PEPERIKSAAN PERCUBAAN NEGERI PERAK
SIJIL PELAJARAN MALAYSIA
2009

SKEMA PEMARKAHAN
CHEMISTRY

4541/1
4541/2
4541/3

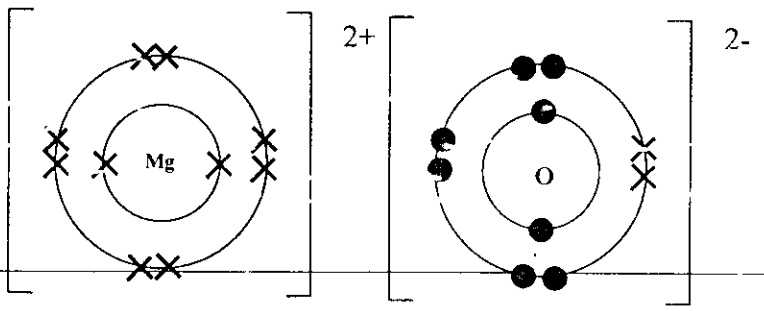
JAWABAN KERTAS 1 : PERCUBAAN SPM 2009

SOALAN	JAWABAN
1	D
2	B
3	A
4	A
5	A
6	B
7	B
8	A
9	C
10	C
11	D
12	B
13	B
14	C
15	C
16	C
17	A
18	D
19	D
20	A
21	D
22	C
23	A
24	A
25	C

SOALAN	JAWABAN
26	C
27	B
28	A
29	A
30	B
31	A
32	B
33	D
34	D
35	C
36	D
37	C
38	B
39	D
40	A
41	C
42	B
43	D
44	C
45	B
46	C
47	B
48	D
49	C
50	B

MARKING SCHEME PAPER 2
TRIAL EXAM 2009

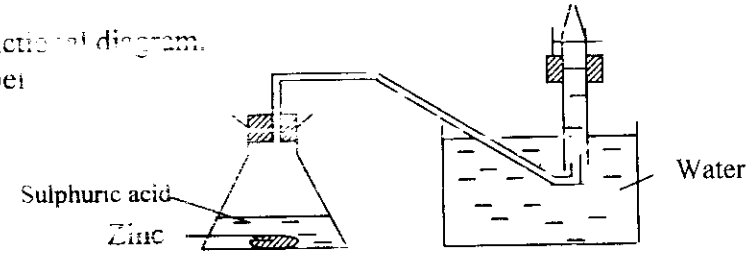
No			Answer	Mark
1	(a)	(i)	A : hydrophobic // hydrocarbon B : an anionic // hydrophilic	1 1
		(ii)	B // hydrophilic	1
		(iii)	Calcium / calcium ion // magnesium / magnesium ion	1
	(b)	(i)	Lechitin	1
		(ii)	prevent an emulsion from separating out // mix water and oil	1
		(iii)	Mono-glycerides // di-glycerides,	1
	(c)	(i)	Antidepressant	1
		(ii)	Respiratory difficulties, sleeplessness, coma, death	1
			Total	**9**

2	(*a*)	(i)	Atoms of the same element which contain same proton number but different nucleon number // Atoms of the same element which contain same number of proton but different number of neutrons	1
		(ii)	Estimate the age of fossils	1
	(*b*)		Proton	1
	(*c*)		4	1
	(*d*)		$^{12}_{6}C$ // $^{14}_{6}C$	1
	(*e*)	(i)	$2Mg + O_2 \rightarrow 2MgO$ -correct formulae of reactants and products – 1 mark -balanced chemical equation – 1 mark	1 + 1
		(ii)		

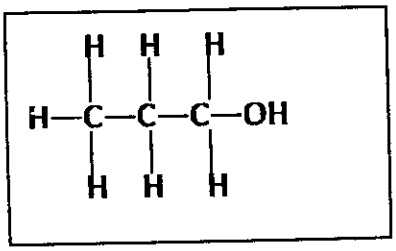
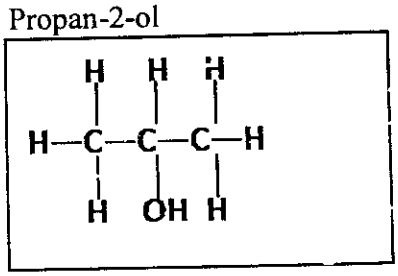
			-correct number of shells and number of electrons for Mg and O – 1 mark -correct charges for Mg and O – 1 mark	1 + 1
			Total	**9**

3	(a)	(i)	W// X	1
		(ii)	- W is added into sodium carbonate/any metal carbonate stated in a test tube, - Gas released turns lime water cloudy // - magnesium/zinc is added into W in a test tube, - gas released gives a 'pop' sound with a lighted splinter	1 + 1
		(iii)	W	1
	(b)	(i)	Sodium hydroxide	1
		(ii)	$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$ - Correct formulae of reactants - correct formulae of products - Balanced equation	1 + 1+ 1
		(iii)	Y	1
			Total	**9**

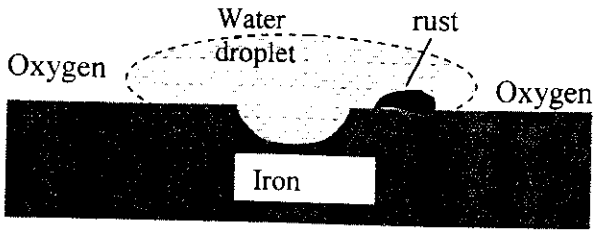
4	(a)		[draw an arrow from zinc to copper through wire]	1
	(b)		zinc // Zn	1
	(c)		Chemical → electrical	1
	(d)		Copper(II) ion	1
	(e)	(i)	copper is deposited on the cathode// positive terminal	1
		(ii)	$Cu^{2+} + 2e \rightarrow Cu$	1
	(f)	(i)	The reading increases.// accept any suitable figure more than 1.8	1
		(ii)	In electrochemical series, magnesium is located higher than zinc. The distance between magnesium and copper is further compare to the distance between zinc and copper, so the voltage increases.	1 + 1
	(g)		$Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$ - Correct formulae of reactants and products	1
			Total	**10**

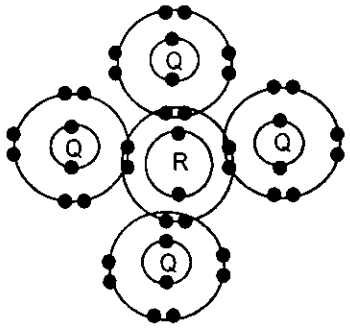
5	(a)	A substance which alters the rate of chemical reaction	1
	(b)	1. Functional diagram. 2. Label  	1 1

	(c)		$Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_2$ - Correct formulae of reactants - correct formulae of products	1+1
	(d)		1. Correct number of mol of sulphuric acid $\frac{0.1 \times 25.0}{1000}$ // 0.0025 2. Correct the maximum volume 0.0025×24 // 0.06 dm^3 // 0.0025×24000 // 60 cm^3	1 1
	(e)	(i)	Experiment I . $\frac{40.0}{180}$ // 0.2222 $cm^3 s^{-1}$ - Correct answer with unit	1
		(ii)	Experiment II $\frac{52.0}{180}$ // 0.2889 $cm^3 s^{-1}$ - Correct answer with unit	1
		(iii)	1. The average rate of reaction for experiment II is higher than experiment I. 2. Catalyst reduce the activation energy. 3. More colliding particles are able to achieve the lower activation energy to increase the frequency of effective collision.	1 1 1
			Total	**12**

6	(a)	Addition reaction / hydration reaction		1
	(b)	Phosphoric acid		1
	(c)	1,2 – dichloropropane // dichloropropane		1
	(d)	$C_2H_5OH + \frac{5}{2}O_2 \rightarrow 2CO_2 + 3H_2O$ or $2C_2H_5OH + 5O_2 \rightarrow 4CO_2 + 6H_2O$ - Correct formulae of reactants - correct formulae of products		1 + 1
	(e)	(i)	Propanol / propan-1-ol  Propan-2-ol 	1 1 1 1
		(ii)	purple to colourless.	1
	(f)	Ester		1
			Total	11

MARKING SCHEME PAPER 2 SECTION B AND C

7	(a)	 Negative terminal// anode : $Fe \rightarrow Fe^{2+} + 2e$ Positive terminal// cathode : $O_2 + 2H_2O + 4e \rightarrow 4\ OH^-$ iron(II) ions produced combined with the hydroxide ions to form $Fe(OH)_2$ / iron(II) hydroxide $Fe(OH)_2$ is oxidized by oxygen to form rust / $Fe_2O_3\ x.H_2O$	2 1 1 1 1 1 7
	(b)	(i) using protective coating : oil / paint / plastics / galvanizing / tin plating (ii) Alloying : stainless steel – carbon + chromium + nickel (iii) Sacrificial protection. – iron is attached to the sacrificial metal which is more electropositive than iron -Correct method with example	1 1 1 3
7	(c)	(i) Potassium hexacyanoferrate(III) solution – detect the presence of iron(II) ions by giving the blue colour Phenolphthalein – detect the presence of OH^- ions by giving the pink colour. A : - Iron (II) ions are formed and OH^- ions are formed - Iron is oxidized to iron(II) ions. - Metal P is less electropositive than iron B : - No Iron(II) is formed / and OH^- ions are formed - Iron does not rust. Metal Q is oxidized thus metal Q is more electropositive than iron C : A little Irons (II) are formed / and OH^- ions are formed. Iron is oxidized. Metal R is less electropositive than iron (ii) P< Iron < R < Q // P, Iron, R, Q	1 1 1 1 1 1 1 1 1 1 10
			Total 20

8	(a)	(i)	1.The electron arrangement of atom Q : 2.7//2,7 2. The electron arrangement of atom R : 2.4//2,4	1 + 1 2
		(ii)	1.The number of neutrons in atom R is 6 2. The number of electrons in atom Q is 9	1 + 1 2
	(b)		1.Q and R form covalent bond. 2.Atom Q has an electron arrangement of 2.7//2,7 3.Atom R has an electron arrangement of 2.4//2,4 4.To achieve the stable electron arrangement, [atom] R shares electrons with [atom] Q. 5.One [atom] R contributes 4 electrons. 6. Each [atom] R contributes one electron. 7. [Atom] R shares four of its valence electrons each with 4 atoms of Q 8. molecule with the formula RQ_4.  Notes : points 4, 7 and 8 can be obtained from the diagram	1 1 1 1 1 1 1 1 8
	(c)		<u>For group 1 elements,</u> 1. Going down the group ,atomic size increases//the valence electron becomes further away from the nucleus 2. Forces of attraction between the protons / nucleus and the valence electron becomes weaker. 3. It is easier for the atom to donate / release the valence electrons. 4. The reactivity increases down the group // Reactivity increases/More reactive ----------> Lithium,Sodium,Potassium,Rubidium,Caesium,Francium// Li, Na , K , Rb , Cs , Fr <u>For Group 17 elements,</u> 1.Atomic size increases when descending the group //the valence electrons become further away from nucleus. 2. Forces of attraction between the protons / nucleus and the valence electrons become weaker 3.it is more difficult for the atom to accept /gain/receive electrons. 4.The reactivity decreases down the Group //	1 1 1 1 1 1 1 1

			Reactivity increases/More reactive ----------> Fluorine,Chlorine,Bromine,Iodine,Astatine	max 8
				Total **20**

No.		Answer	Marks
9 (*a*)	(i)	$CuSO_4$ // $FeSO_4$ // HgCl – used as pesticides to destroy pests	1 + 1 **2**
	(ii)	Sodium chloride – to add flavour to food // Sodium hydrogen carbonate – used in baking cakes and breads	1 + 1 2
	(iii)	Calcium sulphate sesquihydrate – used to make cement casts to encase fractured bones. Barium sulphate – used on X-ray plates to identify tumours in the intestines. (*Accept other relevant answers*)	1 + 1 2
(*b*)		- heat the solution until a saturated solution is produced. - cool it to the room temperature - filter the crystal formed - dry the crystal by pressing it with the filter paper.	1 1 1 1 4
(*c*)		Pour [20-100]cm^3 of zinc nitrate solution [0.1-1.0]mol dm^{-3} into a beaker Add [20-100]cm^3 of sodium carbonate solution [0.1-1.0]mol dm^{-3} Filter the mixture Pour [20-100]cm^3 dilute/[0.1-1.0]mol dm^{-3} sulphuric acid into a beaker Add the residue/precipitate into the acid until in excess Stir and filter the mixture Heat the filtrate until saturated / 1/3 of original volume Cool the saturated solution Filter and dry the crystal $Zn(NO_3)_2 + Na_2CO_3 \rightarrow ZnCO_3 + 2NaNO_3$ $ZnCO_3 + H_2SO_4 \rightarrow ZnSO_4 + H_2O + CO_2$	1 1 1 1 1 1 1 1 1 1 1 1 max **10**
		Total	**20**

QUESTION	SAMPLE ANSWER	SCORE
2 (a)	How does the concentration of chloride ion/solution, affect the product at the anode / electrode?	3
2(b)	Manipulated variable : Concentration of chloride ion / solution Responding variable : Ion discharged / product (at the anode) Fixed variable : Type of electrolyte // type of electrode // duration of electrolysis	3
2(c)	When the concentration of chloride ion is higher, then the chloride ion will be discharged	3
2(d)	Substances : 1.0 mol dm^{-3} of chloride solution , 0.001 mol dm^{-3} of chloride solution (Any chloride solution : eg, Hydrochloric acid , Potassium chloride, Sodium chloride) Apparatus : Batteries, carbon electrodes, connecting wires with crocodile clips, electrolytic cell, test tubes, litmus paper and wooden splinter.	3
2(e)	Procedures : (1) An electrolytic cell is filled with 1.0 mol dm^{-3} of chloride solution until it is half full. (2) The carbon electrodes is connected to the batteries by using connecting wires. (3) Two test tubes is filled with chloride solution and inverted to both of the electrodes. (4) Gas produced at the anode is collected and the gas is tested with moist litmus paper and glowing splinter. (5) The observations are recorded in the table. (6) Steps 1 to 5 are repeated by using 0.001 mol dm^{-3} chloride solution to replace 1.0 mol dm^{-3} chloride solution	3
2(f)	<table><tr><th>Electrolyte</th><th>Observation</th></tr><tr><td>1.0 mol dm^{-3} of chloride solution</td><td></td></tr><tr><td>0.001 mol dm^{-3} of chloride solution</td><td></td></tr></table>	