Location Entry Codes

Www.PapaCanibridge.com As part of CIE's continual commitment to maintaining best practice in assessment, CIE has begun to use different variants of some question papers for our most popular assessments with extremely large and widespread candidature, The question papers are closely related and the relationships between them have been thoroughly established using our assessment expertise. All versions of the paper give assessment of equal standard.

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International

The content assessed by the examination papers and the type of questions are unchanged.

This change means that for this component there are now two variant Question Papers. Mark Schemes and Principal Examiner's Reports where previously there was only one. For any individual country, it is intended that only one variant is used. This document contains both variants which will give all Centres access to even more past examination material than is usually the case.

The diagram shows the relationship between the Question Papers, Mark Schemes and Principal Examiner's Reports.

Mark Scheme **Question Paper** Principal Examiner's Report Introduction Introduction Introduction **First variant Question Paper** First variant Mark Scheme First variant Principal Examiner's Report Second variant Question Paper Second variant Mark Scheme Second variant Principal Examiner's Report

Who can I contact for further information on these changes?

Please direct any questions about this to CIE's Customer Services team at: international@cie.org.uk



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

0620/31

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.

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Page 2	2	Mark S	Scheme: Teachers' version	Syllabus	· A er
			GCSE – May/June 2009	0620	Star 1
(a) (i)	basic :	set up – cont	tainer and chromatography pap	ber	ww.xtrapape w.papacamphie [1]
			ove level of solvent		11
	(origin:	al mark must	t be shown and not just the line	;)	
	indicat	ion that more	e than one "spot" either on diag	gram or as comment	[1]
		MAX [2] for ro more rings	ound filter paper with green spo		
(ii)			of pure chlorophyll can be impl	lied	[1]
		position of gr ust a green s	reen spot or same Rf spot		[1
(b) cata	alvst				
, pho	otosynth	nesis or chlor			
•		nical reaction xide + water	n or needs light form		
			kygen NOT sugar ints ignore incorrect answers		[3
,	y 11113-				_
					[Total: 8]
molten	potassiı	um iodide	NOT aqueous		[1
hydroge					[1
	ised up d		ecomes more concentrated or	sodium chloride remain	
	o change ucts are (lrogen, chlorine and sodium hy	droxide then 2/3	[1
-		given de nya	Togon, onionno ana coatan ny.		
copper oxygen	(and wa	ater)			[1 [1
		,	accept hydrogen sulfate		[1
sulfuric					[1
aqueou		ute or concer formulae	ntrated potassium bromide		
aqueou			ntrated potassium bromide		
aqueou			ntrated potassium bromide		
aqueou	correct		ntrated potassium bromide		[Total: 8
aqueou accept	correct D		ntrated potassium bromide		[Total: 8 [1
aqueou accept (a) (i) (ii)	Correct D E	formulae	ntrated potassium bromide		[Total: 8 [1 [1
aqueou accept (a) (i) (ii) (iii)	D E B or F	formulae	ntrated potassium bromide		[Total: 8 [1 [1
aqueou accept (a) (i) (ii)	D E B or F B	formulae	ntrated potassium bromide		[Total: 6 [^ [^

Firs	st variant	Mark Scheme	www.xtrapapers.com
	Page 3		Syllabus 7.0 er
	(b) (i)	IGCSE – May/June 2009 CF_2 or CaI_2 CONDnext two marks conditional on correct formula C^{2+} and F^- or Ca^{2+} and $I^ 7 \times$ and 10 round F/INOTE covalent = 0Ignore electrons around Caaccept arrow notation arrow from electron on calcium and the second seco	Syllabus 0620 And Cannot to iodine
	(ii)	high melting point or boiling point conducts when molten or in solution soluble in water brittle correct chemical properties hard Any TWO NOT crystalline solid NOT does not conduct as a solid	[2]
			[Total: 10]
4	(i)	Cu and Pd	[2]
	(ii)	Ba and La	[2]
	(iii)	+2 or 2+ or Ba ²⁺	[1]
	(iv)	Ba or La	[1]
	(v)	it is a transition metal or a d block element	[1]
			[Total: 7]
5	(a) (i)	$Ca^{2+} + 2F^{-} \rightarrow CaF_{2}$ Not balanced ONLY [1] Both species must be correct for first mark. Second mat	[2] ark is for correct balancing.
	(ii)	Mole ratio Ca^{2+} : F ⁻ is 1:2 Answer must mention moles accept argument based on charges or <u>number</u> of ions accept 2 moles of NaF react with 1 mole of $CaCl_2$ NOT just "2" in equation If fluorine must specify atoms or ions	[1]
	(iii)	to remove traces of solutions or to remove soluble impurities or to remove a named salt sodium chloride or sodium fluoride or calcium chloride To remove impurities is not enough	[1]
	(iv)	to dry (precipitate) or to remove water or to evaporate NOT to evaporate some of water NOT to crystallise sa	

Firs	t var	riant	Mark Scheme	www.xtrapapers.com
	Pa	age 4	Mark Scheme: Teachers' version Syllab IGCSE – May/June 2009 0620	ous Paper
	(b)	exp	PO ₄) ₂ allow correct example lain why 8 cm ³ <u>react fully</u> nment about mole ratio	ETotal: 8
6	(a)	(i)	air (liquid) petroleum or crude oil or alkanes or methane or water or steam suitable aqueous solution e.g. brine or sea water NOTE: cannot crack methane	[1] or steam reforming or [1]
		(ii)	iron	[1]
		(iii)	(as a) fertiliser or to make fertilisers or to make nitric acid	[1]
	(b)	(i)	concentrations/macroscopic properties do not change accept amounts stay the same NOT no change	[1]
			rate of forward and back reactions equal	[1]
		(ii)	it <u>decreases</u> with <u>increase</u> temperature or it <u>increases</u> with <u>decrease</u> temperature	[1]
	(c)	(i)	shows an increase either a line or curve (any decrease = 0)	[1]
		(ii)	increase pressure favours the side with lower volume or molecules that is RHS or products side ignore any mention of rates	or moles [1] [1]
				[Total: 10]
7	(a)	(tot acc	al endothermic change = 436 + 242 = +)678 kJ al exothermic change = 2 × 431 = –)862 kJ sept correct sign/supplied/absorbed for endo etc.	[1] [1]
			ept correct sign/evolved/produced for exo etc. nge for reaction = -184 kJ	[1]
		ecf	necessary to calculate –184, just show that exo change > than endo allowed provided negative 4 kJ scores all 3 marks	0
	(b)	(i)	because it accepts a proton accepts hydrogen ion or H ⁺ ONLY [1] proton and H ⁺ [2]	[2]
		(ii)	hydrogen chloride is a strong acid hydrogen fluoride is a weak acid weaker or stronger correctly applied for [2]	[1] [1]

Firs	t variant	Mark	Scheme					WWW.	xtrapapers.com
	Page	5	Mark	Scheme: Te	achers' v	ersion	Sylla	bus 2.A	er
	- - - -	•		SCSE – May			062	20	2Day
	(iii)	OR h	ogen chloride nydrogen fluor ues suggeste	de (aqueou	s) would h		ł		strapapers.com
8	• •	-	dable or break m a renewabl		•	ise up petrole	um		
	any	y TWO	sual pollution) ention of toxic		need for la	undfill sites or	less dange	r to wildlife	[2]
	(b) (i)		pt polyester c	r fat or lipid	or vegeta	ıble oil or <u>carl</u>	ooxylic acid		[1]
	(ii)	alcoh	or carboxylic nol or hydroxy formulae NO	l or alkanol	noic <u>acid</u>				[1] [1]
	(iii)	CON	ensation D because wa onomer does			on			[1] [1]
	(c) (i)	lactic	acid ightarrow acry	lic acid + wa	ater				[1]
	(ii)	rema goes If ma	oromine (wate lins brown/ora colourless N lirk 1 near mise ur of reagent i	nge/yellow DT clear s e.g. bromic	de allow m	arks 2 and 3	therwise ma	ax [2]	[1] [1] [1]
			acidified potas le/pink to colo		anate(VII)				
		purpl	alkaline potass le/pink to gree urple/pink to b	n					

First v	ariant	Mark	Scheme	WWW	xtrapape
F	Page 6	6	Mark Scheme: Teachers' version	Syllabus	er er
			IGCSE – May/June 2009	0620	Day
	(iii)	reag obse	ent ervable result		atrapape anacambrid
		if un-	ble named metal (NOT sodium, lead, any metal bel -named metal [0] result can score [1] ogen evolved or bubbles/effervescence/fizzing	low magnesium etc.)	
			uble metal oxide ur change or dissolves		
			carbonate or bicarbonate carbon dioxide/bubbles/effervescence/fizzing		
		temp unsp	um hydroxide or alkali perature increase or accept indicator to show neutra pecified base scores [1] only ralcohol	alisation	
					[Total: 13]
9 (a	Mg acc	₃ N ₂	3 and 28/14 = 2 ust formula for [2] even with incorrect or no working		[1] [1]
(k			2H ₂ O = 4AI(OH) ₃ + 3CH ₄ ₃ ONLY [1]		[2]
(c	c) (i)	0.07 beca If 80	on is limiting reagent moles of Si and 25/160 = 0.156 moles of Br_2 nuse 0.14 (2 × 0.07) < 0.156 used to find moles of Br_2 the mark 1 and 3 still avail ments based on masses can be used	lable	[1] [1] [1]
	(ii)	0.07 NOT			[1
					[Total: 8]



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

0620/32

Paper 3 (Extended Theory), maximum raw mark 80

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econ	nd varian	it Mar	k Scheme		www.xtrapapers.c
	Page 2	2		Scheme: Teachers' version	Syllabus 7. Ster
				IGCSE – May/June 2009	0620 732
1	(a) (i)	basio	c set up – cor	ntainer and chromatography paper	Strate.
				oove level of solvent st be shown and not just the line)	Syllabus 0620 or as comment [1]
		indic	ation that mo	ore than one "spot" either on diagram o	or as comment [1]
			w MAX [2] for or more rings	round filter paper with green spot at co	
	(ii)	same		n of pure chlorophyll can be implied green spot or same Rf spot	[1] [1]
	pho carl gluo	otosyn otoche bon d cose (ioxide + wate or starch or c	on or needs light	[3]
	-	,	·		[Total: 8]
-	14 - va				
2			n chloride	NOT aqueous	[1]
	hydroge oxygen	∍n			[1] [1]
				becomes more concentrated or sodiur	
			0	/drogen, chlorine and sodium hydroxid	
	copper	(and)	·····		[1]
	oxygen sulfuric		Water	accept hydrogen sulfate	[1] [1]
			lilute or conce ct formulae	entrated potassium bromide	[1]
					[Total: 8]
3	(a) (i)	D			[1]
	(ii)	Е			[1]
	(iii)	B or	F		[1]
	(iv)	в			[1]

	Syllabus	Mark Scheme: Teachers' version	Page 3
20	0620	IGCSE – May/June 2009	raye s
r Ann. Daba cannbring	tom to oxygen	or CaO ND C ²⁺ and A ^{2–} or Ca ²⁺ and O ^{2–} and 2o round anion FE covalent = 0 ore electrons around Ca ept arrow notation arrow from electron on calcium a	C 6 N Ig
[2]		c(oxide) or basic property	co so bi bi bi A
[Total: 10]			
[2]		and Pd	(i) C
[2]		and La	(ii) B
[1]		or 2+ or Ba^{2+}	(iii) +:
[1]		or La	(iv) B
[1]		a transition metal or a d block element	(v) it
[Total: 7]			
[2]	k is for correct ba	$f + 3F^{-} \rightarrow FeF_{3}$ balanced ONLY [1] is species must be correct for first mark. Second ma	N
balancing.		e ratio Fe ³⁺ : F [−] is 1:3	· · ·
balancing. [1]		wer must mention moles ept argument based on charges or <u>number</u> of ions ept 1mole of FeF ₃ reacts with 3 moles of NaF I just "3" in equation lorine must specify atoms or ions	a a N
		ept argument based on charges or <u>number</u> of ions ept 1mole of FeF_3 reacts with 3 moles of NaF f just "3" in equation	ad Ad N If (iii) to in o

IC Va	arian	t Mark Scheme		www.xtrapap
Ра	ge 4	Mark Scheme: Teacher IGCSE – May/June		Syllabus Ager 0620
(b)	exp	O₄ allow correct example ain why 6 cm ³ <u>react fully</u> ment about mole ratio		Syllabus 0620 (Total: 8
(a)	(i)	air (liquid) petroleum or crude oil or alkanes or suitable aqueous solution e.g. brine NOTE: cannot crack methane		r or steam or steam reforming c [
	(ii)	iron		[
	(iii)	(as a) fertiliser or to make fertilisers of	or to make nitric ac	cid ['
(b)	(i)	concentrations/macroscopic propertie accept amounts stay the same NOT no change	es do not change	[
		rate of forward and back reactions ec	qual	[
	(ii)	it <u>increases</u> with <u>increase</u> pressure or it <u>decreases</u> with <u>decrease</u> pressu	ire	['
(c)	(i)	shows a decrease either a line or cu (any increase = 0)	rve	['
	(ii)	increase temperature favours the end that is LHS or reactants side or so le accept corresponding exothermic ar	ss ammonia at equ	uilibrium [[·]
				[Total: 10
(a)	(tota acc	al endothermic change = 436 + 158 = al exothermic change = 2 × 562 = –)1 ept correct sign/supplied/absorbed fo	124 kJ r endo etc.	[`
		ept correct sign/evolved/produced for nge for reaction = –530 kJ	exo etc.	[
	ecf	necessary to calculate –530, just sho allowed provided negative 0 kJ scores all 3 marks	w that exo change	> than endo
(b)	(i)	because it accepts a proton accepts hydrogen ion or H^+ ONLY [1 proton and H^+ [2]]	[:
	(ii)	hydrogen chloride is a strong acid hydrogen fluoride is a weak acid weaker or stronger correctly applied	for [2]	[.

Seco	ond variar	nt Mark Scheme		www.xtrapapers.com
	Page 5	5 Mark Scheme: Teachers' vers	sion Syllabu	is ² A er
		IGCSE – May/June 2009	0620	822
	(iii)	hydrogen chloride (aqueous) would have lo OR hydrogen fluoride (aqueous) would have If values suggested, not over 7		IS PROVINSION OF THE TRANSPORT
8		degradable or breaks down naturally de from a renewable source or does not use	up petroleum	
	any	uce visual pollution or reduces need for land / TWO ore mention of toxic gases	ïll sites or less danger to	o wildlife [2]
	(b) (i)	ester accept polyester or fat or lipid or vegetable	oil or <u>carboxylic acid</u>	[1]
	(ii)	acid or carboxylic <u>acid_</u> or alkanoic <u>acid</u> alcohol or hydroxyl or alkanol NOT formulae NOT hydroxide		[1] [1]
	(iii)	condensation COND because water is formed in reaction or monomer does not have C=C bond		[1] [1]
	(c) (i)	lactic acid \rightarrow acrylic acid + water		[1]
	(ii)	add bromine (water) or bromine in an organ remains brown/orange/yellow goes colourless NOT clear If mark 1 near miss e.g. bromide allow mark Colour of reagent must be shown somewhe	s 2 and 3	[1] [1] [1]
		OR acidified potassium manganate(VII) purple/pink to colourless		
		OR alkaline potassium manganate(VII) purple/pink to green or purple/pink to brown precipitate		

Page 6	Mark Scheme: Teachers' version	Syllabus or
	IGCSE – May/June 2009	0620
(iii) reag obse	jent ervable result	Cambrid
gas	able named metal (NOT sodium, lead etc.) /hydrogen/bubbles/effervescence/fizzing -named metal [0] result can score [1]	Syllabus 0620 BDRCR/MB/CR/MB/100
	luble metal oxide ur change or dissolves	
gas	carbonate /carbon dioxide/bubbles/effervescence/fizzing ept_bicarbonate	
(tem uns	um hydroxide or alkali operature increase or accept indicator to show neutra pecified base scores [1] only Falcohol	alisation)
		[Total: 13]
Mg ₃ N ₂	3 and 28/14 = 2 ust formula for [2] even with incorrect or no working	[1] [1]
	12H ₂ O = 4AI(OH) ₃ + 3CH ₄ ₃ ONLY [1]	[2]
0.08 beca If 19	on is limiting reagent 6 moles of Si and 7.2/38 = 0.189 moles of F_2 ause 0.16 (2 × 0.08) < 0.189 9 used to find moles of F_2 marks 1 and 3 still availabl ments based on masses can be used	[1] [1] [1]
(ii) 0.08 NO	с Гecf	[1]