

past Papers Standard Grade General Chemistry



Marking Scheme

2010	K	U	PS		
Credit	/30	%	/30	%	
1	21+	70%	22+	73%	
2	16+	53%	13+	43%	
See general	<16	< 53%	<13	< 43%	

2010 Standard Grade Chemistry Credit Marking Scheme												
Question	Answer	Chemistry Covered										
		Property	Fraction A		Fractio	on B	Frac	tion C	Fr	raction D	Fracti	on E
		Viscosity	Low	•							• Hi	gh
1a	Е	Evaporation	Easily	•							Slo	wly
		Flammability	High	•							La	w
		Boiling Point	Low	-							• Hi	gh
		Property	Fraction A		Fractio	on B	Frac	tion C	Fr	raction D	Fracti	on E
1b	А	Name	Petroleum Go	เร	Napht	ha	Kero	osene		Gas Oil	Resid	lue
		Use	Camping Gas	5	Petro	ol	Aircro	ift Fuel		Diesel	Tar/Bit	umen
	-	Element	Hydrogen	Nit	rogen	Sil	icon	Alumin	ium	Magnesiu	m Oxy	gen
2a	E	Density (g/cm ³)	0.00009	0.0	0013	2	.33	2.70	0	1.74	0.00)14
2b	A+C Both for 1 mark	Si can be su	ıbstituted f	or C	as the	ey are	both i	n group	4			
			Write dowi Formulae	n	Write of Cr	e Down ross Ov	Reverse er Rule	Follow o	arrow	s to get for	mula	
						,	V	Va	enc	v of X=3	3	
20	D+F						, 7	· X	is ,	, Aluminiu	m	
20	Both for 1 mark		X_2Y_3			\sim						
			• • • • • • • •	N2/3			Valency of Y=2					
					3		2		Y is	Oxyger	ı	
		No. of neuti	rons = mass	num	ber - c	atomic	numb	er				
		Porticlo	23 1		³ 0 ⁴⁰ v		24		2+	³⁵ CI-	16	
За	A+D Both for 1 mark	Furncie	111100	80	'	19 ^		12 Mg		17 ^{CI}	80	
	born for 1 mark	No of	23-11	18-	8	40-1	.9	24-12		35-17	16-8	
		Neutrons	=12	=10)	=21		=12		=18	=8	
		Particle	²³ ₁₁ Na	18	0	40	K⁺	²⁴ ₁₂ M	g ²⁺	$^{35}_{17} Cl^{-}$)
3b	D	No of electrons	11	0	8	19	18	10	<u> </u>	1/		8
		Flactron			0	-	10		,	10		,
		Arrangement	2,8,1		2,6	2	,8,8	2,	8	2,8,8	2	,6
4a	E	Carbohydrat	e fructos	e	gluc	ose	mal	tose	SI	ucrose	starc	h
16	A+B	Formula	$C_6H_{12}C_{12}$) ₆	C_6H_1	206	C12+	I ₂₂ O ₁₁	C_{12}	$H_{22}O_{11}$	(C ₆ H ₁₀ (05) n
40	Both for 1 mark	Type	monosaccha	ride n	nonosac	charide	disac	charide	dise	accharide	polysacch	aride
5α	В	Galvanising is series and pr	the coating otects the ir	of ira on/st	on/stee teel fro	el with om cori	zinc. Z rosion b	inc is hig by sacrif	gher (icial	up the elec protection	trochemi	cal
		An intact la	yer of tin w	ill pr	revent	iron f	rom co	prroding	as t	the intact	tin laye	r
5b	D	acts a barri	er to air an	d wa	ter ge [.]	tting t	to the	iron una	dern	eath.		
		If the tin lo	iyer is scrat	cheo	d, the	iron c	orrode	s to sad	rifi	cially prot	ect the	tin.
		🗷 A Propei	ne C₃H6 wil	l dea	colour	ise bi	romine	e water	' qui	ckly		
		🗹 B Cyclop	ropane C3H	6 fit	's C _n H	2n and	decol	ourises	bro	mine solu	ition qui	ckly
60	B+F	☑C Propane C3H8 does not have a general formula of CnH2n										
60 Both for 1 mark		🗷 D Butan	e C4H10 doe	es no	ot hav	e a ge	eneral	formu	la of	C _n H _{2n}		
		⊠E Butene C₄H₃ will decolourise bromine water quickly.										
		☑F Cyclob	utane C4H	₃ fit	s C _n Ha	2n and	decol	ourises	bro	omine sol	ution qu	lickly



			. 11	411	
65	R	Homologous Series	Alkane	Alkene	CycloalKane
00	U	1 st Member	Methane CH4	Ethene C2H4	Cyclopropane C3H6
6c	E+F Both for 1 mark	 ☑ A Propene C₃H₆ ☑ B Cyclopropane C ☑ C Propane C₃H₈ ☑ D Butane C₄H₁₀ ☑ E Butene C₄H₈ h ☑ F Cyclobutane C 	has a different fo C ₃ H ₆ has a differer has a different for has a different for as the same formu 4H ₈ has the same f	rmula so is not an it formula so not a rmula so is not an i rmula so is not an i ila but a different formula but a diffe	isomer of C4H8 n isomer of C4H8 somer of C4H8 somer of C4H8 structure erent structure
7α	D	Nitrog	gen + Hydroger	n <u>iron</u> → An	nmonia
7b	С	ammonia +	oxygen platinum	 nitrogen dioxide 	+ water
8	B,E 1 mark each	 ☑ A alkaline solution ☑ B alkaline solution ☑ C alkaline solution ☑ D alkaline solution ☑ E Dilution decrement 	ons have a pH grec ons contain ions an ons contain more C ons neutralise acid ases the concentr	iter than 7 d conduct electric)H ⁻ ions than pure Is like hydrochloric ation of OH ⁻ ions i	ity water : acid n an alkali
9	A , F 1 mark each	 ✓A copper carbonate ✓B lead nitrate + p ✓C potassium hyd ✓D copper is not ✓E silver is not re ✓F ammonium nitra 	e + sulphuric acid \rightarrow co potassium iodide \rightarrow roxide + nitric acio reactive enough to eactive enough to r te + sodium hydroxio	pper sulphate + water lead iodide solid + d \rightarrow potassium nitr react with water react with hydroch de \rightarrow ammonia + wat	+ carbon dioxide potassium nitrate rate + water Noric acid er + sodium nitrate

Question	Answer	Chemistry Covered				
10a	Man-made or not found in nature	Synthetic materials are not found naturally on Earth and are made by the chemical industry.				
10b(i)	Diagram showing:	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$				
10b(ii)	Addition	In addition polymerisation, C=C double bonds open up to form a polymer with a long chain of C-C single bonds				
10c	Carbon monoxide	Carbon monoxide is a toxic gas formed when carbon compounds burn in a limited supply of air.				
11a(i)	Fermentation or anaerobic respiration	glucose <u>yeast</u> ► ethanol + carbon dioxide				
11a (ii)	Carbon dioxide					
11b	Balloon doesn't inflate or no gas produced or Enzymes destroyed at 80°C					



	Enzymes do not work at high temperatures and are denatured at these temperatures. Enzymes work best at their optimum temperature (usually ~37°C)	Enzyme activity 37°C temperature (°C)
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120	Burns with a		Gas	Hydrog	gen	Оху	gen	Carbon Dioxide	
120	рор		Test	burns with	a pop	relights a glo	wing splint	turns lime water milky	
12b	Line graph	$\frac{1}{2}$ mark - both labels with units $\frac{1}{2}$ mark - both scales							
	showing	± mark - points plotted correctly ± mark - points joined up appropriately							
12c	42-44cm ³	Problem Solving: Answer should be taken from graph							
124	53 cm ³	Reaction with dilute sulphuric acid was finished at 60seconds							will
120	55CM	At a higher concentration of sulphuric acid will finish before 60seconds but will still produce same final volume of aas (53cm ³)							WIII
		1 mol N	1 mol Mg = 24.5g						
				no	. of mol = -	mass ofm = 24	$\frac{4.9g}{5a \text{ mol}^{-1}} = 0$	0.2mol	
				Ma	+ H2S	∑₄ ——►	MaSC	$\lambda_1 + H_2$	
12e	0.4g			1mol	11200		mgee	1mol	
				0.2mol				0.2mol	
		1mol H	l₂ = 2x	:1 = 2g					
		Ninget		mass = n	io. of mol	× gfm = 0.2	mol x 2g	$mol^{-1} = 0.4g$	
40	Electrodes have	the dir	curren ection	of electron fl	oe usea as ow is alwa	this give con vs the same.	stant posit	rive and negative electro	ies as
13a	same charge at all	Alterno	ating cu	urrent (a.c.)ha	is reversin	, 1g current dir	ection so t	the charge on each electr	rode
	Times	would k	keep ch	anging.	h				
13b	Green	Ni ² ⁺ io	ns will	travel to th	ive becau e neoativ	se metais ai e electrode	ways torr (electrod	n positive ions. le A)	
			Writ	e down Valer	ncv		(0.001.00	Follow arrows and]
			below	v each eleme	nt's	Put in These over A	nnowe	cancel down to get	
				symbol		1055-0Ver P	in ows	formula	
							-		
13c	Ni ²⁺ CrO ₄ ²⁻		N	i ²⁺ CrO	4 ²⁻ N	li ²⁺ Cr	O_4^{2-}		
13c	Ni ²⁺ CrO ₄ ²⁻		Ν	i ²⁺ CrO	4 ²⁻ N	li ²⁺ Cr	<i>O</i> ₄ ²⁻	Ni²⁺CrO₄²⁻	
13c	Ni ²⁺ CrO₄ ^{2−}		N 2	i²⁺ CrO. 2	4 ²⁻ N	li ²⁺ Cr	O ₄ ²⁻	Ni ²⁺ CrO₄ ²⁻	
13c	Ni ²⁺ CrO4 ²⁻	Titeria	N 2	i²+ CrO. 2	4 ²⁻ N		O ₄ ²⁻ 2	Ni ²⁺ CrO ₄ ²⁻	
13c	Ni ²⁺ CrO ₄ ²⁻	Titaniun	N 2 n (IV) c Metal	i ²⁺ CrO 2 hloride contains Is and non-meta	4 ²⁻ N 2 s a metal an Is usually jo	d a non-metal i	O4 ²⁻ 2 n the compo	Ni ²⁺ CrO4 ²⁻	
13c	Ni ²⁺ CrO ₄ ²⁻ Covalent	Titaniun	N 2 n (IV) c Metal Ionic n (IV) c	i ²⁺ CrO 2 hloride contains ls and non-meta bonding results bloride contains	4 ²⁻ N s a metal an Is usually ja in a high m	d a non-metal is in to form ioni elting and boili	O4 ²⁻ 2 n the composite c bonding ng points a liquid at po	Ni ²⁺ CrO ₄ ²⁻	
13c 14a	Ni ²⁺ CrO4 ²⁻ Covalent	Titaniun • Titaniun boiling p	N 2 n (IV) c Metal Ionic n (IV) c point be	i ²⁺ CrO. 2 hloride contains is and non-meta bonding results hloride contains low 20°C	4 ²⁻ s a metal and ls usually ja in a high m s covalent b	d a non-metal i of a non-metal i of to form ioni melting and boili onding as it is	O4 ²⁻ 2 n the compo c bonding ng points a liquid at ro	Ni ²⁺ CrO4 ²⁻	ive a
13c	Ni ²⁺ CrO4 ²⁻ Covalent TiCl4 + 4Na	Titaniun • Titaniun boiling p	N 2 n (IV) c Metal Ionic n (IV) c point be	i ²⁺ CrO 2 hloride contains is and non-meta bonding results hloride contains low 20°C	4 ²⁻ s a metal an ls usually ja in a high m s covalent b	d a non-metal i in to form ioni letting and boili onding as it is	O4 ²⁻ 2 n the compo c bonding ng points a liquid at ro	Ni ²⁺ CrO4 ²⁻	ive a
13c 14a 14b(i)	Ni ²⁺ CrO4 ²⁻ Covalent TiCl4 + 4Na ↓	Titaniun • Titaniun boiling p	N 2 n (IV) c Metal Ionic n (IV) c point be	i ²⁺ CrO 2 hloride contains ls and non-meta bonding results hloride contains low 20°C TiCl4	4 ²⁻ s a metal and ls usually jo in a high m s covalent b . + 4N	d a non-metal i in to form ioni aelting and boili onding as it is	O4 ²⁻ 2 n the composite c bonding ng points a liquid at re Ti +	Ni ²⁺ CrO4 ²⁻	ive a
13c 14a 14b(i)	Ni ²⁺ CrO4 ²⁻ Covalent TiCl4 + 4Na ↓ Ti + 4NaCl Sodium is more	Titaniun • Titaniun boiling p	N 2 n (IV) c Metal Ionic n (IV) c point be	i ²⁺ CrO 2 hloride contains s and non-meta bonding results hloride contains low 20°C TiCl4	4 ²⁻ s a metal an ls usually ja in a high m s covalent b . + 4N	d a non-metal is d a non-metal is in to form ioni iselting and boili onding as it is	O4 ²⁻ 2 n the comport c bonding ng points a liquid at re-	Ni ²⁺ CrO4 ²⁻	ive a
13c 14a 14b(i) 14b(ii)	Ni ²⁺ CrO4 ²⁻ Covalent TiCl4 + 4Na ↓ Ti + 4NaCl Sodium is more reactive than	Titaniun Titaniun boiling p	N 2 n (IV) c Metal Ionic n (IV) c point be	i ²⁺ CrO 2 hloride contains is and non-meta bonding results hloride contains low 20°C TiCl4 Jation: T	4 ²⁻ s a metal an ls usually ja in a high m s covalent b + 4N -i ⁴⁺ + 4	d a non-metal i d a non-metal i in to form ioni elting and boili onding as it is Ja Ja 4Na	O4 ²⁻ 2 n the comports a liquid at rest Ti +	Ni ²⁺ CrO4 ²⁻ ound boom temperature so must ha 4NaCl i + 4Na ⁺	ive a
13c 14a 14b(i) 14b(ii)	Ni ²⁺ CrO4 ²⁻ Covalent TiCl4 + 4Na ↓ Ti + 4NaCl Sodium is more reactive than titanium	Titaniun • Titaniun boiling p	N 2 n (IV) c Metal Ionic n (IV) c point be	i ²⁺ CrO 2 hloride contains is and non-meta bonding results hloride contains low 20°C TiCl4 uation: T r up metal di	4 ²⁻ s a metal an ls usually ja in a high m s covalent b . + 4N -i ⁴⁺ + 4 splaces a	d a non-metal i in to form ioni ielting and boili onding as it is Ja 4Na ilower down	O4 ²⁻ 2 n the compace c bonding ng points a liquid at re Ti + Ti + metal fre	Ni ²⁺ CrO4 ²⁻ ound boom temperature so must he 4NaCl i + 4Na ⁺ om its ion	ive a
13c 14a 14b(i) 14b(ii) 15a	Ni ²⁺ CrO4 ²⁻ Covalent TiCl4 + 4Na ↓ Ti + 4NaCl Sodium is more reactive than titanium Higher the distance from surface the higher the	Titaniun • • Titaniun boiling p Reda	N 2 n (IV) cl Metal Ionic n (IV) cl ooint be ox Equ Higher Higher	i ²⁺ CrO. 2 hloride contains ls and non-meta bonding results hloride contains low 20°C TiCl4 uation: T r up metal di ving: Interpr	4 ²⁻ s a metal an ls usually ja in a high m s covalent b . + 4N - j ⁴⁺ + 4 splaces a retation o	li ²⁺ Cr d a non-metal i ond to form ioni aelting and boili onding as it is Ja Ja 4Na i lower down f table of r	O4 ²⁻ 2 n the compo c bonding ng points a liquid at ro Ti + Ti + Ti metal fro esults	Ni ²⁺ CrO4 ²⁻ bound boom temperature so must ho 4NaCl i + 4Na ⁺ bom its ion	ive a
13c 14a 14b(i) 14b(ii) 15a	Ni ²⁺ CrO4 ²⁻ Covalent TiCl4 + 4Na ↓ Ti + 4NaCl Sodium is more reactive than titanium Higher the distance from surface the higher the concentration	Titaniun Titaniun boiling p Redo	N 2 n (IV) cl Metal Ionic n (IV) c point be ox Equ Higher	i ²⁺ CrO 2 hloride contains is and non-meta bonding results hloride contains low 20°C TiCl4 uation: T r up metal di ving: Interpr	4 ²⁻ s a metal an ls usually jc in a high m s covalent b + 4N -i ⁴⁺ + 4 splaces a retation o	li ²⁺ Cr d a non-metal i in to form ioni elting and boili onding as it is Ja Ja ANa lower down f table of r	O4 ²⁻ 2 n the compo c bonding ng points a liquid at ro Ti + Ti + T metal fro esults	Ni ²⁺ CrO4 ²⁻	ive a
13c 14a 14b(i) 14b(ii) 15a	Ni ²⁺ CrO4 ²⁻ Covalent TiCl4 + 4Na ↓ Ti + 4NaCl Sodium is more reactive than titanium Higher the distance from surface the higher the concentration	Titaniun Titaniun boiling p Redo	N 2 n (IV) cl Metal Ionic n (IV) cl point be	i ²⁺ CrO 2 hloride contains is and non-meta bonding results hloride contains low 20°C TiCl4 uation: T r up metal di ving: Interpr Distance	4 ²⁻ s a metal and ls usually ja in a high m s covalent b + 4N - j ⁴⁺ + 4 splaces a retation o 0 11.5	li ²⁺ Cr d a non-metal i in to form ioni ielting and boili onding as it is Ja Ja ANa lower down f table of r	O_4^{2-} 2 n the compact c bonding ng points a liquid at re- Ti + Ti + Ti + Ti + Metal free esults 30 4 46.0 5	Ni ²⁺ CrO4 ²⁻ ound boom temperature so must ha 4NaCl i + 4Na ⁺ om its ion	ive a
13c 14a 14b(i) 14b(ii) 15a 15b	Ni ²⁺ CrO4 ²⁻ Covalent TiCl4 + 4Na ↓ Ti + 4NaCl Sodium is more reactive than titanium Higher the distance from surface the higher the concentration 80.5	Titaniun Titaniun boiling p Reda	N 2 n (IV) cl Metal Ionic n (IV) cl ooint be ox Equ Higher Higher	i ²⁺ CrO. 2 hloride contains is and non-meta bonding results hloride contains low 20°C TiCl4 uation: T r up metal di ving: Interpr Distance oncentration difference	$4^{2-} N$ is a metal an a metal and is usually ja in a high m s covalent b $+ 4N$ if $4^+ + 4$ splaces a retation o 0 11.5 2 11.5 2	d a non-metal i d a non-metal i in to form ioni aelting and boili onding as it is Ja Ja Ja Ja Ja Ja Ja Ja Ja Ja Ja Ja Ja	O_4^{2-} 2 n the composite c bonding ng points a liquid at re- Ti + Ti + To metal free esults 30 4 46.0 5 5 11.5	Ni ²⁺ CrO4 ²⁻ bound boom temperature so must have 4NaCl $i + 4Na^+$ bom its ion 40 50 60 7.5 - (11 5) (11 5)	ive a
13c 14a 14b(i) 14b(ii) 15a 15b	Ni ²⁺ CrO4 ²⁻ Covalent TiCl4 + 4Na i Ti + 4NaCl Sodium is more reactive than titanium Higher the distance from surface the higher the concentration 80.5	Titaniun • Titaniun boiling p Redo	N 2 n (IV) c Metal Ionic n (IV) c point be ox Equ Higher Higher	i ²⁺ CrO. 2 hloride contains is and non-meta bonding results hloride contains low 20°C TiCl4 Lation: T r up metal di ving: Interpr Distance incentration difference Estimate	$4^{2-} \mathbf{N} $ is a metal and	Ii ²⁺ Cr d a non-metal i in to form ioni ielting and boili onding as it is Ja Ja Ja Ja Ja Ja Ja Ja Ja Ja Ja Ja Ja	O_4^{2-} 2 n the composite c bonding ng points a liquid at re- Ti + Ti + Ti + To metal free esults 30 46.0 5 5 11.5 -	Ni ²⁺ CrO4 ²⁻ ound boom temperature so must have 4NaCl $i + 4Na^+$ tom its ion 40 50 60 7.5 - (11.5) (11.5) - 69 80.5	ive a
13c 14a 14b(i) 14b(ii) 15a 15b	Ni ²⁺ CrO4 ²⁻ Covalent TiCl4 + 4Na i Ti + 4NaCl Sodium is more reactive than titanium Higher the distance from surface the higher the concentration 80.5 Protons	Titaniun Titaniun boiling p Redo Proble	N 2 n (IV) c Metal Ionic n (IV) c coint be ox Equ Higher Higher Co Co	i ²⁺ CrO 2 hloride contains is and non-meta bonding results hloride contains low 20°C TiCl4 uation: T r up metal di ving: Interpr Distance oncentration difference Estimate nd is a shared	$4^{2-} N$ is a metal and is usually ja in a high m s covalent b is cov	is to form ioni in to form ioni ielting and boili onding as it is Ja Ja Ja Ja Ja Ja Ja Ja Ja Ja Ja Ja Ja	O_4^{2-} 2 n the composite c bonding ng points a liquid at re- Ti + Ti + Ti + To metal free sults 30 4 46.0 5 5 11.5 - een two at	Ni ²⁺ CrO4 ²⁻ pund point temperature so must he 4NaCl i + 4Na⁺ pom its ion 40 50 60 7.5 - (11.5) (11.5) - 69 80.5 roms. The electrostatic	ive a
13c 14a 14b(i) 14b(ii) 15a 15b 15c	Ni ²⁺ CrO ₄ ²⁻ Covalent TiCl ₄ + 4Na ↓ Ti + 4NaCl Sodium is more reactive than titanium Higher the distance from surface the higher the concentration 80.5 Protons Flectrons	Titaniun Titaniun boiling p Reda Proble	N 2 n (IV) cl Metal Ionic n (IV) cl ooint be ox Equ Highen Highen Km Solv Co cl lent bol tion be	i ²⁺ CrO. 2 hloride contains is and non-meta bonding results hloride contains low 20°C TiCl4 uation: T r up metal di ving: Interpr Distance oncentration difference Estimate nd is a shared tween the neg	$4^{2-} N $ is a metal and is usually ja in a high m s covalent b $+ 4N$ if $4^{+} + 4$ splaces a retation o 0 11.5 2 11.5 - 12 11.5 - 12 11.5 - 12 12 12 12 12 12 12 12 12 12	li ²⁺ Cr d a non-metal i in to form ioni ielting and boili onding as it is Ja 4Na lower down f table of r 10 20 3.0 34.5 11.5 11 ectrons betw trons and the	O_4^{2-} 2 n the comparison n the comparis	Ni ²⁺ CrO4 ²⁻ bound boom temperature so must he ANaCl i + ANa ⁺ bom its ion 40 50 60 7.5 - (11.5) (11.5) - $69 80.5froms. The electrostaticnuclei holds the covalent$	ive a
13c 14a 14b(i) 14b(ii) 15a 15b 15c	Ni ²⁺ CrO ₄ ²⁻ Covalent TiCl4 + 4Na i Ti + 4NaCl Sodium is more reactive than titanium Higher the distance from surface the higher the concentration 80.5 Protons Electrons	Titaniun boiling p Reda Proble	N 2 n (IV) cl Metal Ionic n (IV) c coint be cox Equ Higher Higher Co c c lent boo tion be er ur is c	i ²⁺ CrO. 2 hloride contains is and non-meta bonding results hloride contains low 20°C TiCl4 Lation: T r up metal di ving: Interpr Distance incentration difference Estimate nd is a shared tween the neg	4^{2-} N is a metal and is usually jc in a high m is covalent b + 4N $-i^{4+} + 4$ splaces a retation o 0 11.5 2 11.5 - 11.5 - 12 pair of el ative elec metal elec	Ii ²⁺ Cr d a non-metal i in to form ioni elting and boili onding as it is Ja Ja 4Na a lower down f table of r 10 20 3.0 34.5 11.5 11 ectrons betw trons and the ement and fer	O_4^{2-} 2 n the composite c bonding ng points a liquid at re- Ti + Ti + Ti + To metal fre- esults 30 46.0 5 5 11.5 - re- re- positive n positive n positive n	Ni ²⁺ CrO4 ²⁻ ound boom temperature so must have 4NaCl $i + 4Na^+$ om its ion 40 50 60 7.5 - (11.5) (11.5) - 69 80.5 roms. The electrostatic inclei holds the covalent formula to the coval	ive a



		1 mol Pb5 = (1x207) + (1x32) = 207 + 32 = 239g							
16a(ii)	86.6%	$%Pb = \frac{\text{mass of Pb}}{\text{mass of PbS}} = \frac{207}{239} \times 100 = 86.6\%$							
16b(i)	Iron	Iron is made from iron ore in a blast furnace: $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$							
		Method Metals Made This Way Reason							
	Mercury	Electrolysis Potassium Sodium Lithium Calcium Magnesium Aluminium most reactive metals							
16b(ii)	Aluminium	Heat With Carbon Zinc Iron Tin Lead Copper medium reactive metals							
	Copper	Mercury Silver Heat Alone Gold Platinum							
		$Fe(s) + 2Ag^{\dagger}(aq) + 2NO_{3}^{-}(aq) \longrightarrow Fe^{2+}(aq) + 2Ag(s) + 2NO_{3}^{-}(aq)$							
		Cancel out any spectator ions which appear on both sides							
1/a		$Fe(s) + 2Ag^{*}(aq) + 2NO_{3}^{*}(aq) \rightarrow Fe^{2*}(aq) + 2Ag(s) + 2NO_{3}^{*}(aq)$							
	circled on both sides	Fe(s) + 2Aq ⁺ (aq) \rightarrow Fe ²⁺ (aq) + 2Aq(s)							
	Ferroxyl indicator	turns blue in presence of Ee^{2+} ions							
17b	turns blue with Fe ²⁺	Ferroxyl Indicator turns pink in presence of OH- ions							
		$Fe(s) + 2Ag^{+}(aq) \rightarrow Fe^{2+}(aq) + 2Ag(s) \qquad redox$							
17c	Ag⁺+e⁻→Ag	Fe(s) \rightarrow Fe ²⁺ (aq) + 2e ⁻ oxidation							
		$2e^{-} + 2Ag^{\dagger}(aq) \rightarrow 2Ag(s) \text{ reduction}$							
	iron silver	 Iron is higher up electrochemical series than silver (p) data bookiet) Iron electrode must be on left as electrons flow from left to right 							
17d	athree a	Silver electrode must be on right as electrons flow from left to right Silver electrode must be characteristic electrons flow from left to right							
	nitrate	 1st line of question states silver nitrate is used 							
18a	ethoxypropane	Carbon fragment to left of Oxygen atom = 2 carbons ∴ethoxy- Carbon fragment to right of Oxygen atom = 3 carbons ∴-propane							
		$Gfm: CH_3CH_2OCH_2CH_3 = (4\times12) + (10\times1) + (1\times16) = 48 + 10 + 16 = 74g$							
		Alkane Methane Ethane Propane Butane Pentane Hexane Heptane Octane							
18b	36°C	Formula CH4 C2H6 C3H8 C4H10 C5H12 C6H14 C7H16 C8H18							
		gfm 16g 30g 44g 58g 72g 86g 100g 114g							
10 -	2E 0 3	$ B_0 B_0 B_0 B_0 B_0 B_0 B_0 B_0 $							
190	25.0cm°	The rough fitte is never used to calculate the average volume							
		$HCI + NaOH \rightarrow H_2O + NaCI$							
19b	0.25mol/l	1mol 1mol 0.0025mol 0.0025mol							
		n o. of mol 0.0025mol							
		concentration = volume = 0.01 litres = 0.25 mol l ⁻¹							
		Н НН НН НН НН							
20a(i)	Propanal	$ H - \dot{c} - OH H - \dot{c} - \dot{c} - OH H - \dot{c} - \dot{c} - OH H - \dot{c} - \dot{c} - \dot{c} - OH H - \dot{c} - \dot{c} - \dot{c} - OH H - \dot{c} - \dot{c} - \dot{c} - OH H - \dot{c} - \dot{c} - \dot{c} - \dot{c} - OH H - \dot{c} - \dot{c} - \dot{c} - \dot{c} - OH H - \dot{c} - \dot{c} - \dot{c} - \dot{c} - OH H - \dot{c} - \dot{c} - \dot{c} - \dot{c} - \dot{c} - OH H - \dot{c} - \dot{c} - \dot{c} - \dot{c} - OH H - \dot{c} - \dot{c} - \dot{c} - \dot{c} - \dot{c} - OH H - \dot{c} - OH H - \dot{c} - \dot$							
200(1)	riopanoi	н нн ннн нннн							
		methanol ethanol propanol butanol							
		ŀŀŀŀ ŀŀ							
20a(ii)	One from:	H-C-C-H or H-C-C-O-C-H							
		Нонй Нійій							
20h	carbon dioxide	Alkanols burn to in a plentiful supply of air to form carbon dioxide and water:							
200	& water	$2C_{3}H_{7}OH + 9O_{2} \longrightarrow 6CO_{2} + 8H_{2}O$							

