## UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

**International General Certificate of Secondary Education** 

## MARK SCHEME for the May/June 2009 question paper for the guidance of teachers

## 0620 CHEMISTRY

0620/02

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

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				IGCSE – May/June 2009	0620	02
1	(a)	(i)		III) oxide / iron oxide / $Fe_2O_3$ ; OW: iron		[1]
		(ii)		(II) bromide / lead bromide / PbBr <sub>2</sub> ; : lead		[1]
	1	(iii)		um carbonate / CaCO <sub>3</sub> ; : carbonate		[1]
	ı	(iv)	ALL	um hydroxide / NaOH; OW: hydroxide / OH <sup>-</sup> : sodium		[1]
		(v)	meth	nane;		[1]
	(b)	(i)	ALLO ALLO	gen is removed (from the iron oxide); OW: carbon takes the oxygen from the iron oxide OW: oxygen goes to the carbon / the oxygen combi OW: oxidation number of <u>iron</u> decreases / electrons : the iron oxide loses electrons		[1]
		(ii)				[4] [Total: 10]
2	(a)	cald	cium,	magnesium, iron, copper;		[1]
	(b)	few ALL NO NO	bbles per bulger	produced steadily / moderately / slowly / produced faster than iron and slower than magnesishes than magnesium and more than iron; many bubbles produced but less than magnesium bbles produced rapidly / less rapidly s bubbles than magnesium / more bubbles than iron action / it's faster than iron and slower than magnes	n	[1]
	(c)	(i)	mag	nesium floats on top of the magnesium chloride OF nesium is above the magnesium chloride ORA; OW: magnesium is on top of the magnesium chloric		[1]
		(ii)	carb ALL ALL	gnesium) too reactive / above carbon in reactivity on; OW: magnesium is a reactive metal / magnesium is OW: too high a temperature needed for the extraction; magnesium oxide / magnesium will not react with	reactive on	ive than [1]

Mark Scheme: Teachers' version

Page 2

Syllabus

Paper

Page 3		Mark Scheme: Teachers' version	Syllabus	Paper
<u> </u>		IGCSE – May/June 2009	0620	02
(iii)	to prevent magnesium reacting with the air / oxygen / nitrogen; ALLOW: to stop magnesium oxidising NOT: because it is reactive NOT: to stop it reacting NOT: because inert gases are unreactive			
(iv)	nitro	gen / helium / neon / argon / krypton / xenon / rador	า;	[1]
(d) (i)		cture of ethene showing all atoms and all bonds; OW: correct electronic structure		[1]
(ii)	two (	of: ark each)		[2]
	•	carbon monoxide + poisonous / toxic; ALLOW: carbon monoxide combines with haemogle ALLOW: carbon monoxide suffocates NOT: carbon monoxide harmful / dangerous hydrogen + flammable / explosive; NOT: hydrogen dangerous hydrogen sulfide + poisonous / toxic; ALLOW: harmful NOT: dangerous / affects breathing ethene + flammable; methane + flammable; ALLOW: explosive	obin / red blood cells	5
(e) (i)	ALL(	on monoxide + water / steam → carbon dioxide + h OW: arrow for equilibrium sign : carbon oxide instead of carbon monoxide : mixture of words and symbols	ydrogen;	[1]
(ii)	go b	librium / reversible reaction / the reaction can go b ackwards or forwards; OW: the reaction can also go backwards : the reaction goes backwards	oth ways / the reac	tion can [1]
(iii)	(red- ALL) ALL IGN	sodium hydroxide (solution) / (aqueous) ammonia; -)brown / rusty red precipitate (both points); OW: solid for precipitate OW: yellow-brown precipitate / orange precipitate ORE: references to excess ammonia / sodium hydro	oxide	[1] [1]

[Total: 13]

Page 4		Mark Scheme: Teachers' version	Syllabus	Paper
		IGCSE – May/June 2009	0620	02
(a)		al) distillation; fractionation		[1]
(b)	IGNORE	fuel gas / refinery gas; naphtha; light gas oil / heavy gas oil / fuel oil; lubricating oil / lubricating fraction; (NOT: lubricant) bitumen; (ALLOW: residue) :: kerosene / paraffin / gasoline / petrol / diesel :: methane / named chemical compounds :: gas alone		[2]
(c)	ALLOW:	s / aircraft fuel / for jet engines / for car engines; for making more petrol for cooking / for heating / for lighting / for fuel		[1]
(d)	A and D;	(both needed)		[1]
(e)	ethane; unreactiv oxygen; water;	/e;		[4]
(f)	(that can ALLOW: ALLOW:	d: has only single bonds / contains the maximum at be combined with carbon atoms); does not have double bonds consists of single bonds s single bonds	amount of hydroge	n atoms [1]
	hydrocar carbon a	bon: (compound / substance) containing hydroger and hydrogen only; tit has carbon and hydrogen molecules only / ideas		[1]

3

[Total: 11]

Page 5		Mark Scheme: Teachers' version	Syllabus	Paper
		IGCSE – May/June 2009	0620	02
(a)	ammonia	a / NH <sub>3</sub> ;		[1]
(b)	NOT: go	e; goes purply-blue es blue then bleaches es purple		[1]
(c)	carbon d water; NOT: for			[3]
(d)	ALL ALL ALL	eplace nitrogen lost from soil; OW: to make (crop) plants grow better OW: to make plants grow more / faster OW: to improve crop yield ORE: to replace minerals lost from the soil / to repla	ce nutrients	[1]
		e nitrogen / greater percentage of nitrogen; : more nitrate		[1]
(	( <b>iii)</b> 80;			[1]
(e)	oxygen / NOT: O	O <sub>2</sub> ;		[1]
(f)	erosion of ALLOW: NOT: de	o / effect of acid rain e.g. trees or plants die / poof buildings / corrosion of bridges; smog / damages buildings stroys buildings eathing difficulties / lung damage / irritation to throat		[1]

4

[Total: 10]

Page 6		Mark Scheme: Teachers' version Syllabus		Paper 02		
	IGCSE – May/June 2009 0620					
(a) car NC	[1]					
(b) (i)		615 s; ALLOW: in numbers in range 600–630 s				
(ii)		n or near the line at beginning of experiment; OW: on or near line up to 50 s		[1]		
(iii)	start	lower curve at initial rate; ts levelling off at 100.2 g; OW: (beginning to) level off between 100.15 and 10	0.25 g	[1] [1]		
(c) (i)		eases / goes faster; Γ: takes less time / becomes fast / reaction increase	s	[1]		
(ii)		eases / goes faster; Γ: takes less time / becomes fast / reaction increase	s	[1]		
(d) cor	(d) combustion;					
sm larç				[3]		
(e) (i)		oiration; Γ: oxidation		[1]		
(ii)	ÀLL( NOT	ostance / compound / it) speeds up / increases the ra OW: changes rate of reaction I: decreases the rate ORE: references to biological substances	ate of a reaction;	[1]		

[Total: 12]

5

Page 7			Mark Scheme: Teachers' version	Syllabus	Paper	
<u> </u>			IGCSE – May/June 2009	0620	02	
(a)	Br <sub>2</sub> ;				[1]	
(b)			random AND roughly similar size to the one shown very close together or touching;		[1] [1]	
(c)	<ul> <li>(c) Any three of: <ul> <li>bromine evaporates / liquid evaporates; (NOT: it evaporates)</li> <li>more energetic particles from liquid to vapour;</li> <li>diffusion;</li> <li>random movement of molecules / particles move everywhere / both air and bromine particles are moving;</li> <li>(bromine and air) particles get mixed up / collision of bromine and air particles; ALLOW: molecules in place of particles</li> <li>NOT: atoms in place of particles</li> </ul> </li> </ul>					
(d)		nt) gre IORE	een; :: yellow		[1]	
	reddish-brown / brown / orange / yellow-brown; NOT: yellow / red					
(e)	NO.	T: bro T: ma	higher in reactivity series than <u>iodine</u> / bromine more omide more reactive than iodide agnesium bromide more reactive omine stronger than iodine	e reactive than <u>iodi</u> ı	<u>ne</u> ; [1]	
(f)	(i)		r; OW: Na⁺Br⁻ Γ: multiples e.g. 2NaBr		[1]	
	(ii)	ALL	bromide; OW: zinc(II) bromide Γ: ZnBr <sub>2</sub>		[1]	
	(iii)		alent; F: single bonding		[1]	
	(iv)	A an	nd D; (both needed)		[1]	
	(v)	ALL NOT	ons can move / ions are mobile; OW: the ions are free (from each other) : ions delocalised / charged particles moved ECT: electrons and ions move		[1]	

6

[Total: 14]

			IGCSE – May/June 2009	0620	02
,	(a)	Cl <sub>2</sub> ; correct b	alancing;		[1] [1]
	(b)	ALLOW:	pair; electrons all correct and no other electrons on hydro use of circle / dot for chlorine and cross for hydrogo i: inner electrons	_	[1] [1]
	(c)	pH1;			[1]
	(d)	hydrogei NOT: H <sub>2</sub>			[1]
	(e)	ALL NOT NOT leav leav NOT	of: corate off some of the water / heat solution to crystal OW: concentrate the solution : boil off the water / implication that all the water is : heat without further qualification e to crystallise / leave in the warm / leave in the all the eat room temperature; : let it cool / leave it to cool crystals with filter paper; : heat / warm to dry / put in an oven	removed	[2] dow sill /
	(f)		rine / $Cl_2$ ; -: $Cl$		[1]
		(ii) zinc	/ Zn;		[1]

Mark Scheme: Teachers' version

Syllabus

Paper

[Total: 10]

Page 8

7