



**SULIT**

Nama : .....

Kelas : .....



**JABATAN PELAJARAN NEGERI JOHOR**

**PEPERIKSAAN PERCUBAAN SPM 2009**  
**CHEMISTRY**  
Kertas 3  
September

**4541/3**

1½ jam  
Satu jam tiga puluh minit

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**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

1. *Tuliskan nama dan tingkatan pada ruang yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
4. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

<i>Untuk Kegunaan Pemeriksa</i>		
<b>Soalan</b>	<b>Markah Penuh</b>	<b>Markah Diperoleh</b>
1	33	
2	17	
<b>JUMLAH</b>	50	

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Kertas soalan ini mengandungi 11 halaman bercetak

Jawab semua soalan.

- 1 The alkali metals in Group 1 of the Periodic Table of Elements can react with oxygen gas with different reactivity.

Table 1 shows the experiment and observation when Lithium, Li, Sodium, Na and Potassium, K react with Oxygen, O<sub>2</sub> gas.

Logam alkali dalam Kumpulan 1 Jadual Berkala Unsur boleh bertindak balas dengan gas oksigen dengan kereaktifan berbeza.

Jadual 1 menunjukkan eksperimen dan pemerhatian apabila Litium, Li, Natrium, Na dan Kalium, K bertindak balas dengan gas oksigen.

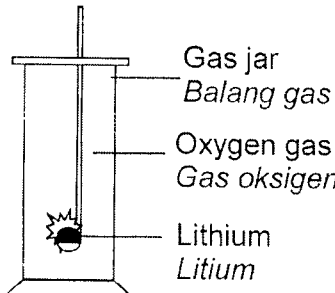
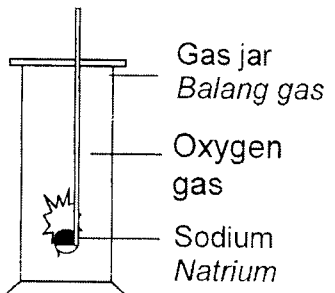
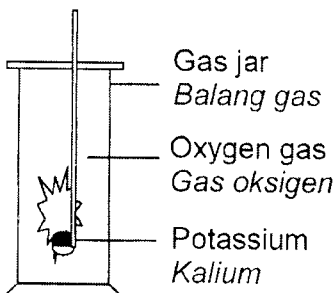
Experiment <i>Eksperimen</i>	Observation <i>Pemerhatian</i>
	<p>Lithium burns slowly with a red flame. White fume is released. White solid is produced.</p> <p><i>Litium terbakar perlahan-lahan dengan nyalaan merah. Wasap putih di bebaskan. Pepejal putih terhasil.</i></p>
	<p>Sodium burns vigorously with a yellow flame. White fume is released. White solid is produced.</p> <p><i>Natrium terbakar cergas dengan nyalaan kuning. Wasap putih terbebas. Pepejal putih terhasil.</i></p>
	<p>Potassium burns very vigorously with a reddish-purple flame. White fume is released. White solid is produced.</p> <p><i>Kalium terbakar sangat cergas dengan nyalaan ungu-kemerahan. Wasap putih terbebas. Pepejal putih terhasil.</i></p>

Table 1  
Jadual 1

(a) State the inference for the observations in Table 1.

*Nyatakan inferens bagi pemerhatian-pemerhatian dalam Jadual 1.*

.....  
.....

[3 marks]  
[3 markah]

(b) Based on the experiment above:

*Berdasarkan eksperimen di atas:*

(i) State the method to manipulate the variable.

*Nyatakan kaedah untuk memanipulasi pembolehubah.*

.....

(ii) State the responding variable.

*Nyatakan pembolehubah bertindak balas.*

.....

(iii) State the controlled variable.

*Nyatakan pembolehubah dimalarkan.*

.....

[3 marks]  
[3 markah]

(c) State the hypothesis for the experiment.

*Nyatakan hipotesis bagi eksperimen tersebut.*

.....

[3 marks]  
[3 markah]

(d) By referring to the reaction between alkali metals with oxygen, give the operational definition for the reactivity of alkali metals.

*Merujuk kepada tindak balas antara logam alkali dengan oksigen, berikan definisi secara operasi bagi kereaktifan logam-logam alkali.*

.....

[3 marks]  
[3 markah]

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1(b)

3
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1(c)

3
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1(d)

3
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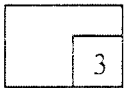
Alkali metal X ignites spontaneously in air with a reddish-violet flame. White fumes and a white solid are also produced.

*Logam X juga adalah merupakan ahli Kumpulan 1.*

*Logam alkali X terbakar secara spontan di udara dengan nyalaan ungu-kemerahan. Wasap putih dan pepejal putih juga terbentuk.*

- (i) Predict in which period, the metal X is located in the Periodic Table of Element.

1(e)(i)



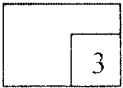
*Ramalkan Kala, logam X diletakkan dalam Jadual Berkala Unsur.*

[3 marks]

[3 markah]

- (ii) Based on the observations in Table 1 and (e) (i), arrange lithium, sodium, potassium and metal X in ascending order of reactivity of metals towards oxygen.

1(e)(ii)



*Berdasarkan pemerhatian dalam Jadual 1 dan (e) (i), susun litium, natrium, kalium dan logam alkali X mengikut tertib menaik kereaktifan logam terhadap oksigen.*

[3 marks]

[3 markah]

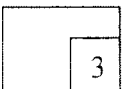
- (f) 0.2 g of sodium will take 18 seconds to burn completely in oxygen gas.  
0.5 g of sodium will take 45 seconds to burn completely in oxygen gas.  
State the relationship between the mass of sodium and the time taken for the metal to burn completely in oxygen gas.

*0.2 g natrium mengambil masa 18 saat untuk terbakar lengkap dalam oksigen gas.*

*0.5 g natrium mengambil masa 45 saat untuk terbakar lengkap dalam oksigen gas.*

*Nyatakan hubungan antara jisim natrium dan masa yang diambil untuk logam itu terbakar bertindak balas lengkap dalam oksigen gas.*

1(f)



[3 marks]

[3 markah]

When the reaction in Table 1 is completed, 10 cm<sup>3</sup> of water is poured into the gas jar. A pH meter is dipped into the solution formed. Table 2 shows the pH meter reading.

Apabila tindak balas dalam Jadual 1 selesai, 10 cm<sup>3</sup> air dituang ke dalam balang gas. Meter pH dicelup ke dalam larutan yang terbentuk. Jadual 2 menunjukkan bacaan meter pH..

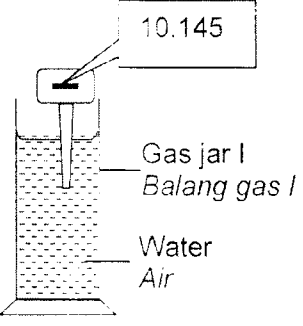
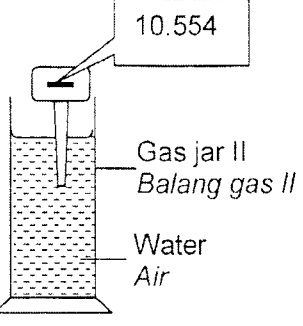
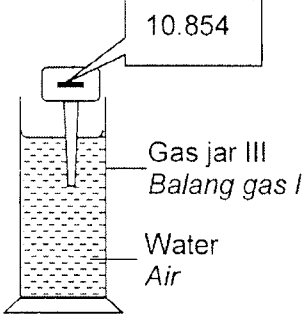
 <p>10.145</p> <p>Gas jar I Balang gas I</p> <p>Water Air</p>	 <p>10.554</p> <p>Gas jar II Balang gas II</p> <p>Water Air</p>	 <p>10.854</p> <p>Gas jar III Balang gas III</p> <p>Water Air</p>
Reading:..... Bacaan	Reading:..... Bacaan	Reading:..... Bacaan

Table 2

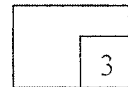
Jadual 2

(g) Record the pH meter reading to one decimal place in Table 2.

Rekod bacaan meter pH dengan satu tempat perpuluhan dalam Jadual 2.

[3 marks]  
[3 markah]

1(g)



- (h) Write the observations when blue litmus paper and red litmus paper are dipped into the solution formed in Gas Jar I, Gas Jar II and Gas Jar III.

*Tuliskan pemerhatian apabila kertas litmus biru dan merah dicelup ke dalam larutan yang terbentuk dalam Balang Gas 1, Balang Gas II dan Balang Gas III.*

Solutions <i>Larutan-larutan</i>	Red litmus paper <i>Kertas litmus merah</i>	Blue litmus paper <i>Kertas litmus biru</i>
Gas Jar I <i>Balang Gas I</i>		
Gas Jar II <i>Balang Gas II</i>		
Gas Jar III <i>Balang Gas III</i>		

1(h)

3
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[3 marks]  
[3 markah]

- (i) Write the balanced chemical equations for the reaction:

*Tulis persamaan kimia yang seimbang untuk tindak balas:*

- (i) Between alkali metal and oxygen gas (choose only one from Table 1):

*Di antara logam alkali dan gas oksigen (pilih satu daripada Jadual 1):*

.....

- (ii) Between the product formed from (i) (i) and water :

*Di antara hasil yang terbentuk daripada (i) (i) dan air:*

.....

[3 marks]  
[3 markah]

1(i)

3
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- (j) Classify the following alkaline solutions into strong alkali and weak alkali.

*Kelaskan larutan-larutan alkali berikut kepada alkali kuat dan alkali lemah.*

Sodium hydroxide, NaOH

Ammonia solution, NH<sub>3</sub>

*Natrium hidroksida, NaOH*

*Larutan ammonia, NH<sub>3</sub>*

Potassium hydroxide, KOH

Calcium hydroxide, Ca(OH)<sub>2</sub>

*Kalium hidroksida, KOH*

*Kalsium hidroksida, Ca(OH)<sub>2</sub>*

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1(j)

[3 marks]  
[3 markah]

	3
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Total  
1

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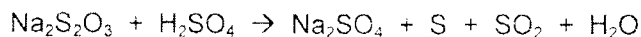
	33
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Use

## 2 Reaction I / Tindak balas I

Reaction between sodium thiosulphate,  $\text{Na}_2\text{S}_2\text{O}_3$  solution and dilute sulphuric acid,  $\text{H}_2\text{SO}_4$  will produce sodium sulphate,  $\text{Na}_2\text{SO}_4$ , sulphur, S, sulphur dioxide,  $\text{SO}_2$  and water,  $\text{H}_2\text{O}$ . The chemical equation is:

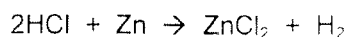
*Tindak balas antara larutan natrium tiosulfat,  $\text{Na}_2\text{S}_2\text{O}_3$  dan asid sulfurik cair,  $\text{H}_2\text{SO}_4$  akan menghasilkan natrium sulfat,  $\text{Na}_2\text{SO}_4$ , sulfur, S, sulfur dioksida,  $\text{SO}_2$  dan air,  $\text{H}_2\text{O}$ . Persamaan kimia adalah:*



## Reaction II / Tindak balas II

Reaction between hydrochloric acid, HCl and zinc, Zn will produce zinc chloride,  $\text{ZnCl}_2$  and hydrogen gas,  $\text{H}_2$ . The chemical equation is:

*Tindak balas antara asid hidroklorik, HCl dan zink, Zn akan menghasilkan zink klorida,  $\text{ZnCl}_2$  dan gas hydrogen,  $\text{H}_2$ . Persamaan kimia adalah:*

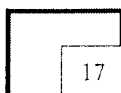


By using the information of Reaction I or Reaction II, plan an experiment to investigate the effect of temperature on the rate of reaction. Your planning should include:

*Dengan menggunakan maklumat Tindak balas I atau Tindak balas II, rancang satu eksperimen untuk mengkaji kesan suhu ke atas kadar tindak balas. Perancangan anda hendaklah mengandungi:*

- (i) Problem statement  
*Pernyataan masalah*
- (ii) All the variables  
*Semua pemboleh ubah*
- (iii) Hypothesis  
*Hipotesis*
- (iv) List of material and apparatus  
*Senarai bahan dan alat radas*
- (v) Procedure  
*Prosedur*
- (vi) Tabulation of data  
*Penjadualan data*

Total  
2



[17 marks]  
[17 markah]

END OF QUESTION PAPER