## **CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**International General Certificate of Secondary Education** 

## MARK SCHEME for the May/June 2013 series

## 0620 CHEMISTRY

0620/23

Paper 2 (Core 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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.



	Page 2			Mark Scheme	Syllabus	Paper
				IGCSE – May/June 2013	0620	23
1	(a)	(i) A	<b>A</b> ; <b>E</b>	(1 mark each)		[2]
		(ii) C	3			[1]
	(	(iii) C	2			[1]
	(	(iv) E	3			[1]
	(b)	<sup>3</sup> He	OW:	3 <sub>2</sub> D		[1]
	(c)	proto neutro radioa	ns; ons; activ	ch for: e; LLOW: neutrons		[4]
						[Total: 10]
2	(a)		<b>ALL</b> C	g point below room temperature  W: it boils at –35°C  RE: boiling point is too low		[1]
	ALL			ng point below room temperature <u>and</u> boiling <b>W</b> : it melts at –7 °C <u>and</u> boils at 59 °C <b>RE</b> : other stated figures	point above room temp	erature [1]
	(b)	increa	ases	(down the group)		[1]
	(c)	ALLC	OW:	0.06 - 0.08 (actual = 0.071)		[1]
	(d)	REJE	ECT:	nt green/yellow-green yellow alone blue-green		[1]
	(e)	7 elec	ctron	s in outer shell;		[1]
				s in middle shell ectrons can be shown as dots, crosses or e <sup>-</sup>		[1]
		ALLC	OW:	2, 8, 7 in numbers for 2 marks		

Page 3		1	Mark Scheme	Syllabus	Paper	
			IGCSE – May/June 2013	0620	23	
(f)	f) (i) Br <sub>2</sub> on right;					
		2 on	[1]			
	(ii)	NOT ALL IGN	ne is less reactive than bromine ORA  TE: both iodine and bromine (or symbols or formulae  OW: bromine is higher in the electrochemical series  ORE: less reactive than bromide  ORE: iodine is lower in the group/Periodic Table the	than iodine	[1]	
					[Total: 10]	
3 (a)	<ul> <li>(a) Any four of: <ul> <li>in solid, particles are arranged regularly (or are ordered)/in a lattice</li> <li>in solid, particles are close together</li> <li>in solid, particles are not moving/only vibrate/are in fixed position</li> <li>in liquid, particles randomly arranged/disordered/have random motion</li> <li>in liquid, particles slide over each other/move slowly</li> <li>in liquid, particles are close together</li> </ul> </li> <li>IGNORE: particles are closer together</li> </ul>					
	• IGN	durir IORE	of: ng melting, particles become less ordered ng melting, particles start moving/move more/move i: during melting, particles get further apart nere must be a reference to particles to score marks		[1]	
(b)	·	cond malle duct <b>ALL</b>	ous or shiny <b>ALLOW</b> : silvery duct heat/conduct electricity/conduct eable or can be shaped: <b>ALLOW</b> : can be bent ile/can be drawn into wires  OW: solid at room temperature/solid below 37°C in high boiling point/comments about density/sonor	ous/comments abou	[3] t	
(c)	Ga <sub>2</sub>	${}_{2}C\mathit{l}_{6}$			[1]	
(d)	(i)	IGN	er density/better electrical conductor  ORE: low density/lighter/lightweight/good electrica  E: comparative needed	al conductor	[1]	
	(ii)		nger/cheaper E: comparative needed		[1]	
	(iii)	lowe	er density; cheaper (1 mark each) <b>E</b> : comparative needed		[2]	

	Page 4		Mark Scheme	Syllabus	Paper				
			IGCSE – May/June 2013	0620	23				
	(e)	food containers/cooking utensils/aircraft or cars (bodywork)/rail truck (or rail car) (bodywork)/bicycles/(drink) cans/foil/windows/doors/roofing/walking poles/alloy magnets/(some types of) CD's/transistors/(high brightness) LEDs/paints/(solid) rocket fuels/coins/guitar plates (or necks)/mirrors/any other suitable use							
		[Total: 1							
4	(a)	(i) filtration: idea of removing larger particles or insoluble particles;  ALLOW: to remove clay particles/soil particles/sticks/large impurities  IGNORE: remove large molecules / to remove impurities / to clean the water							
		chlorination: to kill bacteria  ALLOW: to kill germs/to kill microorganisms  IGNORE: to disinfect/to remove bacteria/to get bacteria out							
		<ul> <li>(ii) any suitable use for water in the home, e.g. for washing/cooking/cleaning/sanitation</li> <li>IGNORE: for cooling but ALLOW: for cooling body, i.e. lowering body temperature (of fever)</li> <li>IGNORE: industrial uses</li> </ul>							
	(b)		us/white copper sulfate; E: incorrect oxidation numbers		[1]				
		turns blue							
		OR							
		anhydrous/blue cobalt chloride (1 mark); turns pink (1 mark)							
		NOTE: second mark dependent on first being correct BUT: copper sulfate turns blue/cobalt chloride turns pink = 1 mark							
	(c)	ALI IGN RE.	and cross placed between each H atom and the O <b>LOW</b> : two dots/two crosses/two 'e' for each bond <b>IORE</b> : electrons in inner shell of oxygen if drawn <b>JECT</b> : inner electron shells given to hydrogen/extra rogen or oxygen	electrons in outer	[1] shell of				
		bon	alent + reasons, e.g. because electrons are shared/d(s) IORE: because they are two non-metals	pair of electrons fo	orm the [1]				
	(d)	(pH) 7			[1]				
	(e)		+ water → sodium hyrdroxide + hydrogen E: symbol equations		[1]				

[Total: 9]

Page 5			Mark Scheme Syll		Paper		
			IGCSE – May/June 2013	0620	23		
(a)	(a) exothermic IGNORE: combustion						
(b)		lepen	ident on $O_2$ or $2O$ )		[1] [1]		
(c)	(i)	В			[1]		
	(ii)	ALL	for cars/fuel for vehicles  OW: implication of powering cars/vehicles  ORE: fuel or cars without any qualification		[1]		
(d)	(i)		oints plotted correctly;		[2]		
			point incorrectly plotted = 1 mark correctly drawn through points		[1]		
	(ii)	99 (°	°C) or from value correctly shown on graph with inc	orrect line	[1]		
(e)	(i)	(grou	two of: up of chemicals with) similar chemical properties IGNORE: same chemical same functional group same general formula IGNORE: have a general for successive members differ by CH <sub>2</sub> group general trend in physical properties		[2]		
	(ii)	ALL	temperature/heat; .OW: stated temperatures between 300 and 900 °C ORE: temperature unqualified		[1]		
			lyst; OW: aluminium + silicon oxides/zeolites IECT: incorrect name alone, e.g. nickel		[1]		
		OR					
		ALL	pressure (1 mark)  OW: stated pressures between 50–100 atmosphere ORE: pressure unqualified	es			
					[Total: 13]		

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Page 6		6	Mark Scheme IGCSE – May/June 2013	Syllabus 0620	Paper 23			
(-)	Δ							
(a)		Any four of:  liquid in beaker/other suitable container with chromatography paper dipping into the liquid solvent labelled or named as word solvent or as specific named solvent (must be in correct context, e.g. in beaker)  REJECT: solution of substance to be chromatographed spot placed on paper above solvent level allow solvent to run up the paper/solvent carries the dyes up the paper the spots separate/different dyes go different distances  IGNORE: the dyes separate (in stem of question) compare distance spot moves to a standard						
	-							
	sol							
	ŘΕ							
	the							
	cor							
			more advanced points, e.g. mark solvent front/cormarks from labelled diagram	npare <i>R</i> <sub>f</sub> values				
(b)	(i)	F			[			
	(ii)	G			[			
	(iii)	G			[			
(c)	C -	- O – H	1		[			
	0							
	AL	LOW:	COOH/CO <sub>2</sub> H					
(d)	sub	stanc	e which dissolves another/substance which dissolv	es a solute	[			
(e)	(i)	4			[			
	(ii)	10			[			
					[Total: 1			
(a)	(i)	prote	ein/catalyst;		[			
		ALL	eds up a reaction/increases rate of reaction/makes OW: changes the rate of a reaction ORE: makes a reaction slower	reaction faster	[			
	(ii)	2 (or	left) and no other figures added;		[			
(b)	(i)		easing the concentration increases rate ORA		[			
	/!!\		DRE: concentration increases rate		-			
	(ii)		I slope of line between that of 0.2 and 0.4 mol dm <sup>-3</sup>	concentrations;	[			
		line I	evels off about half way between 18 and 22 cm <sup>3</sup>		[			

		IGCSE – May/June 2013	0620	23
(iii)	volu	[1]		
	time - 20(s)		[1]	
(c) (i)	loss <b>ALL</b>	[1]		
(ii)	calci	ium sulfate;		[1]
		er ORE: symbol equation PLY: listing		[1]
(iii)	(iii) add (aqueous) silver nitrate;			[1]
		e) <u>vellow</u> precipitate ond mark dependent on first being correct)		[1]
	<u>yello</u>	(aqueous) lead nitrate (1 mark) ow precipitate (1 mark) ond mark dependent on first being correct)		

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[Total: 13]

Paper

**Syllabus**