UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2007 question paper

0620 CHEMISTRY

0620/03

Paper 3 (Extended Theory), maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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Page 2	Mark Scheme	Syllabus	Paper
	IGCSE – May/June 2007	0620	3

An incorrectly written symbol, e.g. NA or CL, should be penalised once in the paper.

1 (a) (i) coal or coke or peat [1] **NOT** wood **or** charcoal (ii) natural gas or methane or propane or butane or petroleum gases or calor gas or refinery gas [1] (b) (i) petrol or gasoline paraffin **or** kerosene diesel aviation fuel or jet fuel fuel oil heavy fuel oil heating oil [2] Any **TWO** NOT a named alkane e.g. octane (ii) waxes or grease or lubricants or polishes or bitumen (tar, asphalt) or naphtha [2] Any **TWO** from the primary or secondary distillation of petroleum (iii) (liquid) air **or** ethanol and water **or** alkenes (made by cracking) Noble Gases [1] [Total: 7] 2 good [1] [1] named example e.g. sodium chloride **ACCEPT** correct formula silica or silicon(IV) oxide or sand or silicon oxide named polymer only TWO elements [1] electrons [1] and positive ions [1] [2] good [1] [Total: 6] 3 [1] (i) method C sulphuric acid (allow if given in equation) [1] zinc oxide + sulphuric acid = zinc sulphate + water [1] (ii) method A [1] hydrochloric acid [1] $KOH + HCI = KCI + H_2O$ [1] (iii) method B [1] potassium iodide or any soluble iodide [1] Pb²⁺ + 2l⁻ = Pbl₂ accept a correct equation even if soluble iodide is wrong [2] Not balanced - $Pb^{2+} + I^{-} = PbI_2 ONLY [1]$

[Total: 10]

Page	3	Mark Scheme	Syllabus	Paper
			0620	3
(a) (i)	ВаО			[1]
(ii)	B ₂ O ₃	3		[1]
(b) (i)	S ²⁻			[1]
(ii)	Ga³⁺			[1]
(c) NO	DND	8e (1bp and 3nbp) around each chlorine 8e (3bp and 1nbp) around nitrogen		[1] [1] [1]
(d) (i)	vana vana vana ANY OR	re a correct chemical property in (i) adium harder adium higher melting point or boiling point adium higher density 7 TWO corresponding statements for potassium has to be comparison		[2]
(ii)	pota pota pota vana vana ANY	re a correct physical property in (ii) ssium more reactive or example of different reactive ssium reacts with cold water, vanadium does not. ssium one oxidation state, vanadium more than on adium coloured compounds, potassium white or coadium and its compounds catalysts, not potassium or TWO has to be comment about both elements	e	[2]
(e) (i)		ine gas tine solid		[1] [1]
(ii)	both both or ar both both both both both	have valency of one can react with other elements to form halides are oxidants by correct Chemistry – they both form acidic hydrid have diatomic molecules accept one electron or form ion X have seven valency electrons react with non-metals to form covalent compounds form acidic oxides		
		have a valency of 7 T WO		[2]

4

[Total: 15]

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		IGCSE – May/June 2007	0620	3
5	(a) (i)	air would react (with the magnesium or titanium) OR argon would not react (with the metals) NOT argon is inert		[1]
	(ii)	any metal higher than magnesium in reactivity se	ries	[1]
	(iii)	add water (to dissolve salt) filter or centrifuge		[1] [1]
	(b) (i)	electron loss		[1]
	(ii)	hydrogen		[1]
	(iii)	oxygen chlorine		[1] [1]
	(iv)	it cannot lose electrons (because) it receives electrons (from the battery)		[1] [1]
		OR reduction occurs at the cathode oxidation at the anode (not cathode)		[1] [1]
		OR electrons are "pushed" to rig preventing it from being oxidised		[1] [1]
		for comments of the type – rusting needs oxygen, it is formed on		not iron ONLY [1]
		NOT the idea that titanium is more reactive etc		

Syllabus

Paper

(v) SET 1

Page 4

sacrificial protection is a cell does not need electricity cathodic protection is electrolysis cathodic protection needs electricity

SET 2

sacrificial protection needs a more reactive metal (in contact with iron or steel) this metal corrodes instead of steel

cathodic protection needs an inert electrode accept unreactive or less reactive metal as an electrode

has to be **ONE** comment from each set all comments about oxide layers and coating are neutral

[Total: 12]

[2]

	Page 5		j	Mark Scheme	Syllabus	Paper
				IGCSE – May/June 2007	0620	3
6	(a)	sod iron	lium a n(III) (or aluminium oxide aluminate oxide or centrifuge NOT conditional		[1] [1] [1] [1]
	(b)	carl 900 aluı	bon c	to right: athode or <u>carbon</u> negative electrode 000°C m		[1] [1] [1] [1]
	(c)	(i)	not l	+ 3e = A <i>l</i> palanced [1] (aq) = 0		[2]
		(ii)		gen is formed NOT oxide its with carbon anode		[1] [1]
	(d)	(i)	acce	density or light or resistant to corrosion ept strength/weight ratio or alloys are stronging on its own is neutral		[1]
		(ii)	oxid easi	attacked or corroded or unreactive e layer ly shaped or malleable or ductile TWO		[2]
	1	(iii)	NOT	trength or so it does not break or does not sag or can steel is a better conductor aluminium protects steel from rusting	have pylons	further apart [1]

[Total: 16]

raye o			Wark Scheme	Syllabus	Paper	
			IGCSE – May/June 2007	0620	3	
(a)	butanol no number needed but if one is given it has to be 1					
	structural formula (all bonds shown) accept –OH NOT –HO				[1]	
	ethanoic acid structural formula (all bonds shown) accept –OH NOT –HO no conseq marking if all bonds are not shown (CH ₃ –CH ₂ –), penalise once					
(b)	(i)		t have correct ester linkage ID continuation and a group on either side of the es	ter group	[1] [1]	
		Acce	ept -COO-			
	(ii)		ept any sensible suggestion s, clothing, bottles, packaging, bags		[1]	
(c)	(i)	8			[1]	
	(ii)	CON C ₂ H ₂	ole bond becomes single and 4 bonds per carbon at I D a bromine atom on each carbon _I Br ₂ ONLY [1] opt a structural formula with hydrogen atoms	om	[1] [1]	
((iii)	corn	oil		[1]	
(d)	(d) 100g of fat react with 86.2g of iodine 884g of fat react with 762 g of iodine limit 762 x 2					
	one mole of fat reacts with 762/254 moles of iodine molecules one mole of fat reacts with 3 moles of iodine molecules			[1]		
	number of double bonds in one molecule of fat is 3 limit 6 consequential marking allowed provided the number of double bonds is an integer.					
	consequential manning allowed provided the manner of dealer being to all integer.					

Syllabus

Paper

Page 6

7

[Total: 14]