPEROLEHI
A	1	5	
	2	5	
	3	6	
	4	7	
	5	8	
	6	9	
	7	10	
	8	10	
B	9	20	
	10	20	
C	11	20	
JUMLAH			

Kertas soalan ini mengandungi **43** halaman bercetak.

Bahagian A

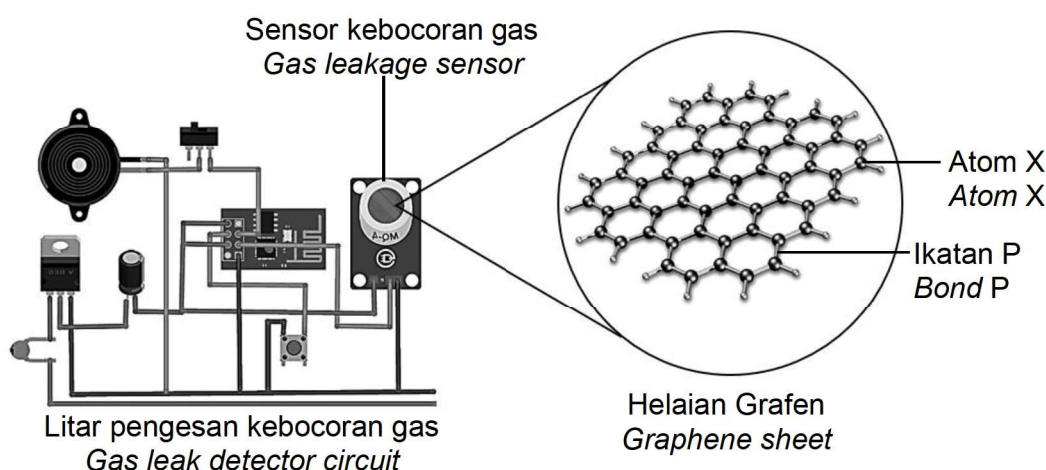
[60 markah]

Jawab semua soalan dalam bahagian ini

MNZ@MAHER CHEMISTRY 2025

1. Rajah 1 menunjukkan litar pengesanan kebocoran gas yang dipasang dirumah untuk mengesan kebocoran gas. Sensor yang digunakan dalam litar tersebut dibina menggunakan nano teknologi.

Diagram 1 shows a gas leak detector circuit installed at home to detect gas leaks. The sensor used in the circuit is built using nano technology.



Rajah 1
Diagram 1

- (a) Apakah yang dimaksudkan dengan nanoteknologi ?

What is meant by nanotechnology

.....

.....

[1 markah]
[1 mark]

- (b) Namakan atom X dan ikatan P yang menyambung atom-atom X.

Name the atom X and the bond P that connects the atoms X.

Atom X :

Atom X

Ikatan P :

Bond P

[2 markah]
[2 marks]

- (c) Terangkan mengapa grafen sangat sesuai digunakan sebagai sensor untuk mengesan kebocoran gas?

Explain why graphene is very suitable for use as a sensor to detect gas leaks?

.....

.....

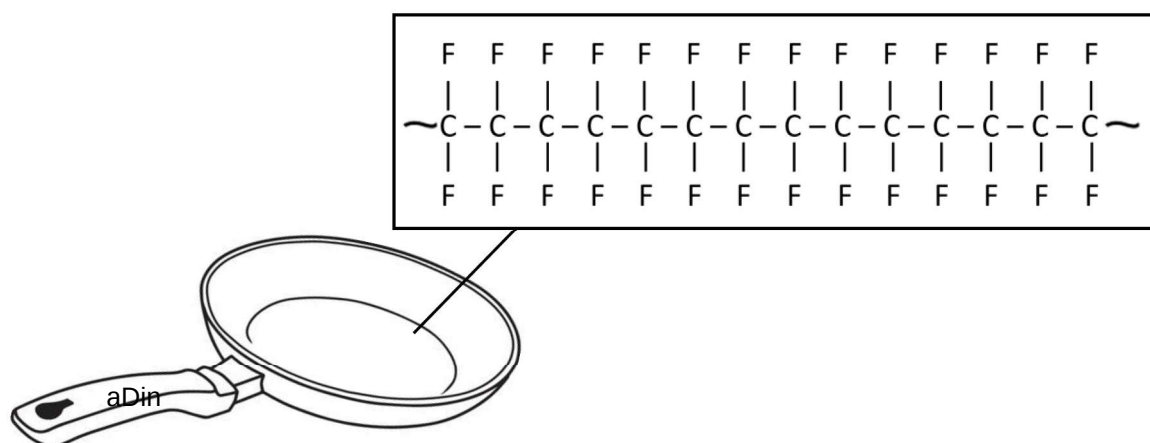
.....

[2 markah]

[2 marks]

2. Permukaan kuali dilapisi dengan Teflon untuk mengelakkan makanan melekat pada permukaan kuali tersebut. Rajah 2 menunjukkan sebahagian formula struktur Teflon yang digunakan untuk melapisi permukaan dalaman kuali tersebut.

The surface of the pan is coated with Teflon to prevent food from sticking to the surface of the pan. Diagram 2 shows part of the Teflon structural formula used to coat the inner surface of the pan.



Rajah 2
Diagram 2

- (a) (i) Apakah yang dimaksudkan dengan polimer?

What is meant by polymer?

.....
.....

[1 markah]

[1 mark]

- (ii) Lukiskan formula struktur bagi unit asas bagi Teflon

Draw the structural formula for the basic unit of Teflon.

[1 markah]
[1 mark]

- (b) (i) Apakah jenis tindak balas pempolimeran yang terlibat dalam pembentukan polimer yang ditunjukkan dalam Rajah 2?

What type of polymerization reaction is involved in the formation of the polymer shown in Diagram 2?

.....
[1 markah]
[1 mark]

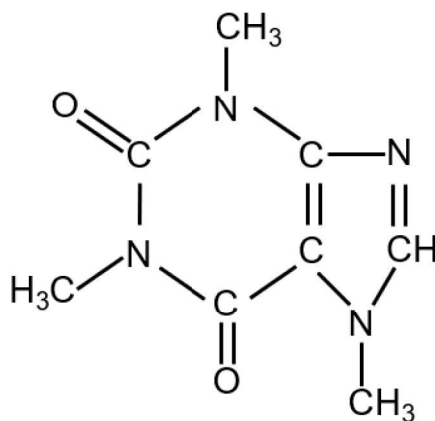
- (ii) Terangkan bagaimana polimer tersebut terbentuk melalui jenis tindak balas yang dinyatakan di (b)(i)

Explain how the polymer is formed through the type of reaction stated in (b)(i)

.....
.....
[2 markah]
[2 marks]

3. Kafein adalah satu bahan perangsang yang biasa ditemui dalam kopi atau teh. Rajah 3 menunjukkan formula struktur bagi kafein.

Caffeine is a stimulant commonly found in coffee or tea. Figure 3 shows the structural formula for caffeine.



Rajah 3
Diagram 3

Berdasarkan Rajah 3

Based on Diagram 3

- (a) Namakan unsur yang diwakili oleh huruf 'N'

Name the element represented by the letter 'N'

.....
[1 markah]
[1 mark]

- (b) Tuliskan formula empirik dan formula molekul bagi kafein.

Write the empirical formula and molecular formula for caffeine.

Formula molekul :
Molecular formula

Formula empirik :
Empirical formula

[2 markah]
[2 marks]

- (c) Apakah jenis zarah yang terdapat dalam kafein?

What types of particles are found in caffeine?

.....
[1 markah]
[1 mark]

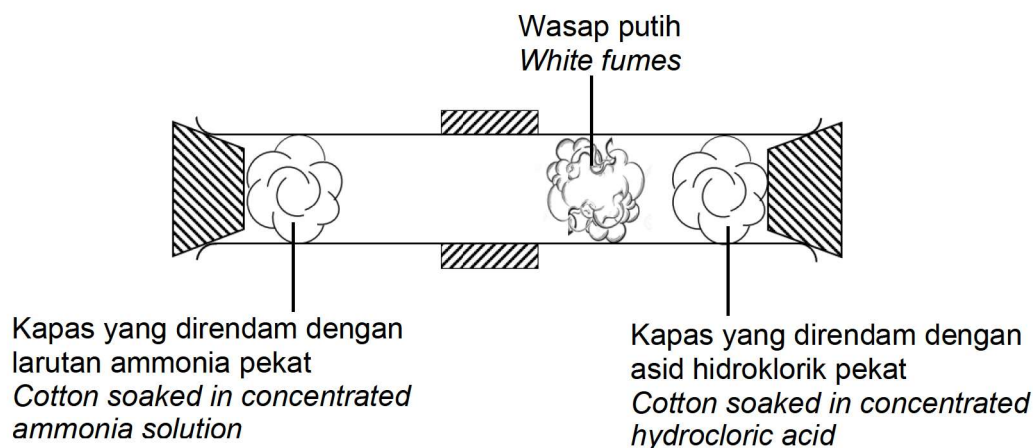
- (d) Hitungkan peratus atom karbon yang terdapat dalam kafein tersebut.
[Jisim atom relatif : H=1, C=12, N=14, O=16]

Calculate the percentage of carbon atoms present in the caffeine.
[Relative atomic mass : H=1, C=12, N=14, O=16]

[2 markah]
[2 marks]

4. Rajah 4 menunjukkan bagaimana wasap putih, ammonium klorida terbentuk apabila gas ammonia bertindak balas dengan gas hidrogen klorida.

Diagram 4 shows how white fumes, ammonium chloride, are formed when ammonia gas reacts with hydrogen chloride gas.



Rajah 4
Diagram 4

- (a) Berdasarkan Rajah 4

Based on Diagram 4

- (i) Namakan ikatan kimia yang membentuk sebatian ammonia.

Name the chemical bonds that form the ammonia compound.

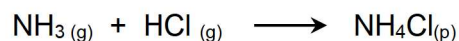
.....
[1 markah]
[1 mark]

- (ii) Nyatakan satu sifat fizik bagi ammonia.

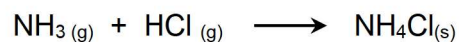
State one physical property of ammonia

.....
[1 markah]
[1 mark]

- (b) Persamaan kimia bagi tindak balas dalam Rajah 3 adalah seperti berikut



The chemical equation for the reaction in Figure 3 is as follows:



- (i) Nyatakan dua maklumat yang dapat disimpulkan dari persamaan kimia yang ditunjukkan di atas.

State two pieces of information that can be deduced from the chemical equation shown above.

.....

.....

[2 markah]

[2 marks]

- (ii) Ion ammonium terbentuk melalui ikatan datif. Dengan menggunakan lukisan yang sesuai, tunjukkan bagaimana pembentukan ion ammonium terbentuk dan labelkan ikatan yang terlibat.

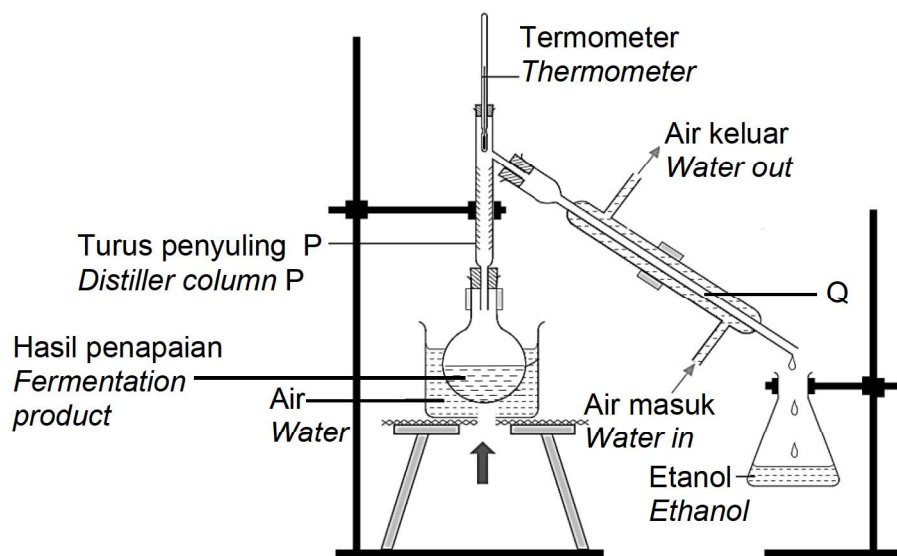
Ammonium ions are formed through dative bonds. Using a suitable drawing, show how ammonium ions are formed and label the bonds are involved.

[3 markah]

[3 marks]

5. Etanol yang terhasil dari proses penapaian bercampur dengan air. Etanol tersebut perlu diasingkan daripada air untuk mendapat etanol tulen. Rajah 5.1 menunjukkan susunan radas yang digunakan untuk mendapatkan etanol tulen. Hasil penapaian dipanaskan sehingga suhu 85°C dan etanol mendidih pada suhu 76°C .

The ethanol produced from the fermentation process is mixed with water. The ethanol needs to be separated from the water to obtain pure ethanol. Diagram 5.1 shows the arrangement of the apparatus used to obtain pure ethanol. The fermentation product is heated to a temperature of 85°C and ethanol boils at a temperature of 76°C .



Rajah 5.1
Diagram 5.1

- (a) Apakah maksud takat didih?

What does boiling point meant?

.....
.....

[1 markah]

[1 mark]

- (b) (i) Namakan proses yang berlaku pada alat radas Q

Name the process that occurs in the Q apparatus.

.....
.....

[1 markah]

[1 mark]

- (b) (i) Lakarkan graf pemanasan bagi etanol bermula dari suhu bilik sehingga suhu mencecah 85 °C dan tunjukkan takat didih bagi etanol pada graf tersebut.

Sketch a heating graph for ethanol starting from room temperature until the temperature reaches 85 oC and show the boiling point of ethanol on the graph.

[2 markah]

[2 marks]

- (c) (i) Lukiskan susunan zarah etanol semasa berada dalam turus penyuling P

Draw the arrangement of ethanol particles while in the distiller column P



[1 markah]

[1 mark]

- (ii) Bandingkan tenaga kinetik yang dimiliki zarah etanol semasa berada di dalam turus penyuling P dan di Q.

Compare the kinetic energy possessed by the ethanol particles while they are in the distiller column P and at Q.

.....
[1 markah]

[1 mark]

- (d) Rajah 5.2 menunjukkan doktor membersihkan lengan pesakitnya dengan etanol sebelum menyuntik pesakitnya.

Diagram 5.2 shows a doctor cleaning his patient's arm with ethanol before injecting his patient.



Rajah 5.2
Diagram 5.2

Selepas disapu dengan etanol, kulit pesakit tersebut terasa sejuk. Terangkan mengapa situasi ini berlaku.

After being wiped with ethanol, the patient's skin felt cold. Explain why this situation occurs.

.....
.....

[2 markah]
[2 mark]

6. Jadual 6 menunjukkan perbandingan maklumat bagi tindak balas unsur X dan unsur Y dengan gas oksigen dan gas klorin. Unsur X dan unsur Y berada dalam kumpulan yang berbeza dalam Jadual Berkala Unsur.

Table 6 shows a comparison of information for the reactions of element X and element Y with oxygen gas and chlorine gas. Element X and element Y are in different groups in the Periodic Table of Elements.

Unsur <i>Element</i>	Tindak balas dengan oksigen <i>React with oxygen</i>	Tindak balas dengan klorin <i>React with chlorine</i>
X	Mengalami pengoksidaan membentuk sebatian XO dan jika pengoksidaan berterusan, pepejal perang dengan formula X_2O_3 terbentuk. <i>Undergoes oxidation to form the compound XO and if oxidation continues, a brown solid with the formula X_2O_3 is formed.</i>	Terbakar dengan terang menghasilkan pepejal berwarna perang dengan formula XCl_3 <i>Burns brightly in excess chlorine gas to form a brown solid with the formula XCl_3</i>
Y	Mengalami pengoksidaan membentuk pepejal putih, Y_2O dan larut dalam air membentuk larutan beralkali <i>Undergoes oxidation to form a white solid, Y_2O and dissolves in water to form an alkaline solution</i>	Terbakar terang dalam gas klorin berlebihan membentuk pepejal putih dengan formula YCl <i>Burns brightly in excess chlorine gas to form a white solid with the formula YCl</i>

Jadual 6
Table 6

- (a) Bagaimana unsur-unsur dalam Jadual Berkala Unsur disusun?

How are the elements in the Periodic Table of Elements arranged?

.....
[1 markah]

[1 mark]

- (b) Berdasarkan Jadual 6

Based on Table 6

- (i) Nyatakan dalam kumpulan manakah unsur X dan unsur Y diletakkan dalam Jadual Berkala Unsur

State in which group element X and element Y are placed in the Periodic Table of Elements.

Unsur X :
Element X

Unsur Y :
Element Y

[2 markah]

[2 marks]

- (ii) Apakah nombor pengoksidaan yang dibawa oleh X dalam

What is the oxidation number carried by X in

X oksida : X klorida :
X oxide X chloride

[2 markah]

[2 marks]

- (c) Dalam tindak balas menghasilkan YCl, unsur Y dibakar dalam gas klorin berlebihan untuk menghasilkan 14.63 g sebatian YCl. Hitungkan isipadu sebenar yang telah digunakan oleh unsur Y dalam tindak balas tersebut.

[Jisim atom relatif : Y=23, Cl=35.5;

Isipadu molar gas pada keadaan bilik = $24 \text{ dm}^3 \text{ mol}^{-1}$]

In the reaction to produce YCl, element Y is burned in excess chlorine gas to produce 14.63 g of compound YCl. Calculate the actual volume of element Y used in the reaction.

[Relative atomic mass : Y=23, Cl=35.5;

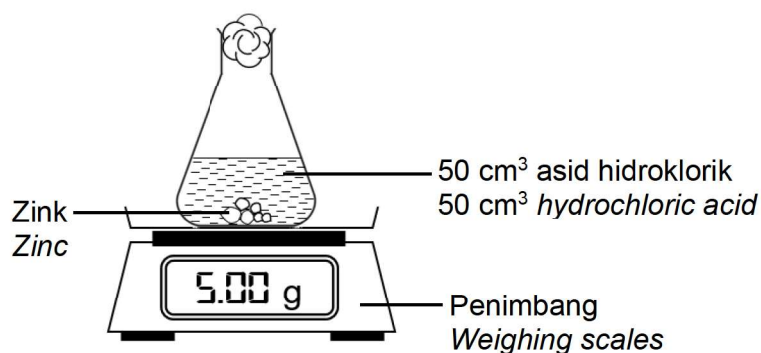
Molar volume of gas at room temperature = $24 \text{ dm}^3 \text{ mol}^{-1}$]

[3 markah]

[3 marks]

7. Rajah 7.1 menunjukkan susunan radas yang digunakan untuk mengkaji kadar tindak balas antara zink dan asid hidroklorik.

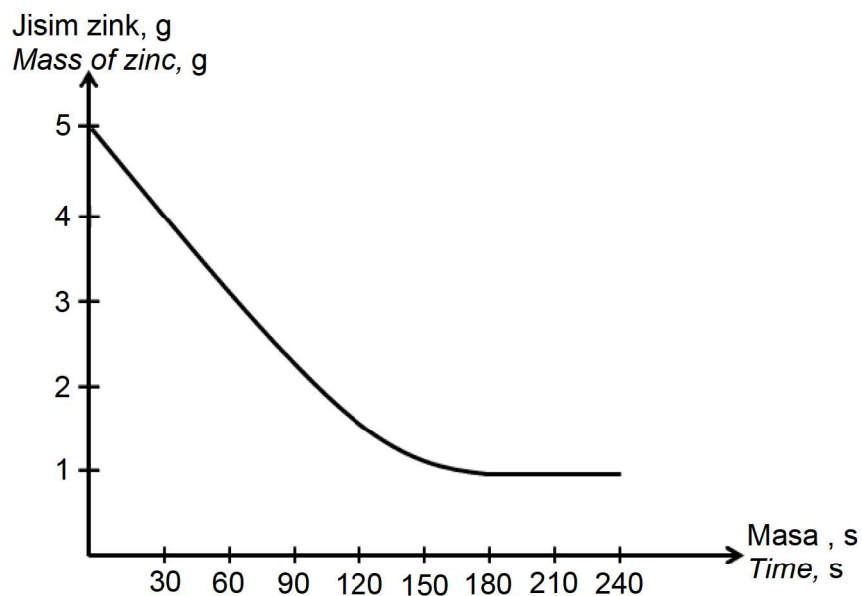
Diagram 7.1 shows the arrangement of the apparatus used to study the rate of reaction between zinc and hydrochloric acid.



Rajah 7.1
Diagram 7.1

Rajah 7.2 menunjukkan lakaran graf yang diperolehi dari eksperimen yang dijalankan.

Diagram 7.2 shows a sketch of the graph obtained from the experiment carried out.



Rajah 7.2
Diagram 7.2

- (a) Berdasarkan Rajah 7.1 dan Rajah 7.2

Based on Diagram 7.1 and 7.2

- (i) Nyatakan maksud kadar tindak balas.

State the meaning of rate of reaction

.....
.....

[1 markah]

[1 mark]

- (ii) Tentukan kadar tindak balas purata keseluruhan tindak balas tersebut.

Determine the average reaction rate of the entire reaction.

[1 markah]

[1 mark]

- (iii) Tuliskan persamaan kimia bagi mewakili tindak balas yang berlaku.

Write a chemical equation to represent the reaction that occurred.

.....
[2 markah]
[2 marks]

- (iv) Hitungkan kepekatan asid yang telah digunakan.
[Jisim atom relatif : H=1, Cl=35.5, Zn=64]

Calculate the concentration of acid used.
[Relative atomic mass : H=1, Cl=35.5, Zn=64]

[3 markah]
[3 marks]

- (v) Eksperimen tersebut diulang dengan menambahkan 2 cm³ larutan kuprum (II) sulfat kepada bahan tindak balas. Apakah yang akan terjadi kepada tempoh masa yang diambil untuk tindak balas berlaku?

The experiment is repeated by adding 2 cm³ of copper (II) sulphate solution to the reactants. What will happen to the time taken for the reaction to occur?

.....
[1 markah]
[1 marks]

- (b) Ammonia dihasilkan melalui tindak balas secara terus antara gas nitrogen dan gas hidrogen pada suhu dan tekanan yang tinggi. Pihak syarikat penghasilan ammonia mencari kaedah penghasilan yang paling optimum agar kadar penghasilan dapat ditingkatkan. Jadual 7.3 menunjukkan cadangan suhu dan kadar penghasilan yang dicadangkan oleh jurutera syarikat. Kedua-dua tindak balas dijalankan pada tekanan 450 atm.

Ammonia is produced by a direct reaction between nitrogen gas and hydrogen gas at high temperature and pressure. The ammonia production company is looking for the most optimal production method so that the production rate can be increased. Table 7.3 shows the recommended temperature and production rate suggested by the company's engineers. Both reactions are carried out at a pressure of 450 atm.

Set	Bahan tindak balas <i>Reactants</i>	Suhu tindak balas, °C <i>Temperature of reaction, °C</i>	Peratus penghasilan ammonia % <i>Percentage of ammonia production %</i>
Set I	Gas nitrogen + Gas hidrogen <i>Nitrogen gas + hydrogen gas</i>	500	30
Set II	Gas nitrogen + Gas hidrogen + serbuk besi <i>Nitrogen gas + hydrogen gas + iron powder</i>	350	70

Pihak syarikat memilih Set II sebagai kaedah yang patut digunapakai oleh syarikat. Dengan menggunakan konsep kadar tindak balas, wajarkan pilihan yang dilakukan oleh syarikat tersebut.

The company chose Set II as the method that should be used by the company. Using the concept of response rate, justify the choice made by the company.

.....

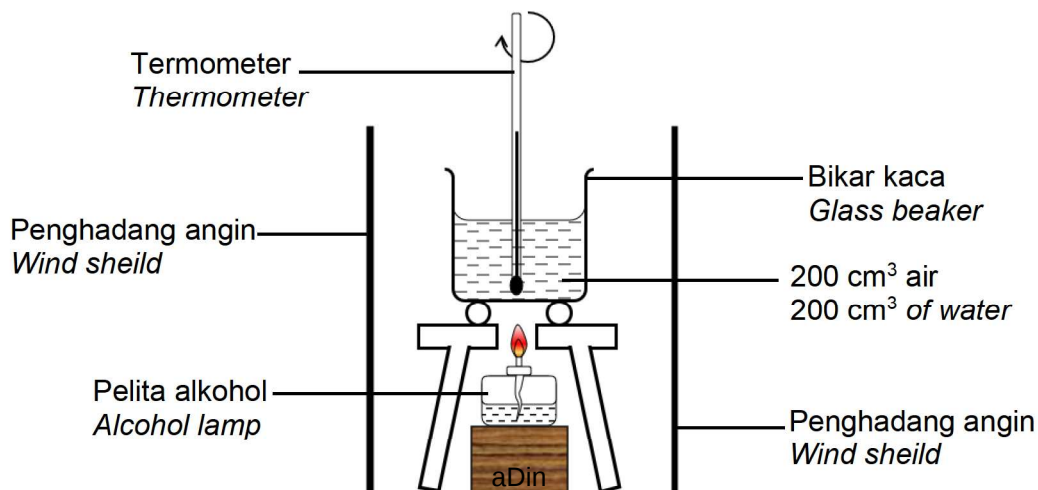
.....

.....

[2 markah]
[2 marks]

8. Rajah 8.1 menunjukkan susunan radas yang digunakan untuk menentukan haba pembakaran bagi dua alkohol yang berbeza.

Diagram 8.1 shows the arrangement of the apparatus used to determine the heat of combustion of two different alcohols.



Rajah 8.1
Diagram 8.1

Jadual 8.2 menunjukkan maklumat yang diperolehi dari eksperimen yang dijalankan menggunakan susunan radas dalam Rajah 8.1

Table 8.2 shows the information obtained from the experiment conducted using the apparatus arrangement in Diagram 8.1.

Alkohol <i>Alcohol</i>	Haba pembakaran, kJ mol^{-1} <i>Heat of combustion, kJ mol^{-1}</i>
Propanol <i>Propanol</i>	-2021
Butanol <i>Butanol</i>	-2676

Jadual 8.2
Table 8.2

- (a) Apakah yang dimaksudkan dengan haba pembakaran?

What is meant by heat of combustion?

.....

.....

[1 markah]
[1 mark]

- (b) Cadangkan penambahbaikan yang perlu dilakukan ke atas susunan alat radas yang digunakan supaya keputusan eksperimen yang diperolehi lebih tepat.

Suggest improvements that need to be made to the arrangement of the apparatus used so that the experimental results obtained are more accurate.

.....
[1 markah]
[1 mark]

- (c) Terangkan mengapa nilai haba pembakaran bagi kedua-dua alkohol tersebut berbeza.

Explain why the heat of combustion values of the two alcohols are different.

.....
.....
[2 markah]
[2 marks]

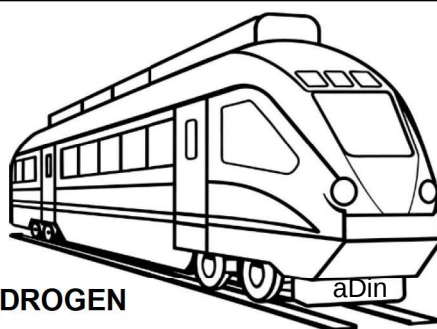
- (d) Berdasarkan Rajah 8.1 dan Jadual 8.2, tentukan kenaikan suhu air didalam bikar jika 1.5 g alkohol P telah terbakar dengan lengkap.
[Jisim atom relatif :H=1, C=12, O=16 ; Muatan haba tentu air = $4.2 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$]

Based on Figure 8.1 and Table 8.2, determine the temperature increase of the water in the beaker if 1.5 g of alcohol P has burned completely.

[Relative atomic mass : H=1, C=12, O=16 ;
Specific heat capacity of water = $4.2 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$]

[3 markah]
[3 marks]

(e)

**TREM BERKUASA HIDROGEN**

Dalam usaha mengurangkan pembebasan gas rumah hijau, syarikat pengangkutan telah mencipta trem menggunakan gas hidrogen sebagai bahan api. Setiap 1 mol hidrogen dibakar, sebanyak 282 kJ tenaga dibebaskan

HYDROGEN-POWERED TRAM

In an effort to reduce greenhouse gas emissions, transportation companies have created trams that use hydrogen gas as fuel. For every 1 mole of hydrogen burned, 282 kJ of energy is released.

Berdasarkan petikan diatas, adakah gas hidrogen sesuai digunakan sebagai bahan api dalam kenderaan berbanding bahan api tradisional?
Wajarkan jawapan anda.

*Based on the quote above, is hydrogen gas suitable for use as a fuel in vehicles compared to traditional fuels ?
Justify your answer.*

.....
.....
.....

[3 markah]
[3 marks]

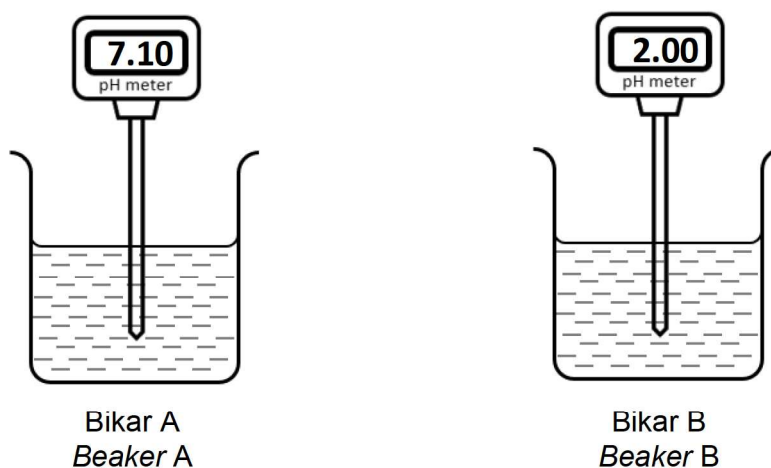
Bahagian B

[20 markah]

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

9. (a) Rajah 9.1 menunjukkan bacaan pH bagi dua sampel air yang di ambil dari dua sumber yang berlainan.

Diagram 9.1 shows the pH readings of two water samples taken from two different sources.



Rajah 9.1
Diagram 9.1

- (i) Apakah julat bagi skala pH?

What is the range of the pH scale?

[1 markah]
[1 marks]

- (ii) Hitungkan kepekatan keua-dua larutan dalam Rajah 9.1 dan tentukan larutan yang manakah mempunyai kepekatan ion hidrogen yang tinggi. Cadangkan bagaimana anda dapat mengurangkan kepekatan ion hidrogen dalam sesuatu larutan.

Calculate the concentrations of the two solutions in Diagram 9.1 and determine which solution has the higher hydrogen ion concentration. Suggest how you can reduce the hydrogen ion concentration in a solution.

[5 markah]
[5 marks]

- (iii) Air dalam bikar A dan bikar B digunakan untuk menguji keberkesanan sabun dalam tindak balas pencucian kotoran bergris. Bandingkan keberkesanan sabun dalam kedua-dua air tersebut dan terangkan jawapan anda.

The water in beaker A and beaker B are used to test the effectiveness of soap in the greasy stain cleaning reaction. Compare the effectiveness of soap in the two waters and explain your answer.

[4 markah]

[4 marks]

- (b) Jadual 9.2 menunjukkan pemerhatian apabila ujian kation menggunakan larutan natrium hidroksida, NaOH dan larutan ammonia, NH_3 dilakukan ke atas beberapa jenis garam yang berbeza.

Table 9.2 shows observations when cation tests using sodium hydroxide solution, NaOH, and ammonia solution, NH_3 , were performed on several different types of salts.

Larutan garam Salt solution	Pemerhatian Observation			
	Sedikit larutan NaOH <i>A little NaOH solution</i>	Larutan NaOH berlebihan <i>Excess NaOH solution</i>	Sedikit larutan NH_3 <i>A little NH_3 solution</i>	Larutan NH_3 berlebihan <i>Excess NH_3 solution</i>
P	Mendakan putih <i>White precipitate</i>	Mendakan putih larut <i>White precipitate dissolve</i>	Mendakan putih <i>White precipitate</i>	Mendakan putih larut <i>White precipitate dissolve</i>
Q	Mendakan biru <i>Blue precipitate</i>	Mendakan biru kekal tak larut <i>The blue precipitate remains insoluble.</i>	Mendakan biru <i>Blue precipitate</i>	Mendakan biru larut menjadi larutan biru tua. <i>The blue precipitate dissolves into a dark blue solution.</i>
R	Mendakan putih <i>White precipitate</i>	Mendakan putih kekal tak larut <i>White precipitate remains insoluble</i>	Tiada perubahan berlaku <i>No changes occurs</i>	Tiada perubahan berlaku <i>No changes occurs</i>

Jadual 9.2

Table 9.2

- (i) Jika kesemua garam yang diuji adalah garam nitrat, namakan garam P, garam Q dan garam R dan huraikan satu ujian khas bagi mengesahkan kehadiran ion nitrat dalam garam tersebut.

If all the salts tested are nitrate salts, name salt P, salt Q and salt R and describe a special test to confirm the presence of nitrate ions in the salt.

[7 markah]

[7 marks]

- (ii) Tuliskan persamaan kimia bagi pemanasan pepejal garam P dan apakah warna sisa pepejal yang tertinggal selepas pemanasan tersebut.

Write the chemical equation for heating solid salt P and what is the colour of the solid residue left after heating.

[3 markah]

[3 marks]

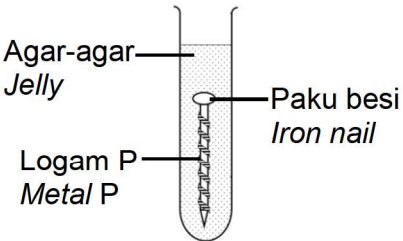
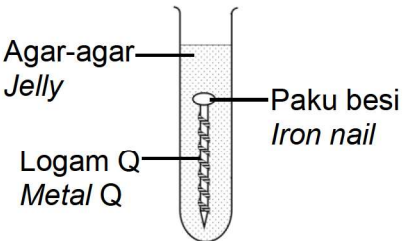
[illegible]

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.

This image shows a full page of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page, providing a template for handwriting practice or general writing. There are no margins, text, or other markings on the page.

- 10 (a) Dua set eksperimen telah dijalankan untuk mengkaji kesan logam lain terhadap pengurangan besi. Paku besi dililit dengan logam yang berlainan jenis dan dimasukkan ke dalam agar-agar panas yang mengandungi beberapa titis larutan kalium heksasianoferat (III) dan juga fenolftalein. Pemerhatian eksperimen ditunjukkan dalam Jadual 10.1

Two sets of experiments were conducted to study the effect of other metals on the rusting of iron. Iron nails were wrapped with different types of metals and placed in hot agar containing a few drops of potassium hexacyanoferrate (III) solution and also phenolphthalein. The experimental observations are shown in Table 10.1

Set Set	Eksperimen Experiment	Pemerhatian Observation
I		Tompok warna merah jambu terbentuk <i>Pink spots form</i>
II		Tompok warna biru gelap terbentuk <i>Dark blue spots form</i>

Jadual 10.1
Table 10.1

Berdasarkan pemerhatian dalam Jadual 10.1

Based on the observations in Table 10.1

- (i) Apakah fungsi larutan kalium heksasianoferat (III) ? Cadangkan nama bagi logam P dan logam Q.

What is the function of potassium hexacyanoferrate (III) solution? Suggest names for metal P and metal Q.

[3 markah]
[3 marks]

- (ii) Terangkan perbezaan pemerhatian yang ditunjukkan dalam Jadual 10.1 dan nyatakan logam yang mengalami pengoksidaan dan tuliskan setengah persamaan pengoksidaan yang berlaku bagi setiap set eksperimen.

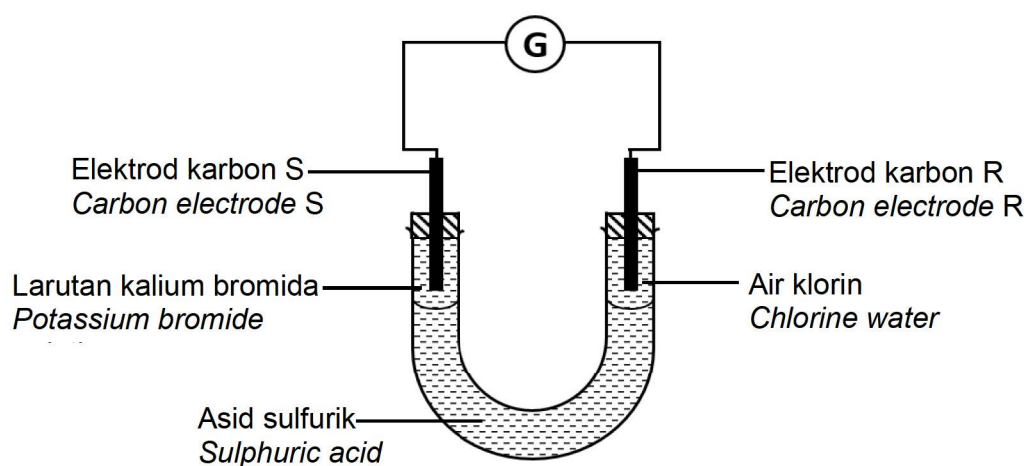
Explain the differences in observations shown in Table 10.1 and state the metal that undergoes oxidation and write the half-equation of oxidation that occurs for each set of experiments.

[8 markah]

[8 marks]

- (b) Rajah 10.2 menunjukkan susunan radas yang digunakan untuk mengkaji pemindahan elektron pada satu jarak antara air klorin dan larutan kalium iodida.

Diagram 10.2 shows the arrangement of the apparatus used to study electron transfer at a distance between chlorine water and potassium iodide solution.



Rajah 10.2
Diagram 10.2

- (i) Setelah 20 minit litar dilengkapkan, nyatakan perubahan yang berlaku pada setiap elektrod, namakan bahan yang mengalami pengoksidaan dan bahan yang mengalami penurunan. Huraikan satu ujian kimia bagi mengesahkan hasil yang terbentuk di sekitar elektrod S

After 20 minutes of completing the circuit, state the changes that occur at each electrode, name the substance that undergoes oxidation and the substance that undergoes reduction. Describe a chemical test to confirm the results formed around electrode S.

[6 markah]

[6 marks]

- (ii) Eksperimen diulangi dengan menggantikan air klorin dengan air iodin. Apakah pemerhatian yang dijangka berlaku dan terangkan jawapan anda.

The experiment is repeated by replacing the chlorine water with iodine water. What observations are expected to occur and explain your answer.

[3 markah]

[3 marks]

[illegible]

[illegible]

This image shows a full page of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page, typical of notebook or legal stationery. There are no margins, text, or other markings on the page.

This image shows a full page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page, providing a template for handwriting practice. There are no margins, text, or other markings on the page.

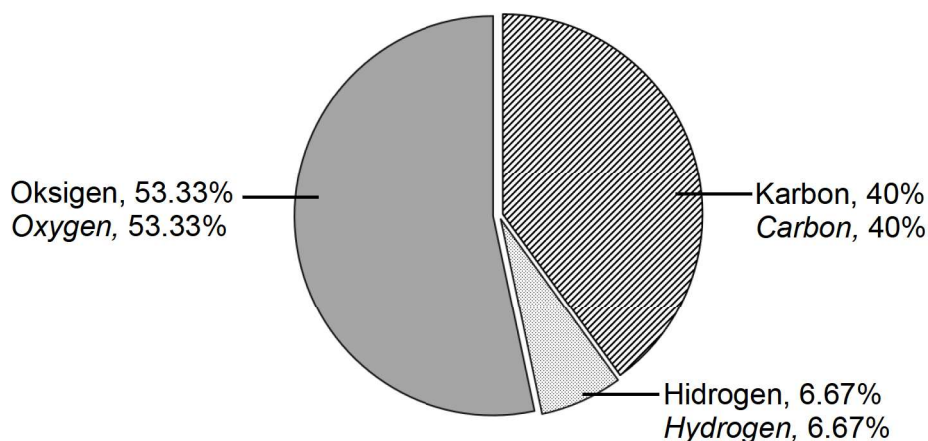
Bahagian C

[20 markah]

Soalan ini **mesti** dijawab

11. (a) Rajah 11.1 menunjukkan peratus kandungan unsur mengikut jisim bagi satu asid organik, P yang mempunyai jisim molar 60 g mol^{-1} .

Diagram 11.1 shows the percentage of element content by mass for an organic acid, P that has a molar mass of 60 g mol^{-1} .



Rajah 11.1
Diagram 11.1

- (i) Apakah istilah yang digunakan bagi menamakan sebatian yang mengandungi karbon sebagai unsur juzuknya?

What is the term used to name compounds that contain carbon as a constituent element?

[1 markah]

[1 mark]

- (ii) Berdasarkan Rajah 11.1, tentukan formula empirik dan formula molekul bagi asid organik P.
[Jisim atom relatif : $\text{H}=1$, $\text{C}=12$, $\text{O}=16$]

Based on Diagram 11.1, determine the empirical formula and molecular formula for the organic acid P.

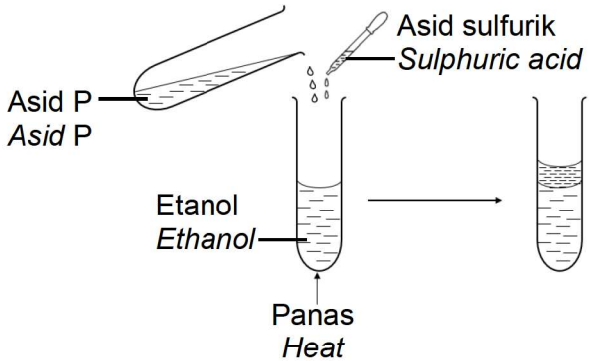
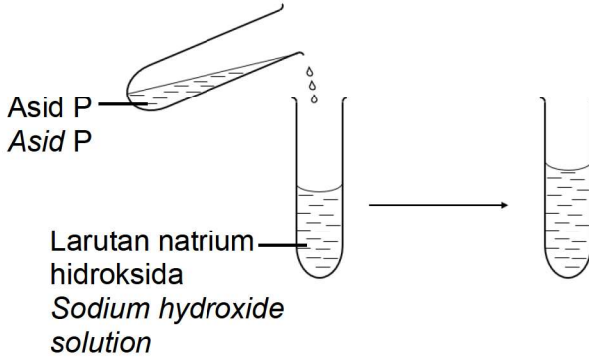
[Relative atomic mass : $\text{H}=1$, $\text{C}=12$, $\text{O}=16$]

[5 markah]

[5 marks]

- (iii) Jadual 11.2 menunjukkan pemerhatian bagi dua set eksperimen yang melibatkan asid organik P.

Table 11.2 shows observations for two sets of experiments involving the organic acid P.

Set Set	Pemerhatian Observation
I	 Asid P Asid P Asid sulfurik Sulphuric acid Etanol Ethanol Panas Heat
II	 Asid P Asid P Larutan natrium hidroksida Sodium hydroxide solution

Jadual 11.2
Table 11.2

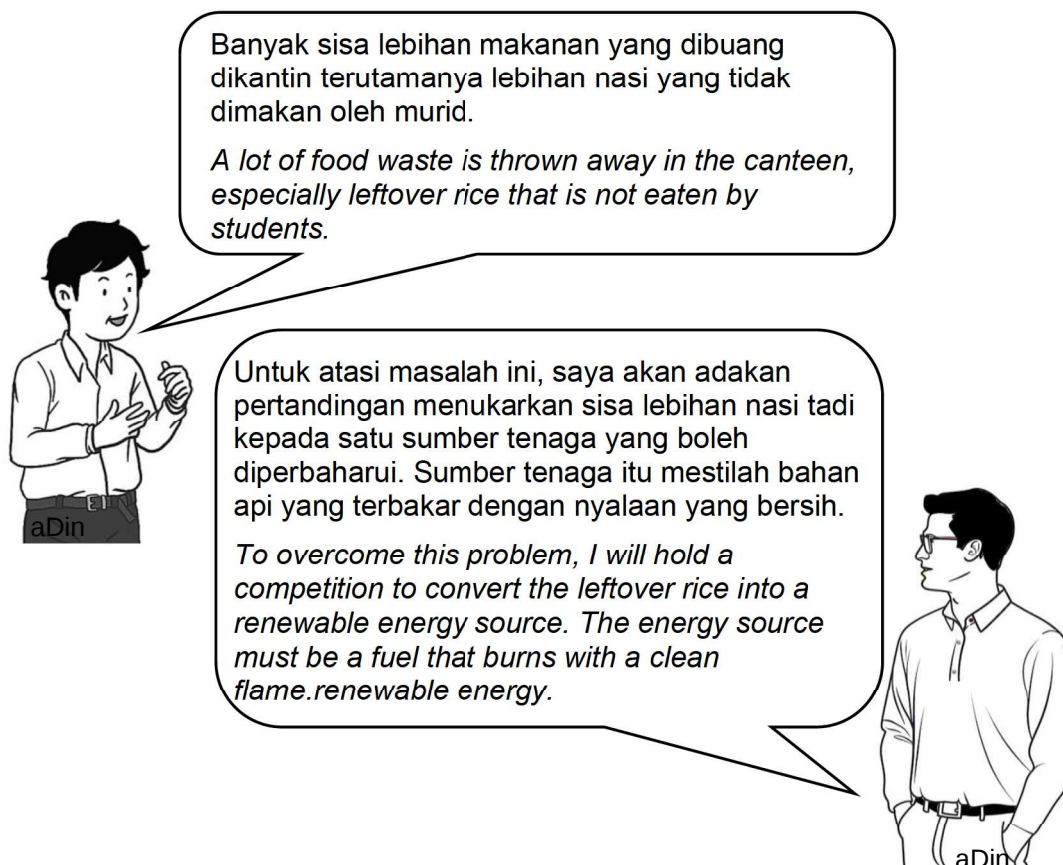
Berdasarkan Jadual 11.2, namakan jenis tindak balas yang ditunjukkan dalam kedua-dua set eksperimen dan tuliskan persamaan kimia bagi kedua-dua tindak balas tersebut. Namakan hasil tindak balas dalam Set I dan lukiskan formula struktur bagi hasil yang terbentuk dalam tindak balas tersebut.

Based on Table 11.2, name the type of reaction shown in both sets of experiments and write the chemical equations for both reactions. Name the products of the reaction in Set I and draw the structural formula for the products formed in the reaction.

[6 markah]
[6 marks]

- (b) Rajah 11.3 menunjukkan perbualan antara guru dengan muridnya mengenai masalah lebih makanan dikantin sekolah yang dibuang oleh murid-murid.

Diagram 11.3 shows a conversation between a teacher and his students regarding the problem of excess food in the school canteen being thrown away by the students.



Rajah 11.3
Diagram 11.3

Berdasarkan perbualan dalam Rajah 11.3, huraikan bagaimana anda dapat menyediakan sumber tenaga yang dinyatakan. Tuliskan persamaan kimia bagi tindak balas yang berlaku semasa penyediaan tersebut.

Based on the conversation in Diagram 11.3, describe how you could provide the energy source stated. Write the chemical equation for the reaction that occurred during the preparation.

[8 markah]
[8 marks]

This image shows a full page of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page, providing a template for handwriting practice or general writing. There are no margins, text, or other markings on the page.

This image shows a full page of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page, providing a template for handwriting practice or general writing. There are no margins, text, or other markings on the page.

This image shows a full page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page, providing a template for handwriting practice. There are no margins, text, or other markings on the page.

This image shows a full page of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page, providing a template for handwriting practice or general writing. There are no margins, text, or other markings on the page.

1	H Hydrogen 1	2	He Helium 4
---	---------------------------	---	--------------------------

3	Li Litium 7	4	Be Berilium 9
11	Na Natrium 23	12	Mg Magnesium 24

19	K Kalium 39	20	Ca Kalsium 40
37	Rb Rubidium 86	38	Sr Strontium 88
55	Cs Sesium 133	56	Ba Barium 137
87	Fr Fransium 223	88	Ra Radium 226

21	Sc Skandium 45	22	Ti Titanium 48	23	V Vanadium 51	24	Cr Kromium 52	25	Mn Mangan 55	26	Fe Ferus 56	27	Co Kobalt 59	28	Ni Nikel 59	29	Cu Kuprum 64	30	Zn Zink 65	31	Ga Gallium 70	32	Ge Germanium 73	33	As Arsenik 75	34	Se Selenium 79	35	Br Bromin 80	36	Kr Krypton 84
39	Y Itrium 89	40	Zr Zirkonium 91	41	Nb Niobium 93	42	Mo Molibdenum 96	43	Tc Teknetium 98	44	Ru Rutenium 101	45	Rh Rodium 103	46	Pd Paladium 106	47	Ag Argentum 108	48	Cd Kadmium 112	49	In Indium 115	50	Sn Stanum 119	51	Sb Antimoni 122	52	Te Telurium 128	53	I Iodin 127	54	Xe Xenon 131
72	Hf Hafnium 179	73	Ta Tantalum 181	74	W Tungsten 184	75	Re Renium 186	76	Os Osmium 190	77	Ir Iridium 192	78	Pt Platinum 195	79	Au Aurum 197	80	Hg Merkuri 201	81	Tl Thallium 204	82	Pb Plumbum 207	83	Bi Bismut 209	84	Po Polonium 210	85	At Astatin 210	86	Rn Radon 222		

10	Ne Neon 20
----	-------------------------

Nombor Proton
 Simbol
 Nama Unsur
 Jisim atom relatif

58	Ce	59	Pr	60	Nd	61	Pm	62	Sm	63	Eu	64	Gd	65	Tb	66	Dy	67	Ho	68	Er	69	Tm	70	Yb	71	Lu
Serium		Praseodimium		Neodimium		Promerium		Samarium		Europium		Gadolinium		Terbium		Disprosium		Holmium		Erbium		Tulium		Iberbium		Lutetium	
140		141		144		147		150		152		157		159		163		165		167		169		173		175	
	Th	Pa	U		Np	Pu		Am		Cm		Bk		Cf		Es		Fm		Md		No		Lr			
	Thorium	Protactinium	Uranium		Neptunium	Plutonium		Amerisium		Kurium		Berkelium		Californium		Einsteinium		Fermium		Mendelevium		Nobelium		Lawrensium			
	232	231	238		237	244		243		247		247		247		254		254		257		258		259			