10 Jadual 10 menunjukkan dua set eksperimen tindak balas antara marmar, $CaCO_3$ dengan asid hidroklorik. Masa yang diambil untuk mengumpulkan **50 cm^3 gas karbon dioksida** dalam setiap set ditunjukkan di dalam jadual.
*Table 10 shows two sets of reaction experiments between marble, $CaCO_3$ and hydrochloric acid. The time taken to collect **50 cm^3 of carbon dioxide gas** in each set is shown in the table.*

Set *Set*	**Bahan tindak balas** *Reactants*	**Masa diambil (s)** *Time taken (s)*
I	5.0 g ketulan marmar, $CaCO_3$ + 50 cm^3 asid hidroklorik, HCl 0.5 mol dm^{-3} pada suhu bilik *5.0 g marble chips, $CaCO_3$ + 50 cm^3 of 0.5 mol dm^{-3} hydrochloric acid at room temperature*	50
II	5.0 g serbuk marmar, $CaCO_3$ + 50 cm^3 asid hidroklorik, HCl 0.5 mol dm^{-3} pada suhu bilik *5.0 g marble powder, $CaCO_3$ + 50 cm^3 of 0.5 mol dm^{-3} hydrochloric acid at room temperature*	20

Jadual 10
Table 10

(a) Berdasarkan Jadual 10,
Based on Table 10,

(i) Nyatakan
- maksud kadar tindak balas dalam eksperimen ini
- faktor yang mempengaruhi kadar tindak balas

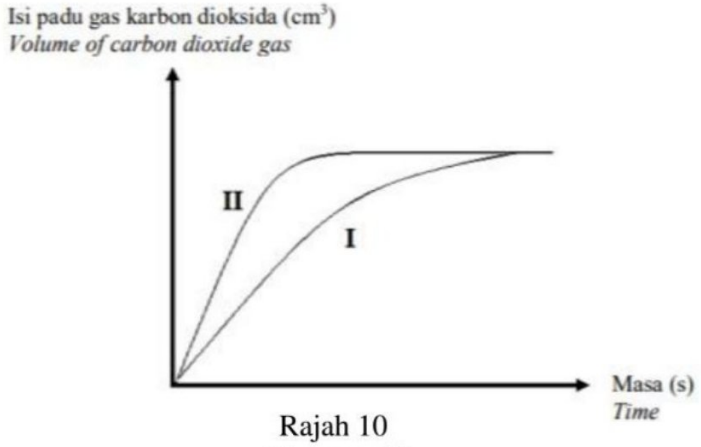
State
- *the meaning of rate of reaction*
- *factor that effect rate of reaction*

[2 markah]
[2 *marks*]

(ii) Tuliskan persamaan kimia bagi Set 1. Hitungkan kadar tindak balas purata bagi Set 1 dan Set II. Berdasarkan jawapan anda, bandingkan kadar tindak balas kedua-dua set dan terangkan perbandingan tersebut menggunakan teori perlanggaran.
Write the chemical equation for Set 1. Calculate the average rate of reaction for Set 1 and Set II. Based on your answer, compare the rate of reaction between two sets and explain the comparison using collision theory.

[8 markah]
[*8 marks*]

(b) Rajah 10 menunjukkan graf isipadu karbon dioksida melawan masa bagi dua set eksperimen, I dan II.
Diagram 10 shows the graph of volume of carbon dioxide gas against time for two sets of experiment, I and II.



Rajah 10
Diagram 10

Cadangkan dua kaedah lain untuk menjalankan eksperimen tersebut supaya memperoleh graf seperti Set II.
Suggest another two methods to conduct the experiment, in order to obtain the graph as in Set II.

[2 markah]
[2 *marks*]

(c) Dengan menggunakan Set 1 dalam Jadual 10, huraikan prosedur untuk menjalankan eksperimen itu.
Using Set 1 in Table 10, describe the procedure for conducting the experiment.

[8 markah]
[8 *marks*]

Bahagian B
***Section* B**

[20 *markah*]
[20 *marks*]

Jawab **satu** soalan dalam bahagian ini.
Answer **one** *question in this section.*

9 (*a*) Maria ingin memanggang ayam. Dia meminta anaknya, Malik pergi ke pasar untuk membeli ayam.
Rajah 9 menunjukkan jenis potongan ayam yang perlu dipilih oleh Malik.
Maria wants to cook roasted chicken. She asks her son, Malik to go to market to buy chicken.
Diagram 9 shows types of pieces of chicken to be chosen by Malik.

Jenis A
Type A

Jenis B
Type B

Rajah 9
Diagram 9

(i) Nyatakan maksud kadar tindak balas.
State the meaning of rate of reaction.

[1 *markah*]
[1 *mark*]

(ii) Jenis potongan ayam manakah yang perlu dipilih oleh Malik?
Terangkan jawapan anda berdasarkan faktor yang mempengaruhi kadar tindak balas.
Which type of chicken pieces should Malik choose?
Explain your answer based on the factors that influence the rate of reaction.

[3 *markah*]
[3 *marks*]

(*b*) Sekumpulan murid telah menjalankan eksperimen untuk mengkaji faktor yang mempengaruhi kadar tindak balas antara logam R dan asid HX.
Jadual 9 menunjukkan maklumat bagi bahan tindak balas dan masa yang diambil untuk mengumpul 30 cm^3 gas hidrogen.

A group of students carried out experiments to investigate the factor affecting the rate of reaction between metal R *and* HX *acid.*
Table 9 shows the information of the reactants and time taken to collect 30 cm^3 *of hydrogen gas.*

Eksperimen *Experiment*	**Bahan tindak balas** *Reactants*	**Masa diambil / s** *Time taken / s*
I	Serbuk logam R dan 50 cm^3 asid HX 1.0 mol dm^{-3} *Metal* R *powder and* 50 cm^3 of 1.0 mol dm^{-3} HX *acid*	10
II	Serbuk logam R dan 50 cm^3 asid HX 0.5 mol dm^{-3} *Metal* R *powder and* 50 cm^3 of 0.5 mol dm^{-3} HX *acid*	20

Jadual 9
Table 9

(i) Cadangkan nama bagi logam R dan asid HX. Dengan menggunakan logam R dan asid HX yang dinamakan, tulis persamaan kimia seimbang bagi tindak balas antara logam R dan asid HX.

Suggest the name of metal R *and* HX *acid. By using the named metal* R *and* HX *acid, write balanced chemical equation for the reaction between metal* R *and* HX *acid.*

[4 *markah*]
[4 *marks*]

(ii) Hitungkan kadar tindak balas purata bagi Eksperimen I dan Eksperimen II.

Calculate the average rate of reaction for Experiment I *and Experiment* II.

[2 *markah*]
[2 *marks*]

(iii) Dengan menggunakan teori perlanggaran, terangkan perbezaan kadar tindak balas antara Eksperimen I dan Eksperimen II.

By using the collision theory, explain the difference in the rate of reaction between Experiment I *and Experiment* II.

[5 *markah*]
[5 *marks*]

(iv) Sekumpulan murid itu ingin mengulangi Eksperimen I dengan menambahkan satu bahan yang dapat meningkatkan kadar tindak balas tanpa mengubah keadaan bahan tindak balas dalam Eksperimen I tersebut.

Cadangkan satu bahan yang sesuai digunakan. Terangkan bagaimana bahan tersebut dapat meningkatkan kadar tindak balas.

The group of students wants to repeat the Experiment I *by adding a substance that can increase the rate of reaction without changing the condition of the reactants in the Experiment* I.

Suggest a suitable substance that can be used. Explain how the substance can increase the rate of reaction.

[5 *markah*]
[5 *marks*]

Bahagian C
Section C
[20 markah]
[20 marks]

Jawab soalan dalam bahagian ini.
Answer question from this section.

11. Rajah 11 menunjukkan dua situasi bagi mengkaji kadar tindak balas dalam kehidupan seharian,
Diagram 11 shows two situation to study rate of reaction in daily life.

Situasi I : Kotak sejuk
Situation I : Cool Box

Situasi II : Vitamin C larut dalam air
Situation II : Vitamin C dissolve in water

Rajah 11 / Diagram 11

(a) Apakah maksud kadar tindak balas?
What is meant by rate of reaction?

[1 markah/mark]

(b) Berdasarkan Rajah 11,
Based on Diagram 11,

(i) Nyatakan dua faktor yang terlibat situasi I dan II.
State two factors involve in situation I and II.

[2 markah/marks]

(ii) Terangkan bagaimana faktor yang mempengaruhi kadar tindakbalas membantu anda dalam situasi I dan situasi II pada Rajah 11.
Explain how the factor affecting rate of reaction helps you in situation I and situation II in Diagram 11.

[4 markah/marks]

(c) Jadual 11 menunjukkan tiga set eksperimen untuk mengkaji faktor-faktor yang mempengaruhi kadar tindak balas di antara kalsium karbonat, $CaCO_3$ dan asid nitrik, HNO_3.
Table 11 shows three sets of experiment to study the factors affecting the rate of reaction between calcium carbonate, $CaCO_3$ *and nitric acid,* HNO_3.

Eksperimen *Experiment*	Reaktan *Reactant*	Suhu / °C *Temperature / °C*
I	25 cm^3 asid nitrik 0.1 mol dm^{-3} dan ketulan kalsium karbonat berlebihan 25 cm^3 *nitric acid* 0.1 mol dm^{-3} *and excess calcium carbonate chips*	30
II	25 cm^3 asid nitrik 0.1 mol dm^{-3} dan ketulan kalsium karbonat berlebihan 25 cm^3 *nitric acid* 0.1 mol dm^{-3} *and excess calcium carbonate chips*	40
III	25 cm^3 asid nitrik 0.1 mol dm^{-3} dan serbuk kalsium karbonat berlebihan 25 cm^3 *nitric acid* 0.1 mol dm^{-3} *and excess calcium carbonate powder*	40

Terangkan perbezaan kadar tindak balas antara eksperimen I dan II **ATAU** eksperimen II dan III dengan menggunakan teori perlanggaran.
Explain the difference in the rate of reaction between Experiment I *and* II ***OR*** *Experiment* II *and* III *by using collision theory.*

[5 markah/marks]

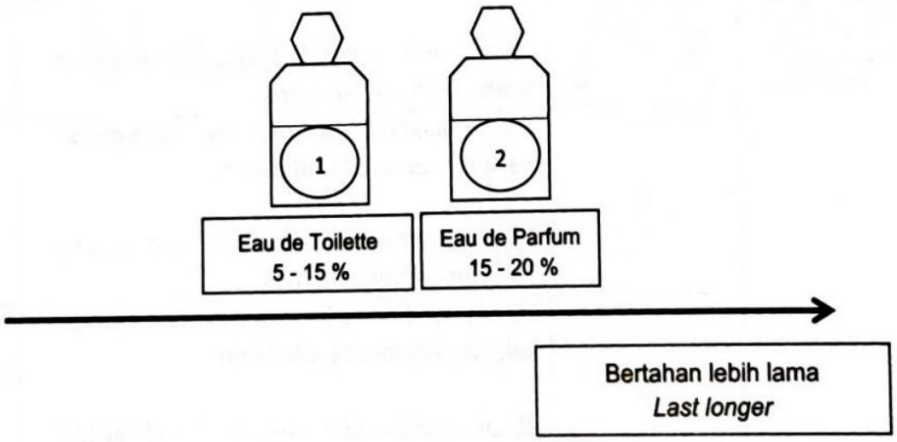
(d) (i) Petikan di bawah menerangkan tentang platlet dan kaitannya dengan kadar pembekuan darah.
The passage below describes about platelets and their relation to the rate of blood clotting.

Penggumpalan darah bergantung kepada kepekatan platlet dalam darah. *Blood clotting depends on the concentration of platelets in the blood.*

Harun mengalami kemalangan kecil dan dia mendapati aliran darah pada lukanya sukar untuk berhenti. Terangkan situasi ini.
Harun had a minor accident and he found out that the blood flow from his wounds difficult to stop. Describe this situation.

[4 markah/marks]

(ii) Rajah menunjukkan dua botol pewangi yang mengandungi peratusan ester berbeza.
Diagram shows two bottles of fragrance containing different percentage of ester.



Firdaus bekerja sebagai Ketua Pegawai Eksekutif di Melur Holding. Adakala Firdaus bekerja di pejabat dan adakala Firdaus perlu melawat tapak pembinaan.
Berdasarkan situsi tempat kerja Firdaus, wajarkan penggunaan kedua-dua jenis minyak wangi di atas.
Firdaus works as Chief Executive Officer in Melur Holding. Sometimes he works in the office and sometimes he has to visit the construction site. According to the situation on Firdaus work place, justify the uses of both perfumes.

[4 markah/marks]

10 Tiga set eksperimen dijalankan untuk menentukan faktor yang mempengaruhi kadar tindak balas. Jadual 4 menunjukkan bahan tindak balas dan masa yang diambil untuk mengumpul 40 cm^3 gas bagi Set I, Set II dan Set III.

Three sets of experiment are carried out to determine the factors that affect the rate of reaction. Table 4 shows the reactants and time taken to collect 40 cm^3 of gas for Set I, Set II and Set III.

Set	**Bahan tindak balas** *Reactants*	**Masa yang diambil untuk mengumpul 40 cm^3 gas (s)** *Time taken to collect 40 cm^3 of gas (s)*
I	Serbuk kalsium karbonat berlebihan + 25 cm^3 asid hidroklorik 0.4 mol dm^{-3} *Excess of calcium carbonate powder + 25 cm^3 of 0.4 mol dm^{-3} hydrochloric acid*	30
II	Serbuk kalsium karbonat berlebihan + 25 cm^3 asid hidroklorik 0.2 mol dm^{-3} *Excess of calcium carbonate powder + 25 cm^3 of 0.2 mol dm^{-3} hydrochloric acid*	50
III	Ketulan kalsium karbonat berlebihan + 25 cm^3 asid hidroklorik 0.2 mol dm^{-3} *Excess of calcium carbonate granules + 25 cm^3 of 0.2 mol dm^{-3} hydrochloric acid*	90

Jadual 5/ *Table 5*

(a) Apakah yang dimaksudkan dengan kadar tindak balas dan nyatakan dua faktor yang mempengaruhi kadar tindak balas.

What is meant by rate of reaction and state two factors that affect the rate of reaction.

[3 markah/ *marks*]

Berdasarkan Jadual 5,
Based on Table 5,

(b) lukis gambar rajah susunan radas bagi Set I.
draw an apparatus set-up for Set I.

[2 markah/ *marks*]

(c) tulis persamaan kimia bagi tindak balas itu dan hitungkan isi padu sebenar gas yang terbebas dalam Set I.
write a chemical equation for the reaction and calculate the actual volume of gas released in Set I.

[Diberi isi padu molar sebarang gas memenuhi 24 dm^3 pada keadaan bilik]
[*Given that the molar volume of any gas occupies 24 dm^3 at room condition*]

[5 markah/ *marks*]

(d) bandingkan kadar tindak balas antara set eksperimen dan terangkan jawapan anda berdasarkan teori perlanggaran:
compare the rate of reaction between sets of experiment and explain your answer based on collision theory:

(i) Set I dan Set II
Set I *and Set* II

(ii) Set II dan Set III
Set II *and Set* III

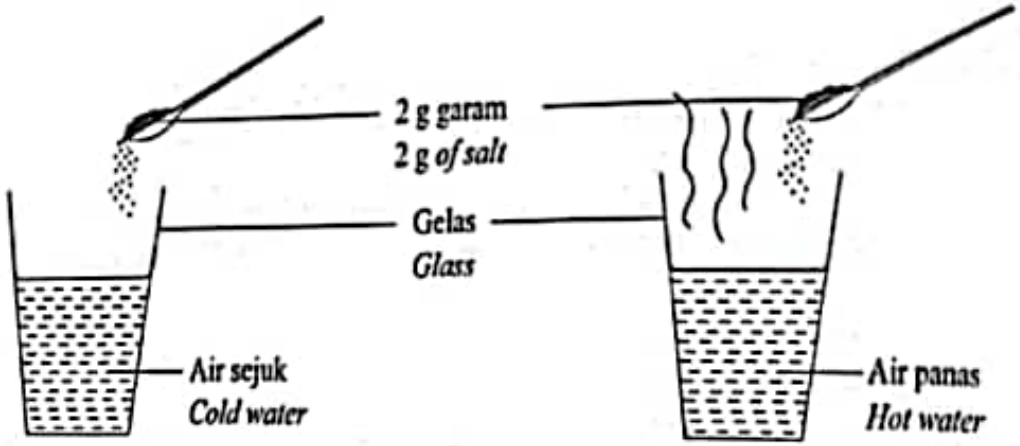
[10 markah/ *marks*]

Bahagian B
Section B

[20 markah]
[20 *marks*]

Jawab mana-mana ***satu*** *soalan*
Answer any ***one*** *question*

9 (a) Rajah 9 menunjukkan garam ditambahkan ke dalam dua gelas yang berbeza.
Diagram 9 shows salt added into two different glasses.



Rajah 9 / *Diagram 9*

Berdasarkan Rajah 9, garam di dalam gelas yang manakah akan melarut dengan lebih cepat? Terangkan jawapan anda.

Based on Diagram 9, salt in which glass will dissolve faster? Explain your answer.

[3 markah/*marks*]

(b) Tiga eksperimen telah dijalankan untuk mengkaji faktor yang mempengaruhi kadar tindak balas. Jadual 9 menunjukkan bahan tindak balas dan suhu asid yang digunakan dalam eksperimen tersebut.

Three experiments have been carried out to study the factor that affect the rate of reaction. Table 9 shows the reactants and temperature of acid used in the experiment.

Eksperimen ***Experiment***	**Bahan tindak balas** ***Reactant***	**Suhu asid (°C)** ***Temperature of acid (°C)***
I	Serbuk zink berlebihan +100 cm^3 asid sulfurik 0.5 mol dm^{-3} *Excess zine powder + 100 cm^3 of 0.5 mol dm^{-3} sulphuric acid*	20
II	Serbuk zink berlebihan + 100 cm^3 asid sulfurik 1.0 mol dm^{-3} *Excess zinc powder 100 cm of 10 mol dm^{-3} sulphuric acid*	20
III	Serbuk zink berlebihan+100 cm^3 asid sulfurik 0.5 mol dm^{-3} *Excess zine powder + 100 cm^3 of 0.5 mol dm^{-3} sulphuric acid*	40

Jadual 9 / *Table 9*

Berdasarkan Jadual 9,
Based on Table 9,

(i) Nyatakan semua faktor yang mempengaruhi kadar tindak balas dalam Eksperimen I, II dan III.

State all factors that affecting the rate of reaction in Experiment T. II and III.

[2 markah /*marks*]

(ii) Tulis persamaan kimia yang seimbang bagi tindak balas dalam Eksperimen 1.
Hitungkan isi padu gas yang dibebaskan.
[Isi padu molar gas pada keadaan bilik ialah 24.0 dm^{-3} mol^{-1}]

Write a balanced chemical equation for the reaction in Experiment I.
Calculate the volume of gas released.
[Molar volume of gas at room condition is 24.0 dm^{-3} mol^{-1}]

[5 markah /*marks*]

(iii) Bandingkan kadar tindak balas antara:
Compare the reaction rate between:

- Eksperimen I dan II
  Experiment I *and* II
- Eksperimen I dan III
  Experiment I *and* III

Terangkan jawapan anda dengan menggunakan Teori Perlanggaran.
Explain your answer by using Collision Theory.

[10 markah /*marks*]

8 Azrul dan rakan menjalankan eksperimen untuk menyiasat faktor yang mempengaruhi kadar tindakbalas antara serbuk logam zink dengan asid hidroklorik.

Azrul and his friends carried out experiments to investigate the factor affecting the rate of reaction between powdered metal zinc and hydrochloric acid.

Jadual 8 menunjukkan maklumat berkaitan bahan tindak balas dan masa yang diambil untuk mengumpul 30 cm^3 gas P.

Table 8 shows the information about the reactants and the time taken to collect 30 cm^3 of gas P

Eksperimen *Experiment*	Bahan tindak balas *Reactants*	Masa yang diambil / s *Time taken / s*
I	Serbuk logam zink + 50 cm^3 asid hidroklorik 1.0 mol dm^{-3} *Powdered metal zinc* + 50 cm^3 *of* 1.0 mol dm^{-3} *hydrochloric acid*	10
II	Serbuk logam zink + 100 cm^3 asid hidroklorik 0.5 mol dm^{-3} *Powdered metal zinc* + 100 cm^3 *of* 0.5 mol dm^{-3} *hydrochloric acid*	20

Jadual 8/ *Table 8*

(a) Apakah maksud kadar tindakbalas?
What is the meaning of rate of reaction?

.....

[1 markah / *mark*]

(b) Berdasarkan jadual di atas,
Based on the table above,

(i) Nyatakan gas yang terhasil.
State the gas produced.

……

[1 markah / *mark*]

(ii) Tulis persamaan ion bagi tindakbalas itu.
Write the ionic equation for the reaction.

……

[1 markah / *mark*]

(c) (i) Hitung kadar tindakbalas purata bagi eksperimen I dan eksperimen II
Calculate the average rate of reaction for experiment I *and experiment* II

[2 markah / *marks*]

(ii) Berdasarkan jawapan di c(i), bandingkan kadar tindakbalas antara eksperimen I dan eksperimen II. Nyatakan faktor yang mempengaruhi kadar tindak balas dalam eksperimen ini.
Based on the answer in c(i)*, compare the rate of reaction between experiment* I *and experiment* II*. State the factor that affects the rate of reaction.*

……

……

[2 markah / *marks*]

(iii) Dengan menggunakan teori perlanggaran, terangkan perbezaan kadar tindakbalas c(ii).
By using the collision theory, explain the difference in the rate of reaction for c(ii).

……

……

……

……

[3 markah / *marks*]

10

Bahagian C / Section C
[20 *mark*ah / 20 *marks*]

Jawab semua soalan daripada bahagian ini
Answer all question from this section.

11 (a) Jadual 11 menunjukkan maklumat yang diperolehi daripada dua set eksperimen yang mengkaji kesan kepekatan ke atas kadar tindak balas antara zink dengan asid nitrik.
Table 11 shows the information obtained from two sets of experiments that investigate the effect of concentration on the rate of reaction between zinc and nitric asid.

Set	Bahan tindak balas ***Reactant***	Suhu campuran ***Temperature of the mixture***
I	Serbuk zink berlebihan + 50 cm^3 asid nitrik 0.4 mol dm^{-3} *Excess zinc powder +* *50 cm^3 nitric acid 0.4 mol dm^{-3}*	30 ^{0}C
II	Serbuk zink berlebihan + 50 cm^3 asid nitrik 0.2 mol dm^{-3} *Excess zinc powder +* *50 cm^3 nitric acid 0.2 mol dm^{-3}*	30 ^{0}C

Jadual 11/*Table 11*

Berdasarkan Jadual 11 di atas,
Based on Table 11 above,

(i) Tuliskan persamaan kimia tindak balas dan hitungkan isipadu maksimum gas hidrogen yang dihasilkan dalam set II.
[Jisim atom relatif: Zn =65; 1 mol gas menepati 24 dm^3 pada keadaan bilik]

Based on the above table, write a chemical equation for the reaction and calculate the maximum volume of hydrogen gas collected in set II.
[Relative atomic mass: Zn=65;1 mol of any gas occupies 24 dm^3]

[5 markah/ *marks*]

(ii) Lakarkan graf isipadu gas hidrogen yang dihasilkan melawan masa bagi kedua-dua set eksperimen.

Sketch the graph of volume of hydrogen gas produced against time for both sets of experiment.

[3 markah/ *marks*]

(iii) Berdasarkan Jadual 11 di atas, bandingkan kadar tindak balas antara set I dan set II.
Based on the above table, compare the rate of reaction between set I and set II.

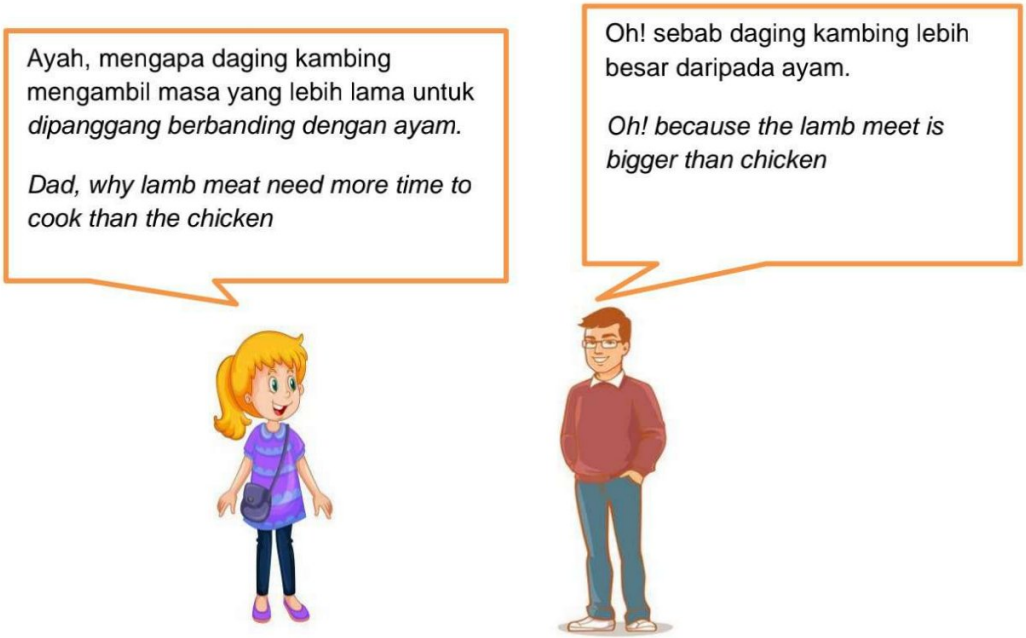
[2 markah/ *marks*]

(b)

Sate ayam
Chicken satay

Daging kambing
Lamb meat

Rajah 11.1/*Diagram 11.1*



Rajah 11.2/*Diagram 11.2*

Merujuk pada situasi di atas, huraikan satu eksperimen bagaimana faktor dapat mempengaruhi kadar tindak balas antara kalsium karbonat dengan asid hidroklorik. Dalam huraian anda sertakan

- Gambarajah berlabel
- Prosedur eksperimen
- Persamaan ion

Referring to the above situation, describe an experiment using the factor that affects the rate of reaction between calcium carbonate and hydrochloric acid. In your description, include

- *A labeled diagram*
- *Procedure of the experiment*
- *Ionic equation*

[10 markah/ *marks*]

KERTAS SOALAN TAMAT
END OF QUESTIONS

10 Seorang pelajar menjalankan tiga set eksperimen dengan menggunakan 1.3 g zink untuk mengkaji faktor yang mempengaruhi kadar tindak balas. Masa yang diambil untuk mengumpul 100 cm^3 gas direkodkan dalam Jadual 4.
A student carried out three sets of experiments by using 1.3 g *of zinc to investigate the factors that affect the rate of reaction. The time taken to collect* 100 cm^3 *of gas is recorded in Table* 4.

Set	**Bahan tindak balas** ***Reactants***	**Masa yang diambil untuk mengumpul 100 cm^3 gas (s)** ***Time taken to collect* 100 cm^3 *gas* (s)**
I	50 cm^3 asid sulfurik 0.5 mol dm^{-3} dengan serbuk zink 50 cm^3 *of* 0.5 mol dm^{-3} *sulphuric acid with zinc powder*	80
II	50 cm^3 asid sulfurik 0.5 mol dm^{-3} dengan ketulan zink 50 cm^3 *of* 0.5 mol dm^{-3} *sulphuric acid with zinc granule*	120
III	50 cm^3 asid sulfurik 1.0 mol dm^{-3} dengan serbuk zink 50 cm^3 *of* 1.0 mol dm^{-3} *sulphuric acid with zinc powder*	40

Jadual 4
Table 4

(a) (i) Kira kadar tindak balas bagi set I.
Calculate rate of reaction for set I.

[1 markah]
[1 *mark*]

(ii) Zink, Zn bertindak balas dengan asid sulfurik, H_2SO_4 menghasilkan zink sulfat, dan gas hidrogen. Tulis persamaan kimia yang seimbang bagi tindak balas itu dan hitung isipadu maksimum gas hidrogen yang dihasilkan dalam set III.
Zinc, Zn *reacts with sulphuric acid,* H_2SO_4 *to produce zinc sulphate, and hydrogen gas. Write a balanced chemical equation for the reaction and calculate the maximum volume of hydrogen gas produced in set* III.
[Jisim atom relatif; Zn = 65; 1 mol bagi sebarang gas menempati 24 dm^3 mol^{-1} pada keadaan bilik].
[*Relative atomic mass:* Zn = 65*;* 1 *mole of any gas occupies* 24 dm^3 mol^{-1} *at room conditions*].

[5 *markah*]
[5 *marks*]

[Lihat halaman sebelah

(b) Dengan merujuk kepada teori perlanggaran, bandingkan kadar tindak balas
By referring to the collision theory, compare the rates of reaction
(i) Set 1 dan set II
Set I *and set* II
(ii) Set I dan set III
Set I *and Set* III.

[10 markah]
[10 *marks*]

(c)

Ali ingin membakar sate pada jamuan hari lahirnnya yang ke-17.
Ali wants to grill satay on his 17^{th} *birthday celebration.*

(i) Berdasarkan pengetahuan anda di dalam kadar tindak balas, nyatakan **dua** faktor bagi memastikan sate cepat masak?
Based on your knowledge in rate of reaction, state ***two*** *factors to ensure satay cook faster*?

[2 markah]
[2 *marks*]

(ii) Berdasarkan jawapan anda di c(i), pilih **satu** faktor yang dinyatakan dan terangkan jawapan anda.
Based on your answer in c(i)*, choose* ***one*** *factor and explain your answer.*

[2 markah]
[2 *marks*]

10. (a) Jadual 10.1 menunjukkan dua situasi cara memasak kentang goreng.
Table 10.1 *shows two situations how to cook potatoes.*

Situasi *Situation*	A	B
Bentuk kentang *Shape of potatoes*	Jejari kentang *Fries*	Baji kentang *Wedges*
Gambar *Picture*		

Jadual / *Table* 10.1

Merujuk kepada Jadual 10.1, situasi manakah kentang akan masak terlebih dahulu?
Nyatakan faktor yang mempengaruhinya dan terangkan bagaimana faktor itu menyebabkan kentang cepat masak.
Refer to table 10.1, *which situation will the potatoes cook first? State the factor that influence it and explain how those factor cause potatoes to ripen quickly.*

[4 *marks*]

(b) Seorang pelajar menjalankan tiga set eksperimen untuk mengkaji faktor yang mempengaruhi kadar tindak balas. Masa yang diambil untuk mengumpul 40 cm^3 gas hidrogen direkodkan dalam Jadual 10.2
A student carried out three sets of experiment to investigate the factors that affect the rate of reaction. The time taken to collect 40 cm^3 *of hydrogen gas is recorded in Table* 10.2.

Set	Bahan tindak balas *Reactants*	Suhu campuran (°C) *Temperature of the mixture(°C)*	Masa yang diambil untuk mengumpul 40 cm^3 gas hydrogen (s) *Time taken to collect 40 cm^3 of hydrogen gas (s)*
I	25 cm^3 asid nitrik 0.2 mol dm^{-3} + serbuk zink berlebihan 25 cm^3 *of* 0.2 mol dm^{-3} *nitric acid + excess zinc powder*	30	90
II	25 cm^3 asid nitrik 0.2 mol dm^{-3} + serbuk zink berlebihan 25 cm^3 of 0.4 mol dm^{-3} *nitric acid + excess zinc powder*	40	55
III	25 cm^3 asid nitrik 0.2 mol dm^{-3} + serbuk zink berlebihan + mangkin X 25 cm^3 *of* 0.2 mol dm^{-3} *nitric acid + excess zinc powder + catalyst* X	30	30

Jadual / *Table* 10.2

(i) Zink bertindak balas dengan asid nitrik menghasilkan zink nitrat dan gas hidrogen. Cadangkan mangkin X. Seterusnya, tulis persamaan kimia yang seimbang bagi tindak balas itu dan hitung isipadu maksimum gas hidrogen yang dihasilkan dalam set I.
[Jisim atom relatif: Zn = 65; 1 mol bagi sebarang gas menempati 24 dm^3 mol^{-1} pada keadaan bilik]
Zinc reacts with nitric acid to produce zinc nitrate and hydrogen gas. Suggest catalyst X. *Hence, write a balanced chemical equation for the reaction and calculate the maximum volume of hydrogen gas produced in set* I.
[*Relative atomic mass:* Zn = 65; 1 *mol of any gas occupies* 24 dm^3 mol^{-1} *at room conditions*]

[6 *marks*]

(ii) Berdasarkan Jadual 4, bandingkan kadar tindak balas
Based on Table 4, *compare the rate of reaction*

- Antara set I dengan set II
  Between set I *and set* II

- Antara set I dengan set III
  Between set I *and set* III

Dengan merujuk kepada teori perlanggaran , terangkan jawapan anda.
By referring to collision theory, explain your answer.

[10 *marks*]

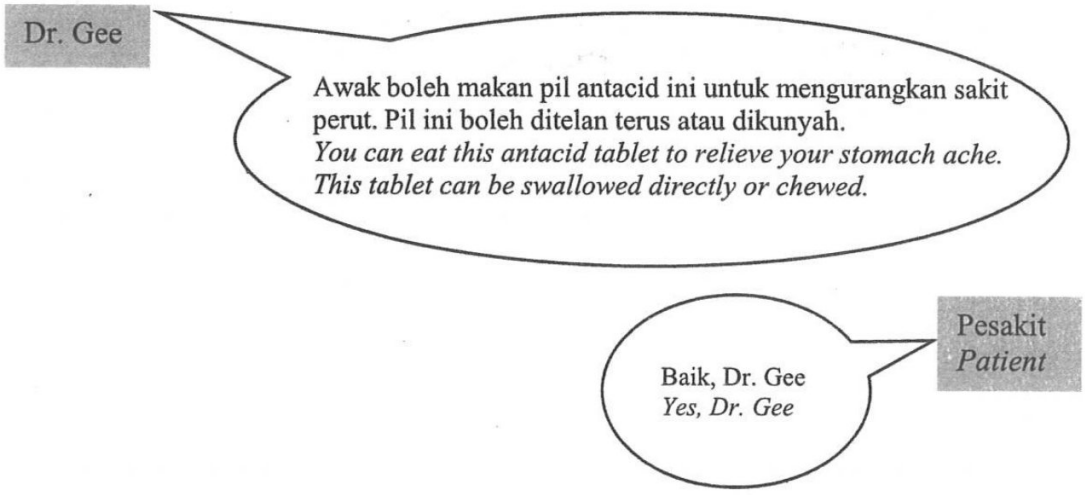
Bahagian B
***Section* B**

[20 markah]
[20 *marks*]

Jawab mana-mana **satu** soalan dalam bahagian ini.
Answer any ***one*** *question in this section.*

9 Rajah 9.1 menunjukkan perbualan antara pesakit yang mengalami sakit perut dengan seorang doktor.

Diagram 9.1 *shows a conversation between a patient with a stomach ache and her doctor.*



Rajah 9.1
Diagram 9.1

(a) (i) Berdasarkan Rajah 9.1, kaedah manakah yang melegakan sakit perut dengan lebih cepat? Terangkan jawapan anda.

Based on Diagram 9.1, *which method will relieve the stomach pain faster? Explain your answer.*

[3 marks]

(ii) Pil antasid mengandungi kalsium karbonat. Jadual 9 menunjukkan isipadu gas yang terkumpul melawan masa untuk tindak balas di antara pil antasid dengan asid hidroklorik. Set I dan Set II menggunakan pil antasid dengan saiz yang berbeza.

The antacid tablets contain calcium carbonate. Table 9 shows the volume of gas collected against time for the reaction between antacid tablets with hydrochloric acid. Set I *and Set* II *use the different size of antacid tablets.*

Set	**Masa (min)** ***Time* (min)**	**0**	**1**	**2**	**3**	**4**	**5**
I	Isipadu gas terhasil(cm^3) *Volume of gas evolved* (cm^3)	0.00	31.00	48.00	48.00	48.00	48.00
II	Isipadu gas terhasil (cm^3) *Volume of gas evolved* (cm^3)	0.00	38.00	54.00	67.00	72.00	72.00

Jadual 9
Table 9

(ii) Hitungkan kadar tindak balas purata bagi Set I dan Set II.
Calculate the average rate of reaction for Set I *and Set* II.

[2 marks]

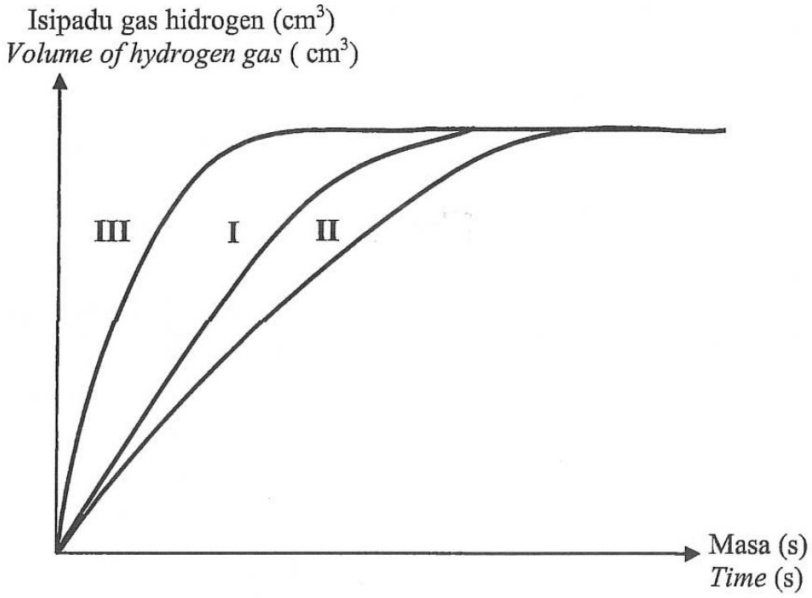
(iii) Tuliskan satu persamaan kimia seimbang yang mewakili tindak balas antara pil antasid dan asid hidroklorik dan hitungkan jisim kalsium karbonat dalam pil antasid dalam Set II.
[Jisim atom relatif : H=1, C=12, O=16, Cl=35.5, Ca=40]
[1 mol gas menempati 24 dm^3 pada keadaan bilik]

Write a balanced chemical equation to represent the reaction between antacid tablet and hydrochloric acid and calculate the mass of calcium carbonate in the antacids tablet in Set II.
[*Relative atomic mass* : H=1, C=12, O=16, Cl=35.5, Ca=40]
[1 mol *of gas occupies* 24 dm^3 *at room conditions*]

[5 marks]

(b) Rajah 9.2 menunjukkan graf isipadu gas yang terhasil melawan masa bagi tiga set eksperimen untuk menyiasat faktor-faktor yang mempengaruhi kadar tindak balas antara zink dan asid nitrik.

Diagram 9.2 shows the graph of volume of gas released against time for three sets of experiments to investigate the factors affecting rate of reaction between zinc and nitric acid.



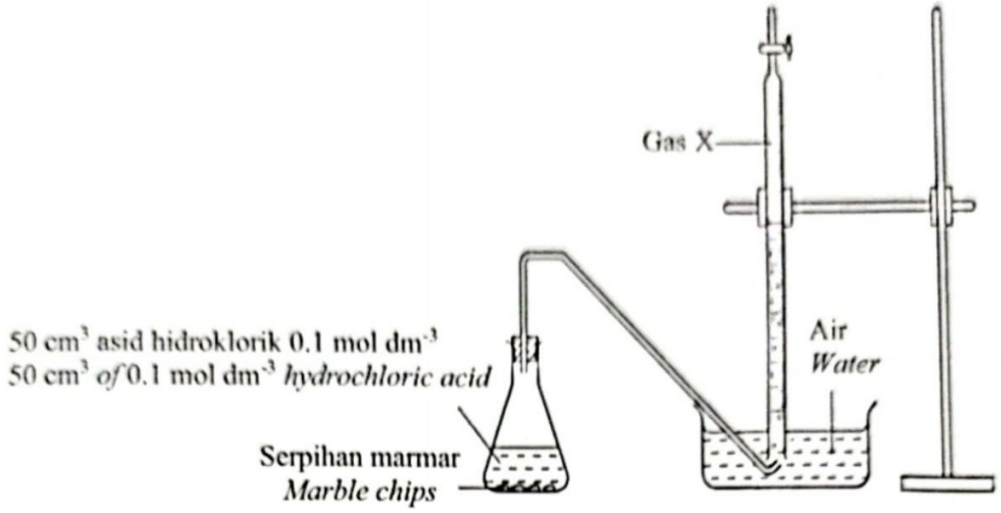
Rajah 9.2
Diagram 9.2

Serbuk zink berlebihan ditambah ke dalam 25 cm^3 asid nitrik 0.2 mol dm^{-3} pada 30 °C dalam Set I.
Cadangkan perubahan yang boleh dilakukan selain dari kepekatan asid nitrik dan suhu pada Set I untuk mendapatkan lengkung seperti dalam Set II dan Set III. Terangkan kedua-dua cadangan anda berdasarkan teori perlanggaran.

Excess zinc powder is added to 25 cm^3 *of* 0.2 mol dm^{-3} *nitric acid at* 30 °C *in Set* I. *Suggest changes that can be done to* Set I *other than the concentration of nitric acid and temperature to obtain the curve as shown in Set* II *and Set* III. *Explain both of your suggestions based on the collision theory.*

[10 marks]

7 (*a*) Rajah 7.1 menunjukkan susunan radas bagi menentukan kadar tindak balas antara serpihan marmar dan asid hidroklorik.
Diagram 7.1 *shows the apparatus set-up to determine the rate of reaction between marble chips and hydrochloric acid.*



Rajah 7.1
Diagram 7.1

(i) Apakah maksud kadar tindak balas?
What is the meaning of rate of reaction?

.....
[1 markah / 1 *mark*]

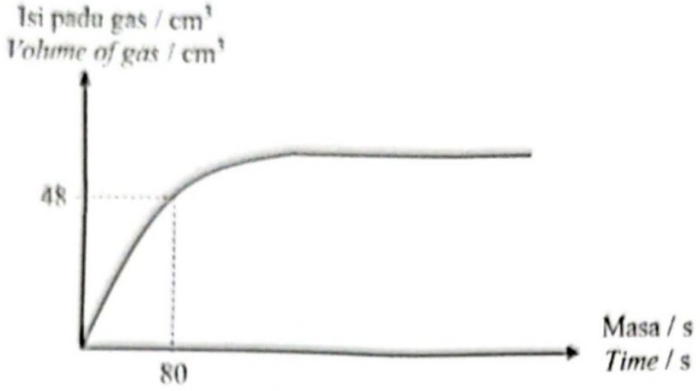
(ii) Apakah perubahan yang dapat diukur untuk menentukan kadar tindak balas dalam eksperimen ini?
What is the change that can be measured to determine the rate of reaction in this experiment?

.....
[1 markah / 1 *mark*]

(iii) Tulis persamaan kimia yang seimbang bagi tindak balas yang berlaku dalam eksperimen ini.
Write a balanced chemical equation for the reaction occurred in this experiment.

.....
[2 markah / 2 *marks*]

(*b*) Rajah 7.2 menunjukkan graf isi padu gas melawan masa bagi eksperimen ini.
Diagram 7.2 shows the graph of volume of gas against time for the experiment.



Rajah 7.2
Diagram 7.2

(i) Hitung kadar tindak balas purata dalam 80 saat pertama.
Calculate the average rate of reaction in the first 80 seconds.

[1 markah / 1 *mark*]

(ii) Tanpa mengubah kepekatan dan isi padu asid, cadangkan satu cara supaya masa yang diperlukan untuk mengumpul 48 cm^3 gas dapat dipendekkan.
Without changing the concentration and volume of the acid, suggest a way so that the time needed to collect 48 cm^3 gas can be shortened.

.....

[1 markah / 1 *mark*]

(*c*) (i) Ramalkan isi padu gas yang dikumpulkan dalam 80 saat pertama jika asid hidroklorik digantikan dengan asid etanoik yang mempunyai kepekatan yang sama.
Predict the volume of gas collected in the first 80 seconds if hydrochloric acid is replaced with ethanoic acid that have the same concentration.

.....

[1 markah / 1 *mark*]

(ii) Dengan menggunakan teori perlanggaran, terangkan jawapan anda di 7(*c*)(i).
By using collision theory, explain your answer in 7(*c*)(i).

.....

.....

.....

[3 markah / 3 *marks*]

Bahagian B
***Section* B**

[20 markah]
[20 marks]

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

9. (a) Rajah 9 menunjukkan dua jenis periuk yang berbeza.
Diagram 9 shows two different types of pots.

Periuk tekanan
Pressure cooker

Periuk aluminium
Aluminium pot

Rajah 9/ *Diagram 9*

Hidayu ingin memasak sup tulang untuk makan malam. Berdasarkan Rajah 9, sup tulang dalam periuk manakah yang akan masak dengan lebih cepat? Terangkan.
Hidayu wants to cook bone soup for dinner. Based on Figure 9, which pot of bone soup will cook faster? Explain.

[3 markah/ *3 marks*]

(b) Jadual 9 menunjukkan maklumat tentang eksperimen yang dilakukan oleh seorang pelajar untuk mengkaji faktor-faktor yang mempengaruhi kadar tindak balas antara magnesium dengan asid hidroklorik.
Table 9 shows the information about the experiments carried out by a student to investigate the factors that affect the rate of reaction between magnesium and hydrochloric acid.

Eksperimen *Experiment*	Bahan tindak balas *Reactants*	Suhu (^{0}C) *Temperature (^{0}C)*
I	Pita magnesium berlebihan + 25 cm^3 asid hidroklorik 0.5 mol dm^{-3} *Excess magnesium ribbon + 25 cm^3 of 0.5 mol dm^{-3} hydrochloric acid*	30
II	Serbuk magnesium berlebihan + 25 cm^3 asid hidroklorik 0.5 mol dm^{-3} *Excess magnesium powder + 25 cm^3 of 0.5 mol dm^{-3} hydrochloric acid*	30
III	Serbuk magnesium berlebihan + 25cm^3 asid hidroklorik 0.5 mol dm^{-3} *Excess magnesium powder + 25 cm^3 of 0.5 mol dm^{-3} hydrochloric acid*	40

Jadual 9/ *Table 9*

(i) Nyatakan takrif bagi kadar tindak balas dalam eksperimen I. Jika larutan kuprum(II) sulfat ditambahkan ke dalam eksperimen I, ramalkan kadar tindak balas bagi eksperimen tersebut.
State the definition for rate of reaction in experiment I. If copper(II) sulphate solution is added to experiment I, predict the rate of reaction for the experiment.

[2 markah/*2 marks*]

(ii) Tuliskan persamaan kimia bagi tindak balas yang berlaku antara magnesium dan asid hidroklorik dalam Eksperimen III.
Hitungkan isi padu gas yang dibebaskan bagi eksperimen tersebut.
Write the chemical equation for the reaction that occurred between magnesium and hydrochloric acid in Experiment III.
Calculate the volume of gas released for the experiment.

[Satu mol gas menempati isi padu 24.0 dm^3 pada keadaan bilik]
[One mole of gas occupies the volume of 24.0 dm^3 at room condition]

[5 markah/*5 marks*]

(iii) Bandingkan kadar tindak balas antara
Compare the rate of reaction between

- Eksperimen I dan Eksperimen II
  Experiment I and Experiment II

- Eksperimen II dan Eksperimen III
  Experiment II and Experiment III

Jelaskan jawapan anda berdasarkan Teori Perlanggaran.
Explain your answer based on the Collision Theory.

[10 markah/*10 marks*]

Bahagian B
Section B

[20 *markah*]
[20 *marks*]

Jawab **satu** soalan dalam bahagian ini.
Answer **one** *question in this section.*

9 (*a*) Rajah 9 menunjukkan dua situasi memanggang daging.
Diagram 9 *shows two situation of grilling meat.*

Situasi A
Situation A

Situasi B
Situation B

Rajah 9
Diagram 9

Berdasarkan Rajah 9, dalam situasi manakah daging akan masak dengan lebih cepat?
Nyatakan faktor yang mempengaruhi kadar untuk memasak daging itu.
Based on Diagram 9, *in which situation meat will cook faster*?
State the factor that affect the rate of cooking meat.

[2 *markah*]
[2 *marks*]

(*b*) Sekumpulan murid telah menjalankan eksperimen untuk mengkaji faktor yang mempengaruhi kadar tindak balas antara kalsium karbonat dan asid hidroklorik. Jadual 9 menunjukkan maklumat bagi bahan tindak balas dan masa yang diambil untuk mengumpul 50 cm^3 gas Y.

A group of students carried out experiments to investigate the factor affecting the rate of reaction between calcium carbonate and hydrochloric acid. Table 9 shows the information of the reactants and time taken to collect 50 cm^3 *of gas* Y.

Set ***Set***	**Bahan tindak balas** ***Reactants***	**Masa diambil / s** ***Time taken / s***
I	Serbuk kalsium karbonat berlebihan dan 50 cm^3 asid hidroklorik 1.0 mol dm^{-3} *Excess calcium carbonate powder and* 50 cm^3 *of* 1.0 mol dm^{-3} *hydrochloric acid*	25
II	Serbuk kalsium karbonat berlebihan dan 50 cm^3 asid hidroklorik 0.5 mol dm^{-3} *Excess calcium carbonate powder and* 50 cm^3 *of* 0.5 mol dm^{-3} *hydrochloric acid*	50

Jadual 9

Table 9

(i) Nyatakan maksud kadar tindak balas.

State the meaning of rate of reaction.

[1 *markah*]
[1 *mark*]

(ii) Tulis persamaan kimia bagi tindak balas antara kalsium karbonat dan asid hidroklorik.

Namakan gas Y yang terhasil.

Hitungkan isi padu maksimum bagi gas Y yang terhasil dalam eksperimen Set I.
[1 mol gas menempati 24 dm^3 pada keadaan bilik]

Write chemical equation for the reaction between calcium carbonate and hydrochloric acid.

Name the gas Y *produced.*

Calculate the maximum volume of gas Y *produced in experiment Set* I.
[1 mol *of gas occupies* 24 dm^3 *at room condition*]

[6 *markah*]
[6 *marks*]

(iii) Hitungkan kadar tindak balas purata bagi eksperimen Set I dan eksperimen Set II.

Calculate the average rate of reaction for experiment Set I *and experiment Set* II.

[2 *markah*]
[2 *marks*]

(iv) Dengan menggunakan teori perlanggaran, terangkan perbezaan kadar tindak balas antara eksperimen Set I dan eksperimen Set II.

By using the collision theory, explain the difference in the rate of reaction between experiment Set I *and experiment Set* II.

[5 *markah*]
[5 *marks*]

(v) Sekumpulan murid itu ingin mengulangi eksperimen Set I dengan meningkatkan suhu asid hidroklorik.

Terangkan bagaimana tindakan itu dapat mempengaruhi kadar tindak balas.

The group of students wants to repeat the experiment Set I *by increasing the temperature of hydrochloric acid.*

Explain how the action can affect the rate of reaction.

[4 *markah*]
[4 *marks*]

Bahagian B
Section B

[20 *markah*]
[20 *marks*]

Jawab **satu** soalan dalam bahagian ini.
Answer **one** *question in this section.*

9 Jadual 9 menunjukkan maklumat bagi Eksperimen I dan Eksperimen II untuk mengkaji kadar tindak balas antara zink karbonat dengan dua asid, P dan Q.

Table 9 *shows the information for Experiment* I *and Experiment* II *to study the rate of reaction of zinc carbonate with two acids*, P *and* Q.

Eksperimen ***Experiment***	**Bahan tindak balas** ***Reactants***	**Hasil tindak balas** ***Products***
I	0.625 g zink karbonat dengan 50 cm^3 asid P 2.0 mol dm^{-3} 0.625 g *of zinc carbonate and* 50 cm^3 *of* 2.0 mol dm^{-3} *acid* P	Zink nitrat, air dan gas S *Zinc nitrate, water and gas* S
II	0.625 g zink karbonat dengan 50 cm^3 asid Q 2.0 mol dm^{-3} 0.625 g *of zinc carbonate and* 50 cm^3 *of* 2.0 mol dm^{-3} *acid* Q	Zink sulfat, air dan gas S *Zinc sulphate, water and gas* S

Jadual 9
Table 9

(*a*) (i) Merujuk kepada Eksperimen I dan Eksperimen II, nyatakan:
- Maksud kadar tindak balas
- Faktor yang mempengaruhi kadar tindak balas
- Namakan asid P dan asid Q

Referring to Experiment I *and Experiment* II, *state*:
- *The meaning of rate of reaction*
- *Factor that affects the rate of reaction*
- *Name the acid* P *and acid* Q

[4 *markah*]
[4 *marks*]

(ii) Kenal pasti gas S.
Huraikan ujian kimia untuk mengesahkan gas S.
Identify gas S.
Describe the chemical test to verify gas S.

[3 *markah*]
[3 *marks*]

(iii) Tulis persamaan kimia bagi tindak balas antara asid Q dengan zink karbonat dan hitung isi padu maksimum gas S yang dihasilkan dalam Eksperimen II.
[Jisim atom relatif: Zn = 65, O = 16, C = 12 dan 1 mol bagi sebarang gas menempati 24 dm^3 pada keadaan bilik]

Write the chemical equation for the reaction of acid Q *with zinc carbonate and calculate the maximum volume of gas* S *produced in Experiment* II.
[*Relative atomic mass*: Zn = 65, O = 16, C = 12 *and* 1 *mol of any gas occupies* 24 dm^3 *at room conditions*]

[5 *markah*]
[5 *marks*]

(*b*) (i) Lakarkan graf isi padu maksimum gas S melawan masa bagi Eksperimen I dan Eksperimen II atas paksi yang sama.

Sketch a graph of the maximum volume of gas S *against time for Experiment* I *and Experiment* II *on the same axis.*

[3 *markah*]
[3 *marks*]

(ii) Berdasarkan graf di **9**(*b*)(i), bandingkan kadar tindak balas antara Eksperimen I dan Eksperimen II.

Terangkan jawapan anda menggunakan teori perlanggaran.

Based on the graph in **9**(*b*)(i), *compare the rate of reaction between Experiment* I *and Experiment* II.

Explain your answer using collision theory.

[5 *markah*]
[5 *marks*]

10 (a) Jadual 4 menunjukkan keputusan satu eksperimen bagi mengkaji faktor yang mempengaruhi kadar tindak balas.
Table 4 shows the result of an experiment to study the factors affecting the rate of reaction.

Eksperimen *Experiment*	I	II	III
Bahan tindak balas *Reactants*	Ketulan zink berlebihan + 20cm^3 asid sulfurik 0.1 moldm^{-3}. *Excess zinc granules + 20cm^3 of 0.1moldm^{-3} sulphuric acid*	Ketulan zink berlebihan + 20cm^3 asid sulfurik 0.1moldm^{-3}. *Excess zinc granule + 20cm^3 of 0.1moldm^{-3} sulphuric acid*	Serbuk zink berlebihan + 20cm^3 asid sulfurik 0.1 moldm^{-3} *Excess zinc powder + 20cm^3 of 0.1 moldm^{-3} sulphuric acid*
Suhu (°C) *Temperature (°C)*	30.0	40.0	40.0
Masa yang diambil untuk mengumpul 30cm^3 gas yang terbebas,(s) *Time taken for collecting 30cm^3 of gas released,(s)*	40.0	25.0	15.0

Jadual 4
Table 4

Berdasarkan Jadual 4,
Based on Table 4,

(i) Apakah maksud kadar tindak balas? *What is the rate of reaction?* [1 mark]

(ii) Tuliskan persamaan kimia bagi tindak balas antara zink dan asid sulfurik. Kira kadar tindak balas purata untuk Eksperimen I dan Eksperimen II dalam unit cm^3 s^{-1}.
Write the chemical equation for the reaction between zinc and sulphuric acid. Calculate the average rate of the reaction for Experiment I and Experiment II in cm^3 s^{-1}.
[4 marks]

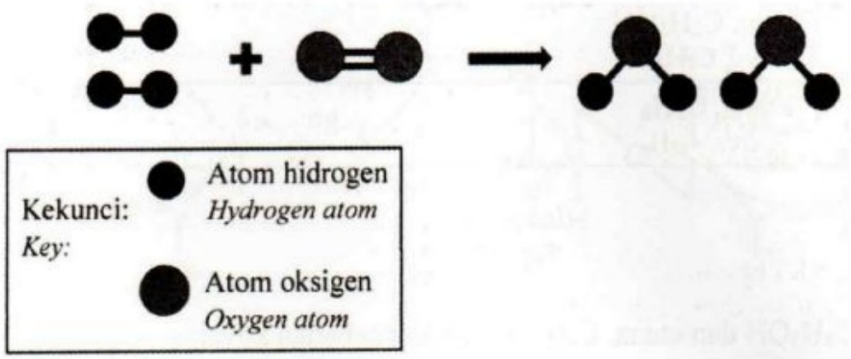
(iii) Lakarkan graf isi padu melawan masa bagi eksperimen I dan II dalam paksi yang sama.
Sketch the graph volume against time for experiment I and II in same axis.
[2 marks]

(iv) bandingkan kadar tindak balas antara;
compare the rate of reaction between;

- Eksperimen I dan II/ *Experiment I and II*
- Eksperimen II dan III/ *Experiment II and III*

Untuk setiap kes, terangkan perbezaan kadar tindak balas dengan merujuk kepada teori perlanggaran.
In each case, explain the difference in the rate of reaction with reference to the collision theory.
[8 marks]

10 (b) Rajah 8 menunjukkan model molekul bagi tindak balas antara gas hidrogen dan gas oksigen untuk menghasilkan molekul air.
Diagram 8 shows the molecular model for the reaction between hydrogen gas and oxygen gas to produce water molecule.



Rajah 8
Diagram 8

Molekul air terhasil apabila berlakunya perlanggaran berkesan antara zarah- zarah bahan tindak balas.
Water molecules are produced when effective collision occurred between the reactant particles.

(i) Apakah maksud perlanggaran berkesan? Nyatakan dua syarat untuk perlanggaran berkesan berlaku.
What is an effective collision? State two conditions for the effective collision to take place.
[3 marks]

(ii) Tulis persamaan kimia seimbang dan cadangkan satu cara untuk meningkatkan kadar tindak balas di atas.
Write a balanced chemical equation and suggest one way to increase the rate of reaction above.
[2 marks]

8 Tiga set eksperimen dijalankan untuk menyiasat faktor-faktor yang mempengaruhi kadar tindak balas. Jadual 6 menunjukkan bahan tindak balas dan keadaan tindak balas bagi Set I, II dan III.

Three sets of experiment are carried out to investigate the factors that affecting the rate of reactions. Table 6 shows the reactants and the conditions of reaction for Set I, II *and* III.

Set	**Bahan tindak balas** ***Reactant***	**Suhu** ***Temperature*** **(°C)**	**Masa yang diambil untuk mengumpul 50 cm^3 gas hidrogen (s)** ***Time taken to collect* 50 cm^3 *of hydrogen gas* (s)**
I	Serbuk zink berlebihan + 25 cm^3 asid hidroklorik 0.1 mol dm^{-3} *Excess zinc powder* + 25 cm^3 *hydrochloric acid* 0.1 mol dm^{-3}	30.0	50
II	Serbuk zink berlebihan + 25 cm^3 asid hidroklorik 0.1 mol dm^{-3} *Excess zinc powder* + 25 cm^3 *hydrochloric acid* 0.1 mol dm^{-3}	40.0	30
III	Ketulan zink berlebihan + 25 cm^3 asid hidroklorik 0.1 mol dm^{-3} *Excess zinc granules* + 25 cm^3 *hydrochloric acid* 0.1 mol dm^{-3}	40.0	60

Jadual / *Table* 6

Berdasarkan Jadual 6,

Based on Table 6,

(*a*) nyatakan dua faktor yang mempengaruhi kadar tindak balas.

state two factors that affect the rate of reaction.

……

……

[2 *markah / marks*]

(*b*) nyatakan satu perubahan yang dapat diperhatikan dalam eksperimen ini yang boleh digunakan untuk menentukan kadar tindak balas.

state one observable change in this experiment that can be used to determine the rate of reaction.

……

[1 *markah / mark*]

(*c*) Tulis persamaan kimia bagi tindak balas antara zink dan asid hidroklorik.

Write the chemical equation for the reaction between zinc and hydrochloric acid.

……

[1 *markah / mark*]

(*d*) Hitung kadar tindak balas purata dalam
Calculate the average rate of reaction in

Set I :

Set II :

[1 *markah / mark*]

(*e*) (i) Bandingkan kadar tindak balas antara Set I dan Set II.
Compare the rate of reaction between Set I *and Set* II.

……

[1 *markah / mark*]

(ii) Terangkan jawapan anda di **8**(*e*)(i) berdasarkan teori perlanggaran.
Explain your answer in **8**(*e*)(i) *based on collision theory.*

……

……

[2 *markah / marks*]

(*f*) Seorang murid ingin meningkatkan kadar tindak balas bagi Set I dengan menggantikan asid hidroklorik dengan asid etanoik yang sama kepekatan. Pada pandangan anda, adakah murid itu membuat keputusan yang betul? Terangkan jawapan anda.
A student wishes to increase the rate of reaction for Set I *by replacing the hydrochloric acid with ethanoic acid of the same concentration. In your opinion, do you think he made a correct decision? Explain your answer.*

……

……

[2 *markah / marks*]