CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2012 series

0620 CHEMISTRY

0620/21

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 October/November 2012 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.



Page 2		ge 2			Syllabus	Paper		
			IGCSE – Octobe	r/November 2012	0620	21		
1	(a)	(i)	C / C ₂ H ₄ / ethene;			[1]		
			A / CO ₂ / carbon dioxide; [1]					
			E / ethanol / correct formula for ethanol;					
		(iv)	D / CH ₄ / methane;	H ₄ / methane;				
		(v)	A / CO ₂ / carbon dioxide; allow: E	[1]				
	` '		E / ethanol / correct formula for ethanol; allow: A					
	(b)	C ₂ H	4;			[1]		
	(c) compound: substance containing two or more different atoms joined / botogether / substance containing 2 or more elements that can only be segmeans; allow: different atoms joined / different elements joined / 2 elements reamolecule / molecule with 2 or more elements / substances chemically coignore: two or more molecules combined / different elements react / submolecules reject: if reference to a mixture				n only be separate elements react to t chemically combin	arated by chemical [1] ct to form a mbined		
		ineı	: unreactive / doesn't react;			[1]		
	catalyst: substance which speeds up a reaction / it speeds up a reaction; allow: changes rate of reaction / changes speed of reaction				[1]			
						[Total: 10]		
2	(a) structure completely correct;;allow: 1 mark for 1 pair of electrons bonded between H a ignore: inner shell electrons		ns bonded between H and	I C <i>1</i> ;	[2]			
	(b)	(i)	A: burette; B: flask / erlenmeyer;			[1] [1]		
		(ii)	pH starts above 7 / stated valuallow: high pH	ue above 7;		[1]		
			decreases (on addition of acid	l);		[1]		
			(pH) ends at below 7 / stated allow: low pH note: pH decreases to pH 7 = note: pH goes from alkali to a	2 marks		[1]		

Page 3		3		Ma	rk Schen	ne		Syllabus	S	Paper	
			IGC	SE – Octo	ober/Nov	ember 2	012	0620		21	
	(iii) ammonium ch reject: ammo									[1]	
			NH ₃ ;								[1]
	(c)	(c) any 4 of: blue solution at start / precipitate formed / (light) blue (precipitate) / precipitate redissolves (in excess ammonia) / solution formed (in excess ammonia precipitate disappears (solution is) deep blue / dark blue allow: goes deep blue / dark blue / goes darker blue				ammonia	[4] a) /				
											[Total: 13]
3	(a)	 (i) magnesium → zinc → iron → lead / Mg > Zn > Fe > Pb;; if: one pair reversed / complete order reversed = 1 mark 				[2]					
		(ii)		t will not rea				e / iron is le	ss reactive;		[1]
	(b)		box tic t box t	•							[1] [1]
	(c)	(i)	allov	ngement: re v: close tog re: stick tog	ether / pa	cked toge	ether	lication of r	egularity e.g.	in layers	; [1]
				on: cannot r re: only mo		-	tion/ (only	v) vibrate;			[1]
		(ii)	disso filtrat sand igno salt s the c allow igno	three of: blve sodium ion / use a remains or re: residue solution goe collecting tul v: decanting re: water go re: distillation	filter pape I filter pap I filter pap I filter pap I for 1 ma I fo	r / er / aper (filter pa _l rk (in plad	per) / salt		the filtrate / s	salt water	[3] goes into
	(d)	dist	tillatior	n; lower; vol	atile; cond	denser; v	apour; (1	mark each)		[5]
	. ,			·		•					[Total: 15]

 (a) atoms with same number of protons but different number of neutrons; allow: atomic number for number of protons allow: different number of protons allow: different number of number of protons allow: same (type of) atom with different mass numbers of neutrons ignore: atoms with different numbers of neutrons ignore: labelled or shown by + or p / 3 (protons) / neutrons in nucleus – labelled or shown by n / 4 (neutrons) / 3 electrons – labelled or shown by dots, crosses or e / 2 electrons in first shell and 1 in second (c) 4Li + O₂ → 2Li₂O;;; allow: two marks for 2Li + O → Li₂O / 4Li + 2O → 2Li₂O allow: two marks for 2Li + O → Li₂O / 4Li + 2O → 2Li₂O allow: the marks for 0₂ if no other marks scored (d) (i) electrolyte correctly labelled; [1] and dissolved in water / solution in water; allow: answers implying substance is mixed with water ignore: hydrated / hydrous (ii) dissolved in water / solution in water; allow: answers implying substance is mixed with water ignore: hydrated / hydrous (iii) ions can move; allow: ions are free reject: electrons can move [7] total: 13] (b) (i) amount or mass or volume of water / distance of flame from can / height of flame / same can; ignore: the water (unqualified) / same amount of fuel / time (ii) to make sure that the water has the same temperature (throughout) / it is at the same temperature / so it is heated evenly / so there are no hot spots / so there are no cold spots; allow: so that all the particles mix 	•							
nucleus (need not be labelled) in middle of atom and electrons round outside (electrons can be shown as dots, crosses or e) / protons in nucleus – labelled or shown by + or p / 3 (protons) / neutrons in nucleus – labelled or shown by n / 4 (neutrons) / 3 electrons – labelled or shown by dots, crosses or e / 2 electrons in first shell and 1 in second (c) 4Li + O₂ → 2Li₂O;;; [3] [3] allow: two marks for 2Li + O → Li₂O / 4Li + 2O → 2Li₂O allow: 1 mark for O₂ if no other marks scored (d) (i) electrolyte correctly labelled; [1] anode rod correctly labelled; [1] ignore: label on circuit / label on + sign (ii) dissolved in water / solution in water; [1] allow: answers implying substance is mixed with water ignore: hydrated / hydrous (iii) ions can move; allow: ions are free reject: electrons can move [Total: 13] 5 (a) hydrogen → a fuel with RMM of 2; [1] methane → the main constituent of natural gas; [1] fuel oil → fuel for ships; [1] kerosene → fuel for aircraft; [1] (b) (i) amount or mass or volume of water / distance of flame from can / height of flame / same can; [1] ignore: the water (unqualified) / same amount of fuel / time (ii) to make sure that the water has the same temperature (throughout) / it is at the same temperature / so it is heated evenly / so there are no hot spots / so there are no cold spots; allow: so that all the particles are heated	4	 allow: atomic number for number of protons allow: different mass number / nucleon number for different number of neutrons allow: same (type of) atom with different mass numbers ignore: atoms with different numbers of neutrons ignore: element(s) with different numbers of neutrons ignore: atoms with different relative atomic mass (b) any 5 of: nucleus (need not be labelled) in middle of atom and electrons round outside (electrons be shown as dots, crosses or e) / protons in nucleus – labelled or shown by + or p / 3 (protons) / neutrons in nucleus – labelled or shown by n / 4 (neutrons) / 3 electrons – labelled or shown by dots, crosses or e / 						
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allow: ions are free reject: electrons can move [Total: 13] 5 (a) hydrogen → a fuel with RMM of 2; methane → the main constituent of natural gas; fuel oil → fuel for ships; kerosene → fuel for aircraft; [1] (b) (i) amount or mass or volume of water / distance of flame from can / height of flame / same can; ignore: the water (unqualified) / same amount of fuel / time (ii) to make sure that the water has the same temperature (throughout) / it is at the same temperature / so it is heated evenly / so there are no hot spots / so there are no cold spots; allow: so that all the particles are heated			(ii)	allow: answers implying substance is mixed with water	[1]			
 5 (a) hydrogen → a fuel with RMM of 2; [1] methane → the main constituent of natural gas; [1] fuel oil → fuel for ships; [1] kerosene → fuel for aircraft; [1] (b) (i) amount or mass or volume of water / distance of flame from can / height of flame / same can; [1] ignore: the water (unqualified) / same amount of fuel / time (ii) to make sure that the water has the same temperature (throughout) / it is at the same temperature / so it is heated evenly / so there are no hot spots / so there are no cold spots; [1] allow: so that all the particles are heated 			(iii)	allow: ions are free	[1]			
methane → the main constituent of natural gas; fuel oil → fuel for ships; kerosene → fuel for aircraft; [1] (b) (i) amount or mass or volume of water / distance of flame from can / height of flame / same can; ignore: the water (unqualified) / same amount of fuel / time (ii) to make sure that the water has the same temperature (throughout) / it is at the same temperature / so it is heated evenly / so there are no hot spots / so there are no cold spots; allow: so that all the particles are heated				[Total:	13]			
can; ignore: the water (unqualified) / same amount of fuel / time (ii) to make sure that the water has the same temperature (throughout) / it is at the same temperature / so it is heated evenly / so there are no hot spots / so there are no cold spots; allow: so that all the particles are heated	5	(a)	me fue	thane \rightarrow the main constituent of natural gas; I oil \rightarrow fuel for ships;	[1] [1]			
temperature / so it is heated evenly / so there are no hot spots / so there are no cold spots; [1] allow: so that all the particles are heated		(b)	(i)	can;				
			(ii)	temperature / so it is heated evenly / so there are no hot spots / so there are no cold spots; allow: so that all the particles are heated				

Mark Scheme
IGCSE – October/November 2012

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Syllabus 0620 Paper 21

	Page 5	Mark Scheme		Syllabus	Paper	
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	 (iii) petroleum spirit; highest temperature rise / highest increase in temperature; allow: calculation of all the temperature differences form the table ignore: because it releases most heat / because it has the highest tempera if fuel incorrect = 0 for the question 					
		trogen / N ₂ / N; xygen / O ₂ / O;			[1] [1]	
	. , . ,	mps / (to provide an) inert atmosph low: for lighting nore: for neon lights	ere / in welding / la	sers etc	[1]	
	(ii)	/ third / III;			[1]	
	(iii) inert / unreactive; ignore: it is stable				[1]	
					[Total: 13]	
6	diffus rando mole both partio Ag io (to m	ls dissolve or go into solution /	particles spread or	-	[4] s or	
	` '	$Cl_2 ightarrow 2KCl + I_2$; : 1 mark for 2KI + 2C $l ightarrow 2KCl + I_2$	• ,		[2]	
					[Total: 6]	
7	(a) 24;				[1]	
	(b) 256;				[1]	

<u> </u>	•		- j	. 5.	
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si (s ig si ni to si al	ulfur reasulfur bugnore: sulfur dio itrogen of form sulfur dio llow: sullow: s	roleum / crude oil / named fraction from crude oil acts with oxygen / air arms) to form sulfur dioxide sulfur oxide xide reacts (with gases) in the atmosphere / sulfur coxides alfur trioxide xide / trioxide react with water / rain alfur dioxide / trioxide dissolves in water / rain alfur oxide(s) mix with water / rain sulfurous/ sulfuric acid	dioxide reacts wit	h oxygen /	[4]
(d) ni	itrogen	/ N ₂ / N; phosphorus / P;			[2]

Syllabus

Mark Scheme

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Paper

(e) add (acidified) barium chloride / barium nitrate; [1] [1] white precipitate; note: second mark dependent on correct reagent

[Total: 10]