


**BEDOK GREEN SECONDARY SCHOOL
SCIENCE DEPARTMENT
MARKING SCHEME
YEAR (2018)**

SUBJECT: Science Chemistry 5076/5078 Paper 3
SETTER: Tang Hui Boon
LEVEL: 4E5N

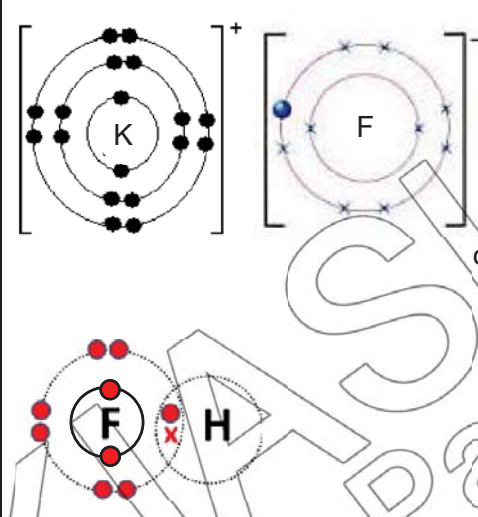
EXAM: Prelim

PAPER 3
Section A: 45 marks

Qn. No.	Scoring Points		Marks	Max. Marks
1	(a)	(i) F	[1]	[5]
		(ii) D	[1]	
		(iii) C	[1]	
		(iv) A	[1]	
		(v) B	[1]	
	(b)	A and/or D	[1]	[1]
2	(a)	Particles are closely packed but not orderly arranged .	[1]	[2]
		Particles move freely and slide past each other throughout the liquid.	[1]	
	(b)	At -200°C , argon, carbon dioxide and water will be removed as solids .	[1]	[1]
	(c)	Fractional distillation	[1]	[1]
	(d)	Oxygen gas	[1]	[2]
It has the highest boiling point .		[1]		
(e)	Nitrogen gas	[1]	[1]	
3	(a)	(i) electrons	[1]	[1]
		(ii) protons or neutrons or nucleus	[1]	[1]
	(b)	(i) They have different number of neutrons . $^{12}_6\text{C}$ has 6 neutrons whereas $^{13}_6\text{C}$ has 7 neutrons .	[1]	[1]
	(ii)		[1]	[1]
4	(a)	Suspect Z	[1]	[1]
	(b)	The ink from the pen of W is probably made from a pure substance .	[1]	[1]
	(c)	Unlike ink from a pen, pencil line will not dissolve in the solvent and will not interfere with the separation of the ink .	[1]	[2]
		OR Ink from a pen is a mixture and it will dissolve in the solvent and will get separated in the solvent which will interfere with the separation of the ink .	[1]	
(d)	The ink used for signing bank cheque would probably be insoluble in water .	[1]	[1]	

5	(a)	Carbon dioxide is formed when coke is burnt in hot air and when limestone is decomposed at high temperature . (will not accept CO reducing Fe_2O_3 equation given in part (b). CO_2 is produced mainly by oxidation under this reaction.)	[1] [1]	[2]																					
	(b)	(i) +3	[1]	[1]																					
	(c)	(ii) The oxidation state of iron has decreased and thus, it is reduced . Iron's oxidation state has decreased from +3 in iron(III) oxide to 0 in iron .	[1] [1]	[2]																					
6	(a)	Number of moles of $\text{Cu}(\text{NO}_3)_2 = \frac{37.6}{188} = 0.2$ Concentration in $\text{mol} / \text{dm}^3 = \frac{0.2}{0.5} = 0.4 \text{ mol} / \text{dm}^3$	[1] [1]	[2]																					
	(b)	Zinc is more reactive than copper . Zinc displaces copper in copper(II) nitrate to form copper metal which is the reddish brown solid.	[1] [1]	[2]																					
7	(a)	X: silver chloride / AgCl Y: iron(II) hydroxide / $\text{Fe}(\text{OH})_2$ Z: iron(II) chloride / FeCl_2	[1] [1] [1]	[3]																					
	(b)	$\text{FeCl}_2 + 2\text{AgNO}_3 \rightarrow \text{Fe}(\text{NO}_3)_2 + 2\text{AgCl}$ OR $\text{FeCl}_2 + 2\text{NaOH} \rightarrow \text{Fe}(\text{OH})_2 + 2\text{NaCl}$ correct formulae of reagents and products balanced equation	[1] [1]	[2]																					
8	(a)	<table border="1"> <thead> <tr> <th>name of substance</th> <th>chemical formula</th> <th>solubility in water</th> </tr> </thead> <tbody> <tr> <td>sodium carbonate</td> <td>Na_2CO_3</td> <td>soluble</td> </tr> <tr> <td>calcium nitrate</td> <td>$\text{Ca}(\text{NO}_3)_2$</td> <td>soluble</td> </tr> <tr> <td>potassium sulfate</td> <td>K_2SO_4</td> <td>soluble</td> </tr> <tr> <td>barium chloride</td> <td>BaCl_2</td> <td>soluble</td> </tr> <tr> <td>lead(II) chloride</td> <td>PbCl_2</td> <td>insoluble</td> </tr> <tr> <td>iron(III) carbonate</td> <td>$\text{Fe}_2(\text{CO}_3)_3$</td> <td>insoluble</td> </tr> </tbody> </table>	name of substance	chemical formula	solubility in water	sodium carbonate	Na_2CO_3	soluble	calcium nitrate	$\text{Ca}(\text{NO}_3)_2$	soluble	potassium sulfate	K_2SO_4	soluble	barium chloride	BaCl_2	soluble	lead(II) chloride	PbCl_2	insoluble	iron(III) carbonate	$\text{Fe}_2(\text{CO}_3)_3$	insoluble	[1] [1] [1] [1] [1] [1]	[5]
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(b)	1. sodium carbonate 2. calcium nitrate	both [1]	[1]																						
(c)	Mix sodium carbonate and calcium nitrate solution (or reagents stated in 8(b)(i) together). Filter the mixture and collect the residue . Wash the residue with distilled water and dry between pieces of filter paper .	[1] [1] [1]	[3]																						

Section B: 30 marks

Qn. No.	Scoring Points		Marks	Max. Marks					
9	(a)	$2K + F_2 \rightarrow 2KF$ correct formulae of reagents and product balanced equation	[1] [1]	[2]					
	(b)	 correct transfer of electron and charge correct number of electrons correct number of shared electrons correct number of electrons in the molecule	[1] [1] [1] [1]	[4]					
	(c)	Potassium fluoride is an ionic compound with strong electrostatic forces of attraction between its oppositely charged ions , thus it requires a large amount of energy to overcome the attraction and has a high melting and boiling point . Hydrogen fluoride is a covalent compound with weak intermolecular forces . It requires only a little amount of energy to overcome the attraction, thus it has a low melting and boiling point .	[1] [1] [1] [1]	[4]					
10	(a)	(i)	Member of the same homologous series have similar chemical properties and they display a gradual change in their physical properties as the number of carbon atoms increases in their molecules. <i>(will not accept same functional groups or general formula because question ask for properties and not structure.)</i>	[1] [1]	[2]				
		(ii)	$C_nH_{2n+1}OH$	[1]	[1]				
	(b)	(i)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">name of X</th> <th style="width: 50%;">structural formula of X</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ethanol</td> <td style="text-align: center;"> $\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$ </td> </tr> </tbody> </table> correct name correct structural formula	name of X	structural formula of X	ethanol	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$	[1] [1]	[2]
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		(ii)	CH_3COOH	[1]	[1]				
		(iii)	Yeast is added to a solution of glucose in a conical flask and placed in a water bath. Temperature of the mixture in the water bath needs to be kept at 37°C .	[1] [1]	[3]				

		<p>The conical flask is connected through a delivery tube to a test tube with limewater to prevent oxygen in air from entering the conical flask.</p> <p><i>*please emphasize to students that a brief mention of the 3 conditions with no proper description of experiment will be penalised one mark in the exams because the question asked for description of process.</i></p>	[1]	
	(iv)	X can be burnt exothermically to produce heat to power the vehicles.	[1]	[1]

11	(a)	<p>OR</p>	[1] [1]	[4]
		<p>Plot a graph of volume of gas produced against time. OR Plot a graph of mass of contents in flask against time.</p> <p>relevant graph to the diagram drawn. (Students are not required to plot/sketch the graph)</p> <p>The speed of reaction can be determined by the gradient of graph. (Stopwatch needs to be mentioned "once" either in diagram or description to be awarded mark either in diagram or description.</p>	[1] [1]	
	(b)	<p>Increasing the temperature of reaction mixture will increase the kinetic energy / speed of reacting particles.</p> <p>OR</p> <p>Use powdered magnesium instead of strips of magnesium provides smaller particle size of magnesium which provide a larger surface area for collision.</p> <p>OR</p>	[1] [1] OR [1] [1] OR [1]	[3]

		Use a higher concentration of hydrochloric acid provides more H^+ ions per unit volume for collision with magnesium particles.	[1]	
		either of the above answers	[1]	
		Higher frequency of effective collision between H^+ ions and magnesium particles increases the speed of reaction. <i>Note: Students need to mention the reacting particles, magnesium and acid particles (H^+ ions) at least once in the answers.</i>		
	(c)	hydrogen	[1]	[1]
	(d)	(i) Ca	[1]	[1]
		(ii) They have the same number of valence electrons . OR They both have two valence electrons .	[1]	[1]

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