UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2010 question paper for the guidance of teachers

0620 CHEMISTRY

0620/31

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, which would have considered the acceptability of alternative answers.

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

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Page 2		2	Mark Scheme: Teachers' version	Syllabus	Paper	
			IGCSE – October/November 2010	0620	31	
1	(a) (i)	same number of protons and electrons				
	(ii) all have the same number of protons / same proton number / same atomic number					
	(iii) more electrons than protons number of protons and electrons not equal ONLY [1]					
	(iv) same number of protons (and electrons) / same proton number / same atomic number different number of neutrons / different mass number / nucleon number					
	(b) (i)	2 + 8	8 + 5		[1]	
	(ii)	3/5			[1]	
	(iii)	/ nee	metal because it accepts electrons eds 3e to complete outer energy level cause it is in Group V or 5e in outer shell e need both non-metal and reason for [1]		[1]	
					[Total: 9]	
2	(a) (i)		ler / stronger / any sensible suggestion which relate stays sharp longer / cuts better / more corrosion res		ties for purpose [1]	
	(ii)	zinc			[1]	
	(b) (i)	lattic	ce		[1]	
	(ii)	with	llar pattern of one type of atom different atom interspersed show the difference – size, shading, label etc.		[1] [1]	
	(iii)		change its shape by force / plastically deform / card etc.	n be hammered i	nto sheets / can [1]	
	(iv)	cond or m	icles / ions / atoms / layers d can slide past each other netallic bond is non-directional icles can move past each other		[1] [1] [1] [1]	

Page 3		Mark Scheme: Teachers' version	Syllabus	Paper
		IGCSE – October/November 2010	0620	31
(c) (i)	not on according to the second	(V) oxide + carbon → tin + carbon dioxide carbon monoxide as a reductant ept carbon monoxide as a product tin(IV) ept correct symbol equation		[1]
(ii)		er on dioxide		[1] [1]
(iii)	(pure impu elect	ect labels for e) copper cathode <u>ure copper anode</u> trolyte copper(II) sulfate / any soluble copper(II) sal pels on electrodes reversed [0]	t / Cu ²⁺	[1] [1] [1]
(iv)		s / pipes / jewellery / nails / roofing / ammunition oture	n / coins / cookw	vare / catalyst / [1]
				[Total: 15]
3 (i)	cher	nical		[1]
(ii)		right to left through salt bridge		[1]
(iii)		+ 2e → 2Br- 3r- as product [1]		[2]
(iv)	/ bed	ction because <u>electron gain</u> cause oxidation number decreases d both points		[1]
(v)	Fe ³⁺			[1]
(vi)	e.g.	correct discussion of the reactivity of the halogens the more reactive the halogen the higher the voltag better conductor	е	[1]
				[Total: 7]

Page 4			Mark Scheme: Teachers' version Syllabus				Paper		
				IG	CSE – Octo	ber/Novemb	er 2010	0620	31
4	(a)	(i)	nitro	gen 2+5					[1]
		(ii)		ds three ele omplete en					[1] [1]
	(b)	(i)	expe	ensive met	al / iron chea	aper / better o	atalyst		[1]
		(ii)	_	•		with smaller duct / ammon	volume / fewer r ia side	moles	[1] [1]
		(iii)	-	cled / sent ept used a	over catalys gain	st again			[1]
		(iv)		antage dvantage	high yield slow reacti	on rate etc			[1] [1]
									[Total: 9]
5	(a)	(i)		y (simple) mer molec		form one (la	arge) molecule	/ monomer	molecules form one [1]
		(ii)			ner is the on	ly product			[1]
						•	cules formed		[1]
	(b)	(i)		$H_{26} ightarrow C_8 H_1$ y other cori	₈ + 2C ₂ H ₄ rect version				[1]
		(ii)	/ eth / wa	ene more ste half chl	readily availa	ange of produ able than etha Irogen chloric n ethane	ane		[1]
		(iii)		trolysis eous sodiu	m chloride				[1] [1]
		(iv)		t have thre d continua	ee correct un	nits			[1]
					поп 2–СН(С <i>1</i>))n-	_			[1]
									[Total: 9]

	. ugo		IGCSE – October/November 2010	0620	31		
6	(a) (i)		s not form compounds / does not accept and does l/has 8e in outer shell / it is a Noble Gas / it is in Gro	not lose electrons			
	(ii)		small number of outer electrons / lose electrons then positive large number of outer electrons / gain electrons then negative				
	(iii)		two from nitrogen, oxygen and fluorine ept symbols / molecular formulae		[1]		
	(b) (i)	zinc	/ aluminium / lead / tin / chromium		[1]		
	(ii)		e precipitate cipitate dissolves / colourless solution forms / forms a	a clear solution	[1]		
			uble in excess	a clear solution	[1]		
	(c) (i)	LiF NF ₃			[1] [1]		
	(ii)	LiF i / LiF as li LiF i	has higher mp / bp is a (crystalline) solid, NF ₃ is probably a gas / a liquid is less volatile quids only LiF conducts is soluble in water, NF ₃ is not in both solids LiF is harder two	d	[2]		
	(iii)		is an ionic compound is a covalent/molecular compound		[1] [1]		
		for s	stating that one is ionic and the other covalent [1] wit	hout specifying w			
					[Total: 13]		
7	(i)	ozor	hane / water vapour / oxides of nitrogen / hydroflune sulfur dioxide	uorocarbons / pe	rfluorocarbons / [1]		
	(ii)	proc	g organisms / plants and animals / cells duce energy (from food / glucose / carbohydrates) forms carbon dioxide (could be in an equation)		[1] [1] [1]		
	(iii)		n growing the crop removed carbon dioxide from atrop photosynthesised and used carbon dioxide	nosphere	[1]		
			bustion returned the carbon dioxide		[1]		
	(iv)		eased combustion ossil fuels / named fossil fuel		[1] [1]		
			eforestation photosynthesis		[1] [1]		
			greater population		[Total: 8]		
					[. 0 (0). 0]		

Mark Scheme: Teachers' version

Syllabus

Paper

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	Pag	ge 6	Mark Scheme: Teachers' version	Syllabus	Paper
			IGCSE – October/November 2010	0620	31
3	(a)	(partially allow to dry cryst "dry" on i evaporat	ntrifuge / decant) evaporate / heat / boil crystallise / cool / let crystals form als / dry between filter paper / leave in a warm placits own must be a verb te to dryness only marks 1 and 2 scuss residue only mark 1	ce to dry	[1 [1 [1
	(b)	number of number of mass of maximur accept 9 mark ecf	of moles of HC l used = 0.04 × 2 = 0.08 of moles CoC l_2 formed = 0.04 of moles CoC l_2 .6H $_2$ O formed = 0.04 one mole of CoC l_2 .6H $_2$ O = 238 g m yield of CoC l_2 .6H $_2$ O = 9.52g .5 g if to moles of HC l mark ecf to integers		[4
		to show	that cobalt(II) carbonate is in excess		
		mass of number of	of moles of HC l used = 0.08 must use value above one mole of CoCO $_3$ = 119g of moles of CoCO $_3$ in 6.0g of cobalt(II) carbonate why cobalt(II) carbonate is in excess 0.05 > 0.08/2	= 6.0/119 = 0.050	[1 [1

[Total: 10]