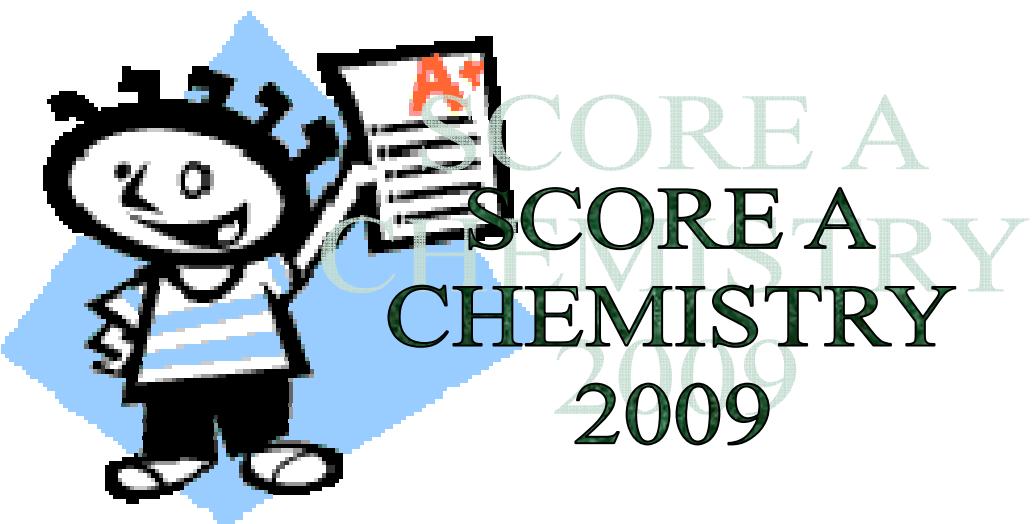




Projek Jawab Untuk Jaya (JUJ) 2009

MODULE DAN BAHAN SEMINAR UNTUK GURU

JUJ
JUJ
2009
2009



Module dan Bahan Seminar Untuk Guru
@JUJ 2009

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CHELIST FOR A MINIMUM NEEDS FOR THE CHAPTERS

Chapter 2: The Structure of the Atom

1. The kinetic theory of matter.
2. Meaning of atom, molecule and ion.
3. Define for melting point.
4. Define proton number and nucleon number.
5. State the meaning of isotopes and uses of carbon-14 and cobalt-60
6. Explain why the temperature remains unchanged during the melting process and the freezing process.
7. Explain the changes in energy content, forces of attraction between the particles, and arrangement of particles.
8. State the main subatomic particles of an atom.
9. $^{27}_{13}Al$ is the symbol of aluminium.
 - (a) Determine the number of neutron of and electron arrangement of aluminium.

Chapter 3: Chemical Formulae and Equations

1. State the meaning of relative atomic mass based on carbon-12 scale.
2. Define a mole.
3. State the meaning of molar mass
4. State the meaning of molar volume of gas.
5. State the meaning of empirical formula.
6. State the meaning of molecular formula.
7. Determine the empirical formula of copper(II) oxide and magnesium oxide.
8. **Describe a laboratory experiment to determine the empirical formula of magnesium oxide and copper(II) oxide.**

Chapter 4: Periodic Table of Elements

1. State the basic principle of arranging the elements in the Periodic Table from its proton number.
2. State the physical properties of Group 1.
3. State the physical properties of Group 17.
4. State the changes in the atomic size and electronegativity of elements across Period 3.
5. State three special properties of transition elements.
6. State why helium gas is not reactive.
7. **Describe a laboratory experiment to compare the reactivity of elements in**
 - a) **Group 1: lithium, sodium and potassium with water and oxygen.**
8. **Describe a laboratory experiment to compare the reactivity of chlorine, bromine and iodine in the reaction with iron wool.**



1. Chapter 5: Chemical Bonds

2. State the meaning of anion and cation.
3. State the physical properties of ionic compounds.
4. State the physical properties of covalent compounds.
5. Explain why sodium chloride can conduct electricity in aqueous state but cannot conduct electricity in solid state.
6. Describe the formation of ionic bond in sodium chloride, NaCl.
7. By using example, describe the formation of covalent bond between element from Group 14 and element from Group 17.
8. Draw electron arrangement of the compound formed from the following elements.
 - a) Nitrogen and hydrogen,
 - b) Carbon and oxygen,
 - c) Magnesium and chlorine,
 - d) Carbon and hydrogen,
 - e) Hydrogen and chlorine,
 - f) Sodium and oxygen.

Chapter 6: Electrochemistry

1. State the meaning of electrolyte and electrolysis.
2. State three factors affecting electrolysis of an aqueous solution.
3. Explain why solution of hydrogen chloride in water can conduct electricity but solution of hydrogen chloride in methylbenzene cannot conduct electricity?
4. Explain how the following factors can determine the selective discharge of ions at the electrodes.
 - i. Types of electrodes,
 - ii. Concentration of the ions.
5. **Describe the electrolysis of molten lead(II) bromide.**
6. **Describe the extraction of aluminium and lead(II) oxide by electrolysis.**
7. **Describe a laboratory experiment to show that types of electrodes affecting the selective discharge of ions in electrolysis of copper(II) sulphate solution.**
8. **Describe a laboratory experiment to construct the electrochemical series of magnesium, copper, zinc and lead.**



Chapter 7&8: Acids ,Bases and Salts

1. State the meaning of acid and alkali.
2. State the meaning of strong acid and weak alkali
3. Define salt.
4. Determine the molarity of the solution.
5. Determine the molarity of the nitric acid, HNO_3 using titration method.
6. Describe a chemical test to determine a given solution is an acid solution.
7. Describe a laboratory experiment to determine the concentration of sodium hydroxide by using titration method.
8. **Describe the preparation of zinc sulphate, lead(II) chloride and potassium**
9. **Describe the confirmatory tests to confirm for the present of nitrate ions in salt solution.**
10. **Describe the confirmatory tests to confirm for the present of carbonate ions besides heating.**
11. **Describe the confirmatory tests for the present of cations in colourless solution.**

Chapter 9: Manufactured Substance in Industry

1. Define the meaning of alloy and uses.
2. Define the meaning of composite materials
3. State the components of the following composite materials:
 - a. Reinforced concrete,
 - b. Superconductor,
 - c. Fibre optic,
 - d. Fibre glass,
 - e. Photochromic glass.
4. State the catalyst, temperature and pressure of the following process:
 - a. Contact process
 - b. Haber process
5. Define the meaning of polymers.
6. Name the monomer of polythene and polyvinyl chloride.
7. State four types of glass and their compositions. List the uses of each glass.
8. Define the meaning of ceramics
9. State the properties and list the uses of ceramics.
10. State why bronze is harder than copper.
11. Explain how acid rain is formed.
Describe how acid rain causes environmental pollution.
12. Explain the industrial process involved in the manufacture of sulphuric acid.
13. Explain the industrial process involved in the manufacture of ammonia gas.



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14. Describe a laboratory experiment to prepare ammonium sulphate (ammonium fertiliser)
15. Describe a laboratory experiment to compare the hardness of brass and copper.

Chapter 10: Rate of Reaction

1. Define the rate of reaction.
2. Define the collision theory, activation energy and effective collision.
3. Explain how surface area (size of reactant) can increase the rate of reaction based on collision theory.
4. Explain how temperature ,concentration, catalyst and size can increase the rate of reaction based on collision theory.
5. **Describe a laboratory experiment to show that an increase in temperature will increase the rate of reaction between sodium thiosulphate solution and sulphuric acid.**

Chapter 11: Carbon compounds

1. Define homologous series, saturated and unsaturated hydrocarbon and state an example for each of them.
2. Isomerism for butane,ethane and propane.
3. Define polimer and an example of polymer and its monomer.
4. Define saturated and unsaturated fats.
5. A test to differentiate between ethane and ethene by using acidified potassium mangante(II) solution or bromine water.
6. Explain the coagulation process of latex.
7. Explain how to prevent coagulation of latex.
8. **Describe a laboratory experiment to prepare ethane gas from ethanol.**
9. **Describe a laboratory experiment to prepare ethanoic acid gas from ethanol.**

Chapter 12: Oxidation and Reduction

1. Define a meaning of oxidation and deduction based on loss or gain of oxygen.
2. Define a meaning of oxidation and deduction based on transfer of electrons.
3. Define a meaning of oxidation and deduction based on changes in oxidation number.
4. Define a meaning of redox reactions
State an example of redox reactions.
5. The reaction between zinc and copper(II) sulphate solution is a redox reaction. Explain why.
6. Explain the observation when bromine water is added to the potassium iodide solution, the solution changes colour from colourless to brown.
7. Describe the rusting of iron.
8. Describe a change of color of 111 trichloroethene when chlorine water is added to potassium iodide solution in a test tube.



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9. Describe a laboratory experiment to change the oxidation number of iron from +2 to +3.
10. Describe a laboratory experiment to change the oxidation number of iron from +3 to +2 by using zinc.
11. Describe the extraction of iron.
- 12. You are given lead, zinc, copper and their oxides. Describe a laboratory experiment to compare the reactivity of zinc, copper and other oxides metal with oxygen.**

Chapter 12: Thermochemistry

1. Define exothermic reaction and endothermic reaction.
2. Determine :
 - i. the heat of precipitation
 - ii. the heat of displacement.
 - iii. heat of neutralisation?
 - iv. heat of combustion?
3. Draw for the energy level diagram.
- 4. "The higher the number of carbon atoms per molecule, the higher is the heat of combustion"**
Describe a laboratory experiment to prove that the above statement is true by using methanol, ethanol, propan-1-ol, butan-1-ol and pentan-1-ol.

Chapter 13: Chemicals for Consumers

1. Define soap and detergent.
2. Define a saponification process.
3. State the functions of additives in detergent.
4. Define a meaning of hard water.
5. State the function of food additives:
 - a. Preservatives (Sodium nitrite, sodium benzoate)
 - b. Antioxidants (Ascorbic acid)
 - c. Flavourings (Monosodium glutamate (MSG), Aspartame)
 - d. Stabilisers
 - e. Thickeners
6. State the functions of the following modern medicines.
 - a. Analgesics (Aspirin, Paracetamol, Codeine)
 - b. Antibiotics (Penicillin, Streptomycin)
 - c. Psychotherapeutic medicine (Stimulant, Antidepressant, Antipsychotic)
7. State the side effects of paracetamol and aspirin.
8. Describe the cleansing action of soap.
9. Explain the cleansing action of a detergent and a soap in hard water.
- 10. Describe a laboratory experiment to prepare soap from palm oil using the saponification process.**



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EXAM FORMAT FOR SPM CHEMISTRY PAPERS

PAPER	PAPER 1 [4541/1]	PAPER 2 [4541/2]	PAPER 3 [4541/3]
Item	Objective question Multiple choice & Multiple combination	Subjective question Section A Structured questions Section B Limited response questions Section C Open response questions	Structured question & Open response question
Number of questions	50 (answer all)	Section A 6 questions (answer all) Section B 2 question (choose one) Section C 2 question (choose one)	Structured questions 1-2 questions (answer all) Design and planning the experiment 1 question (compulsory)
Total marks	50	100	50
Ways to response	Marked on OMR form	Written in the space provided in the question paper	Written in the space provided in the question paper
Duration of time	1 hour 15 minutes	2 hours 30 minutes	1 hour 30 minutes
Construct	Knowledge: 20 questions Understanding: 15 questions Application: 15 question	Knowledge: 14% Understanding: 21% Application: 29% Analysing: 21% Synthesising: 15%	Sciences process skills: 13 sciences process skills
Level of difficulty	L: 25 questions M: 15 questions H: 10 questions	L:50% M:30% H:20%	



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ANALYSIS OF THE SPM CHEMISTRY PAPERS [2003 – 2008]

PAPER 2

CHAPTERS	YEAR						
	2002	2003	2004	2005	2006	2007	2008
FORM 4	1. Introduction to chemistry						
	2. The structure of the atom			2	½	1	1b
	3. Chemical formulae and questions		11			1	1a
	4. Periodic Table of elements	1	1		1		1a
	5. Chemical bonds					1	1a
	6. Electrochemistry		1	1	2		1b
	7. Acids and bases	1		1	2		1c
	8. Salts					1b	1c
	9. Manufactured substances in industry	1	2	1		1	1a
FORM 5	10. Rate of reaction	1	1		1	1	1a
	11. Carbon compounds	1	1	2			1a
	12. Oxidation and reduction	1	1	1			1c
	13. Thermochemistry	1	1	1	2		1a
	14. Chemical for consumer	1	1	1	1	1	1b

PAPER 3

CHAPTERS	YEAR						
	2002	2003	2004	2005	2006	2007	2008
FORM 4	1. Introduction to chemistry						
	2. The structure of the atom				1		
	3. Chemical formulae and questions			1			
	4. Periodic Table of elements			1			
	5. Chemical bonds						
	6. Electrochemistry				½		1[sps]
	7. Acids and bases		1		½		1(de)
	8. Salts						
	9. Manufactured substances in industry		1		1		
FORM 5	10. Rate of reaction						
	11. Carbon compounds			1		1	
	12. Oxidation and reduction		1				
	13. Thermochemistry					1	1[de]
	14. Chemical for consumer						

Note: *sps* – sciences process skills, *de* – design the experiment



THE MOLE



MODULE THE MOLE

One mole atom	<p>Relative atomic mass = 1 mole of atoms = $(6.02 \times 10^{23}$ atoms) = (A_r in grams)</p> <p>Example : Each 7g lithium, 12g carbon, 56g iron, 64g copper, 197g gold contains 6.02×10^{23} atoms (1 mole atom)</p> <p>[Relative atomic mass: Li,7 ; C,12 ; Fe,56 ; Cu,64 ; Au,197]</p>
One mole molecule	<p>Relative molecular mass = 1 mole of molecules = $(6.02 \times 10^{23}$ molecules) = (M_r in grams)</p> <p>Example : Each 2g hydrogen gas, 16g methane gas, 17g ammonia gas, 44g carbon dioxide gas contains 6.02×10^{23} molecules.</p> <p>[Relative atomic mass : H,1 ; C,12 ; N,14 ;O,16]</p>



ACTIVITY 1

Complete the table below.

Lengkapkan jadual dibawah

[Relative atomic mass, A_r : C,12 ; Al,27 ; He,4 ; H,1 ; O,16 ; N,14]

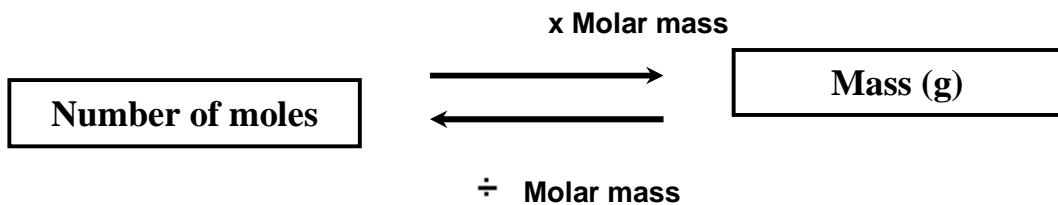
A_r : Atomic mass

Jisim atom

M_r : Molecular mass

Jisim molekul

Substance [Bahan]	Symbol or [Formula]	A_r or M_r	Mass of 1 mole [Jisim 1 mol]	Mass of 6.02×10^{23} Particles [Jisim 6.02×10^{23} Zarah]	Molar mass [Jisim molar]
Carbon	C	12 [1C]	12g	12g	12gmol^{-1}
Aluminium			27g		
Helium	He			4g	
Hydrogen	H ₂	2 x 1 [2H]			2 gmol^{-1}
Carbon Dioxide		44			
Ammonia				17g	
Hydrogen chloride					



Or write in formula,

$$\frac{\text{Mass of substance in gram}}{\text{Molar mass of substance}} = \frac{\text{Jisim bahan dalam gram}}{\text{Jisim molar bagi bahan}}$$

Number of moles of a substance = $\frac{\text{Bilangan mol bahan}}{\text{Molar mass of substance}}$

Example 1:

Calculate the number of moles of an atom which is found in 28g of iron.

Hitung bilangan mol bagi atom yang terdapat didalam 28g besi.

[Relative atomic mass : Fe, 56]

Solution :

$$\text{Step 1} \quad \text{Number of moles} = \frac{\text{mass}}{\text{relative atomic mass}}$$

$$\begin{aligned}\text{Step 2} \quad &= \frac{28}{56} \\ &= 0.5 \text{ mol}\end{aligned}$$



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Example 2 :

Calculate the mass of 0.5 mol carbon dioxide, CO₂?
Hitung jisim 0.5 mol karbon dioksida, CO₂?

[Relative atomic mass : C, 12; O, 16]

Solution :

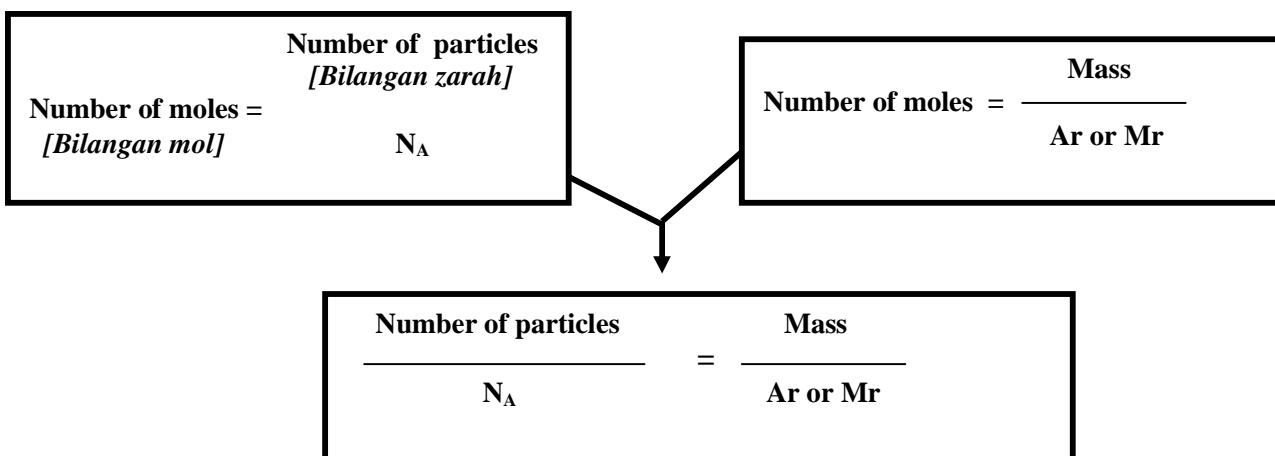
$$\text{Step 1} \quad \text{Number of moles} = \frac{\text{mass}}{\text{Relative molecular mass}}$$

$$\text{Step 2} \quad 0.5 = \frac{\text{mass}}{12 + (2 \times 16)}$$

$$0.5 = \frac{\text{mass}}{44}$$

$$\begin{aligned} \text{Thus, Mass of carbon dioxide} &= 0.5 \times 44 \\ &= 22\text{g} \end{aligned}$$

Problem involving relationships between **number of moles**, **number of particles** and **mass of substance** can be solved using a combination of both equations.
Perkaitan masaalah perhubungan diantara bilangan mol, bilangan zarah dan jisim bahan boleh diselesaikan dengan mengabungkan kedua-dua persamaan.





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To solve questions on the relationship between number of moles, number of particles and mass of substance, the following step can be used.

Untuk menyelesaikan perhubungan diantara bilangan mol, bilangan zarah dan jisim bahan, langkah-langkah berikut boleh digunakan.

Step 1 Langkah 1

Write the formula :

Tulis formula:

$$\frac{\text{Number of particles}}{N_A} = \frac{\text{mass}}{A_r \text{ or } M_r}$$

Step 2 Langkah 2

Substitute the values given into the formula.

Gantikan nilai yang diberikan kedalam formula

Example 3 :

Calculate the number of atoms found in 28g of iron.

Hitung bilangan atom yang didapati didalam 28g besi.
[Relative atomic mass : Fe, 56 ; $N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$]

Solution :

$$\frac{\text{Number of atoms}}{N_A} = \frac{\text{mass}}{\text{relative atomic mass}}$$

$$\frac{\text{Number of atoms}}{6.02 \times 10^{23}} = \frac{28}{56}$$

$$\begin{aligned}\text{Thus, the number of atoms} &= \frac{28}{56} \times 6.02 \times 10^{23} \text{ atoms} \\ &= 3.01 \times 10^{23} \text{ atoms}\end{aligned}$$



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Example 4 :

Calculate the mass in gram for 1.5×10^{24} chlorine molecules.
Hitung jisim dalam gram bagi 1.5×10^{24} molekul klorin

(Relative atomic mass : Cl,35.5 ; $N_A = 6.02 \times 10^{23}$)

Solution :

$$\begin{array}{c} \text{Number of atoms} & \text{mass} \\ \hline N_A & = \frac{\text{mass}}{\text{relative molecular mass}} \\ \hline 1.5 \times 10^{24} & = \frac{\text{mass}}{2 \times 35.5} \\ 6.02 \times 10^{23} & \end{array}$$

$$\begin{aligned} \text{Thus, the mass of chlorine} &= \frac{1.5 \times 10^{24}}{6.02 \times 10^{23}} \times 71 \\ &= 177.5 \text{ g} \end{aligned}$$

ACTIVITY 2:

Complete the table below
Lengkapkan jadual dibawah

[Relatif atomic mass : Ne,20 ; Zn,65 ; H,1 ; Cl,35.5 ; Na,23 ; O,16 ; Al,27 ; S,32 ; C,12 ; Ba,137 ;
 Avagadro Number, $N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$]

No	Element	Mass (g)	Number of moles (mol)	Number of particles
1	Neon,Ne	4		
2	Zinc, Zn			25×10^{24} atoms
3	Hydrochloric acid, HCl		1.5	
4	Sodium oxide, Na_2O	28		
5	Aluminium chloride, AlCl_3			8.5×10^{22} ions



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ACTIVITY 3 : CALCULATING RELATIVE MOLECULAR MASS MENGHITUNG JISIM MOLEKUL RELATIF

No	Name of Compound <i>Nama sebatian</i>	Formula of Compound <i>Formula sebatian</i>	Relative Molecule Mass/ Relative Formula Mass <i>Jisim molekul relatif/</i> <i>Jisim formula relatif</i>	Ans Jwp
1	Copper(II) chloride	CuCl_2	$64 + 2(35.5) = 135$	135
2	Potassium chloride			74.5
3	Sodium sulphate			142
4	Magnesium sulphate			120
5	Zink carbonate			125
6	Potassium nitrate			101
7	Iron(II) oxide			72
8	Calcium nitrate			164
9	Barium sulphate			233
10	Tin(II) chloride			190
11	Lead(II) oxide			223
12	Aluminum chloride			133. 5
13	Ammonium nitrate			80
14	Sodium nitrate			85
15	Silver oxide			232
16	Iron(III) chloride			162. 5
17	Sodium bromide			103
18	Sodium oxide			62
19	Lead(II) sulphate			303
20	Lithium oxide			30
21	Magnesium nitrate			148
22	Potassium iodide			166
23	Potassium sulphate			174
24	Magnesium oxide			40



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No	Name of Compound	Formula of Compound	Relative Molecule Mass/ Relative Formula Mass	Ans
25	Iron(II) carbonate			116
26	Carbon dioxide			44
27	Copper(II) carbonate			124
28	Sodium iodide			150
29	Ammonium nitrate			80
30	Copper(II) hydroxide			98
31	Calcium carbonate			100
32	Ammonium sulphate			132
33	Sodium carbonate			106
34	Silver sulphate			312
35	Aluminum oxide			102
36	Aluminum sulphate			342
37	Iron(III) oxide			160
38	Iron(III) sulphate			400
39	Potassium carbonate			138
40	Acetic acid			60
41	Sulfuric acid			98
42	Hydrochloric acid			36.5
43	Nitric acid			63
44	Magnesium hydroxide			58
45	Copper(II) nitrate			188
46	Magnesium etanoat	$(\text{CH}_3\text{COO})_2\text{Mg}$		142
47	Magnesium sulphate hydrate	$\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$		246
48	Copper(II) sulphate hydrate	$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$		250
49	Butanoic acid	$\text{C}_3\text{H}_7\text{COOH}$		88
50	Potassium manganese(VII)	KMnO_4		158



ACTIVITY 4:

- Calculate the number of moles in each question :
Hitung bilangan mol bagi setiap soalan:

(a) 10 g Sodium hydroxide

Answer:

i. Formula for sodium hydroxide	= NaOH
ii. Relative molecular mass for sodium hydroxide	= $1(23)+1(16)+1(1)$
	= 40
iii. Molar mass for sodium hydroxide	= 40g
iv. Number of mole	= $\frac{10 \text{ g}}{40 \text{ g}} = 0.25 \text{ mol}$

(b) 2 g Copper(II) sulphate

(c) 10.44 g Potassium sulphate

(d) 4.75 g Magnesium chloride

(e) 2.97 g zinc hydroxide



(f) 1.484 g sodium carbonate

(g) 2.769 g aluminum nitrate

(h) 32 g iron(III) sulphate

(i) 5.22 g magnesium hydroxide

(j) 1.655 g lead(II) nitrate



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2. Calculate the mass of :
Hitung jisim bagi:

(a) 0.5 mol sodium oxide

Answer:

i. Formula for sodium oxide	= Na_2O
ii. Relative molecular mass for sodium oxide	= $2(23) + 1(16) = 62$
iii. Molar mass for sodium oxide	= 62g
v. Number of mole	= 0.5 mol
vi. Mass for 0.5 mol sodium oxide	= $0.5 \times 62 = \underline{\underline{31.0\text{g}}}$

(b) 1.2 mol tin(II) chloride

(c) 0.25 mol copper(II) carbonate

(d) 0.3 mol calcium chloride

(e) 0.125 mol iron(II) sulphate



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(f) 0.34 mol potassium sulphate

(g) 0.2 mol barium sulphate

(h) 0.3 mol silver nitrate

(i) 0.12 mol magnesium nitrate

(j) 0.05 mol calcium sulphate



Answer:

1. (a) 0.25 mol (b) 0.0125 mol (c) 0.06 mol (d) 0.05 mol (e) 0.03 mol (f) 0.014 mol (g) 0.013 mol (h) 0.08 mol (i) 0.09 mol (j) 0.005 mol
2. (a) 31.0 g (b) 228.0 g (c) 31.0 g (d) 33.30 g (e) 19.0 g (f) 59.16 g (g) 46.60 g (h) 51.0 g (i) 17.76 g (j) 6.80 g

ACTIVITY 5 :

1. Calculate the number of atoms in :
Hitung bilangan atom didalam:

(a) 4 g oxygen atom

[answer: 1.5×10^{23}]

Answer:

$$\text{i. Formula for oxygen} = \text{O}$$

$$\text{ii. Total of an atoms in oxygen} = 1$$

$$\text{iii. Relative atomic mass for oxygen} = 16$$

$$\text{iv. Molar mass for oxygen} = 16\text{g}$$

$$\text{v. Number of mole} = \frac{4\text{ g}}{16\text{ g}} = 0.25$$

$$\text{vi. Number of atoms} = 0.25 \times 1 \times 6.02 \times 10^{23} = \underline{\underline{1.505 \times 10^{23}}}$$

(b) 1.9 g zinc

[answer: 1.8×10^{22}]

(c) 3 g magnesium

[answer: 7.5×10^{22}]

(d) 2 g hydrogen atom

[answer: 1.2×10^{24}]

(e) 10.08 g iron

[answer: 1.08×10^{23}]



(f) 0.2 mol sulfur

[answer: 1.2×10^{23}]

(g) 0.128 mol nitrogen atom

[answer: 7.68×10^{22}]

2. Calculate the number of atom in :
Hitung bilangan atom didalam:

(a) 4 g oxygen gas

[answer: 1.505×10^{23}]

Answer:

i. Formula for oxygen gas

$= O_2$

ii. Total of an atoms in oxygen gas

$= 2$

iii. Relative atomic mass for oxygen

$= 2(16)$

$= 32$

iv. Molar mass for oxygen

$= 32g$

v. Number of mole

$$= \frac{4 \text{ g}}{32 \text{ g}} = 0.125$$

vi. Number of atom $= 0.125 \times 2 \times 6.02 \times 10^{23}$

$$= \underline{\underline{1.505 \times 10^{23}}}$$

(b) 5.6 g magnesium oxide

[answer: 1.68×10^{23}]

(c) 4.9 g sulphuric acid

[answer: 2.1×10^{23}]



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(d) 1.8 g magnesium sulphate

[answer: 5.4×10^{22}]

(e) 1.96 g copper(II) hydroxide

[answer: 6×10^{22}]

(f) 2.6625 g aluminum nitrate

[answer: 9.75×10^{22}]

3. Calculate the number of ion in :
Hitung bilangan ion didalam:

(a) 4.9 g dilute sulphuric acid

[answer: 9.03×10^{23}]

Answer:

i. Formula for sulphuric acid = H_2SO_4

ii. Total of an ions in sulphuric acid = 3 = $2H^+ + 1SO_4^{2-}$

iii. Relative atomic mass for sulphuric acid = $2(1) + 1(32) + 4(16) = 98$

iv. Molar mass for sulphuric acid = 98g

v. Number of mole = $\frac{4.9\text{ g}}{98\text{ g}} = 0.05$

vi. Number of ions = $0.05 \times 3 \times 6.02 \times 10^{23} = \underline{\underline{9.03 \times 10^{23}}}$

(b) 1.8 g aqueous magnesium sulphate

[answer: 1.8×10^{22}]



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(c) 4.7 g aqueous copper(II) nitrate

[answer: 4.5×10^{22}]

(d) 17 g aqueous zinc chloride

[answer: 2.25×10^{23}]

(e) 17 g aqueous silver nitrate

[answer: 1.2×10^{23}]

(f) 414 g aqueous potassium carbonate

[answer: 5.4×10^{24}]



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4. Calculate the mass of :
Hitung jisim bagi:

(a) 3×10^{23} oxygen atom

[answer:8.0 g]

Answer:

i. Formula for oxygen atom

= O

ii. Relative atomic mass for oxygen atom

= 16

iii. molar mass for oxygen

= 16g

iv. Number of mole = $\frac{3 \times 10^{23} \text{ atom}}{6.02 \times 10^{23} \text{ atom}}$

= 0.50 mol

v. mass for 3×10^{23} oxygen atom = 0.50×16

= **8.0g**

(b) 7.2×10^{23} zinc atom

[answer:78 g]

(c) 7.5×10^{22} sulfur atom

[answer:4.0 g]

(d) 1.8×10^{21} lead atom

[answer:0.621g]

(e) 2.4×10^{22} magnesium atom

[answer:0.96 g]



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(f) 3 hydrogen atom

[answer: 5×10^{-24} g]

(g) 12 helium atom

[answer: 1.2×10^{-22} g]

ACTIVITY 6: MOLE IN CHEMICAL EQUATION I *MOL DIDALAM PERSAMAAN KIMIA 1*

- 3.1 g of copper(II) carbonate is heated to produced copper(II) oxide and carbon dioxide gas.
3.1g kuprum(II) karbonat dipanaskan untuk menghasilkan kuprum(II) oksida dan gas karbon dioksida.
[relative atomic mass for Cu,64;C,12;O,16; Molar Volume is 22.4 dm³ at STP]



From the reaction, calculate:

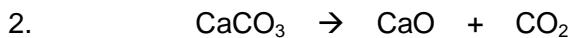
Daripada tindakbalas, hitung:

- the mass of copper (II) oxide produced.
Jisim kuprum(II) oksida yang terhasil.

- the volume of carbon dioxide gas produced at STP
isipadu gas karbon dioksida yang terhasil pada STP.



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In this reaction, 300 cm³ carbon dioxide gas are produced when calcium carbonate is heated.

Dalam tindakbalas ini, 300 cm³ gas karbon dioksida dihasilkan apabila kalsium karbonat dipanaskan.

[relative atomic mass for Cu,64;C,12;O,16; Molar Volume is 22.4 dm³ at STP]

Calculate:

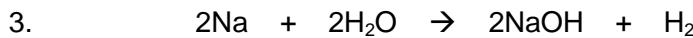
Hitung:

- (a) the mass of calcium carbonate used.

Jisim kalsium karbonat yang digunakan.

- (b) mass of calcium oxide produced.

Jisim kalsium oksida yang dihasilkan.



When 0.23 g of sodium is added to water, the metal will react vigorously at the surface of the water.

Apabila 0.23g natrium dimasukkan kedalam air, logam tersebut bertindakbalas dengan cergas dipermukaan air.

[Relative atomic mass for Na,23;H,1;O,16;Molar volume is 24 dm³ at room temperature]

Calculate:

Hitung:

- (a) The mass sodium hydroxide produced.

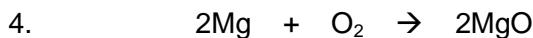
Jisim natrium hidroksida yang dihasilkan.

- (b) Volume of hydrogen gasses yang being produced at temperature room.

Isipadu gas hidrogen yang dihasilkan pada suhu bilik.



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A strip of magnesium has a weight of 1.2 g are being burn with surplus oxygen to produced magnesium oxide.

Kepingan magnesium seberat 1.2g dibakar dengan campuran oksigen untuk menghasilkan magnesium oksida.

[Relative atomic mass Mg,24;O,16]

Calculate:

Hitung:

- (a) The mass magnesium oxide being produced.
Jisim magnesium oksida yang dihasilkan

- (b) The mass of oxygen that needed for this reaction.
Jisim oksigen yang diperlukan bagi tindakbalas ini.



Chemical equation above shows when propane gas was burned in oxygen. If 3.36 dm³ of carbon dioxide gas are produced in this reaction at STP,

Persamaan diatas menunjukkan apabila gas propane dibakar didalam oksigen. Sekiranya 3.36 dm³ gas karbon dioksida dihasilkan dalam tindakbalas ini pada STP,

[relative atomic mass for C, 12; O, 16; H, 1; Molar Volume is 22.4 dm³ at STP]

Calculate:

Hitung:

- (a) The mass of propane burned
Jisim propana yang terbakar.

- (b) Volume of oxygen gas that reacted
Isipadu oksigen yang bertindakbalas.



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1.35g of aluminium powder and copper (II) oxide was heated strongly in laboratory to produced aluminium oxide and copper.

1.35g serbuk aluminium dan kuprum(II) oksida dipanaskan dengan kuat didalam makmal untuk menghasilkan aluminium oksida dan kuprum.

[relative atomic mass for Al,27;O,16;Cu,64]

Calculate:

Hitung:

- (a) The mass of copper (II) oxide reacted
Jisim kuprum(II) oksida yang bertindakbalas.

- (b) The mass of aluminium oxide produced.
Jisim aluminium oksida yang dihasilkan.

- (c) The mass of copper produced.
Jisim kuprum yang dihasilkan.

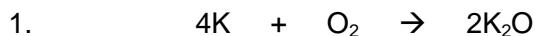


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Answer

- | | | |
|------------------------------------|------------------------------------|-------------------------------------|
| 1. (a) 2 g (b) 0.56 dm^3 | 2.(a) 1.25 g (b) 0.7 g | 3. (a) 0.4g (b) 0.12 dm^3 |
| 4. (a) 2 g (b) 0.8 g | 5.(a) 2.2 g (b) 5.6 dm^3 | 6.(a) 6 g (b) 2.55 g (c) 4.8 g |

ACTIVITY 6 :MOLE IN CHEMICAL EQUATION II



11.7 g of potassium was burnt in oxygen to produce potassium oxide.

11.7g kalium dipanaskan didalam oksigen untuk menghasilkan kalium oksida
[Relative atomic mass: K, 39; O, 16; Molar Volume is 24 dm^3 at room temperature]

Calculate:

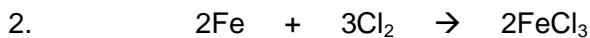
Hitung:

(a) Mass of potassium oxide being produced
Jisim kalium oksida yang dihasilkan.

(b) Volume of oxygen reacts at room temperature
Jisim oksigen yang bertindakbalas pada suhu bilik.



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33.6 g of iron react with chlorine gas to produced iron (III) chloride at room temperature.

33.6g besi bertindakbalas dengan gas klorin menghasilkan Ferum(III) klorida pada suhu bilik.

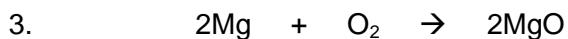
[Relative atomic mass: Fe, 56; Cl, 35.5; Molar Volume is 24 dm³ at room temperature]

Calculate:

Hitung:

- (a) Mass of iron (III) chloride produced
Jisim ferum(III) klorida yang dihasilkan.

- (b) Volume of chlorine gas reacts
Isipadu gas klorin yang bertindakbalas.



3.84 g of magnesium was burnt in oxygen gas to produced magnesium oxide in a laboratory.

3.84g magnesium dibakar didalam oksigen untuk menghasilkan magnesium oksida didalam makmal.

[Relative atomic mass: Mg, 24; O, 16; Molar Volume is 24 dm³ at room temperature]

Calculate:

Hitung:

- (a) Mass of magnesium oxide produced.
Jisim magnesium oksida yang dihasilkan.

- (b) Volume of oxygen reacts with magnesium at room temperature.
Isipadu oksigen yang bertindakbalas dengan magnesium pada suhu bilik.



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5.05 g of potassium nitrate was heated strongly to produce potassium nitrite and oxygen gas at standard temperature.

5.05g kalium nitrat dipanaskan dengan kuat menghasilkan kalium nitrat dan gas oksigen pada suhu piawai.

[Relative atomic mass: K, 39; N, 14; O, 16; Molar Volume is 22.4 dm^3 at standard temperature]

Calculate:

Hitung:

- (a) Mass of potassium nitrite produced
Jisim kalium nitrat yang dihasilkan.

- (b) Volume of oxygen produced
Isipadu gas oksigen yang dihasilkan.



7.282 g of lead nitrate was heated strongly to produce products as above at STP.

7.282g plumbum nitrat dipanaskan dengan kuat untuk menghasilkan bahan tindakbalas seperti diatas pada STP.

[Relative atomic mass: Pb, 207; N, 14; O, 16; Molar Volume is 22.4 dm^3 at standard temperature and pressure]

Calculate:

Hitung:

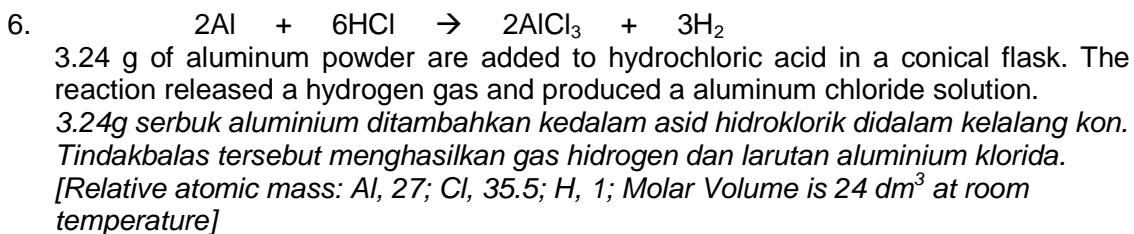
- (a) Mass of lead (II) oxide
Jisim plumbum(II) oksida.



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- (b) Volume of nitrogen dioxide gas released
Isipadu gas nitrogen dioksida yang dibebaskan.

- (c) Volume of oxygen produced in the experiment.
Isipadu gas oksigen yang dihasilkan didalam eksperimen.



Calculate:

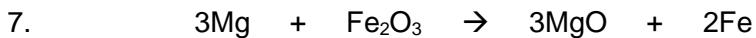
Hitung:

- (a) Mass of hydrochloric acid reacts with aluminum
Jisim asid hidroklorik yang bertindakbalas dengan aluminium
- (b) Mass of aluminum chloride produced
Jisim aluminium klorida yang dihasilkan.



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- (c) Volume of hydrogen gas released at room temperature
Isipadu gas hydrogen yang dibebaskan pada suhu bilik.



3 g of magnesium powder was added to iron (III) oxide and heated very strongly. The reaction produced a white fume of magnesium oxide and a brown metal of iron.

3 g serbuk magnesium ditambah kepada ferum(III) oksida dan dipanaskan dengan kuat. Tindakbalas tersebut menghasilkan wasap putih magnesium oksida dan logam perang besi.

[Relative atomic mass: Mg, 24; O, 16; Fe, 56]

Calculate:

Hitung:

- (a) Mass of iron (III) oxide reacts with magnesium.
Jisim ferum(III) oksida yang bertindakbalas dengan magnesium.

- (b) Mass of the white fume released in the reaction
Jisim wasap putih yang dibebaskan didalam tindakbalas.

- (c) Mass of iron produced
Jisim besi yang dihasilkan.



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Answer

1. (a) 14.1 g (b) 1.8 dm^3
2. (a) 97.5 g (b) 21.6 dm^3
3. (a) 6.4 g (b) 1.92 dm^3
4. (a) 4.25 g (b) 0.56 dm^3
5. (a) 4.906 g (b) 0.9856 dm^3
6. (a) 13.14 g (b) 16.02 g (c) 4.32 dm^3
7. (a) 6.67 g (b) 5 g (c) 4.67 dm^3

ACTIVITY 7 : OBJECTIVE QUESTIONS

- 1 The equation below represents the reaction to extract aluminium from aluminium oxide.

Persamaan dibawah mewakili tindakbalas pengekstakan aluminium daripada aluminium oksida.



What is the mass of aluminium that can be extracted from 102 g of aluminium oxide?
Apakah jisim bagi aluminium yang boleh di ekstrak daripada 102g aluminium oksida?
[Relative atomic mass: O, 16; Al, 27]

- A 13.5 g
- B 27.0 g
- C 54.0 g
- D 108.0 g



The equation above shows the action of heat on the carbonate salt of metal X.

How many moles of XCO_3 are needed to produced 4.0 g of oxide X?

Persamaan diatas menunjukkan tindak balas pemanasan garam karbonat bagi logam X.

Berapakah mol XCO_3 yang diperlukan bagi menghasilkan 4.0g oksida X ?
[Relative atomic mass: C, 12; O, 16; X, 64]

- A 0.03
- B 0.05
- C 0.08
- D 0.09

- 3 Sulphuric acid used as an electrolyte in a car battery has a concentration of 0.5 mol dm^{-3} .

How many moles of sulphuric acid is there in 100 cm^3 ?

Asid sulfuric digunakan sebagai elektrolit bateri kereta yang berkepekatan 0.5 mol dm^{-3} .

Berapakah mol asid sulfuric didalam 100 cm^3 asid itu?

- A 0.025
- B 0.05
- C 0.1
- D 0.5



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- 4 Diagram 1 shows the set-up of apparatus for the titration of potassium hydroxide solution with sulphuric acid.

Rajah 1 menunjukkan susunan radas bagi pentitratan larutan kalium hidroksida dengan asid sulfurik.

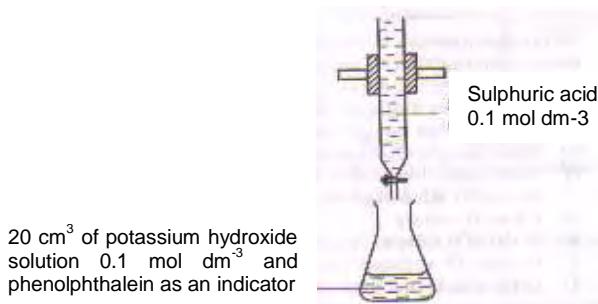


Diagram 1

What is the total volume of the mixture in the conical flask at the end point of the titration in Diagram 1 ?

Apakah jumlah isipadu campuran didalam kelalang kon pada titik akhir pentitratan pada Rajah 1

- A 10 cm^3
- B 20 cm^3
- C 30 cm^3
- D 40 cm^3

- 5 Diagram 2 shows an energy level diagram.

Rajah 2 menunjukkan rajah aras tenaga

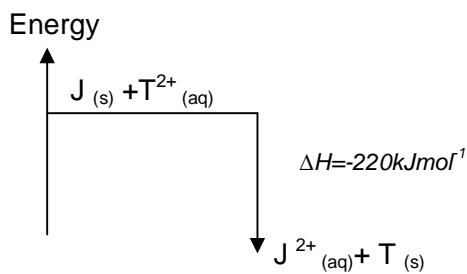


Diagram 2

Based on Diagram 2, what is the increase in temperature of the solution if excess J powder is added to 50 cm^3 of T salt solution 0.2 mol dm^{-3} ?

Berdasarkan Rajah 2, apakah pertambahan suhu terhadap larutan sekiranya serbuk J secara berlebihan ditambah kepada 50 cm^3 larutan garam T 0.2 mol dm^{-3} ? [Specific heat capacity of solution: $4.0 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$]



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- A 4.4°C
B 5.5°C
C 8.8°C
D 11.0°C
- 6 Which of the following quantities of substance contain 6×10^{22} molecules?
Manakah antara kuantiti bahan berikut mengandungi 6×10^{22} molekul.
[Relative atomic mass: H, 1; C, 12; O, 16; Avogadro's Constant: $6 \times 10^{23} \text{ mol}^{-1}$]
- I 1.8 g water
II 1.0 g hydrogen gas
III 3.2 g oxygen gas
IV 4.4 g carbon dioxide
- A I and II only
B III and IV only
C I, III, and IV only
D I, II, III, and IV
- 8 The equation below represents the decomposition of hydrogen peroxide solution.
Persamaan dibawah mewakili penguraian larutan hydrogen peroksida.



Which of the following are produced when 1 mole of hydrogen peroxide is decomposed completely?
Manakah antara berikut menghasilkan 1 mol hydrogen peroksida apabila penguraian lengkap berlaku?

*[1 mole of gas occupies 24 dm^3 at room condition;
Avogadro's Constant: $6.0 \times 10^{23} \text{ mol}^{-1}$]*

- I 2 moles of water
II $12x \text{ dm}^3$ of oxygen gas
III 3×10^{23} of oxygen molecules
IV 1.2×10^{24} of water molecules
- A I and III only
B I and IV only
C II and III only
D II and IV only



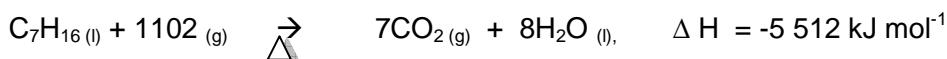
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9. What is the number of molecules in 1 mole of ammonia, NH_3 ?
Use the information that the Avogadro constant = $6.0 \times 10^{23} \text{ mol}^{-1}$
Apakah bilangan molekul didalam 1 mol ammonia, NH_3 ?
Gunakan maklumat bahawa pemalar Avogadro = $6.0 \times 10^{23} \text{ mol}^{-1}$
- A 1.5×10^{23} molecules
B 6.0×10^{23} molecules
C 1.2×10^{24} molecules
D 2.4×10^{24} molecules
10. A compound with formula $X_2\text{CO}_3$ has a relative formula mass of 138.
What is the relative atomic mass of X?
Use the information that the relative atomic mass of C = 12 and O = 16.
Sebatian yang berformula $X_2\text{CO}_3$ mempunyai jisim formula relative 138.
Apakah jisim atom relative bagi X ?
Gunakan maklumat dimana jisim atom ralatif bagi C = 12 dan O = 16
- A 39
B 69
C 78
D 110
11. The equation shows the reaction between sulphuric acid and sodium hydroxide.
Persamaan menunjukkan tindakbalas antara asid sulfuric dan natrium hidroksida.
- $$\text{H}_2\text{SO}_4 + 2\text{NaOH} \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$$
- What is the volume of 1.0 mol dm^{-3} sodium hydroxide solution which can neutralize 25.0 cm^3 of 1.0 mol dm^{-3} sulphuric acid?
Apakah isipadu bagi 1.0 mol dm^{-3} natrium hidroksida yang boleh meneutralalkan 25.0 cm^3 asid sulfuric 1.0 mol dm^{-3} .
- A. 12.5 cm^3
B. 25.0 cm^3
C. 50.0 cm^3
D. 75.0 cm^3
12. 3.2 g of cooper(II) oxide powder is reacted with excess dilute nitric acid.
What is the mass of cooper(II) nitrate formed in the reaction?
3.2 g serbuk kuprum(II) oksida bertindakbalas dengan asid nitric cair secara berlebihan.
Apakah jisim kuprum(II) nitrat yang terbentuk dalam tindakbalas tersebut?
- Use the information that the relative atomic mass of N = 14, O = 16 and Cu = 64.
Gunakan maklumat dimana jisim atom relative bagi N=14, O=16 dan Cu=64.
- A. 3.76 g
B. 4.96 g
C. 5.04 g
D. 7.52 g



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13. The following equation shows the combustion of heptane, C_7H_{16} , in excess oxygen.
Tindakbalas berikut menunjukkan pembakaran bagi heptana, C_7H_{16} , didalam oksigen berlebihan.



The combustion of heptane in excess oxygen released 1,378 kJ of energy.

What is the mass of heptane used?

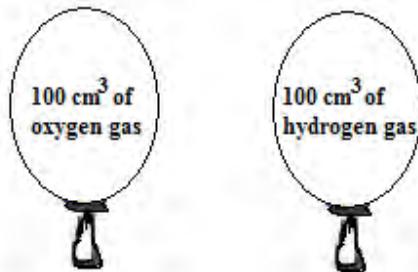
Pembakaran heptana didalam oksigen berlebihan membebaskan 1,378 kJ tenaga.

Apakah jisim heptana yang digunakan ?

Use the information that the relative atomic mass of H = 1 and C = 12.
Gunakan maklumat dimana jisim atom relative bagi H=1 dan C=12.

- A. 25.0g
- B. 36.0g
- C. 77.0g
- D. 88.0g

14. The diagram shows two balloons filled with oxygen gas and hydrogen gas.
Rajah menunjukkan dua belon yang disikan penuh dengan gas oksigen dan gas hidrogen.



Which of the following statements is true about the two gases?

Manakah antara berikut kenyataan benar tentang kedua-dua gas ?

- A. The number of moles of oxygen gas is greater than hydrogen gas
Bilangan mol gas oksigen adalah lebih besar berbanding gas hidrogen.
- B. The number of moles of oxygen gas and hydrogen gas is equal
Bilangan mol gas oksigen dan gas hidrogen adalah sama
- C. The number of oxygen gas molecules is greater than hydrogen gas molecules
Bilangan molekul gas oksigen adalah lebih besar berbanding molekul gas hidrogen
- D. The number of oxygen gas molecules is fewer than hydrogen gas molecules
Bilangan molekul gas oksigen adalah kurang berbanding molekul gas hidrogen



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15. A hydrocarbon compound is burnt completely in air to form 17.6 g of carbon dioxide gas and 7.2 g of water.

What is the molecular formula of the hydrocarbon compound?

Sebatian hidrokarbon terbakar lengkap diudara membentuk 17.6g gas karbon dioksida dan 7.2 g air.

Apakah formula molekul bagi sebatian hidrokarbon tersebut?

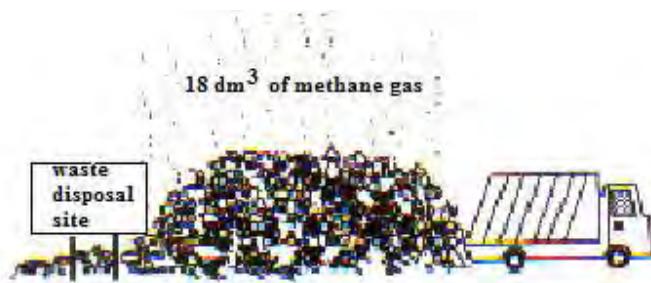
Given that the relative atomic mass of C=12, H=1, O=16.

Diberikan jisim atom relative bagi C=12, H=1, O=16.

- A. C_2H_6
- B. C_3H_8
- C. C_4H_8
- D. C_4H_{10}

16. The picture shows a waste disposal site. The activity of microorganisms in the waste produces methane gas.

Gambar menunjukkan kawasan pembuangan bahan buangan. Aktiviti mikroorganisma terhadap bahan buangan menghasilkan gas methana.



What is the mass of methane gas produced?

Apakah jisim gas methana yang dihasilkan?

Given that the relative atomic mass of H=1, C=12, and 1 mol of gas occupies 24dm^3 at room temperature and pressure.

Diberikan jisim atom relatif bagi H=1, C=12 dan 1 mol sebarang gas memenuhi 24dm^3 pada suhu bilik dan tekanan piawai.

- A. 12g
- B. 16g
- C. 21g
- D. 27g



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17. 5 g of element X reacted with 8 g of elements Y to form a compound with the formula XY_2 .

What is the relative atomic mass of element X?

5g unsur X bertindakbalas dengan 8g unsur Y untuk membentuk sebatian berformula XY_2 .

Apakah jisim atom relatif bagi unsur X?

Given that the relative atomic mass of Y=80.

Diberikan jisim atom relatif bagi Y = 80.

- A. 25
- B. 40
- C. 50
- D. 100

18. 0.12 g of magnesium reacts with excess hydrochloric acid to produced hydrogen gas. Given that the relative molecular mass of H=1, Mg=24, Cl=35.5 and 1 mol of gas occupies 24 dm³at room temperature pressure.

Which of the following is true about the reaction?

0.12g magnesium bertindakbalas dengan asid hidroklorik berlebihan untuk menghasilkan gas hidrogen.

Diberikan jisim atom relatif bagi H=1, Mg=24, Cl=35.5 dan 1 mol sebarang gas memenuhi 24 dm³ pada suhu bilik dan tekanan piawai.

Manakah antara berikut adalah benar bagi tindakbalas tersebut?

- I. $Mg + 2H^+ \rightarrow Mg^{2+} + H_2$
- II. Volume of gas released is 120 cm³
Isipadu gas yang dibebaskan ialah 120 cm³
- III. Mass of the salt formed is 0.30g
Jisim garam yang terbentuk ialah 0.30g.
- IV. This is a redox reaction
Ini merupakan tindakbalas redox

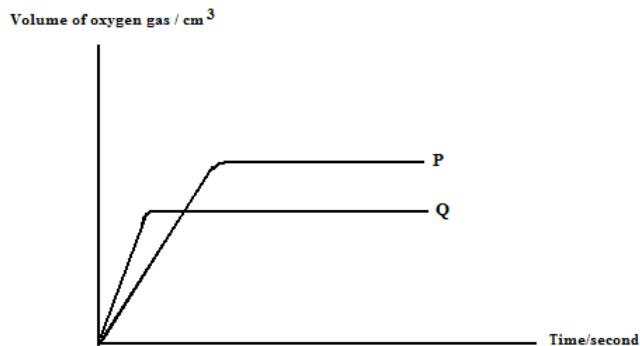
- A. I and II only
- B. I and III only
- C. I, II and IV only
- D. II, III and IV only



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19. In an experiment, the decomposition of 25cm^3 of 0.1 mol dm^{-3} hydrogen peroxide solution produces oxygen gas.

Didalam eksperimen penguraian 25 cm^3 larutan hidrogen peroksida 0.1 mol dm^{-3} meghasilkan gas oksigen.



If the experiment is repeated using another solution, which solution will produce curve Q?
Sekiranya eksperimen diulangi dengan menggunakan larutan lain, larutan yang manakan menghasilkan lengkung Q ?

- A. 25 cm^3 of 0.15 mol dm^{-3} hydrogen peroxide
- B. 20 cm^3 of 0.15 mol dm^{-3} hydrogen peroxide
- C. 15 cm^3 of 0.15 mol dm^{-3} hydrogen peroxide
- D. 10 cm^3 of 0.25 mol dm^{-3} hydrogen peroxide

20. The chemical formula for potassium hexacyanoferrate(III) is $\text{K}_3\text{Fe}(\text{CN})_6$.

What is its relative formula mass?

Formula kimia bagi kalium heksasianoferrat ialah $\text{K}_3\text{Fe}(\text{CN})_6$. Apakah jisim formula relativnya?

[Relative atomic mass of C =12, N=14, K=39 and Fe = 56]

- A 121
- B 199
- C 251
- D 329

21. If the Avogadro number is represented by the letter x , what is the number of hydrogen gas particles, H_2 , with the molar volume of $24\text{ dm}^3\text{ mol}^{-1}$ at room temperature and pressure?

Sekiranya nombor avogadro diwakili oleh huruf x, apakah bilangan zarah gas hidrogen, H_2 dengan isipadu molarnya ialah $24\text{ dm}^3\text{ mol}^{-1}$ pada suhu dan tekanan piawai ?

- A x
- B $2x$
- C x^2
- D $\frac{1}{2}x$



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22. A dibase acid, H_2J has the concentration of 0.5 mol dm^{-3}

Letter J is not the actual symbol of the element. What is the volume of potassium hydroxide, KOH, 1.0 mol dm^{-3} that can neutralize 25.0 cm^3 of the H_2J acid solution?

Asid dwibes, H_2J mempunyai kepekatan 0.5 mol dm^{-3} .

Huruf J bukan merupakan symbol sebenar bagi unsur. Apakah isipadu bagi kalium hidroksida, KOH, 1.0 mol dm^{-3} yang boleh meneutralkan 25.0 cm^3 larutan asid H_2J ?

- A 6.25 cm^3
- B 12.50 cm^3
- C 25.00 cm^3
- D 50.00 cm^3

23. Which of the following reactants produces the highest rate of reaction with zinc powder?

Manakah antara berikut bahan tindakbalas yang menghasilkan kadar tindakbalas yang tinggi bagi serbuk zink?

- A 25 cm^3 of sulphuric acid 0.1 mol dm^{-3}
- B 25 cm^3 of ethanoic acid 0.1 mol dm^{-3}
- C 25 cm^3 of nitric acid 0.1 mol dm^{-3}
- D 25 cm^3 of hydrochloric acid 0.1 mol dm^{-3}

24. Diagram 2 shows three types of substances.

Rajah 2 menunjukkan tiga jenis bahan

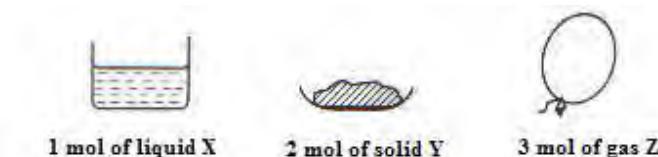


Diagram 2

Which of the following is true about the substance in Diagram 2?

Yang manakah berikut adalah benar bagi bahan pada Rajah 2?

- I. The number of particles in gas Z is $3 \times 6.02 \times 10^{23}$
Bilangan zarah didalam gas Z ialah $3 \times 6.02 \times 10^{23}$
- II. All the substances have only 6.02×10^{23} particles
Semua bahan mempunyai hanya 6.02×10^{23} zarah
- III. The number of particles in liquid X is less than in gas Z.
Bilangan zarah didalam larutan X adalah kurang berbanding gas Z.
- IV. The number of particles in solid Y is two times greater than in liquid X.
Bilangan zarah dalam pepejal Y ialah dua kali ganda berbanding larutan X.



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- A I and II only
B III and IV only
C I, II and IV only
D I, III and IV only.
25. Which of the following gases contains 0.4 mol of atoms at room temperature and pressure?
Manakah antara gas-gas berikut mengandungi 0.4 mol atom pada suhu bilik dan tekanan piawai ?
[1 mol of gas occupies the volume of 24 dm³ at room temperature and pressure]
[1 mol gas memenuhi isipadu sebanyak 24 dm³ pada suhu bilik dan tekanan piawai]
- A 4·8 dm³ He
B 4·8 dm³ H₂
C 4·8 dm³ SO₃
D 4·8 dm³ CO₂
26. The following equation shows the decomposition reaction of copper(II) carbonate when heated at room temperature and pressure.
Persamaan berikut menunjukkan penguraian bagi tindakbalas kuprum(II) karbonat apabila dipanaskan pada suhu bilik dan tekanan piawai.



Which of the following is **not** true when 1 mol of copper (II) carbonate is decomposed?
Yang manakah antara berikut tidak benar apabila 1 mol kuprum(II) karbonat diuraikan ?
[Relative atomic mass: C=12, O=16, Cu=64 and 1 mol of gas occupies the volume of 24 dm³ at room temperature and pressure.]
[Jisim atom relative: C=12; O=16 dan 1 mol gas memenuhi isipadu 24 dm³ pada suhu dan tekanan piawai]

- A 1 mol of copper(II) oxide is formed
1 mol kuprum(II) oksida terbentuk
- B 1 molecule of carbon dioxide gas is given off
1 molekul gas karbon dioksida dibebaskan.
- C 80 g copper(II) oxide is formed
80g kuprum(II) oksida terbentuk
- D 24 dm³ of carbon dioxide gas is given off
24 dm³ gas karbon dioksida dibebaskan.



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27. Diagram 13 shows the neutralization reaction between a strong acid and a strong alkali.

Rajah 13 menunjukkan tindakbalas penenutralan diantara asid kuat dan alkali kuat.

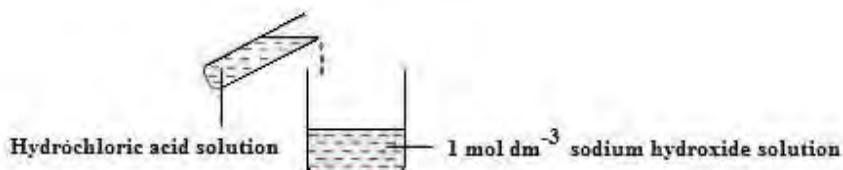


Diagram 13

What is the volume of the alkali needed to produce 1.4625 g of salt?

Apakah isi padu alkali yang diperlukan bagi menghasilkan 1.4625g garam ?

[Relative atomic mass: Na=23, Cl=35.5, H=1, O=16]

[Jisim atom relatif:Na=23, Cl=35.5, H=1, O=16]

- A 0.005 cm³
- B 0.025 cm³
- C 5.000 cm³
- D 25.000 cm³

28. In an experiment, 2.4 g of magnesium powder is added to 100 cm³ of 2.0 mol dm⁻³ copper(II) sulphate solution.

The temperature of the mixture increases by 1.0 °C.

What is the heat of reaction in the experiment?

Didalam satu eksperimen, 2.4g serbuk magnesium ditambahkan kepada 100 cm³ larutan kuprum(II) sulfat 2.0 mol dm⁻³

Apakah haba tindakbalas bagi eksperimen tersebut?

[Specific heat capacity of a solution = 4.2 J g⁻¹⁰C⁻¹;

Relative atomic mass of Mg = 24]

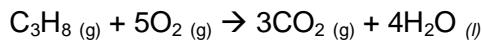
[Muatan haba tentu larutan = 4.2 J g⁻¹⁰C⁻¹; Jisim atom relatif bagi Mg = 24]

- A -0.42 kJ mol⁻¹
- B -0.48 kJ mol⁻¹
- C -4.20 kJ mol⁻¹
- D -4.80 kJ mol⁻¹



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29. Propane burns completely in oxygen according to the equation shown below.
Propana terbakar dengan lengkap dalam oksigen mengikut persamaan dibawah.

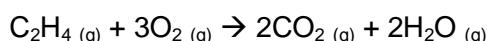


If 1.0 mole of propane gas is burnt completely, which volume of gaseous product is obtained, measured at room temperature and pressure ?
Sekiranya 1.0 mol gas propana terbakar dengan lengkap, manakah isipadu gas yang dihasilkan, diukur pada suhu bilik dan tekanan ?

- | | | | |
|---|---------------------|---|---------------------|
| A | 0.1 dm ³ | C | 2.4 dm ³ |
| B | 0.3 dm ³ | D | 7.2 dm ³ |

30. A mixture containing 1 mole of ethane and 4 mole of oxygen is ignited, in a sealed container at 100⁰ C. The reaction occurring is shown by the equation below.

Campuran yang mengandungi 1 mol ethane dan 4 mol oxygen dinyalakan didalam bekas yang tertutup pada suhu 100⁰ C . Tindakbalas terbentuk ditunjukkan pada persamaan dibawah.



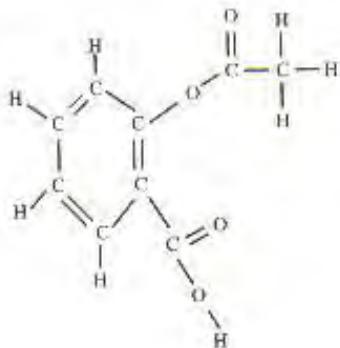
What was the total number of moles of gas at the end of the reaction?
Apakah jumlah bilangan mol bagi gas pada akhir tindakbalas ?

- | | | | |
|---|---|---|---|
| A | 2 | C | 4 |
| B | 3 | D | 5 |



ACTIVITY 8 : STRUCTURED QUESTIONS

1. Diagram above shows the structural formula of aspirin.
Rajah menunjukkan formula struktur bagi formula aspirin



- (a) What is the molecular formula of aspirin?
Apakah formula molekul bagi aspirin ?

- (b) What is the molecular mass of aspirin?
Use the information that the relative atomic mass of H = 1, C = 12 and O = 16.

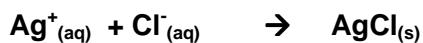
*Apakah jisim molekul bagi aspirin
Gunakan maklumat dimana jisim atom relative bagi H=1, C=12 dan O=16.*



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[Answer: (a) $C_9H_8O_4$ (b) 180]

2. The ionic equation for the precipitation reaction of silver chloride is:
Persamaan ion bagi tindakbalas pemendakan argentums klorida adalah:



What is the number of moles of Ag^+ ions that reacted with Cl^- ions?
Apakah bilangan mol bagi ion Ag^+ yang bertindakbalas dengan ion Cl^- ?

[Answer: 0.0125 mol]

3. When 10cm^3 of 0.5 mol dm^{-3} sodium sulphate solution is added to excess lead(II) nitrate solution, a white precipitate lead(II) sulphate is formed.
Apabila 10 cm^3 larutan natrium sulfat 0.5 mol dm^{-3} ditambah kepada larutan plumbum(II) nitrat berlebihan, mendakan putih terbentuk.

- i. Write the chemical equation for the reaction.
Tulis persamaan kimia bagi tindakbalas tersebut.
- ii. Describe the chemical equation in (3)(i).
Perihalkan persamaan di (3)(i)



- iii. Calculate the number of mole of sodium sulphate in the solution.
Hitungkan bilangan mol natrium sulfat didalam larutan

- iv. Calculate the mass of precipitate formed.
Given that the relative atomic mass of O=16, S=32, Pb=207.
Hitung jisim mendakan yang terbentuk.
Diberikan jisim atom relative bagi O=16, S=32, Pb=207

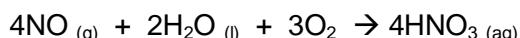


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[Answer: (i) $Pb(NO_3)_2 + Na_2SO_4 \rightarrow PbSO_4 + 2NaNO_3$
(ii) 1 mole lead(II) nitrate reacts with 1 mole of sodium sulphate to produce
1 mole of lead(II) sulphate and 2 moles of sodium nitrate
(iii) 0.005 mol
(iv) 1.515g]

4. Chemical equation below shows how a nitrogen dioxide is converted into nitric acid.

Persamaan kimia dibawah menunjukkan bagaimana nitrogen dioksida ditukarkan kepada asid nitrik



Calculate :

Hitung:

- (a) The number of mole of nitrogen(II) oxide, NO.
Bilangan mol bagi nitrogen(II) oksida, NO.

- (b) The maximum mass of nitric acid which can be produced from 720 dm³ of nitrogen(II) oxide, NO at room temperature and pressure.
Jisim maksima asid nitric yang dihasilkan daripada 720 dm³ nitrogen(II) oksida, NO pada suhu bilik dan tekanan.

[Answer: (a) 30 mol (b) 1890g]

Module dan Bahan Seminar Untuk Guru
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MISTAKES ANSWERS COMMONLY MADE BY THE CANDIDATES

1. What is the meaning of scum?

Ca⁺ and Mg⁺ ions form in hard water

[1 mark]

Correct answer:

2. What are the two ions in sea water that cause the formation of scum?

Calcium ions, Ca⁺ and Magnesium ions, Mg⁺

[2 marks]

Correct answer:

3. State the name of catalyst used in manufacture of sulphuric acid.

Vanadium oxide

[1 mark]

Correct answer:

4. Explain how a waste gas produced during manufacture of sulphuric acid can cause environmental pollution.

Sulphur dioxide will combine with water to form acid rain that can corrode buildings and kill plants.

[2 marks]

Correct answer:

.....

5. Chlorine reacts with sodium to form a compound.

State the type of chemical bond in this compound

Ionic compound

[1 mark]

Correct answer:

- 6.

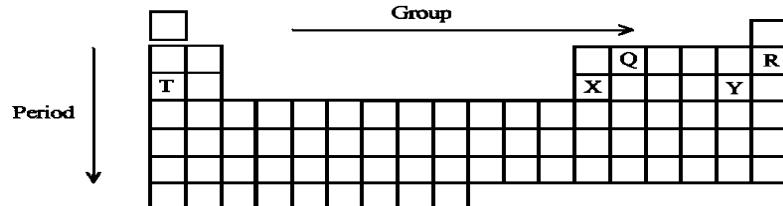


Diagram above shows part of the periodic Table of Elements. Q,R,T,X and Y do not represent the actual symbol of the elements.

Arrange all the elements according to the increases in size of the atoms

T,X,Y,Q,R

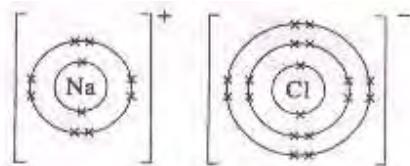
[1 mark]

Correct answer:



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7. Diagram below shows a sodium chloride compound, NaCl, that is produced by the formation of an ionic bond between a sodium ion, Na^+ , and a chloride ion, Cl^- .



How are a sodium ion and a chloride ion formed from their respective atoms?

Sodium ion : sodium donates electron

Chloride ion: chlorine received electron

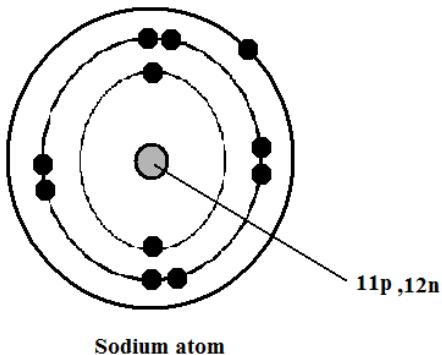
[2 marks]

Correct answer:

Sodium ion:

Chloride ion:

- 8.



Sodium atom

Diagram above shows the arrangement of electron for sodium atom.
From the diagram, the nucleus contains

Eleven proton number and twelve neutron number

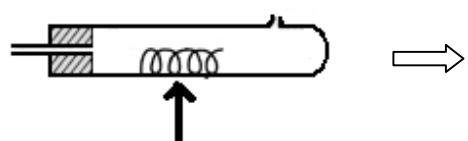
[1 mark]

Correct answer:

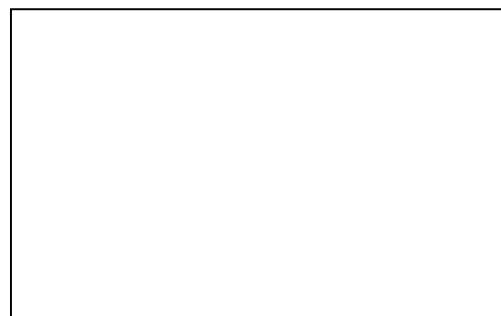
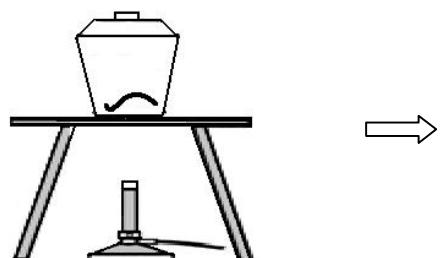


Method of Drawing Diagrams

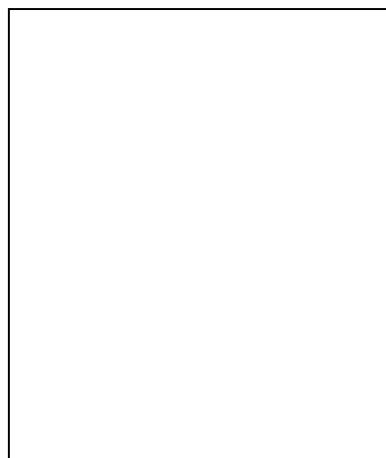
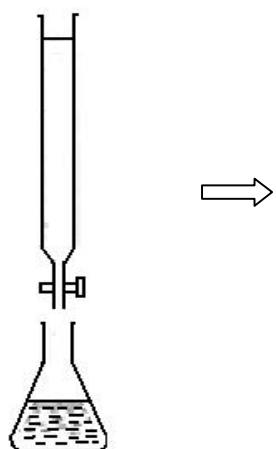
Set 1:



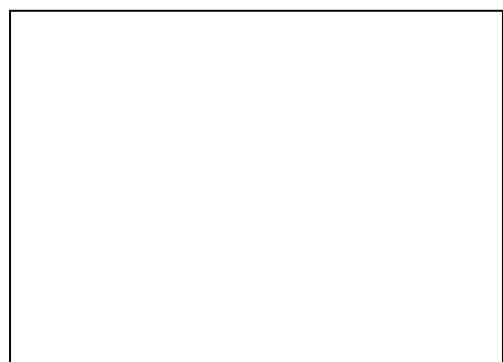
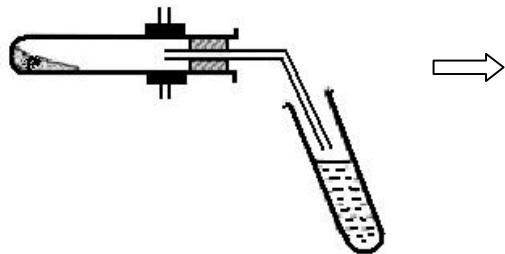
Set 2:



Set 3:



Set 4:





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QUESTION A

Table below shows the description and observation for one experiment.

Experiment	Description	Observation
	Electrolysis of 1.0 mol dm⁻³ of sodium sulphate solution using carbon electrodes.	Gas bubbles are released at the anode and cathode.

Based on Experiment :

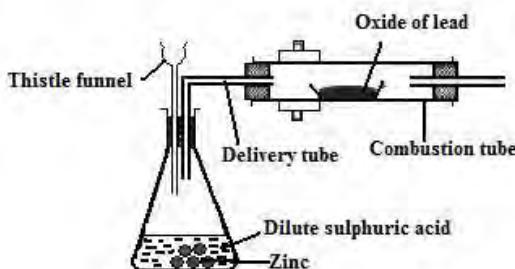
Draw the set up of the apparatus to carry out this experiment.

In your diagram show how the products at the anode and cathode are collected.

[3 marks]

QUESTION B:

Diagram below shows the set-up of apparatus in an experiment to determine the empirical formula of an oxide of lead.



Which of the following is **not** correct in the set-up of apparatus for this experiment?

- I No Bunsen burner
 - II Fixing of the cork
 - III Position of the thistle funnel
 - IV Position of the deliver tube
-
- A I and III only
 - B II and IV only
 - C I, II, and III only
 - D I, III, and IV only



ANSWERING TECNIQUE

QUESTION 1

When 124g of copper(II) carbonate is heated, black colour of the residue and colourless gas produced.

[Apabila 124g kuprum(II) karbonat dipanaskan,baki pemanasan berwarna hitam dan gas tanpa warna diahsilkan]

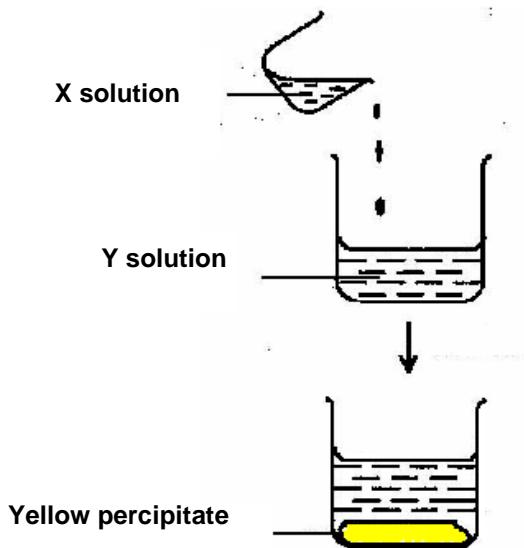
[Given that the relative atomic mass of Cu,64;O,16;C,12: Volume of 1 mol of gas = 24 dm³ at room condition]

- i. Write the chemical equation for the reaction. [2 marks]
[Tulis persamaan kimia bagi tindakbalas yang berlaku]
- ii. Describe the chemical equation in (i). [1 mark]
[Perihalkan persamaan kimia di(i).]
- iii. Name the residue and the colourless gas produced.[2 marks]
[Namakan mendakan putih yang terbentuk]
- iv. Calculate the number of mole of copper(II) carbonate used.[1 mark]
[hitung bilangan mol bagi larutan Natrium sulfat]
- iv. Calculate the volume of colourless gas produced.[3 marks]
[Hitung jisim mendakan putih yang terbentuk]

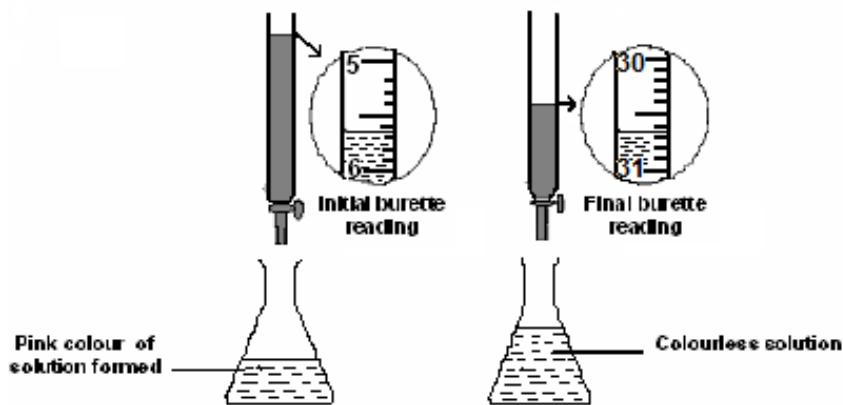
QUESTION 2

CONCEPT OF OBSERVATION
[KONSEP PEMERHATIAN]

Observation 1



Observation 2



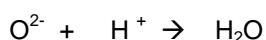
QUESTION 3

Balance each of the following equations:
[Seimbangkan persamaan berikut]

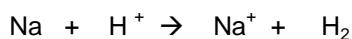
- i. Chemical equation.



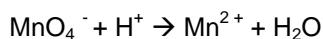
- ii. Ionic equation for the forming of water



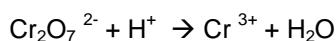
- iii. Ionic equation.



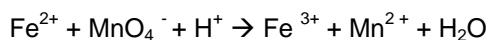
- iv. Half equation



- v. Half equation



- vi. Ionic equation





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QUESTION 4

CHEMICAL TESTS [UJIAN KIMIA]

Type of gases	Method	Observation
Hydrogen		
Oxygen		
Chlorine		
Carbon dioxide		

QUESTION 5

Sodium metal reacts with oxygen to form a metal oxide compound.

Draw the electrons arrangement of the metal oxide compound formed.

[Logam natrium bertindakbalas dengan oksigen membentuk satu oksida.

Lukiskan susunan electron bagi oksida logam yang terbentuk?]

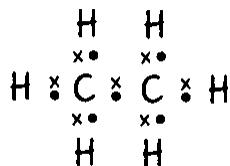
[2 marks]



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QUESTION 6

The diagram shows the arrangement of outer electrons in a molecules of ethane, C₂H₆.
[Rajah menunjukkan susunan elektron terluar bagi molekul ethana]



Draw similar diagrams to show the arrangement of outer electrons in:
[Lukis rajah yang sama bagi menunjukkan susunan bagi elektron terluar bagi:]

- i. Oxygen, O₂
- ii. Ammonia, NH₃
- iii. Tetrachlorometane, CCl₄

QUESTION 7

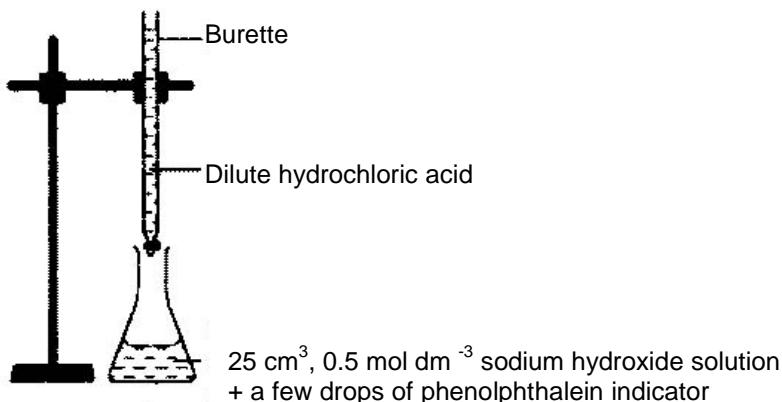


Diagram 2

Diagram 2 shows the apparatus setup to determine the concentration of hydrochloric acid.
[Rajah 2 menunjukkan susunan radas yang digunakan untuk menentukan kepekatan asid hidroklorik cair.]

- (a) State the colour change occurred in the conical flask when the end point is reached.
[Nyatakan perubahan warna larutan dalam kelalang kon sebaik sahaja takat akhir tercapai]

[1 mark]



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- (b) Name the analysis technique used and the type of reaction involved in this experiment.

[Nyatakan kaedah analisis yang digunakan dan tindakbalas yang terlibat dalam eksperimen itu.]

[2 marks]

- (c) The average volume of hydrochloric acid used in this experiment is 12.50 cm^3 . Calculate the molarity of hydrochloric acid used.

[Didapati purata isipadu asid hidroklorik cair yang digunakan dalam eksperimen itu ialah 12.50 cm^3 . Hitung kemolaran asid hidroklorik yang digunakan]

[3 marks]

- (d) You were given with copper(II) nitrate solution.

[Anda dibekalkan dengan larutan kuprum(II) nitrat.]

- (i) Describe briefly how you would test for the presence of copper(II) ion in the solution.

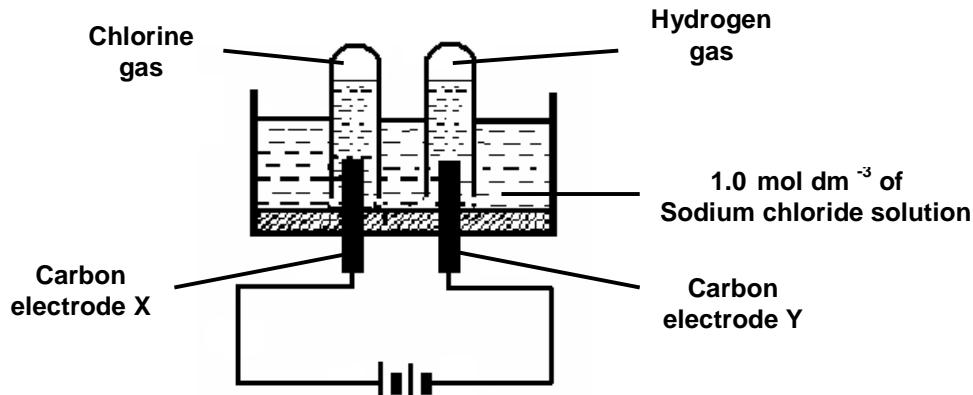
[Huraikan dengan ringkas bagaimana anda mengesahkan kehadiran ion kuprum(II) dalam larutan itu ?]

[3 marks]



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QUESTION 8



Explain the reactions at electrodes, X and Y based on the statements below:
Jelaskan tindakbalas pada elektrod X dan Y berdasarkan kenyataan dibawah:

Statement	Electrode X	Electrode Y
List of ions that attracted to electrodes Senarai ion-ion yang tertarik kesetiap elektrod		
Names of the ion selectively discharged Namakan ion yang dipilih untuk dinyahcaskan		
The reason why the ion are selectively discharged Nyatakan sebab mengapa ion tersebut dipilih untuk dinyahcaskan		
Half equation for the reaction Setengah persamaan bagi tindakbalas		
Observation Permerhatian		

QUESTION 9

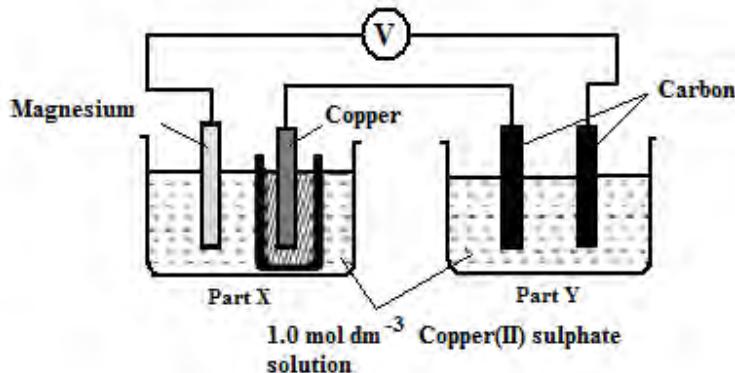


Diagram 9 shows the apparatus set-up for electrochemical cell.
Rajah 9 menunjukkan susunan radas bagi sel elektrokimia.

- (a) What is the role of Part X in the electrochemical cell ?
Apakah fungsi bahagian X didalam sel elektrokimia?

[1 mark]

- (b) State the energy change that occurs in Part X and Part Y.
Nyatakan perubahan tenaga yang berlaku di Bahagian X dan Bahagian Y.

- (i) Part X:
- (ii) Part Y :

[2 marks]

- (c) On Diagram 9, mark the
Pada Rajah 9, tandakan

- (i) Positive terminal of Part X.
Terminal positif di Bahagian X.
- (ii) Direction of the electron flow.
Arah pengaliran elektron

[2 marks]

- (d) (i) What can be observed on the magnesium ribbon of Part X ?
Apakah pemerhatian yang boleh dibuat pada kepingan magnesium di Bahagian X?

[1 mark]

- (iii) Write the half-equation of the reaction that occurs at (d)(i).
Tulis setengah persamaan bagi tindakbalas yang berlaku di (d)(i).

[1 mark]



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- (e) (i) In Diagram 9 , label the anode of Part Y by writting the word ' anode'. [1 mark]
Pada Rajah 9, labelkan anod di Bahagian Y dengan menulis perkataan 'anod'
- (ii) Write the half-equation of the reaction that occurs at the anode in Part Y.
Tulis setangah persamaan bagi tindakbalas yang berlaku di Bahagian Y.
- [1 mark]
- (f) State what will happen if the magnesium ribbon in Part L is replaced with a silver plate.
Nyatakan apakah yang akan berlaku sekiranya kepingan magnesium di Bahagian Y digantikan dengan kepingan kuprum.
- [1 mark]

QUESTION 10

Test	Observation
Sodium hydroxide solution is slowly added until excess. [Larutan natirum hidroksida dicampurkan perlahan-lahan sehingga berlebihan]	White precipitate formed. The white precipitate dissolves in excess sodium hydroxide solution. [Mendakan putih terbentuk. Mendakan putih larut dalam larutan natrium hidroksida berlebihan]
A few drops of sulphuric acid is added [sedikit asid sulfuric cair dicampurkan]	White precipitate formed. [mendakan putih terbentuk]

The table above shows the observations made for a test conducted on a colorless solution. Among the ions below, which ion will probably exist in the solution?
Jadual diatas menunjukkan keputusan bagi ujian yang dijalankan ke atas satu larutan akueus yang tidak berwarna. Antara ion berikut, yang manakah mungkin hadir dalam larutan itu?]

A Al³⁺ B Mg²⁺ C Pb²⁺ D Zn²⁺



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QUESTION 11

The following are three examples of sulphate salts.

From these examples, identify the soluble and insoluble salts.

[Berikut adalah tiga contoh garam sulfat.]

[Daripada contoh ini, kenal pasti garam terlarutkan dan garam tak terlarutkan.]

Name of Salts	Soluble	Insoluble
Potassium sulphate, K_2SO_4 [Kalium sulfat, K_2SO_4]		
Lead(II) sulphate, $PbSO_4$ [Plumbum(II) sulfat, $PbSO_4$]		
Zinc sulphate, $ZnSO_4$ [Zink sulfat, $ZnSO_4$]		
Barium sulphate, $BaSO_4$ [Barium sulfat, $BaSO_4$]		

QUESTION 12

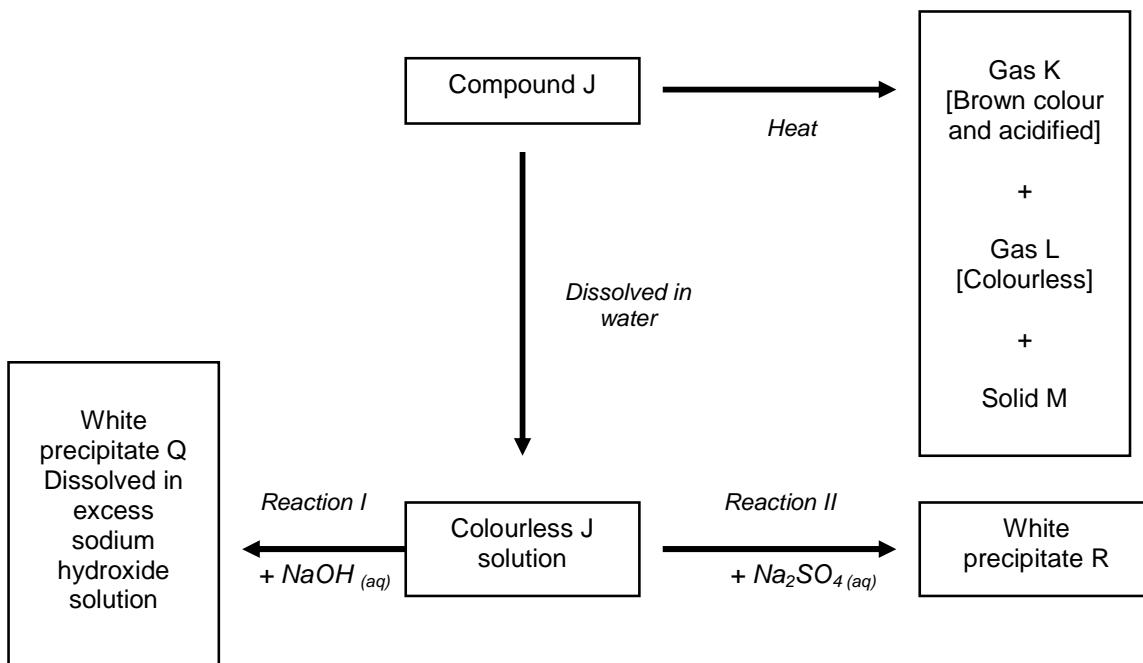


Diagram 4

Diagram 4 shows a series of process done by a student to identify a compound J.

[Rajah 4 menunjukkan beberapa siri tindakbalas yang telah dilakukan oleh seorang pelajar untuk mengenali sebatian J]



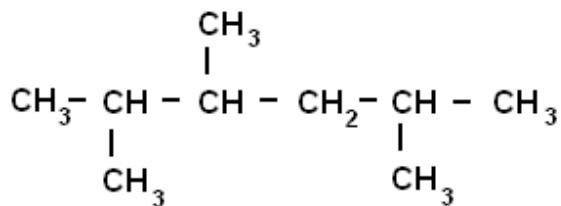
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- (a) With refer to reaction I, white precipitate Q is formed which is soluble in excess sodium hydroxide solution. Name all the ions which are probably presence in solution J.
[Berdasarkan tindakbalas I, larutan J menghasilkan mendakan putih Q yang larut dalam larutan natrium hidroksida berlebihan. Namakan semua kation yang dijangka hadir dalam larutan J tersebut.]
- (b) Referring to reaction I and II, name the cation presence in solution J.
[Berdasarkan tindakbalas I dan II, namakan kation yang hadir dalam larutan J itu.]
- (c) Write down the ionic equation for the reaction forming the white precipitate, R.
[Tuliskan persamaan ion bagi tindakbalas pembentukkan mendakan putih R.]
- (d) (i) Name two cations which produced white precipitate that will not dissolve in excess sodium hydroxide solution.
[Namakan dua kation yang menghasilkan mendakan putih yang tidak larut apabila ditambahkan dengan larutan natrium hidroksida berlebihan]
- (ii) State one confirmatory test for one cations presence in (d)(ii).
[Nyatakan satu ujian kimia untuk mengesahkan kehadiran satu kation dalam d(ii).]



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QUESTION 16

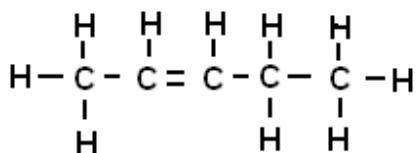


What is the IUPAC name for this alkane ?

[Apakah nama IUPAC alkana itu?]

[1 mark]

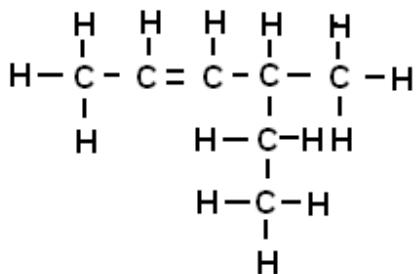
QUESTION 17



i. Name the homologous series for the hydrocarbon given above.
[Namakan siri homolog bagi hidrokarbon diatas]

ii. Give the IUPAC name for the above compound.
[Apakah nama IUPAC bagi alkena itu ?]
[2 marks]

QUESTION 18



i. Name the homologous series for the hydrocarbon given above.
[Namakan siri homolog bagi hidrokarbon diatas]

ii. Give the IUPAC name for the above compound.
[Apakah nama IUPAC bagi alkena itu] [2 marks]

QUESTION 19

A student carried out an experiment to determine the value of heat of neutralization. Diagram 3 shows the set-up apparatus used in the experiment.

[Seorang pelajar telah menjalankan satu eksperimen untuk menentukan nilai haba peneutralan. Rajah 3 menunjukkan susunan radas yang digunakan dalam eksperimen itu]

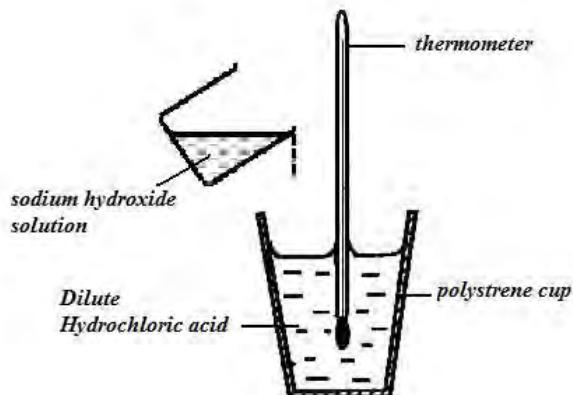


Diagram 3

The following data obtained:

[Data berikut telah diperolehi]

Initial temperature of hydrochloric acid, $\theta_1 = 30^{\circ}\text{C}$

[Suhu awal larutan asid hidroklorik]

Highest temperature of the mixture of product, $\theta_2 = 43.5^{\circ}\text{C}$

[Suhu tertinggi campuran hasil tindak balas]

In this experiment, 50 cm^3 of 2.0 mol dm^{-3} of sodium hydroxide solution is added to 50 cm^3 of 2.0 mol dm^{-3} of hydrochloric acid.

Given that the specific heat of capacity of the solution is $4.2 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$ and the density of the solution is 1.0 g cm^{-3} .

Draw the energy level diagram for the reaction.

[Dalam eksperimen ini 50 cm^3 larutan natrium hidroksida 2.0 mol dm^{-3} ditambah kepada 50 cm^3 asid hidroklorik 2.0 mol dm^{-3} .]

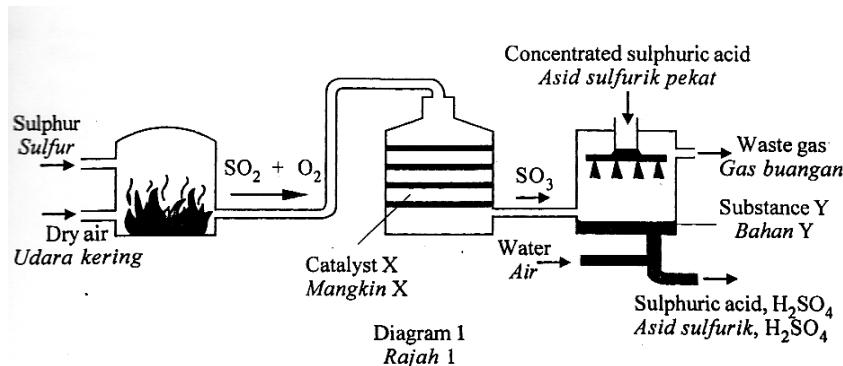
Diberi muatan haba tentu larutan ialah $4.2 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$ dan ketumpatan bandingan ialah 1.0 g cm^{-3} . Lukis gambar rajah aras tenaga bagi tindak balas itu]

[2 marks]

MARKING TECHNIQUE FOR PAPER 2 SAMPLE ANSWERS

Section A

1. Diagram 1 shows the manufacture of sulphuric acid.



- (a) What is the name of this process?

Sample answers:
Contact process

[1 mark]

- (b) State the name of catalyst X.

Sample answers:
1. Vanadium oxide
2. Vanadium(v) oxide

[1 mark]

- (c) (i) State the name of substance Y.

Sample answer:
Oleum

[1 mark]

- (ii) Substance Y is formed when sulphur trioxide reacts with concentrated sulphuric acid.

Sample answers:

1. $\text{SO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{H}_2\text{S}_2\text{O}_7$
2. $\text{SO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{S}_2\text{O}_7 \text{H}_2$

[2 marks]

- (d) A waste gas is produced during the manufacture of sulphuric acid. Explain briefly how this gas can cause environmental pollution.

Sample answers:
1. Sulphur dioxide will combine with water to form acid rain that can corrode buildings and kills plants
2. The gas produce is sulphur dioxide. In air, sulphur dioxide will combine with water molecules from rain to form acid rain which is very dangerous to living things and corrodes iron substances.

[2 marks]



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(e) The sulphuric acid produced can be used to manufacture fertilisers.

(i) Name one fertilizer manufactured from sulphuric acid.

Sample answers:

1. Ammonium sulphate
2. Sodium sulphate

[1 mark]

(ii) State another use of sulphuric acid.

Sample answers:

1. To manufacture detergent.
2. as a component in making of detergent and dye.

[1 mark]

2. Table 2.1 shows a group of elements.

${}^{19}_9\text{F}$ Fluorine Fluorin	${}^{35}_{17}\text{Cl}$ Chlorine Klorin	${}^{80}_{35}\text{Br}$ Bromine Bromin	${}^{127}_{53}\text{I}$ Iodine Iodin
--	---	--	--

Jadual 2.1

(a) In which group of the Periodic Table are these elements located?

Sample answers:

1. Group 17

2. Group VII

[1 mark]

(b) Write the electron arrangement for an atom of fluorine.

Sample answers:

1. 2.7

2. 2.7

[1 mark]

(c) Fluorine atoms are smaller than chlorine atoms.

Explain why fluorine forms a negative ion more easily than chlorine.

Sample answer:

1. The valence shell of fluorine atom is nearer to its nucleus than of chlorine atoms, thus, the force of attraction of the fluorine atom and electrons from outside is stronger, making it easier to form a negative ion compared to chlorine.

2. Since fluorine atoms are smaller than chlorine atoms, the distance of the valence electrons from its nucleus is closer as well as increases in strength to attract electrons, therefore fluorine forms a negative ion easier than chlorine atom.

[2 marks]



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- (d) State the type of chemical bond in an iodine molecule

Sample answer:

Covalent bond

[1 mark]

- (e) Chlorine reacts with sodium to form a compound.

- (i) State the type of chemical bond in this compound.

Sample answer:

1. Ionic bond

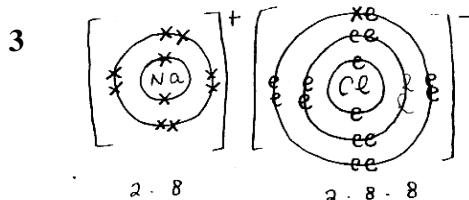
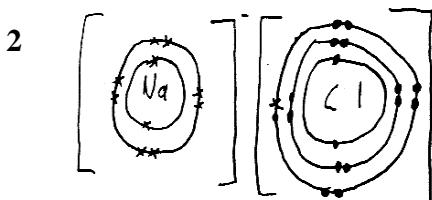
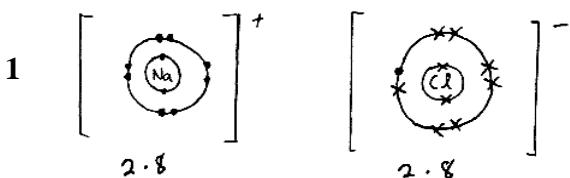
2. Ionic compound

[1 mark]

- (iii) Draw a diagram to show the electron arrangement in this compound

[Proton number of Na = 11]

Sample answers:



[2 marks]



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- (f) Table 2.2 shows three pairs of chemicals.

Sample answers:

1

Chemicals / Bahan kimia	
KI _(aq) + Cl _{2(aq)}	✓
KI _(ak) + Cl _{2(ak)}	
KCl _(aq) + Br _{2(aq)}	
KCl _(ak) + Br _{2(ak)}	
KBr _(aq) + KCl _(aq)	
KBr _(ak) + KCl _(ak)	

Table 2.2

Jadual 2.2

2

Chemicals / Bahan kimia	
KI _(aq) + Cl _{2(aq)}	
KI _(ak) + Cl _{2(ak)}	
KCl _(aq) + Br _{2(aq)}	✓
KCl _(ak) + Br _{2(ak)}	
KBr _(aq) + KCl _(aq)	
KBr _(ak) + KCl _(ak)	✓

Table 2.2

Jadual 2.2

Put a tick (✓) in the box beside the pair of chemicals which will undergo a displacement reaction.

[1 mark]



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3. (a) Diagram 3.1 shows the results of an experiment to investigate the movement of bromine particles in air.

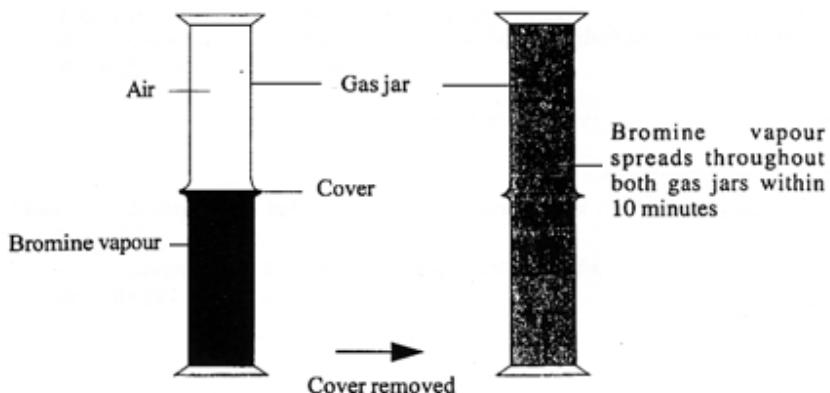


Diagram 3.1

- (i) State the name of the process involved in this experiment.

Sample answers:

1. Movement of particles. Kinetic process
2. Diffusion

[1 mark]

- (ii) State the type of particles present in bromine gas, Br₂.

Sample answers:

1. Molecules
2. Gas

[1 mark]

- (iii) Explain the observation in this experiment based on the kinetic theory of matter.

Sample answers:

1. Gases move very fast in all directions in certain space. When the cover is removed, bromine molecules collide one another and the wall of the container filling up the empty space in the gas jar.
2. Particles in matter which is in a gaseous state move freely. The particles are very far apart and frequency collision occurs more frequently. As the particles are not arranged in an orderly manner, it is able to move freely.

[3 marks]



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- (iv) This experiment is repeated at a higher temperature. Predict the time taken for the bromine vapour to spread throughout the space in both gas jars.

Sample answers:

1. The time taken will reduce, less than 10 minutes (5 minutes)
2. Less than 10 minutes.

[1 mark]

- (b) Diagram 3.2 shows two balloons containing oxygen gas and carbon dioxide gas respectively.

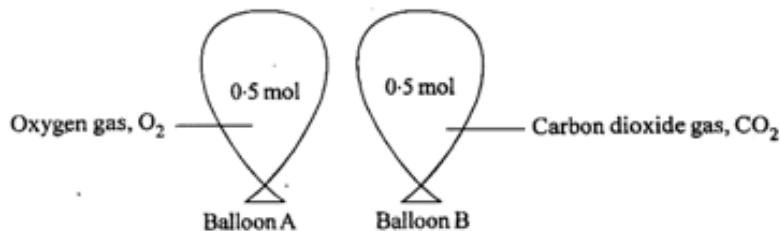


Diagram 3.2

Based in the given information:

- (i) Calculate the mass of oxygen gas in balloon A
[Relative atomic mass: O=16]

Sample answers:

$$1. \text{ Molarity} = \text{mass}/\text{r.m.m}$$

$$\begin{aligned} \text{Mass} &= \text{r.m.m} \times \text{molarity} \\ &= 2(16) \times 0.5 = 16 \text{ cm}^3. \end{aligned}$$

$$\begin{aligned} 2. \text{ Mol} &= \text{mass}/\text{molar mass} \\ 0.5 &= \text{m}/16(2) \\ \text{M} &= 16 \text{ g dm}^{-3}. \end{aligned}$$

[1 mark]

- (ii) Calculate the volume of carbon dioxide gas in balloon B.
[Molar volume of gas= 24 dm³ mol⁻¹ at room temperature and pressure]

Sample answers:

$$\begin{aligned} 1. \text{ Moles} &= \text{volume}/24 \text{ dm}^3 \text{ mol}^{-1} \\ \text{Volume} &= 0.5 \times 24 = 12 \text{ dm}^3 \end{aligned}$$

$$\begin{aligned} 2. \text{ Volume} &= \text{mole} \times 24 \\ &= 0.5 \times 24 \\ &= 12.0 \text{ dm}^{-3}. \end{aligned}$$

[1 mark]



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- (iii) Compare the number of gas molecules in balloon A and in balloon B. Explain your answer.

Sample answers:

1. *The number of gas molecules in both balloons are the same. This is because they have 6.02×10^{23} particles in 0.5 moles of their respective gas.*
2. *Balloon A has a lower number of gas molecules than the balloon B. This is because balloon B has 3 atoms of gas molecules and balloon B only has 2.*

[2marks]

4. The following information is about the compound C₂H₅OH.

- Miscible in all proportions with water
- Undergoes combustion
- A member of a homologous series

- (a) What is the name of this compound?

Sample answer:

Ethanol

[1 mark]

- (b) What is the general formula for the homologous series of this compound?

Sample answers:

1. *C_nH_{2n+1}OH, n=2,3,4.....*
2. *C_nH_{2n+1}OH, n=1,2,3,4.....*

[1mark]

- (c) One mole of this compound undergoes complete combustion to form gas X and water as shown below.



- (i) State the name of gas X.

Sample answers:

1. *Carbon dioxide gas*
2. *Carbon dioxide*

[1 mark]

- (ii) What are the values of m and n ?

Sample answer:

$$\begin{array}{l} \text{m=}3 \\ \text{n=}2 \end{array}$$

[2 marks]



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(d) Compound C_2H_5OH reacts with ethanoic acid to produce compound Y which has a sweet pleasant smell.

(i) State the name of compound Y.

Sample answers:

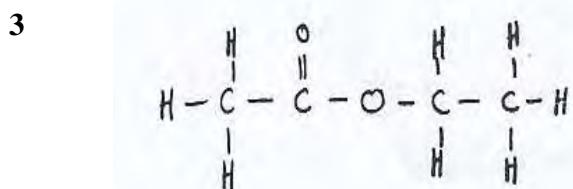
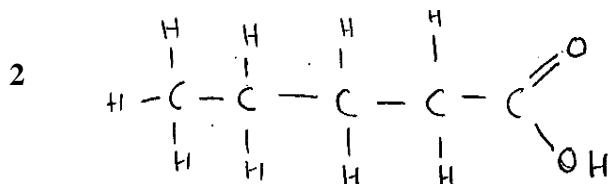
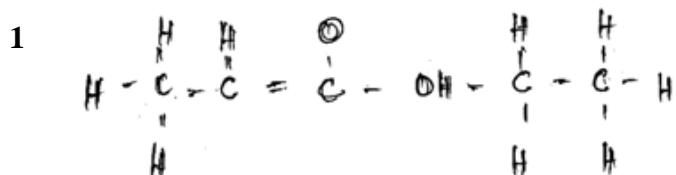
1. Ethyl ethanoate

2. Ethane ethanoic

[1 mark]

(ii) Draw the structural formula of compound Y.

Sample answers:



[1 mark]

(e) Compound C_2H_5OH undergoes dehydration to produce ethane.

(i) Suggest one dehydrating agent for this reaction.

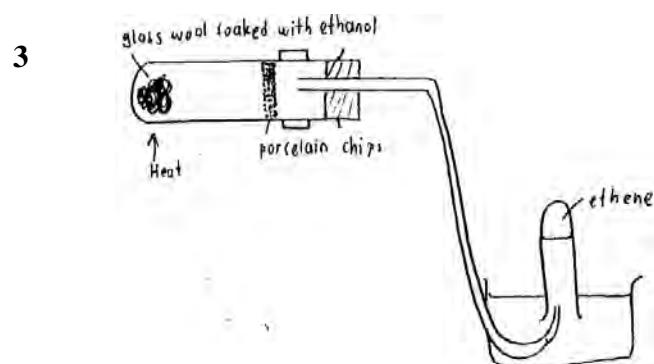
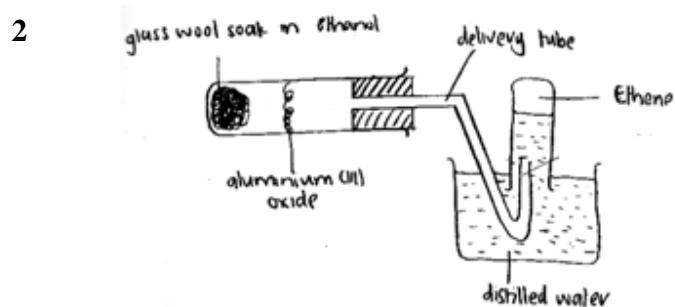
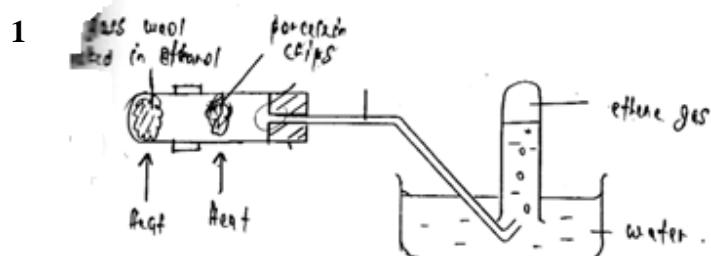
Sample answers:

1. Hydrogen gas

2. Aluminium(III) oxide

[1 mark]

- (f) Draw an apparatus set-up for this dehydration reaction to collect ethane.
- Sample answer:



[2 marks]

5. An experiment is carried out to investigate the rate of reaction of zinc with hydrochloric acid. Excess zinc powder is added to 20 cm³ of 2.0 mol dm⁻³ hydrochloric acid. The volume of gas collected at regular intervals is shown in Diagram 5.1.

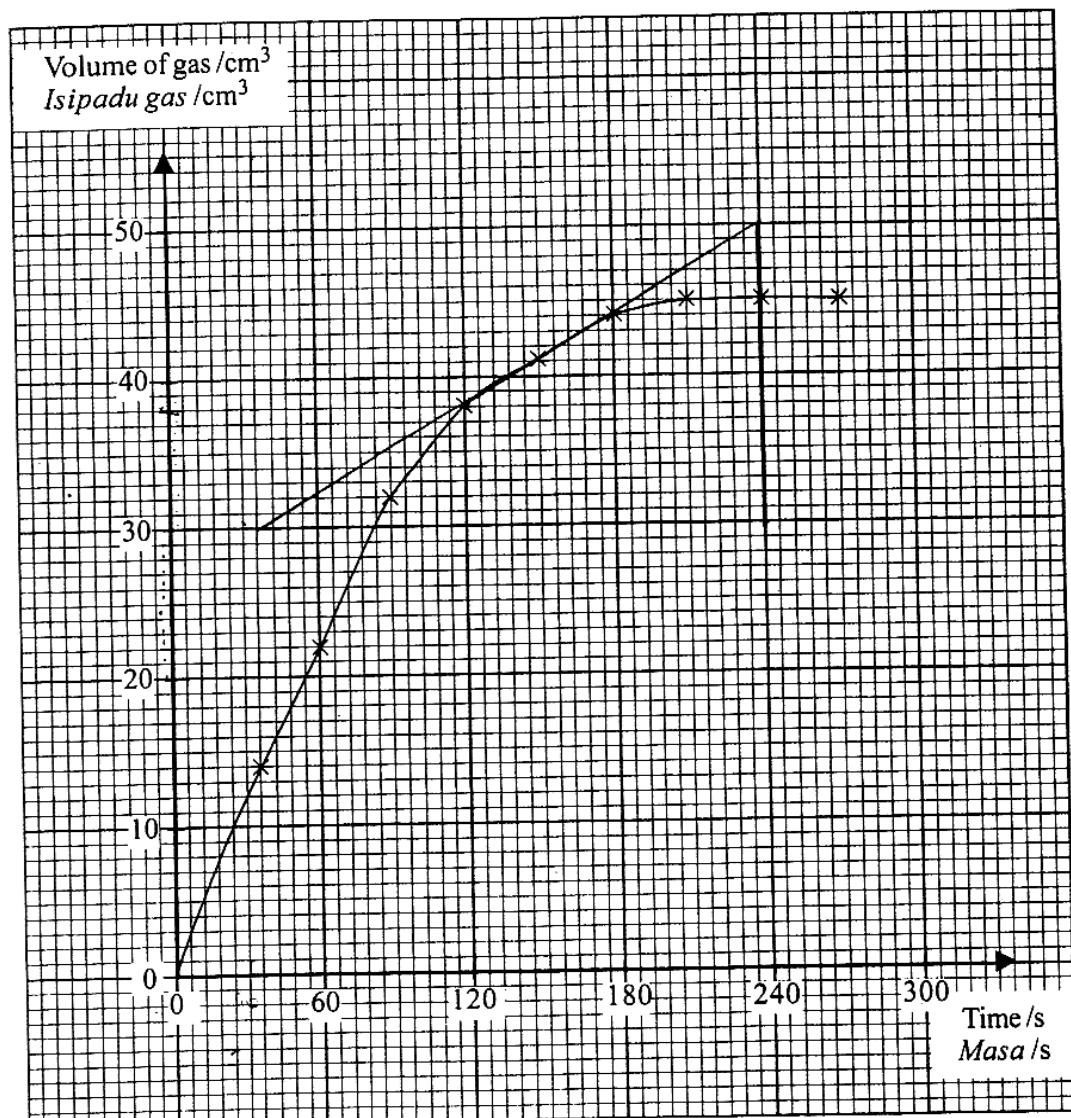


Diagram 5.1



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- (a) State the meaning of the rate of reaction.

Sample answers:

1. *The rate of reaction is the time taken of reactant to produce a product.*
2. *The change in the amount of reactant or product over time.*

[1 mark]

- (b) From graph in Diagram 5.1, determine:

- (i) The rate of reaction at 120s.

Sample answers:

1. $0.2 \text{ cm}^3 \text{s}^{-1}$
2. $0.098 \text{ cm}^3 \text{s}^{-1}$

[2 marks]

- (ii) The average rate of reaction between 60s and 120s.

Sample answers:

1. $0.356 \text{ cm}^3 \text{s}^{-1}$
2. $0.267 \text{ cm}^3 \text{s}^{-1}$

[1 mark]

- (c) Explain why the rate of reaction decreases with time.

Sample answers:

1. *The rate of reaction decreases with time because most of the reactants have been reacted.*
2. *Concentration of hydrochloric acid is decreasing.*

[1 mark]

- (d) Another experiment is carried out to study the factors that affect the rate of this reaction. The result of this experiment using excess zinc powder and 50 cm^3 of 1.0 mol dm^{-3} dilute hydrochloric acid.

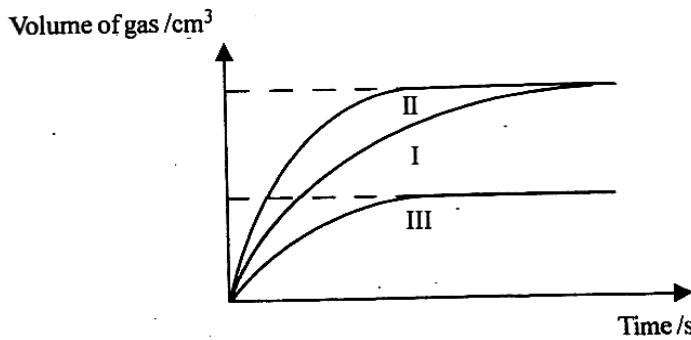


Diagram 5.2



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- (i) Suggest the factors that influence the rate of reaction to obtain the curves labelled II and III.

Sample answers:

- Curve II: 1. the use of a catalyst. ;
2. Temperature

- Curve III: 1. size of reactant particles.
2. Concentration

[2 marks]

- (ii) Describe briefly how to carry out the experiment to obtain the curve labelled III.

Sample answers:

1. *The curve labelled III can be obtained by using zinc chips instead of zinc powder. The large surface area decreases the rate of reaction and thus, the curve become less steep.*
2. *50 cm³ of 0.5 mol dm⁻³ dilute hydrochloric acid is reacted with excess zinc powder in a conical flask attached to a syringe. The gas obtained is carbon dioxide. The volume of the gas is measured and recorded.*

[3 marks]

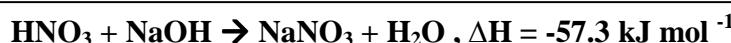
- (iii) Give one reason why the final volume of gas obtained in curve III is half the final volume of gas in curve I.

Sample answers:

1. *This happens because not all the zinc chips have been reacted.*
2. *This is because the concentration of dilute hydrochloric acid used is half of the concentration of acid used in experiment I. Concentration of dilute hydrochloric acid is the limiting factor.*

[1 mark]

6. The thermochemical equation for the neutralization reaction between nitric acid and sodium hydroxide solution is given below.



- (a) State the meaning of heat of neutralisation.

Sample answers:

1. *The heat change when one mole of water is formed from H⁺ ions of HNO₃ and OH⁻ of NaOH.*
2. *Neutralization is 1 mol of water produced from one hydrogen ion of an acid and one hydroxide ion from an alkali.*

[1 mark]



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- (b) Based on the given thermochemical equation, state one observation when dilute nitric acid is added to sodium hydroxide solution.

Sample answers:

1. *The plastic container becomes hot as the temperature of the mixture increases because it is an exothermic reaction where heat is released to the surrounding.*
2. *The temperature of the mixture is higher as the reaction releases heat to the surrounding (exothermic).*

[2 marks]

- (c) In an experiment 100 cm^3 of 2 mol dm^{-3} nitric acid solution was added to 100 cm^3 of 2.0 mol dm^{-3} sodium hydroxide solution.

[Specific heat capacity of solution = $4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$]

Calculate:

- (i) The heat energy released in this experiment.

Sample answers:

$$\begin{aligned}1. \quad & \text{Heat released/no.of moles} = 57300 \text{ Jmol}^{-1} \\& \text{No. of moles} = 100(2) / 1000 = 1.2 \\& \text{Heat released} = 0.2 \times 57300 \\& \qquad \qquad \qquad = 11460 \text{ J} \\& \qquad \qquad \qquad = 11.46 \text{ kJ.}\end{aligned}$$

$$\begin{aligned}2. \quad & \text{Heat released (1)}/0.2 = 57300 \text{ J} \\& \text{Heat released} = 11460 \text{ J.}\end{aligned}$$

[2 marks]

- (ii) The temperature change in this experiment

Sample answers:

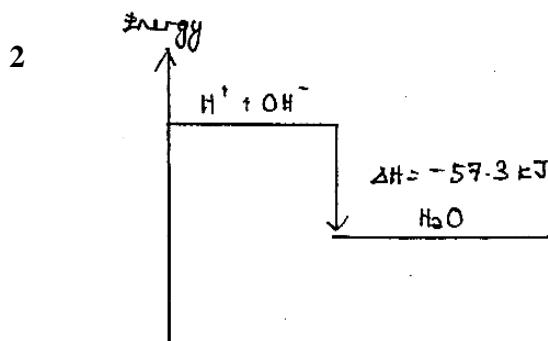
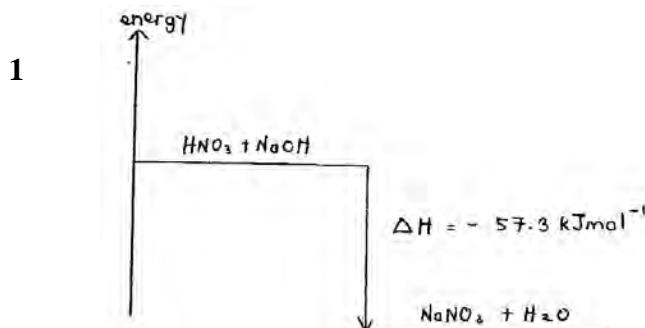
$$\begin{aligned}1. \quad & (100 + 100)(4.2)(\square) = 11460 \\& \qquad \qquad \qquad \square = 13.6 \text{ }^\circ\text{C} \\2. \quad & H = mc\square \\& -57.3 \text{ kJ} = (100+100)/2 (4.2) \\& \qquad \qquad \qquad \square = 136.429 \text{ }^\circ\text{C}\end{aligned}$$



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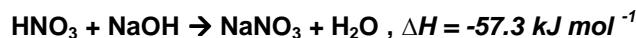
- (d) Draw the energy level diagram for the reaction between nitric acid and sodium hydroxide.

Sample answers:



[2 marks]

- (e) Nitric acid and ethanoic acid both react with sodium hydroxide by a neutralisation reaction.



Explain why the heat of neutralisation for each reaction is slightly different.

Sample answers:

1. This is because ethanoic acid is a weak acid whereas nitric acid is a strong acid. Therefore ethanoic acid dissociates partially in water to produce lower concentration of hydrogen ion and more energy is released as energy is used to break the bonds in the molecules is higher than in nitric acid.
2. Nitric acid is a strong acid while ethanoic acid is a weak acid. Nitric acid has a bigger number of hydrogen ions to be ionised compared to ethanoic acid. Moreover, some of the energy is needed to ionise the hydrogen completely in a solution of weak acid. Thus, the heat of neutralisation of nitric acid is higher than of ethanoic acid.

[2 marks]



Projek Jawab Untuk Jaya (JUJ) 2009

Section B

Sample answer:

7. (a) i. The two substance used as food additives are sodium benzoate and ethyl butanoate.
ii. the function of sodium benzoate is to enhance the taste of the food.
iii. the function of ethyl butanoate is to enhance the smell of the food so that people will addict to it.
- (b) i. For aida, the medicine prescribe to her by the doctor is paracetamol.
ii. the type of the medicine is painkiller.
iii. the correct usage of the medicine is to consume 2 tablets in one day as it is used to decrease the pain of headache.
iv. as for may ling, the medicine prescribe to her by the doctor is vitamin.
v. the type of the medicine is antibiotic.
vi. the correct usage of the medicine is finish all the antibiotic given by the doctors as to make sure.May ling is fully recovered from bacterial infection.
- (c) (i) (a) The effectiveness of the cleaning action between I and III are the same because both cleaning agents A and B succeed to remove the oily stain from the cloth in both 500 cm^3 of soft water.
(b) The effectiveness of cleaning action of experiment II is less effective than the cleaning action of experiment IV. This is because in experiment II, 20 cm^3 of cleaning agent A failed to remove oily stain from cloth in 500 cm^3 of hard water whereas 20 cm^3 of cleaning agent B can remove the oily stain from cloth in the same 500 cm^3 of hard water.
(ii) (a) cleaning agent A is soap
(b) cleaning agent B is detergent.
(c) the cleaning agent B is more effective than the cleaning agent A.



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8. (a) i. The position of ions in the electrochemical series.
ii. the concentration of the ions in the solution.
iii. the type of electrons used.
- (b) in the electrolysis of 1.0 mol dm^{-3} of sodium chloride solution, using carbon electrodes, the electrolyte contains 4 ions. The ions from the sodium chloride Are sodium ions, Na^+ and chloride ions, Cl^- . The presence of water in this solution also explains the presence of hydrogen ions, H^+ and hydroxide ions, OH^- . Electrode P , which is the negative terminal of this cell acts as the cathode. Electrode Q, acts as the anode as it is the positive terminal. Cations Na^+ and H^+ are attracted towards the cathode (P) while anions Cl^- and OH^- are attracted towards the anode (Q). At the cathode, the H^+ ions are selectively discharged. This is because of its position lower than Na^+ in the electrochemical series. Thus, hydrogen ions have a higher tendency to released electrons to form hydrogen gas. The half equation for the reaction at electrode P is $2\text{H}^+ \rightarrow \text{H}_2 + 2e$. At the anode, Cl^- ions are selectively discharged. Although the position of OH^- ions is lower than Cl^- ions in the reactivity series, the concentration of chloride ions in the 1.0 mol dm^{-3} sodium chloride solution is greater than OH^- ions. Thus it will have a higher tendency to accept electrons to form molecules, chlorine gas. The half equation is $2\text{Cl}^- + 2e \rightarrow \text{Cl}_2$. Because of these reasons, hydrogen gas is collected at electrode P and chlorine gas is collected at electrode Q.
- (c) (i) Silver,Ag \rightarrow metal M \rightarrow metal L
- Both metals M and L are able to displace silver ions from its salt solution. This ability tells us that metals M and L are more electropositive than silver thus placed higher in the electrochemical series. To determine the position of metal M and L another experiment was conducted with L nitrate solution and metal M. No reactions were observed. Thus this states that metal M was not able to displace L from its salt solution. This tells us that metal M is less electropositive than L in the electrochemical series. With that, the position of L is above M in the series.
- (ii) if the metal is copper, then the solution formed is copper(II) nitrate solution and the grey deposits are silver metal.



Section C

9. (a) Metal M is sodium. Sodium will burn brightly with yellow flame when it reacts with oxygen gas to produce sodium oxide which is white in colour.
The half equation for oxidation: $\text{Na} \rightarrow \text{Na}^+ + \text{e}$
The half equation for reduction: $\text{O}_2 + 4\text{e} \rightarrow 2\text{O}^{2-}$
- (b) Metal X is lead. This is because lead, Pb is lower in the electrochemical series than iron, Fe. Metals that are lower in the electrochemical series will accelerate the rusting process of iron, Fe, when both of them are in contact. The rusting of iron nail will produce iron(II) ions, Fe^{2+} which is indicated by the dark blue colour of the agar which is mixed with potassium hexacyanoferrate(III). Potassium hexacyanoferrate(III) detects the presence of iron(II) ions, Fe^{2+} ions by turning colour from colourless to dark blue.
Metal Y is magnesium. This is because magnesium, Mg is higher in the electrochemical series than iron, Fe. Metals that are higher in the electrochemical series will stop rusting process of iron, Fe. If the rusting of iron, Fe does not occur, there will be no iron(II) ions, Fe^{2+} produced. The absence of iron(II) ions, Fe^{2+} is indicated by the agar which is mixed with potassium hexacyanoferrate(III). No changes in the colour of the agar shows that iron(II) ions, Fe^{2+} are not present thus rusting of iron nail does not occur.
- (c) Iron(II) ions can be converted to iron(III) ions. This can be done through the process of oxidation of iron(II) ions by using chlorine water as the oxidising agent. First, 3 cm³ of iron(II) nitrate, $\text{Fe}(\text{NO}_3)_2$ solution is poured into a test tube. Then, chlorine water is added into the test tube. Then 2 cm³ of sodium hydroxide, NaOH solution is added into the beaker, after that add the sodium hydroxide NaOH solution in excess. A brown precipitate which does not dissolve in excess sodium hydroxide, NaOH solution confirms the presence of iron(III) cations, Fe^{3+} . The half equation that occurs in this experiment are: $\text{Fe}^{2+} \rightarrow \text{Fe}^{3+} + \text{e}$, $\text{Cl}_2 + 2\text{e} \rightarrow 2\text{Cl}^-$.
Iron(III) ions can be converted back to iron(II) ions, Fe²⁺ through the reduction of iron(III), Fe^{3+} by using zinc as the reducing agent. First, 5 cm³ of iron(III) nitrate, $\text{Fe}(\text{NO}_3)_3$ solution is added into a test tube. Then, a zinc strip is added into the test tube. Then, pour 2 cm³ of sodium hydroxide, NaOH solution is added in excess. A green precipitate which does not dissolve in excess sodium hydroxide, NaOH solution confirms the presence of iron(II), Fe^{2+} ions. The half equation in this experiment are:
$$\text{Fe}^{3+} + \text{e} \rightarrow \text{Fe}^{2+},$$
$$\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}$$



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10. (a) Example of acid A is sulphuric acid, H_2SO_4 . Example of acid B is nitric acid, HNO_3 . Acid A is a strong acid. It ionises completely in water to produce a large amount of H^+ ions, hydrogen ions. The amount of H^+ ions present in the solution will influence the pH value. If the concentration of H^+ ions in the solution is high, the pH value will be low. Since the pH value of acid A is 1 then it is a strong acid. Acid ionises partially in water to produce less H^+ ions than in acid A. Since the concentration of H^+ ions in acid B solution is little, the pH value of the solution is higher, that is 5.
- (b) A 50 cm^3 of 0.1 mol dm^{-3} solution of sodium sulphate, Na_2SO_4 and a solution of lead(II) nitrate, $Pb(NO_3)_2$ is prepared. The sodium sulphate solution is poured into a beaker. Lead(II) nitrate is added into the beaker while stirring the solution with a glass rod continuously. A precipitate will form at the bottom of the beaker after a few minutes. The mixture is filtered using a filter funnel and filter paper. The residue in the filter paper is lead(II) sulphate. The chemical equation is $Na_2SO_4 + Pb(NO_3)_2 \rightarrow PbSO_4 + 2NaNO_3$. The two soluble salt solutions that is sodium sulphate and lead(II) nitrate reacted to produce an insoluble salt, lead(II) sulphate. The residue is then rinsed with distilled water. Then it is dried with two sheets of filter paper.
- (c) ethanoate acid should be applied to the skin. It is a weak acid it will neutralise the sting of a jelly fish. Once neutralised it will not cause any more pain to the victim. It is a weak acid, therefore it will not cause the skin to burn if applied in excess. No further injury will be caused because it is a weak acid. Although it is a weak acid it can still neutralise the alkalinity of the sting of the jelly fish.



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MARKING SCHEME FOR MARKING TECHNIQUE

No.	Marking Scheme	Mark	
1(a)	Answer: Contack process accept: contact	1	1
(b)	Answer: Vanadium(V) oxide reject: vanadium oxide	1	1
(c)(i)	Answer: Oleum a: forming sulphuric acid//pyro sulphuric acid	1	1
(ii)	Able to write the chemical equation 1. Correct formula and the no of mole for SO ₃ and H ₂ SO ₄ 2. Correct formula and the no of mole for H ₂ S ₂ O ₇ Answer: SO ₃ + H ₂ SO ₄ → H ₂ S ₂ O ₇ (1+1) // SO ₃ (g) + H ₂ SO _{4(aq/l)} → H ₂ S ₂ O _{7(aq)} – (0+1) // SO ₃ (g) + H ₂ SO _{4(aq/l)} → H ₂ S ₂ O _{7(l)} – (1+1)	1 1	2
(d)	Answer: 1. Dissolve/react/combine/mix (r: mixture) with rain water(r:cloud). 2. Produce acid rain/acidic vapour/solution r: water/cloud a: water in the cloud	1+1	2
(e)(i)	Answer: 1. Ammonium sulphate 2. Sodium sulphate 3. Potassium sulphate 4. Magnesium sulphate (any one)	1	1
(ii)	Answer: 1. Electrolyte in car battery (r: electrolyte; a: electrolyte in battery) 2. [Manufacturing of detergent] 3. [manufacturing of artificial fibres] 4. [manufacturing of paint] 5. [leather tanning] 6. [Manufacturing of dye] 7. As a catalyst 8. As dehydrating agent 9. Remove oxide layer (any one)	1	1
	TOTAL		9



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No.	Marking Scheme	Mark	
2(a)	Answer: Group 17//halogen a: group seventeen r: group 7	1	1
(b)	Answer: 2.7 // 2,7	1	1
(c)	Answer: 1. Attractive forces between nucleus of fluorine and <u>valence electron/electron/outermost electron</u> are stronger A: pull of a valence electron by a nucleus is stronger 2. Fluorine atom can accept/attract/gain/receive electron easily// fluorine atom has higher tendency/electron affinity to accept electron	1	1
(d)	Answer: Covalent bond a: covalent r: covalent compound	1	1
(e)(i)	Answer: Ionic bond a: ionic, electrovalence Note: 1. "adp" for compound 2. "wcr" for wrong explanation for each of the bonding.	1	1
(e)(ii)	Able to draw a diagram to show the electron arrangement of the compound. 1. Correct no of shell and electron for both ions. 2. Correct charge and label of the ions + nucleus is shown	1 1	2
	<p>Note: 1. $\left[\quad \right]^+ \left[\quad \right]^-$ (1+0)</p>		



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	<p>2.</p> $\left[\begin{array}{c} \text{Na atom} \\ \\ \text{Cl atom} \end{array} \right]^{+} \left[\begin{array}{c} \\ \text{Cl atom} \end{array} \right]^{-}$ <p>(0+1)</p>										
	<p>3.</p> $\left[\begin{array}{c} \\ \text{Cl atom} \end{array} \right]^{-} \left[\begin{array}{c} \\ \text{Cl atom} \end{array} \right]^{+}$ <p>(1+1)</p>										
(f)	Answer: <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td colspan="2">Reactants</td> </tr> <tr> <td>KI_(aq) + Cl₂ (aq)</td> <td>✓</td> </tr> <tr> <td>KCl₂ (aq) + Br₂ (aq)</td> <td></td> </tr> <tr> <td>KBr_(aq) + KCl_(aq)</td> <td></td> </tr> </table>	Reactants		KI _(aq) + Cl ₂ (aq)	✓	KCl ₂ (aq) + Br ₂ (aq)		KBr _(aq) + KCl _(aq)		1	1
Reactants											
KI _(aq) + Cl ₂ (aq)	✓										
KCl ₂ (aq) + Br ₂ (aq)											
KBr _(aq) + KCl _(aq)											
	TOTAL		9								

No.	Marking Scheme	Mark	
3(a)(i)	Answer: Diffusion a:diffusion ; r: difuse	1	1
(ii)	Answer: Molecule		
(iii)	Answer: 1. Made up tiny/discrete(r:small) particles/molecules 2. Continuous/random motion 3. Between the air/bromine/another particles // from high concentration to low concentration/region/area// between the particles a: particles move through the space in the air	1 1 1	3
(iv)	Answer:[Less than 10 minutes] a:lesser//time taken is smaller/faster	1	1
(b)(i)	Answer:0.5 x 32g // 16g	1	1
(ii)	Able to calculate the volume of carbon dioxide gas in balloon B with correct unit Answer: Same Able to explain Answer: The number of moles is the same a: same volume	1 1	2
	TOTAL		10

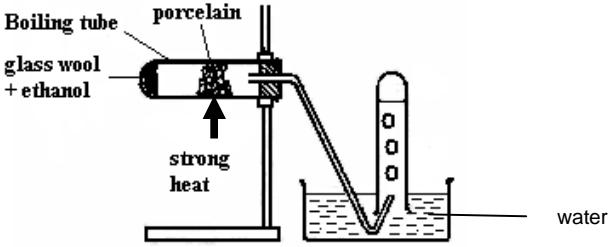


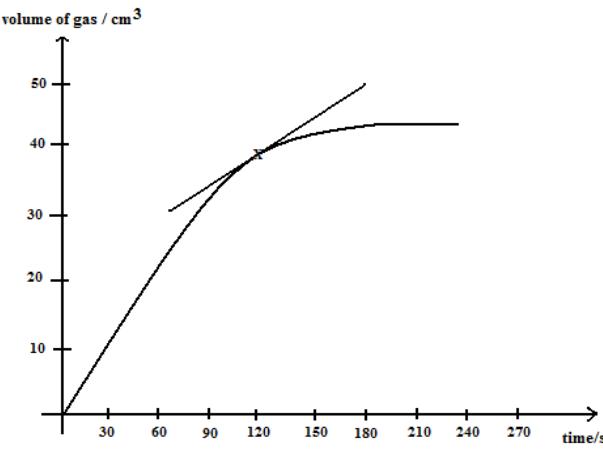
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No.	Marking Scheme	Mark	
4(a)	Answer: Ethanol a: ethyl alcohol	1	1
(b)	Answer: $C_nH_{2n+1}OH$ r: $C_nH_{2n+2}O$ Note: if n is given is must be correct	1	1
(c)(i)	Answer: Carbon dioxide	1	1
(ii)	Answer: $m=3$ $n=2$	1+1	2
(d)(i)	Answer: Ethyl ethanoate	1	1
(ii)	Answer: $ \begin{array}{ccccc} & \text{H} & \text{O} & \text{H} & \text{H} \\ & & & & \\ \text{H} - & \text{C} - & \text{C} - & \text{O} - & \text{C} - & \text{C} - & \text{H} \\ & & & & & \\ & \text{H} & & \text{H} & \text{H} & \text{H} \end{array} $ $ \text{CH}_3 - \underset{\text{ }}{\text{C}} - \text{O} - \text{CH}_2 - \text{CH}_3 \quad // \quad \text{CH}_3 \underset{\text{ }}{\text{C}} - \text{O} \text{CH}_2 \text{CH}_3 $ R: $\text{CH}_3\text{COOC}_2\text{CH}_3$ $\text{CH}_3\underset{\text{ }}{\text{C}}-\text{O C}_2\text{H}_5$ A: mirror image	1	1
(e)(i)	Answer: 1. Concentrated sulphuric acid 2. Porcelain chip 3. Aluminium oxide//alumina/pumice stone 4. Phosphoric acid (any one)	1	1



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(e)(ii) Able to draw a labelled functional apparatus set-up for the dehydration reaction and the collection of ethane. Answer: 	1+1 2
1. Functional with a correct set-up apparatus and [heat] 2. [collection of gas] and labelling of water, Al_2O_3 , glass wool + ethanol	TOTAL
	10

No.	Marking Scheme	Mark
5(a)	Answer: [change of quantity/mol/mass/volume/concentration/amount of reactant/product] with time taken/time // change in quantity of reactant/product /volume of H_2 gas in a certain range of time/per unit time	1 1
(b)(i)	1. Able to draw the tangent at 120s 2. Able to state the rate of reaction with correct unit Answer:  Range: $[0.15 \pm 0.030 \text{ cm}^3 \text{ s}^{-1}]$ [$0.12-0.18 \text{ cm}^3 \text{ s}^{-1}$]	1 1 2



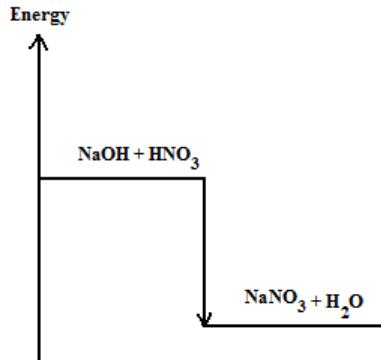
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(ii)	Answer: 0.27/0.267 cm ³ s ⁻¹ // 16 cm ³ s ⁻¹ a: 38-22 / 60 cm ³ s ⁻¹ // 16/60 cm ³ s ⁻¹	1	1
(c)	Answer: Concentration of hydrochloric acid decreases a: no of mole of HCl decreases r; amount/volume of HCl	1	1
(d)(i)	Able to suggest the factors that influence the rate of reaction Answer: Curve II: catalyst/temperature Curve III: concentration	1+1	2
(ii)	Answer: 1. [Repeat the experiment] 2. [reduce the concentration] of hydrochloric acid 3. The volume of hydrochloric acid remains unchanged// [the volume of acid used must produce less than 0.005 mol of HCl] Alternative answer: 2a: Reduce temperature// use zinc granule 3a: reduce volume of hydrochloric acid	1 1 1	3
(iii)	Able to state the reason why the total volume of gas obtained in curve III is half the total volume of gas in curve I Answer: [The number of mole of hydrochloric acid used is half of set I]	1	1
	TOTAL		11

No.	Marking Scheme	Mark	
6(a)	Answer: Heat/energy change/released when 1 mole of water is formed from the neutralization/the reaction between acid and alkali // heat/energy released/change/given out when 1 mole of hydrogen ions/H ⁺ , reacts with 1 mole of hydroxide ions / OH ⁻ (any one)	1	1
(b)	Answer: Observation: the mixture/container become hot//temperature rise/increases Explanation: [the reaction is exothermic]// heat is released//energy of reactants is higher than products	1 1	2
(c)(i)	Answer: 1. No of mole of NaOH = 100/1000 x 2 // 0.2 2. Energy released = 0.2 x 57.3 kJ // 11.46 kJ // 11460 J // 11.5 kJ A: ecf no of mole for P2	1 1	2
(ii)	Answer: 1. Correct substitution : 11.46 x 1000 / 200 x 4.2 // 11460/200 x 4.2 // 11500 / 200 x 4.2 2. Correct answer with unit: 13.6 °C Note: ecf for energy released	1 1	2



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(d)	<p>Able to draw the correct energy level diagram Answer:</p> <ol style="list-style-type: none"> 1. Axis with arrow labelled energy and two energy level 2. Formula of reactants and products of exothermic reaction written on the correct energy levels  <p>Note: ΔH is optional, ignore wrong value of ΔH</p>	1	1	2
(e)	<p>Answer:</p> <ol style="list-style-type: none"> 1. Ethanoic acid is a weak acid// CH_3COOH/ethanoic is partially ionize// nitric acid is a strong acid// HNO_3 is totally/fully/completely ionize 2. Energy is used to ionize/dissociate $\text{CH}_3\text{COOH}/\text{HNO}_3$ 	1	1	2
	TOTAL			11

No.	Marking Scheme	Mark													
7(a)	<p>Able to select two substances used as food additives and state the functions</p> <p><u>Sample answers:</u></p> <table border="1"> <thead> <tr> <th>Substances</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>Ethyl butanoate \checkmark_{S1}</td> <td>\checkmark_{F1} Flavouring agent // Improve/give the taste/flavour</td> </tr> <tr> <td>Sucrose \checkmark_{S2}</td> <td>\checkmark_{F2} Flavouring agent// improve/give the taste/flavour a: sweetener</td> </tr> <tr> <td>Citric acid \checkmark_{S3}</td> <td>\checkmark_{F3} Antioxidant// prevent oxidation</td> </tr> <tr> <td>Gelatin \checkmark_{S4}</td> <td>\checkmark_{F4} Thickening agent// to thicken the food</td> </tr> <tr> <td>Sodium benzoate \checkmark_{S5}</td> <td>\checkmark_{F5} Preservative// prevent the growth of microorganism</td> </tr> </tbody> </table> <p>(any two pairs)</p> <p>Note: Apply wcr for function only</p>	Substances	Function	Ethyl butanoate \checkmark_{S1}	\checkmark_{F1} Flavouring agent // Improve/give the taste/flavour	Sucrose \checkmark_{S2}	\checkmark_{F2} Flavouring agent// improve/give the taste/flavour a: sweetener	Citric acid \checkmark_{S3}	\checkmark_{F3} Antioxidant// prevent oxidation	Gelatin \checkmark_{S4}	\checkmark_{F4} Thickening agent// to thicken the food	Sodium benzoate \checkmark_{S5}	\checkmark_{F5} Preservative// prevent the growth of microorganism	2+2	4
Substances	Function														
Ethyl butanoate \checkmark_{S1}	\checkmark_{F1} Flavouring agent // Improve/give the taste/flavour														
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No.	Marking Scheme				Mark
7(b)	Able to state the names of the medicine, the types of medicine and the correct usage <u>Sample answer</u>				2+2 4
	Name of medicine	Type of medicine	Usage		
Aida	1. Aspirin // paracetamol	2. Analgesic// Pain killer	3. Proper dosage// taken after food// taken with doctor's prescription		
May ling	4. Penicillin// Streptomycin	5. antibiotic	6. Proper dosage (a: given/taken by injection) // taken after food// complete course// taken with doctor's prescription		
 Another sample answers: 1.					
	Name of medicine	Type of medicine	Usage		
Aida	Analgesic x	Aspirin ✓ ₂	✓ ₃ Proper dosage// taken after food// taken with doctor's prescription		
May ling	Antibiotic x	Penicillin ✓ ₄	✓ ₆ Proper dosage (a: given/taken by injection) // taken after food// complete course// taken with doctor's prescription		
 2.					
	Type of medicine	Name of medicine	Usage		
Aida	Aspirin x	Analgesic ✓ ₂	✓ ₃ Proper dosage// taken after food// taken with doctor's prescription		
May ling	penicillin x	antibiotic ✓ ₅	✓ ₆ Proper dosage (a: given/taken by injection) // taken after food// complete course// taken with doctor's prescription		



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No.	Marking Scheme				Mark												
7(b)	3. not mention the name but in correct order																
	<table border="1"><thead><tr><th></th><th>Name of medicine</th><th>Type of medicine</th><th>Usage</th></tr></thead><tbody><tr><td></td><td>Aspirin // paracetamol ✓₁</td><td>Analgesic// Pain killer ✓₂</td><td>✓₃ Proper dosage// taken after food// taken with doctor's prescription</td></tr><tr><td></td><td>Penicilin//Streptomycin ✓₄</td><td>Antibiotic ✓₅</td><td>✓₆ Proper dosage (a:given/taken by injection)// taken after food// complete course// taken with doctor's prescription</td></tr></tbody></table>					Name of medicine	Type of medicine	Usage		Aspirin // paracetamol ✓ ₁	Analgesic// Pain killer ✓ ₂	✓ ₃ Proper dosage// taken after food// taken with doctor's prescription		Penicilin//Streptomycin ✓ ₄	Antibiotic ✓ ₅	✓ ₆ Proper dosage (a:given/taken by injection)// taken after food// complete course// taken with doctor's prescription	
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	4. not mention the name but in wrong order																
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	5. name is mention but wrong medicine is prescribe																
	<table border="1"><thead><tr><th></th><th>Type of medicine</th><th>Name of medicine</th><th>Usage</th></tr></thead><tbody><tr><td>May Ling</td><td>Aspirin x</td><td>Analgesic ✓₂</td><td>✓₆ Proper dosage// taken after food// taken with doctor's prescription</td></tr><tr><td>Aida</td><td>penicilin x</td><td>Antibiotic ✓₅</td><td>✓₃ Proper dosage (a:given/taken by injection)// taken after food// complete course// taken with doctor's prescription</td></tr></tbody></table>					Type of medicine	Name of medicine	Usage	May Ling	Aspirin x	Analgesic ✓ ₂	✓ ₆ Proper dosage// taken after food// taken with doctor's prescription	Aida	penicilin x	Antibiotic ✓ ₅	✓ ₃ Proper dosage (a:given/taken by injection)// taken after food// complete course// taken with doctor's prescription	
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No.	Marking Scheme	Mark
7(c)(i)	<p><u>Sample answer</u></p> <p>Experiment I and III</p> <ol style="list-style-type: none"> 1. Soft water does not contain calcium ions /Ca ²⁺ / magnesium ions/ Mg ²⁺ / metal ions 2. Cleaning agents A and B both dissolve in soft water// not form scum in soft water 3. Cleaning action/agent in experiment I is as effective as/same/equal cleaning action in experiment III <p>Experiment II and III</p> <ol style="list-style-type: none"> 4. Hard water contains calcium ion/Ca ²⁺ / magnesium ions/ Mg ²⁺ / metal ions 5. Cleaning agent A reacts with Ca ²⁺/ Mg ²⁺ to form scum/insoluble salt/precipitate 6. Cleaning agent B does not from scum/precipitate/insoluble salt 7. Cleaning agent/action in experiment IV is more effective than cleaning action in experiment II a:detergent is more effective than soap if soap and detergent mention in Experiment II and experiment IV. <p>Notes:</p> <ol style="list-style-type: none"> 1. If Ca ²⁺/ Mg ²⁺ in hard water is mentioned in P5 or P6, P4 can be awarded 2. P4 and P5 (apply adp for Ca ²⁺ and Mg ²⁺) <ul style="list-style-type: none"> i.e: (a) hard water contain calcium and magnesium - X_{P4} cleaning agent A reacts with Ca and Mg to form scum. ✓_{P5} (b) Hard water contain Na ⁺ and Ca ²⁺ - .✓_{P4} Cleaning agent A reacts with Na ⁺ and Ca ²⁺ to form scum - X_{P5} (c) Hard water contain Na + ion – X_{P4} Cleaning agent A reacts with Na + to form scum - X_{P5} 	



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No.	Marking Scheme	Mark
7(c)(ii)	<p>Sample answer</p> <ol style="list-style-type: none"> 1. Cleaning agent A : soap 2. Cleaning agent B: Detergent <p>Able to state which cleaning agent is more effective</p> <p>Sample answer</p> <ol style="list-style-type: none"> 3. Cleaning agent B is more effective than cleaning agent A a:B 	1 1 1 3 20

No.	Marking Scheme	Mark
8(a)	<p>Sample answer</p> <ol style="list-style-type: none"> 1. At electrode P : the position of ions in electrochemical series 2. At electrode Q: concentration of ions a: concentration of electrolyte// concentration <p>Note:</p> <ol style="list-style-type: none"> 1. P & Q is not mentioned (follow the order) <ul style="list-style-type: none"> - Position of ion in electrochemical series – $\sqrt{P_1}$ - Concentration of ions - $\sqrt{P_2}$ (1+0) 2. P & Q is not mentioned and answer given more than two <ul style="list-style-type: none"> (a) - Position of ion in electrochemical series – $\sqrt{P_1}$ - Concentration of ions - $X_{P_2 \text{ wr}}$ - type of electrode – X (1+0) <ul style="list-style-type: none"> (b) - Position of ion in electrochemical series – $\sqrt{P_1}$ - type of electrode - X - Concentration of ions – ignore because not in sequence (1+0) <ul style="list-style-type: none"> (c) - type of electrode - X - Concentration of ions – $\sqrt{P_2}$ - Position of ion in electrochemical series – ignore (0+1) <ul style="list-style-type: none"> (d) - type of electrode - X - Position of ion in electrochemical series – ignore - Concentration of ions – ignore (0+0) 	1 1 2



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(b)	<p>Sample answer</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Electrode</th><th style="padding: 5px;">P/cathode</th><th style="padding: 5px;">Q/anode</th></tr> </thead> <tbody> <tr> <td style="padding: 5px;">Ions that are attracted</td><td style="padding: 5px;">$\sqrt{P_1} \text{Na}^+, \text{H}^+$</td><td style="padding: 5px;">$\sqrt{Q_1} \text{Cl}^-, \text{OH}^-$</td></tr> <tr> <td style="padding: 5px;">Name the ions that are selectively discharged</td><td style="padding: 5px;">$\sqrt{P_2}$ Hydrogen ion</td><td style="padding: 5px;">$\sqrt{Q_2}$ Chloride ion</td></tr> <tr> <td style="padding: 5px;">Reason</td><td style="padding: 5px;">$\sqrt{P_3}$ H + is lower in the electrochemical series</td><td style="padding: 5px;">$\sqrt{Q_4}$ Concentration of Cl - higher than OH -</td></tr> <tr> <td style="padding: 5px;">Equation</td><td style="padding: 5px;">$\sqrt{P_4} \sqrt{P_5} 2\text{H}^+ + 2e \rightarrow \text{H}_2$</td><td style="padding: 5px;">$\sqrt{Q_5} \sqrt{Q_6} 2\text{Cl}^- \rightarrow \text{Cl}_2 + 2e$</td></tr> <tr> <td style="padding: 5px;"></td><td colspan="2" style="padding: 5px; vertical-align: top;"> P4 & Q4 : correct formula of reactant and product P5 & Q5: correct coefficient of reactant and product </td></tr> </tbody> </table>	Electrode	P/cathode	Q/anode	Ions that are attracted	$\sqrt{P_1} \text{Na}^+, \text{H}^+$	$\sqrt{Q_1} \text{Cl}^-, \text{OH}^-$	Name the ions that are selectively discharged	$\sqrt{P_2}$ Hydrogen ion	$\sqrt{Q_2}$ Chloride ion	Reason	$\sqrt{P_3}$ H + is lower in the electrochemical series	$\sqrt{Q_4}$ Concentration of Cl - higher than OH -	Equation	$\sqrt{P_4} \sqrt{P_5} 2\text{H}^+ + 2e \rightarrow \text{H}_2$	$\sqrt{Q_5} \sqrt{Q_6} 2\text{Cl}^- \rightarrow \text{Cl}_2 + 2e$		P4 & Q4 : correct formula of reactant and product P5 & Q5: correct coefficient of reactant and product		
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No.	Marking Scheme	Mark
8(b)	Note: 1. Q2 – chlorine ion – X Q3 – chlorine ion - $\sqrt{\text{adp}}$ 2. $2\text{H}^+ + 2e = \text{H}_2 - X_{P5} \sqrt{P_4}$ $2\text{Cl}^- = \text{Cl}_2 + 2e - X_{Q5} \sqrt{Q_4}$ 3. If ion attracted to opposite – ecf $X_{P1} \sqrt{Q_1}$ 4. $\text{H}^+ + e \rightarrow \text{H} - 0+0$ 5. $\text{H}^+ + e \rightarrow \text{H}_2 - (1+0) X_{P5} \sqrt{P_4}$ 6. $\text{H}^+ + e \rightarrow \text{H}$ $\text{H}^+ + e \rightarrow \text{H}_2 - X_{P4} \sqrt{P_5}$ 7. $\text{Cl}^- \rightarrow \text{Cl} + e$ $\text{Cl} + \text{Cl} \rightarrow \text{Cl}_2 - X_{Q4} \sqrt{Q_5}$ 8. Equation given but wrong explanation - X $P_4 \sqrt{P_5}$	



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No.	Marking Scheme				Mark	
8 (c)(i)	Sample answer					
	Experiment	I	II	III		
	Explanation	$\sqrt[1]{L}$ is more electropositive than silver// L is higher than silver in the electrochemical series a:L ion	$\sqrt[3]{M}$ is more electropositive than silver// M is higher than silver in the electrochemical series a:M ion	$\sqrt[5]{L}$ is more electropositive than M// L is higher than silver in the electrochemical series a:L ion		
		$\sqrt[2]{L}$ can displace silver from its solution (1+1)	$\sqrt[4]{M}$ can displace silver from its solution (1+1)	$\sqrt[6]{M}$ cannot displace L from its solution (1+1)	Max 5	1 6
	8. The order of the three metals: Ag/Silver, M/Cu/Copper, L					
8(c)(ii)	Able to name the products formed in experiment II Answer: 1. Copper(II) nitrate a: copper nitrate 2. Silver				1+1	2
						20



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No.	Marking Scheme	Mark
9(a)	<p>1. Able to suggest a suitable metal 2. Able to describe the observation when M reacts with oxygen 3. Able to write the half-equation for oxidation 4. Able to write the half-equation for reduction</p> <p>Sample answer:</p> <p>1. Potassium/Sodium/Lithium/Rubidium/Cesium/Francium 2. White solid//white fume/bright (for all metals) Burns with <u>purple</u> (a:lilac) /yellow/red flame</p> <p>3. $M \rightarrow M^+ + e$ (M is either K/Na/Li/Ru/Ce/Fr)</p> <p>4. $O_2 + 4e \rightarrow 2O^{2-}$</p>	1 1 1 1 4

Note:

1. P2 and P3 must correspond to P1
i.e:

1. Potassium
2. burn with purple flame
3. $K \rightarrow K^+ + e$

2. 1. magnesium - X
2. white solid - ✓
3. $Mg \rightarrow Mg^{2+} + 2e - X$
4. $O_2 + 4e \rightarrow 2O^{2-} - \checkmark$

3. 1. Lead - X
2. white solid - X
3. $Pb \rightarrow Pb^{2+} + 2e - X$
4. $O_2 + 4e \rightarrow 2O^{2-} - \checkmark$



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No.	Marking Scheme	Mark
9(b)	<p>Able to suggest metal X and give reason Sample answer:</p> <p>1. X: copper/silver [any metal less electropositive than iron]</p> <p>2. X is less electropositive than iron// x is lower than iron in electrochemical series</p> <p>3. Iron rust/oxidised/lose electron to form $[Fe^{2+}]$ ions Ie: Iron rust, $Fe \rightarrow Fe^{2+} + e^-$.</p> <p>Able to suggest metal Y and give reason Sample answer:</p> <p>4. Y: magnesium/aluminium/zinc [any metal more electropositive than iron]</p> <p>5. Y is more electropositive than iron // Y is higher than iron in electrochemical series</p> <p>6. [Y] oxidised/lose electron to form [Y] ions // prevent /inhibit iron from being oxidised/rusted</p> <p>Note: 1. Adp for ECS 2. Metal X – magnesium - X Magnesium is less electropositive than iron – X Magnesium is more electropositive than iron - X</p>	1 1 1 1 1 1 1 1 6



Projek Jawab Untuk Jaya (JUJ) 2009

No.	Marking Scheme	Mark
9(c)	<p>Sample answer: $\underline{\text{Fe}^{2+} \rightarrow \text{Fe}^{3+}}$</p> <p>1. [suitable metal] Magnesium/zinc // [any other suitable metal more electropositive than iron]</p> <p>2. Add the [metal] to [solution containing Fe³⁺]</p> <p>3. Heat/shake/stir</p> <p>4. Decant/filter the mixture/solution</p> <p>5. Add sodium hydroxide /potassium hexacyanoferate(II)/(III) solution</p> <p>6. Green/blue/dark blue precipitate is formed [note: if insoluble iron(III) compound is used, no marks for P2,P4 and P6. Ie. $\text{Fe}_2(\text{CO}_3)_3$]</p> <p>$\underline{\text{Fe}^{3+} \rightarrow \text{Fe}^{2+}}$</p> <p>7. [suitable halogen] Chlorine/bromine/iodine (mark given if mention chlorine gas // bromine gas/vapour at P7and at P8 must pass the gas through FeSO_4)</p> <p>8. Add chlorine/bromine water to [solution containing Fe²⁺]</p> <p>9. Heat/stir/warm</p> <p>10. Add sodium hydroxide /KSCN/Potassium hexacyanoferate(II)/(III) solution</p> <p>11. Brown /blood red solution/blue/dark blue precipitate formed</p>	1 1 1 1 1 1 1 1 1 Max 10
	Note:	
	<p>1. P11 must corresponding to P10</p> <p>2. If U-tube is used, P8 and P9 as follows: P8a – pour H_2SO_4 into U-tube, pour FeSO_4 solution into one arm of the U-tube and chlorine water into another arm P9a – place/immerse/dip carbon/graphite electrode into chlorine water and FeSO_4 and connect to galvanometer/voltmeter</p> <p>3. If insoluble iron(II) compound is used, no marks for P8 and P11</p>	10



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No.	Marking Scheme	Mark																												
10(a)	<p>Sample answer:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Acid A</th> <th style="text-align: center;">Acid B</th> </tr> </thead> <tbody> <tr> <td>\checkmark_{A1} Hydrochloric acid// sulphuric acid</td> <td>\checkmark_{B1} Ethanoic acid// [any named of weak acid]</td> </tr> <tr> <td>\checkmark_{A2} Strong acid</td> <td>\checkmark_{B2} Weak acid</td> </tr> <tr> <td>\checkmark_{A3} Ionises completely in water</td> <td>\checkmark_{B3} Ionises partially in water</td> </tr> <tr> <td>$\checkmark_{A4} \text{HCl} \rightarrow \text{H}^+ + \text{Cl}^-$</td> <td>$\checkmark_{B4} \text{CH}_3\text{COOH} \rightarrow \text{CH}_3\text{COO}^- + \text{H}^+$</td> </tr> <tr> <td>$\checkmark_{A5}$ Concentration H + is high (any two)</td> <td>\checkmark_{B5} Concentration H + is low (any two)</td> </tr> </tbody> </table> <p>Note:</p> <p>1.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Acid A</th> <th style="text-align: center;">Acid B</th> </tr> </thead> <tbody> <tr> <td>Ethanoic acid - X</td> <td>Nitric acid – X</td> </tr> <tr> <td>Strong acid – X</td> <td>Weak acid – X</td> </tr> <tr> <td></td> <td>Ionises partially in water - X</td> </tr> </tbody> </table> <p>2.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Acid A</th> <th style="text-align: center;">Acid B</th> </tr> </thead> <tbody> <tr> <td>Ethanoic acid - X</td> <td>Nitric acid – X</td> </tr> <tr> <td>Weak acid acid – √</td> <td>strong acid – √</td> </tr> <tr> <td>Ionises partially in water - √</td> <td>Ionises completely in water - √</td> </tr> </tbody> </table>	Acid A	Acid B	\checkmark_{A1} Hydrochloric acid// sulphuric acid	\checkmark_{B1} Ethanoic acid// [any named of weak acid]	\checkmark_{A2} Strong acid	\checkmark_{B2} Weak acid	\checkmark_{A3} Ionises completely in water	\checkmark_{B3} Ionises partially in water	$\checkmark_{A4} \text{HCl} \rightarrow \text{H}^+ + \text{Cl}^-$	$\checkmark_{B4} \text{CH}_3\text{COOH} \rightarrow \text{CH}_3\text{COO}^- + \text{H}^+$	\checkmark_{A5} Concentration H + is high (any two)	\checkmark_{B5} Concentration H + is low (any two)	Acid A	Acid B	Ethanoic acid - X	Nitric acid – X	Strong acid – X	Weak acid – X		Ionises partially in water - X	Acid A	Acid B	Ethanoic acid - X	Nitric acid – X	Weak acid acid – √	strong acid – √	Ionises partially in water - √	Ionises completely in water - √	<p>1+1 2+2 Max 4</p> <p>6</p>
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No.	Marking Scheme	Mark
10(b)	<p>Able to describe the preparation of lead(II) sulphate and include the chemical equation involved</p> <p>Sample answer:</p> <ol style="list-style-type: none"> 1. Substances Lead(II) nitrate/lead(II) ethanoate/sulphuric acid// [any soluble sulphate] 2. Apparatus: Beaker, filter funnel, filter paper <p>Procedures:</p> <ol style="list-style-type: none"> 3. Pour 20 cm³ /[20 – 100 cm³] of 0.5 mol dm⁻³ /[0.1 – 2.0 mol dm⁻³] lead(II) nitrate <u>into a beaker</u> 4. Add 20 cm³ of 0.5 mol dm⁻³ sodium sulphate [adp for concentration and volume if didn't mention in P3 and P4 but word "<u>into a beaker</u>" must present] 5. [Stir the mixture] 6. Filter 7. Wash/rinse the residue/solid/PbSO₄ / salt/ precipitate <p>Equation</p> $\text{Pb}(\text{NO}_3)_2 + \text{Na}_2\text{SO}_4 \xrightarrow{\text{v}_8} \text{PbSO}_4 + 2\text{NaNO}_3 //$ $\text{Pb}^{2+} + \text{SO}_4^{2-} \xrightarrow{\text{v}_8} \text{PbSO}_4$ <ol style="list-style-type: none"> 8. Formula for reactants 9. Formula for products 10. Balance equations <p><u>Note:</u></p> <ol style="list-style-type: none"> 1. P1 and P2 can be inferred from the labelled diagram or procedure. 2. If insoluble salt other than PbSO₄ or not using double decomposition reaction, give P2,P5,P6 and P7 3. If soluble salt is prepared only given P5 and P2 4. If lead(II) sulphate is prepared by recrystallization , no mark given 	1 1 1 1 1 1 1 1 1 1 1 1 1 1 10



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No.	Marking Scheme	Mark
10(c)	<p>Sample answer:</p> <p>Substance : vinegar(acetic acid)/ethanoic acid/citric acid/lemon juice [any substance that containing weak acid] a:lemon/lime/any other acidic substance</p>	1
	<p>Reasons:</p> <p>1. Weak acid 2. Neutralise the alkali 3. Does not produce too much heat 4. Acid is less corrosive// acid does not [harm] skin [any three]</p> <p>Note: If strong acid given – only P2 given</p>	<p>1 1 1 1 Max 3</p> <p>4</p> <p>20</p>

END OF MARKING SCHEME