

Structure {Paper03}

[SPM09-02-P3]

(a)

Times(s)	Burette reading (cm ³)	Volume of gas evolved (cm ³)
90	25.50	24.50
120	22.00	28.50

(b) The volume of the gas increases when the time increases from 0 s to 210 s and then remains constant until the end of the experiment.

(c) The rate of reaction is the volume of gas evolved per unit time or the volume of gas in cm³ evolved per second.

[SBPTrial07-01-P3]

(a)

Rubric	Score
[Able to state all 11 readings correctly] <ul style="list-style-type: none"> • 2 decimal places • Unit cm³ Suggested answer 49.60, 40.10, 31.50, 24.10, 19.50, 15.10, 11.50, 9.60, 8.10, 8.10, 8.10	3
[Able to state any 8 readings correctly]	2
[Able to state any 4 readings correctly]	1
No response or wrong response	0

(b)

Rubric	Score																																				
[Able to design a table and record the time, burette reading and volume of gas liberated] Time /minute 1. Buret reading /cm ³ 2. Volume of gas liberated Suggested answer: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Time /min</th> <th>0</th> <th>0.5</th> <th>1</th> <th>1.5</th> <th>2</th> <th>2.5</th> <th>3</th> <th>3.5</th> <th>4</th> <th>4.5</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>Buret reading /cm³</td> <td>49.60</td> <td>40.10</td> <td>31.50</td> <td>24.10</td> <td>19.50</td> <td>15.10</td> <td>11.50</td> <td>9.60</td> <td>8.10</td> <td>8.10</td> <td>8.10</td> </tr> <tr> <td>Volume of gas / cm³</td> <td>0.00</td> <td>9.50</td> <td>18.10</td> <td>25.50</td> <td>30.10</td> <td>34.50</td> <td>38.10</td> <td>40.00</td> <td>41.50</td> <td>41.50</td> <td>41.50</td> </tr> </tbody> </table>	Time /min	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	Buret reading /cm ³	49.60	40.10	31.50	24.10	19.50	15.10	11.50	9.60	8.10	8.10	8.10	Volume of gas / cm ³	0.00	9.50	18.10	25.50	30.10	34.50	38.10	40.00	41.50	41.50	41.50	3
Time /min	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5																										
Buret reading /cm ³	49.60	40.10	31.50	24.10	19.50	15.10	11.50	9.60	8.10	8.10	8.10																										
Volume of gas / cm ³	0.00	9.50	18.10	25.50	30.10	34.50	38.10	40.00	41.50	41.50	41.50																										
[Able to design a table and record two of the 3 items (time, burette reading and volume of gas liberated) // [Able to design table without unit]	2																																				
[Able to give idea on table] Suggest answer: 2 rows x 11 columns <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>																									1												

(c)

Rubric	Score
[Able to draw 2 graphs of volume of carbon dioxide gas liberated against time for both experiments on the same axes with all the 4 items below correctly] (i) suitable scale used (ii) axes labelled correctly (iii) all points plotted correctly (iv) smooth curve of graphs	3
[Able to draw the graphs of volume of carbon dioxide gas liberated against time for both experiments on the same axes with at least 3 items correctly] // [Able to draw one of the graphs volume of carbon dioxide gas liberated against time with at least 4 items above below correctly]	2
[Able to manipulate two items correctly]	1
No response or wrong response	0

(d)

Rubric	Score
[Able to deduce the relationship between the size of marble chips and the rate of reaction correctly]. Suggested answer: Small pieces of marble chips have a large total surface area than that a large pieces of marble chips of the same mass, course the time taken for reaction more shorter/ rate of reaction more higher	3
[Able to give incomplete relationship] Suggested answer: Small pieces of marble chips have a large total surface area time taken for reaction more faster / rate of reaction more higher	2
[Able to give an idea] Suggested answer: Small pieces of marble chips have a large total surface area // time taken for reaction more faster when size of reactant smaller // rate of reaction depend on the size of reactant	1
No response or wrong response	0

(e)

Rubric	Score
[Able to state three variables and the way to control them correctly] Example :	3
Manipulated variable : Total surface area of marble	Replace large marble chips with small small marble chips
Responding variable : Rate of reaction // time	Measure the volume of gas collected at half-minute interval
Fixed variable : Mass of marble, volume of hydrochloric acid, temperature	Use the same mass/5.0 g marble, same volume/50 cm ³ and concentration/ 0.1 mol dm ⁻³ hydrochloric acid, same temperature in each of the experiment

[Able to state any pair of variable and action correctly]	2
[Able to state any variable and any action correctly // any two variables correctly // any two action correctly]	1
No response or wrong response	0

(f)

Rubric	Score
[Able to state relationship small pieces of meat and time to cook correctly] Suggested answer <ul style="list-style-type: none"> • Smaller pieces of meat has bigger total surface area • The larger surface area provides a larger area for absorption heat • Increased absorption of heat shorten cooking time// The rate of reaction increases 	3
[Able to give incomplete relationship] Suggested answer [state the any two items above]	2
[Able to give an idea // state any one items above]	1
No response or wrong response	0

[SBPtrial04-01-p3] {Translate}

(a)

Rubric	Score
Dapat menyatakan perhubungan antara pemboleh ubah dimanipulasikan dengan pemboleh ubah bergerak balas dengan betul Cadangan jawapan <ul style="list-style-type: none"> • Saiz zarah berkurang kadar tindak balas bertambah/lebih tinggi • Saiz zarah bertambah kadar tindak balas berkurang/lebih rendah • Saiz zarah berkurang, masa untuk mengumpul gas berkurang • Saiz zarah bertambah, masa untuk mengumpul gas bertambah 	3
Dapat menyatakan perhubungan antara pemboleh ubah dimanipulasikan dengan pemboleh ubah bergerak balas dengan kurang tepat Cadangan jawapan <ul style="list-style-type: none"> • Saiz zarah bertambah kadar tindak balas lambat • Saiz zarah berkurang kadar tindak balas cepat • Saiz zarah bertambah masa bertambah / Saiz zarah berkurang masa berkurang 	2
Dapat menyatakan idea hipotesis atau tujuan eksperimen Cadangan jawapan *Mengkaji kesan saiz zarah ke atas kadar tindak balas Saiz zarah mempengaruhi kadar Saiz zarah bertambah, kadar tindak balas berkurang Saiz zarah berubah, kadar tindak balas berubah	1
Tidak memberikan respons atau respons salah	0

(b)

Rubric	Score
[Dapat menyatakan pemboleh ubah dimanipulasi, pemboleh ubah bergerak balas dan pemboleh ubah yang dimalarkan dengan lengkap] Cadangan jawapan: Pemboleh ubah dimanipulasikan : saiz marmar Pemboleh ubah bergerak balas : Masa untuk mengumpul gas // kadar tindak balas Pemboleh ubah yang dimalarkan: isipadu dan kepekatan asid	3
[Dapat menyatakan mana-mana dua pemboleh ubah dengan lengkap// mana-mana 3 pemboleh ubah yang tidak lengkap]	2
[Dapat menyatakan mana-mana satu pemboleh ubah dengan lengkap atau idea bagi mana-mana dua pemboleh ubah] Contoh jawapan: Pemboleh ubah dimanipulasikan : saiz Pemboleh ubah bergerak balas : Masa // kadar Pemboleh ubah yang dimalarkan: isipadu	1
Tidak memberikan respons atau respons salah	0

(c)

Rubric	Score
[Dapat melukis graf dengan betul memenuhi 4 kriteria berikut <ul style="list-style-type: none"> • 1. Paksi X berlabel masa dan berunit saat/ s Paksi Y berlabel isipadu gas dan berunit cm^3 • 2. skala konsisten dan graf meliputi sekurang-kurangnya 1/3 kertas graf • 3. Pindah semua titik dengan betul • 4. Graf melalui/menghampiri semua titik dan garis licin 	3
Dapat melukis graf dengan memenuhi kriteria berikut <ul style="list-style-type: none"> • Paksi X dan paksi Y berlabel/berunit // paksi terbalik • Skala konsisten • Pindah 3-4 titik dengan betul • Graf dilukis 	2
Dapat melukis idea graf dengan memenuhi perkara berikut: <ul style="list-style-type: none"> • Paksi X dan paksi Y • Ada titik//sebarang bentuk graf 	1
Tidak memberikan respons atau respons salah	0

(d)

Rubric	Score
[Dapat menunjukkan garis tangen pada ketika 120saat dan menghitung kecerunan pada ketika 120 saat dengan nilai dan unit yang betul] Cadangan jawapan <ul style="list-style-type: none"> • Kadar Eksperimen I [julat 0.210 – 0.310] cm^3s^{-1} • Kadar Eksperimen II [julat 0.310 – 0.410] cm^3s^{-1} 	3
[Dapat menghitung kecerunan pada ketika 120 saat dengan nilai yang betul]	2
[Dapat menunjukkan idea menghitung kecerunan dengan nilai Eksperimen II lebih tinggi daripada Eksperimen I]	1
Tidak memberikan respons atau respons salah	0

(d)

Rubric	Score
[Dapat menyatakan hubungan antara kadar tindak balas dengan saiz zarah secara kualitatif] Cadangan jawapan <ul style="list-style-type: none"> • Apabila saiz zarah kecil, kadar tindak balas tinggi// • Apabila saiz zarah besar, kadar tindak balas rendah 	3
[Dapat menyatakan hubungan antara kadar tindak balas dengan saiz zarah secara kualitatif] Cadangan jawapan <ul style="list-style-type: none"> • Saiz zarah kecil, kadar tindak balas cepat // • Kadar tindak balas berkadar songsang dengan saiz zarah 	2
[Dapat menyatakan idea hubungan antara kadar tindak balas dengan saiz zarah atau menyatakan tujuan eksperimen] Cadangan jawapan * kadar tindak balas dipengaruhi oleh saiz zarah//tindak balas dipengaruhi oleh saiz zarah// kadar tindak balas tinggi, saiz zarah kecil	1
Tidak memberikan respons atau respons salah	0

(e)

Rubric	Score
[Dapat menyatakan dengan betul hubung kait antara saiz kayu dengan kadar pembakarannya.] Cadangan jawapan <ul style="list-style-type: none"> • Semakin besar saiz kayu, kadar pembakarannya berkurang.// Semakin kecil saiz kayu, semakin tinggi kadar pembakarannya 	3
[Dapat menyatakan dengankurang tepat hubung kait antara saiz kayu dengan kadar pembakarannya]. Contoh jawapan <ul style="list-style-type: none"> • Saiz kayu berkadar songsang dengan kadar pembakarannya// Apabila saiz kayu besar, kadar pembakarannya lambat//Apabila saiz kayu kecil, kadar pembakarannya cepat 	2
[Dapat menyatakan idea umum, hubungkait antara saiz kayu dengan kadar pembakarannya] Contoh jawapan *Apabila saiz kayu besar, kadar pembakarannya meningkat// apabila saiz kayu kecil, kadar pembakarannya berkurang	1
Tidak memberikan respons atau respons salah	0

[SPM11-01]

1(a)(i) Yellow precipitate formed

(ii) sulphur is formed

(b) (i) Manipulated variable : Concentration of sodium thiosulphate

(ii) Responding variable : rate of reaction

(iii) Constant variable : concentration of hydrochloric acid// size of conical flask

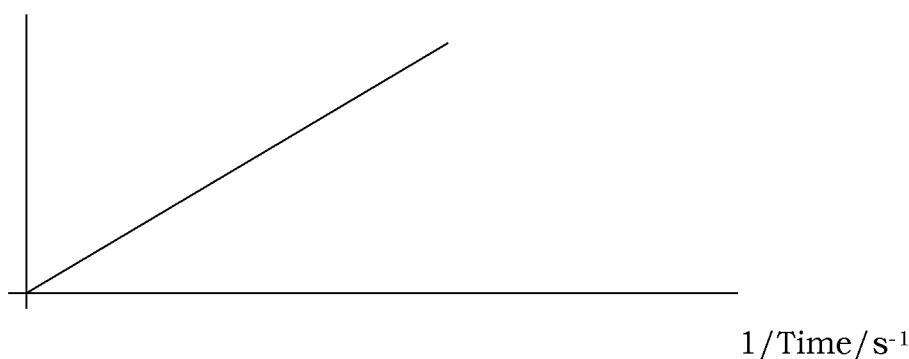
(c) The higher the concentration of sodium thiosulphate solution, the higher the rate of reaction

(d) Time taken for mark “X” to disappear from sight.

(e)(i)

Set	II	III	IV
Time (s)	25	33	50
$\frac{1}{\text{time}} \text{ (s}^{-1}\text{)}$	0.04	0.03	0.02

(ii) Concentration/ mol dm^{-3}



(f) (i) when the concentration of sodium thiosulphate solution is higher, the rate of reaction is higher

(ii) Based of graph, $1/\text{times} = 0.055 \text{ s}^{-1}$

(g) The smaller base of conical flask increases the thickness of yellow precipitate. Therefore, the time taken for mark “X” to disappear from sight becomes shorter.

(h)

Anions	Cations
Cl ⁻	H ⁺
S ₂ O ₃ ²⁻	Na ⁺

[SBPtrial06-02] {Translate}

(a)

Rubric	Score
(i) [Dapat menyatakan 5 bacaan dengan 3 titik perpuluhan] Jawapan : 0.050, 0.040, 0.028, 0.020, 0.011 dan (ii) [dapat melukis graf dengan betul memenuhi kriteria berikut] <ul style="list-style-type: none"> • Paksi X berlabel 1/masa berunit saat⁻¹ • Paksi Y berlabel kepekatan , berunit mol dm⁻³ • Skala konsisten dan graf meliputi sekurang-kurangnya separuh kertas • Pindah semua titik dengan betul • Bentuk graf betul 	3

(i) [Dapat menyatakan 5 bacaan betul] dan (ii) [Dapat melukis graf yang memenuhi kriteria berikut] – <ul style="list-style-type: none"> • Paksi X dan paksi Y berlabel / paksi terbalik • Skala konsisten • Pindah 3- 4 titik dengan betul • Graf dilukis 	2
(i) [Dapat menyatakan sekurang-kurangnya 3 bacaan betul] (ii) [Dapat melukis idea graf dengan memenuhi perkara berikut]- <ul style="list-style-type: none"> • Paksi X dan paksi Y • Ada titik / Sebarang bentuk graf • Graf dilukis 	1
Tidak memberi respons atau respons salah	0

(b)

Rubric	Score
[Dapat menyatakan hubungan antara kadar tindak balas dengan kepekatan dengan tepat] Contoh Jawapan Apabila kepekatan larutan natrium tiosulfat tinggi, kadar tindak balas tinggi / masa yang diambil untuk tanda X tidak kelihatan singkat // sebaliknya	3
[Dapat menyatakan dengan tepat hubungan antara kadar tindak balas dengan kepekatan secara kualitatif] Contoh Jawapan kadar tindak balas \propto kepekatan // kadar tindak balas berkadar terus dengan kepekatan	2
[Dapat menyatakan idea hubungan antara kadar tindak balas dengan kepekatan atau menyatakan tujuan eksperimen] Contoh Jawapan kadar tindak balas dipengaruhi oleh kepekatan// tindak balas dipengaruhi oleh kepekatan	1
Tidak memberi respons atau respons salah	0

(c)

Rubric	Score
[Dapat memberikan kesemua pemboleh ubah dengan betul] Cadangan jawapan: Pemboleh ubah yang dimanipulasikan: Kepekatan larutan natrium tiosulfat Pemboleh ubah yang bergerak balas: Kadar tindak balas (antara natrium tiosulfat dengan asid sulfurik)// Masa yang diperlukan tanda pangkah 'X' tidak kelihatan	3

Pemboleh ubah yang dimalarkan: Suhu tindak balas, Isi padu dan kepekatan larutan asid sulfurik, Saiz kelalang kon	
[Dapat memberikan dua pemboleh ubah dengan betul]	2
[Dapat memberikan satu pemboleh ubah dengan betul]	1
Tidak memberi respons atau respons salah	0

(d)

Rubric	Score
[Dapat menyatakan hipotesis dengan tepat] Contoh jawapan: Jika kepekatan larutan natrium tiosulfat bertambah, maka kadar tindak balas (antara natrium tiosulfat dengan asid sulfurik) bertambah	3
[Dapat menyatakan hipotesis dengan kurang tepat] Contoh jawapan Jika kepekatan bahan tindak balas bertambah, maka kadar tindak balas bertambah	2
[Dapat menyatakan idea tentang hipotesis] Contoh jawapan Kepekatan mempengaruhi kadar tindak balas // Kepekatan berbeza, kadar tindak balas berubah	1
Tidak memberi respons atau respons salah	0

[SBPmidyearF508-01]

(a)

Rubric	Score
[Able to write all the times with units accurately] Suggested answer: t_1 55.0 s, t_2 48.0 s , t_3 42.0 s , t_4 37.0 s , t_5 33.0 s	3
[Able to record all the times accurately but without units / no decimal place] t_1 55.0 , t_2 48.0 , t_3 42.0 , t_4 37.0 , t_5 33.0 // // t_1 55 s , t_2 48.0 s , t_3 42 s, t_4 37s, t_5 33s	2
[Able to write at least 3 readings of the times accurately]	1
No response given / wrong response	0

(b)

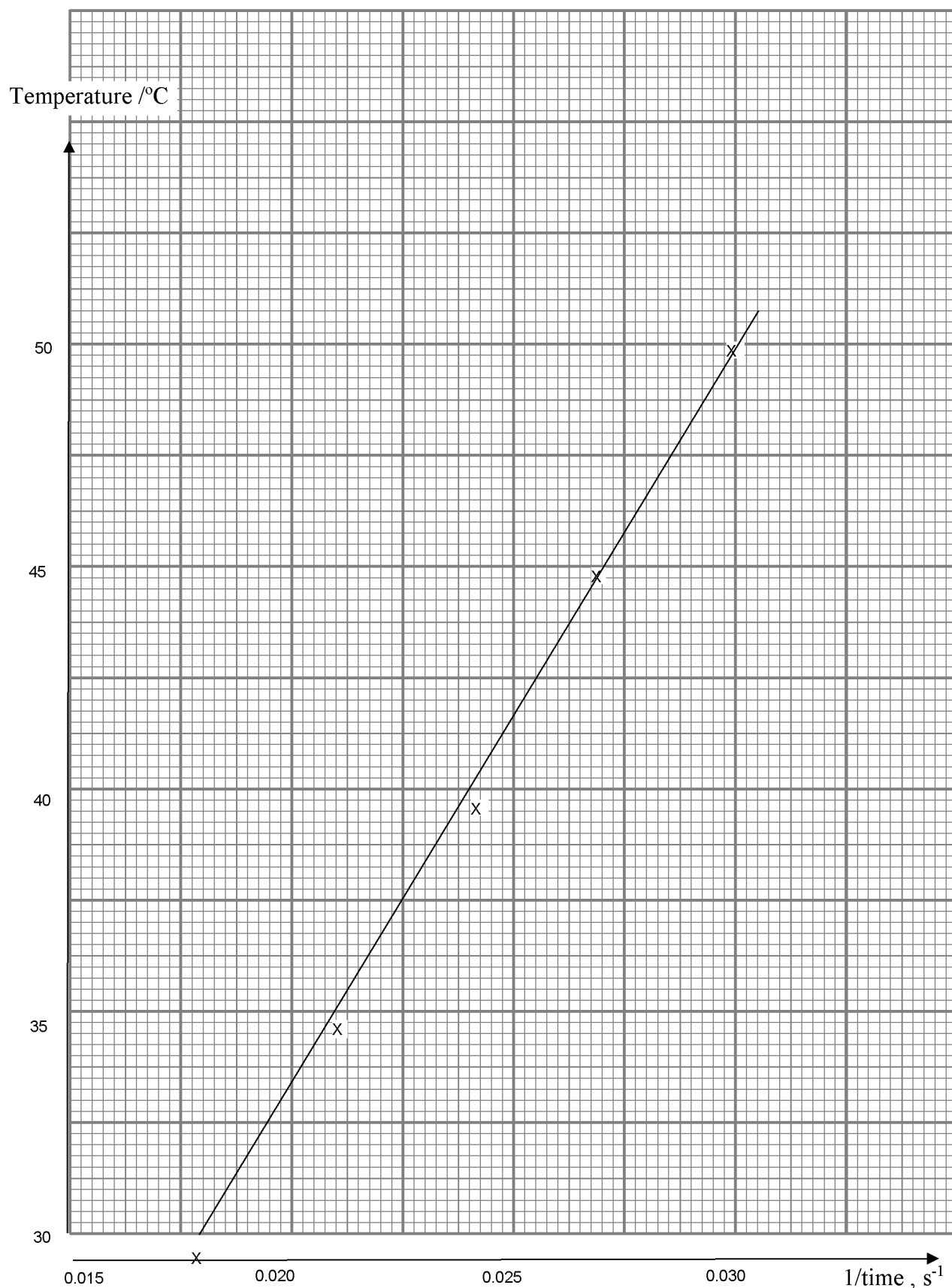
Rubric	Score
[Able to state the colour of sulphur and the rate of it is formed] Suggested answer: Pale / light yellow precipitate is slowly formed	3
[Able to state the colour of sulphur] Pale / light yellow precipitate is formed.	2
[Able to state the formation of precipitate] A precipitate is formed.	1
No response given / wrong response	0

(c)

Rubric	Score																		
[Able to construct a table correctly containing three labeled columns with correct units and record all the time and 1/time accurately] Suggested answer:	3																		
<table border="1"> <tbody> <tr> <td>Temperature, ° C</td> <td>30</td> <td>35</td> <td>40</td> <td>45</td> <td>50</td> </tr> <tr> <td>Time , s</td> <td>55.0</td> <td>48.0</td> <td>42.0</td> <td>37.0</td> <td>33.0</td> </tr> <tr> <td>1 / time , s⁻¹</td> <td>0.018</td> <td>0.021</td> <td>0.024</td> <td>0.027</td> <td>0.030</td> </tr> </tbody> </table>	Temperature, ° C	30	35	40	45	50	Time , s	55.0	48.0	42.0	37.0	33.0	1 / time , s ⁻¹	0.018	0.021	0.024	0.027	0.030	
Temperature, ° C	30	35	40	45	50														
Time , s	55.0	48.0	42.0	37.0	33.0														
1 / time , s ⁻¹	0.018	0.021	0.024	0.027	0.030														
[Able to construct a table correctly containing three labeled columns with correct units and record all the time and 1/time but not accurately]	2																		
[Able to write at least 3 readings of the times accurately]	1																		
No response given / wrong response	0																		

(d)(i)

Rubric	Score
[Able to draw a graph accurately that consists of the following aspects] Suggested answer: 1. Both axes labeled and units (Y axis - temperature , X axis – 1/ time) 2. All points transferred correctly 3. Uniform scale, graph size covers at least half of the graph paper. 4. Straight line/ best fits drawn	3
[Able to draw a graph that consists of the following aspects] 1. Both axes labeled / units (Y axis - temperature , X axis – 1/ time) 2. At least three points transferred correctly 3. Uniform scale, graph size covers at least half of the graph paper. 4. Straight line/ best fits drawn	2
[Able to draw a graph that consists of the following aspects] 1. Both axes labeled and units (Y axis - temperature , X axis – 1/ time) 2. Draw a line	1
No response given / wrong response	0



(d)(ii)

Rubric	Score
<p><i>[Able to interpret the relationship between the rate of reaction and the temperature of sodium thiosulphate solution from graph accurately]</i></p> <p>Suggested answer: The rate of reaction is directly proportional to the temperature of sodium thiosulphate solution // As the temperature of sodium thiosulphate increases the rate of reaction increases.</p>	3

[Able to interpret the relationship between the rate of reaction and the temperature of sodium thiosulphate solution from graph] The rate of reaction is proportional to the temperature // the temperature is proportional to the rate of reaction // the rate of reaction increases when the temperature increases.	2
[Able to state an idea of hypothesis] The temperature affects the rate of reaction.	1
No response given / wrong response	0

(e)

Rubric	Score								
[Able to state three variables and three action to be taken] Suggested answer:	3								
<table border="1"> <tr> <td>Variable</td> <td>Action to be taken</td> </tr> <tr> <td>Manipulated: Temperature</td> <td>Heat the sodium thiosulphate solution at different temperature // Use different temperature.</td> </tr> <tr> <td>Responding: Rate of reaction / time taken for “X” marks to disappear from view.</td> <td>Record the time taken for “X” mark to disappear from view.</td> </tr> <tr> <td>Controlled : Concentration and volume of H₂SO₄, concentration and volume of sodium thiosulphate solution, size of conical flask.</td> <td>Use the same concentration and volume of H₂SO₄ /sodium thiosulphate solution // Use same size conical flask.</td> </tr> </table>	Variable	Action to be taken	Manipulated: Temperature	Heat the sodium thiosulphate solution at different temperature // Use different temperature.	Responding: Rate of reaction / time taken for “X” marks to disappear from view.	Record the time taken for “X” mark to disappear from view.	Controlled : Concentration and volume of H ₂ SO ₄ , concentration and volume of sodium thiosulphate solution, size of conical flask.	Use the same concentration and volume of H ₂ SO ₄ /sodium thiosulphate solution // Use same size conical flask.	
Variable	Action to be taken								
Manipulated: Temperature	Heat the sodium thiosulphate solution at different temperature // Use different temperature.								
Responding: Rate of reaction / time taken for “X” marks to disappear from view.	Record the time taken for “X” mark to disappear from view.								
Controlled : Concentration and volume of H ₂ SO ₄ , concentration and volume of sodium thiosulphate solution, size of conical flask.	Use the same concentration and volume of H ₂ SO ₄ /sodium thiosulphate solution // Use same size conical flask.								
[Able to state any two variables and any two action to be taken]	2								
[Able to state any one variables and any one action to be taken]	1								
No response given / wrong response	0								

[SBP07 F5midyear-01]

(a)

Rubric	Score
[Able to state all 5 readings correctly] Suggested answer : 43s, 26s, 19s, 15s, 12s	3
[Able to state any 4 readings correctly]	2
[Able to state any 3 readings correctly]	1

(b)

Rubric	Score																		
[Able to design a table and record the temperature, time and 1/time correctly for this experiment. Suggested answer :	3																		
<table border="1"> <tr> <td>Temperature (°C)</td> <td>30</td> <td>35</td> <td>40</td> <td>45</td> <td>50</td> </tr> <tr> <td>Time (s)</td> <td>43</td> <td>26</td> <td>19</td> <td>15</td> <td>12</td> </tr> <tr> <td>1 / time (s⁻¹)</td> <td>0.023</td> <td>0.038</td> <td>0.053</td> <td>0.067</td> <td>0.083</td> </tr> </table>	Temperature (°C)	30	35	40	45	50	Time (s)	43	26	19	15	12	1 / time (s⁻¹)	0.023	0.038	0.053	0.067	0.083	
Temperature (°C)	30	35	40	45	50														
Time (s)	43	26	19	15	12														
1 / time (s⁻¹)	0.023	0.038	0.053	0.067	0.083														
[Able to state any 4 readings correctly]	2																		
[Able to state any 3 readings correctly]	1																		
No response or wrong response	0																		

(c)

Rubric	Score
[Able to draw a graph of temperature against $\frac{1}{\text{time}}$ with all the 4 items below correctly] i) suitable scale used ii) axes labelled correctly iii) all points plotted correctly iv) straight line of best fit drawn	3
[Able to draw a graph of temperature against $\frac{1}{\text{time}}$ with at least 3 items correctly]	2
[Able to manipulate two items correctly]	1
No response or wrong response	0

(d)

Rubric	Score
[Able to deduce the relationship between the rate of reaction and temperature correctly] i) temperature is directly proportional to 1/time ii) Rate of reaction is directly proportional to 1/time iii) So, rate of reaction is directly proportional to temperature	3
[Able to deduce at least two relationships correctly]	2
[Able to state at least one relationship correctly]	1
No response or wrong response	0

(e)

Rubric	Score
[Able to predict the time taken for the required temperature accurately] i) Method of predicting shown on the graph ii) Calculation shown iii) Answer to one decimal place iv) Time taken = $1 / 0.064 = 15.6\text{s}$	
[Able to predict the time taken for the required temperature but inaccurate answer] i) Method of predicting shown on the graph ii) Calculation shown iii) Answer inaccurate iv) Time taken = $1 / 0.064 = 15.625\text{s}$ or 15.63s	
[Not able to predict the time taken for the required temperature correctly] i) Method of predicting shown on the graph ii) Calculation not shown Time taken = 0.064s	
No response or wrong response	

[SPM03-01]

(a)	$t_1 = 55.0 \text{ s}$ $t_2 = 48.0 \text{ s}$ $t_3 = 42.0 \text{ s}$ $t_4 = 37.0 \text{ s}$ $t_5 = 33.0 \text{ s}$																		
(b)	<table border="1"> <thead> <tr> <th>Temperature/ °C</th> <th>Time/ s</th> <th>1/time/ s⁻¹</th> </tr> </thead> <tbody> <tr> <td>30</td> <td>55.0</td> <td>0.018</td> </tr> <tr> <td>35</td> <td>48.0</td> <td>0.021</td> </tr> <tr> <td>40</td> <td>42.0</td> <td>0.024</td> </tr> <tr> <td>45</td> <td>37.0</td> <td>0.027</td> </tr> <tr> <td>50</td> <td>33.0</td> <td>0.030</td> </tr> </tbody> </table>	Temperature/ °C	Time/ s	1/time/ s ⁻¹	30	55.0	0.018	35	48.0	0.021	40	42.0	0.024	45	37.0	0.027	50	33.0	0.030
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40	42.0	0.024																	
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50	33.0	0.030																	
(c)	(i) Graph : <ul style="list-style-type: none"> - X and Y axes labelled and unit - Correct scale, size more than 50% - All points transferred correctly - Smooth graph 																		
	(ii) Rate of reaction is directly proportional to the temperature																		
(d)	Time = 30.3 s																		
(e)	(i) Manipulated variable : temperature of sodium thiosulphate Responding variable : time for the 'X' mark disappear from sight or rate of reaction Controlled variable : volume and concentration of acid																		
	(ii) Heat the sodium thiosulphate solution with different temperature while the volume and concentration of sodium thiosulphate and acid remains constant.																		
(f)	The higher the temperature the higher the rate of reaction																		
(g)	The lower the temperature the lower the rate of food turns bad																		

[SBPtrial05-02] {Translate}

(a)

Rubric	Score
[Dapat menyatakan perhubungan antara pembolehubah dimanipulasi dengan pembolehubah bergerak balas dengan tepat]	3
Contoh Jawapan Apabila jisim mangkin mangan(IV) oksida bertambah (berkurang), kadar tindak balas penguraian hidrogen peroksida bertambah (berkurang)	
[Dapat menyatakan perhubungan antara pembolehubah dimanipulasi dan pembolehubah bergerak balas kurang tepat]	2

Contoh Jawapan Apabila jisim mangkin bertambah (berkurang), kadar tindak balas bertambah (berkurang)	
[Dapat menyatakan idea hipotesis atau tujuan eksperimen] Contoh Jawapan Jisim mangkin mempengaruhi kadar tindak balas // Apabila jisim mangkin bertambah, kadar tindak balas berkurang	1
Tidak memberi respons atau respons salah	0

(b)

Rubric	Score
[Dapat melukis graf dengan betul] <ul style="list-style-type: none"> • Paksi x : Isi padu/cm³ dan paksi y : Masa/minit • Skala konsisten dan graf meliputi sekurang-kurangnya setengah kertas graf • Semua titik dipindahkan dengan betul • Bentuk graf betul, melalui/menghampiri semua titik dan dan licin • Graf dilabel 	3
[Dapat melukis graf dengan kurang tepat] <ul style="list-style-type: none"> • Paksi x : Isi padu dan paksi y : Masa // Paksi terbalik • Skala konsisten • Sekurang-kurangnya 5 titik setiap graf dipindahkan dengan betul • Bentuk graf betul dan licin 	2
[Mempunyai Idea melukis graf] <ul style="list-style-type: none"> • Melukis paksi x dan paksi y • Bentuk graf betul 	1
Respons salah atau tiada respons	0

(c)(i)

Rubric	Score
[Dapat menghitung kadar tindak balas dengan betul dan berunit] <ul style="list-style-type: none"> • Melukis tangen pada kedua-dua graf saat ke 120 • Menunjukkan penghitungan kecerunan bagi kedua-dua graf • Jawapan betul dan berunit <p>Eksperimen I : Kadar tindak balas = [0.11 – 0.15] cm³ s⁻¹</p> <p>Eksperimen II : Kadar tindak balas = [0.16 – 0.20] cm³ s⁻¹</p>	3
[Dapat menghitung kadar tindak balas betul tanpa unit] <ul style="list-style-type: none"> • Melukis tangen pada kedua-dua graf saat ke 120 • Menunjukkan penghitungan kecerunan bagi kedua-dua graf 	2
[Dapat menunjukkan idea penghitungan kadar tindak balas] <ul style="list-style-type: none"> • Melukis tangen pada graf saat ke 120 	1
Respons salah atau tiada respons	0

(c)(ii)

Rubric	Score
[Dapat membuat definisi secara operasi daripada graf dengan tepat] Contoh jawapan: Jisim mangkin bertambah (berkurang) kadar tindak balas meningkat/ bertambah (berkurang)	3
[Dapat membuat definisi secara operasi dengan kurang tepat] Contoh jawapan: Kadar tindak balas berkadar terus dengan jisim mangkin atau sebaliknya	2
[Dapat menyatakan idea membuat definisi secara operasi] Contoh jawapan: Jisim mempengaruhi kadar tindak balas// Kadar tindak balas berkadar songsang dengan jisim mangkin	1
Tidak memberi respons atau respons salah	0

(c)(iii)

Rubric	Score
[Dapat membuat ramalan dengan tepat] Contoh jawapan : Kadar tindak balas penguraian hidrogen peroksida lebih rendah daripada [0.11 – 0.15] cm ³ s ⁻¹	3
[Dapat membuat ramalan dengan kurang tepat] Contoh jawapan : Kadar tindak balas lebih rendah daripada [nilai salah yang diperolehi daripada eksperimen I di (2) (c) (ii)]	2
[Idea tentang ramalan] Contoh jawapan : lebih rendah // sangat rendah	1
Respons salah atau tiada respons	0

(d)

Rubric	Score
[Dapat menyatakan perhubungan kadar tindak balas dengan masa dengan tepat] Contoh jawapan : Kepekatan hidrogen peroksida semakin berkurang terhadap masa	3

[Dapat menyatakan perhubungan kadar tindak balas dengan masa dengan tkurang epat] Contoh jawapan : Kuantiti hidrogen peroksida semakin berkurang terhadap masa	2
[Dapat menyatakan idea perhubungan kadar tindak balas dengan masa] Contoh jawapan : Kuantiti hidrogen peroksida/bahan tindak balas berkurang	1
Respons salah atau tiada respons	0

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