MARK SCHEME for the May/June 2014 series

0620 CHEMISTRY

0620/32

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 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 2014 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 2014	0620	32
1	(a)	A aı	nd E	need both (1)		[1]
	(b)	D (1)			[1]
	(c)	C (1)			[1]
	(d)	B (1)			[1]
	(e)	F (1)			[1]
	(f)	E (1)			[1]
	(g)	C (1)			[1]
						[Total: 7]
2	(a)	(i)		stance/material/compound/element/mixture (burn rgy or heat (1)	t) to produce/release	<u>e</u> [1]
		(ii)		two from: coal coke peat petroleum/ crude oil refinery gas/LPG gasoline/petrol naptha kerosene/paraffin diesel (oil)/gas oil fuel oil propane butane		[2]
	((iii)		d/charcoal/animal dung/biomass/Uranium/U/plu	tonium/Pu (1)	[²]
	((111)	W000	d/charcoal/animal dung/biomass/Uranium/U/plu	tonium/Pu (1)	[1]

	Page 3		5	Mark Scheme	Syllabus	Paper
				IGCSE – May/June 2014	0620	32
	(b)	(i)		two from: water/steam/water vapour/H ₂ O(1) carbon dioxide/CO ₂ (1) carbon monoxide/CO(1)		[2]
		(ii)	any	two from:		
			limite	ed or finite resource/non-renewable/will run out/de	epleted (1)	
			gree	nhouse effect/gas(es)/climate change/(cause) glo	bal warming (1)	
			acid	rain (1)		
			prod	uction of <u>poisonous/toxic</u> gases (1)		[2]
						[Total: 8]
3	(a)	(i)	pres	sure 150–300 atmospheres/atm (1)		
			temp	perature accept in range 370 to 470 <u>°C</u> (1)		
			iron	(catalyst) (1)		
			bala	nced equation $N_2 + 3H_2 \Rightarrow 2NH_3$ (1)		
			equi	librium/reversible (1)		[5]
		(ii)	pota	ssium/K (1)		
			phos	sphorus/P (1)		[2]
	(b)	(i)		fossil fuels/burn fuels containing sulfur/burn co n/burn ores containing sulfur/roast metal sulfides		
			sulfu	$r dioxide/SO_2$ (formed) (1)		
			(forn	n) sulfuric/ H_2SO_4 /sulfurous acid/ H_2SO_3 (1)		
			OR			
				gen and oxygen (in air) react at high temperature nes/lightning. (1)	es/in jet engines/ca	r
			(forn	n) oxides of nitrogen (1)		
			(forn	n) nitric acid/HNO $_3$ /nitrous acid/HNO $_2$ (1)		[3]

Pa	ge 4		Mark Scheme Syllabus		
			IGCSE – May/June 2014	0620	32
	 (ii) any two from: calcium oxide/lime/quicklime/CaO (1) calcium hydroxide/Ca(OH)₂/lime/slaked lime/limewater (1) calcium carbonate/CaCO₃/limestone/chalk/marble (1) guidance: 'lime' can only be credited once. 			[2] [Total: 12]	
4 (a)	(i)	buta	noic/butyric acid (1)		
		CH₃($CH_2CH_2COOH/C_2H_5CH_2COOH$ (1)		[2]
	(ii)	anyt	three from:		
	(same) general formula (1)				
		(con	secutive members) differ by CH_2 (1)		
		same	e functional group (1)		
		com	mon methods of preparation (1)		
		chan or e	ical properties vary in predictable manner/sh nge xample of a physical property variation i.e. melting tility (1)	-	-
(b)	(i)	displ	ayed formula of propan-1-ol, all bonds shown sepa	rately (1)	[1]
	(ii)	acidi	fied (1)		
		•	ssium manganate (VII) /potassium permanganate/romate(VI)/K ₂ Cr ₂ O ₇ /potassium dichromate (1)	KMnO₄ or potassiu	m [2]
(c)	(i)	zinc	+ propanoic acid \rightarrow <u>zinc propanoate</u> (+ hydroger	n) (1)	[1]
	(ii)	calci	um oxide + propanoic acid \rightarrow <u>calcium propanoate</u>	<u>e + water</u> (1)	[1]
((iii)	LiOH	$H + CH_3CH_2 COOH \rightarrow CH_3CH_2COOLi + H_2O$ (1))	[1]
(d)	(i)		<u>centration (</u> of acid in C) is less/halved or concen bled. (1)	tration <u>of A</u> is more	e/
		less	collisions or more collisions <u>in A</u> (than in C) (1)		[2]
	 (ii) (higher temperature in B particles/molecules/atoms) move faster/have more energy/more have E_a or (particles/molecules/atoms) in A move slower/have less energy/less have E_a (1) 				
		more	e collisions or less collisions <u>in A</u> (than in B) (1)		[2]

Page 5		5	Mark Scheme	Syllabus	Paper	
			IGCSE – May/June 2014	0620	32	
	(iii	(D) It (I	9) has strong (acid) and A has weak acid/(D) strong dissociates more or <u>A</u> is weaker/ <u>A</u> ionises less/ <u>A</u> d D) has <u>higher concentration of hydrogen ions</u>	lissociates less (1)		
		con	centration of hydrogen ions (1)			
		mor	e collisions (in D) or fewer collisions <u>in A</u> (1)		[3]	
					[Total: 18]	
5	(a) (i) inco (1)	mplete combustion or limited oxygen/less oxyger	n/not enough oxyger	ו [1]	
	(ii) any	two from:			
		(for	ward) reaction is endothermic (1)			
		-	temperature increases yield/favours forward reac ght (1)	tion/shifts equilibriun	ı	
		fast	er reaction (rate) (1)		[2]	
	(iii) any	two from:			
		high	pressure reduces yield or favours LHS (1)			
			ause LHS has smaller volume or number of moles <i>i</i> gas) ORA (1)	number of molecules	6	
		(hig	h pressure plant is) expensive/dangerous/explosio	n/leaks	[2]	
5	(b) hy	ydroge	n and chlorine / H_2 and Cl_2 (1)			
	so	odium l	nydroxide / NaOH / Na⁺OH⁻ (1)			
	21	H⁺ + 2€	$e \rightarrow H_2/2H^+ \rightarrow H_2 - 2e$ (1)			
	20	$Cl^{-} \rightarrow$	$Cl_2 + 2e/2Cl^ 2e \rightarrow Cl_2$ (1)			
	Н	ydroge	$n/H_2/H/H^+$ at cathode and chlorine/chloride/C l_2/C	Cl/Cl⁻ at anode (1)	[5]	
5	(c) <u>e</u>	<u>ach</u> ch	lorine 1 bond pair and 3 non-bond pair (1)			
	0)	kygen a	atom 2 non-bond pairs and 2 bond pairs as double b	oond (1)		
	Са	arbon a	atom 4 bond pairs including 2 bond pairs as double b	cond (1)	[3]	
					[Total: 13]	

IGCSE – May/June 2014	0620	32			
	IGCSE – May/June 2014 0620				
any three from: (it would have) more than one or variable valency/oxidation state/oxidation number (1)					
(metal/element/titanium/it has a) high density (1)					
coloured compounds/ions/solutions (1)					
form complex (ions) (1)					
ompound act as) catalyst (1)		[3]			
rges on <u>both</u> ions (1)					
around (each) fluoride (1)		[3]			
mula of strong acid and alkali (1)					
or neutralises both acid and base or alkali (th	hen amphoteric) (1)				
/soluble in both(acid and alkali) or form solut	tions in both (1)	[3]			
		[Total: 9]			
out indicator/repeat using same volumes or arcoal to remove indicator (1)	of acid and alkali or use	9			
heat/warm/boil/leave in sun (1)					
of the water has gone/some water is on point (1)	s left/saturation (point)	/			
to cool/allow to crystallise (1)					
rystals)/wash(with distilled water)/dry crys varm place/oven/windowsill (1)	stals with filter paper/dry	(5]			
	nent/titanium/it has a) high density (1) ompounds/ions/solutions (1) lex (ions) (1) ompound act as) catalyst (1) rges on <u>both</u> ions (1) around (each) fluoride (1) <u>mula of strong acid and alkali (1)</u> <u>or neutralises</u> both acid and base or alkali (t /soluble in both(acid and alkali) or form solu out indicator/repeat using same volumes arcoal to remove indicator (1) heat/warm/boil/leave in sun (1) of the water has gone/some water i on point (1) / to cool/allow to crystallise (1) rystals)/wash(with distilled water)/dry crystals	ment/titanium/it has a) high density (1) propounds/ions/solutions (1) lex (ions) (1) prompound act as) catalyst (1) rges on <u>both</u> ions (1) around (each) fluoride (1) <u>rmula of</u> strong acid and alkali (1) <u>or neutralises</u> both acid and base or alkali (then amphoteric) (1) /soluble in both(acid and alkali) or form solutions in both (1) /soluble in both(acid and alkali) or form solutions in both (1) extract to remove indicator (1) heat/warm/boil/leave in sun (1) of the water has gone/some water is left/saturation (point) on point (1) / to cool/allow to crystallise (1) rystals)/wash(with distilled water)/dry crystals with filter paper/dry			

Page 7	Mark Scheme	Syllabus	Paper
	IGCSE – May/June 2014	0620	32

- (c) (i) (to prove) <u>all</u> water driven off or evaporated or boiled/no water remains/to make salt anhydrous (1)
 - (ii) $m_1 m_2 = mass of water$ (1)

(calculate) moles of water AND moles of hydrated or anhydrous salt (1)

[3]

1:1 ratio/should be equal (1)