

## **Past Papers Standard Grade** Chemistry **Marking Scheme**

2004	K	U	PS		
Credit	/30	%	/30	%	
1	21+	70%	22+	73%	
2	15+	50%	15+	50%	
See General Paper	<15	<50%	<15	<50%	

	2004	S	tandar	d Gr	rade	e Che	emi	istr	'Y	Cred	it	Marking	g Sc	herr	ie		
Question	Answer		Chemistry Covered														
1a	В	Η	High Energy sparked needed to break N≡N bond: N₂ + 2O₂ → 2NO₂														
1b	A+E Both for 1 mark		Hydrogen in hydrocarbons burns to form H2O Carbon in hydrocarbons burns to form CO2 (or CO in limited air supply)														
			Answe	•		A		B		C		D	E		F		
2	0		Chemi		cyclo	butane	cyclo	pentar	ne	butane	2	propane	etho		butene		
2a	В		Boiling Poi	nt (°C)		13		49		-1		-42	-8	9	-6		
			State at	25°C	ç	gas	li	iquid		gas		gas	ga	เร	gas		
			Answe	er		Α		В		С		D	E		F		
2b	A+F		Chemi	cal	cyclo	butane	cyclo	opentar	ne	butane	2	propane	etho	ane	butene		
	Both for 1 mark		Formu	ıla	C	4 <b>H</b> 8	С	5 <b>H</b> 10		$C_4H_{10}$	)	C₃H8	C2	-16	C₄H <sub>8</sub>		
			Answe	er		A		В		С		D	E		F		
			Chemi		cyclo	butane	cyclo	pentar	ne	butane	2	propane	etho	-	butene		
2c	F		Homologous	Series		balkane		oalkan		alkane		alkane	alka	ane	alkene		
-			Reaction			no		no		no		no	no	D	decolourises		
			Bromine S	olution	rec	action	re	action		reactio	n	reaction	reac	tion	quickly		
		Bo	uses neut	tralise	e aci	ds.											
За	С		Bases includ	- T		hydro (alkalis)	oxid	es		meta	l ox	ides	meto	al car	bonates		
3b	<b>A+C</b> Both for 1 mark	ma	agnesium br soluble	omide	+ lith	ium hydi soluble		le —		→ mag	-	ium hydroxid insoluble	le +		n bromide Duble		
						te down mulae				vn Reverse Over Rule	1 -	ollow arrows to	get for	mula			
3c	A			X		XY <sub>2</sub>		X 2			Valency of X=2 Metal X = magnesium Valency of Y=1 Non-Metal = bromine						
			Experin	nents		Same	2			Same		Same	,	Di	fferent		
4a	C+D Both for 1 mark		C+		Te	empera (20°C)	ture			ze			Conc	entration or 2 mol/l)			
					Experi	nent		Highes	st		S	mallest		Most Rea	ctive	F	lighest
4b	F F				Ta	empera		, P		ticle Siz		Meta			entration		
	•		F			(30°C)				Powder)		(Magnesiu			2 mol/l)		
						(32.9)											
5a	A+E		Answer	A			B			С		D	- <sup>1</sup>	E	F		
Ju	Both for 1 mark		Bonding Type	Ion	ic		/alent ecular		Me	tallic		Covalent Network	Io	nic	Metallic		
5b	D		Reasoning	Ionic as it conduct ion state bu conduct in t stat	the solid t does the liquid	le solid loes		uid. d neans	conducts in both solid and liquid Hig		؛ High r	solid or liquid. n melting point means covalent network		t does not on the solid out does n the liquid ate,	Metallic as conducts in both solid and liquid states.		
	C+D		<u> </u>			Same a	tomi	c numl	ber	but	diff	erent mass n			<u></u>		
6a	C+D Both for 1 mark			Isot	opes							erent number		itrons	]		
		Ar	gon has ele	ctron a	rrange	ement of	f 2,8	,8									
			Ansı			Α		В		С		D		E	F		
6b	A+F		Electron Ar	-	nt	sulphur	m	agnesi		potass		potassium		cium	chlorine		
00 .	Both for 1 mark		of Ele			2,8,6		2,8,2		2,8,8	3,1	2,8,8,1	2,8	,8,2	2,8,7		
			Electron Ar	-	nt	5 <sup>2-</sup>		Mg <sup>2+</sup>							Cl⁻		
			of I	.011		2,8,8		2,8							2,8,8		



			Particle	Location	Charge	Mass			
7	7 B,C 1 mark each		Proton	in nucleus	+1	1 amu			
/			Neutron	in nucleus	0	1 amu			
			Electron	outside nucleus	-1	approx zero			
		⊠A Glucose join tog	ether with	H2O removed to t	form star	ch by condense	ation polymerisation		
		⊠B Starch is forme	d by glucos	e molecules joinin	g togethe	r by condensat	tion polymerisation		
	A,F	🗷 C Sucrose does not react with warm Benedict's solution (glucose, fructose and maltose do)							
8	1 mark each	■D Glucose ( $C_6H_{12}O_6$ ) has a different formula to sucrose ( $C_{12}H_{22}O_{11}$ ) $\therefore$ not an isomer							
		🗷 E Starch is insoluble in water due to its long chain length							
		☑F Sucrose is hydro	lysed (brol	ken down) into a g	lucose mo	lecule and a fr	uctose molecule		
		🗷 A Nickel Ni <sup>2+</sup> ions are positively charged and move towards the negative electrode							
		⊠B nickel ions form	ed and bred	k off the nickel e	electrode	∴ nickel electi	rode loses mass		
9	B,D	■C This process is called nickel plating. Galvanising is coating steel in zinc.							
	1 mark each	☑D Nickel/positive electrode has nickel atoms losing electrons ∴ oxidation occurs							
		■E Electrons travel							



Question	Answer	Chemistry Covered
10a	H H C=C - C - C	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
10b	hydrogen cyanide or carbon monoxide	Polyacrylonitrile burns forming HCN gas Plastics burn in limited supplies of air to form CO
11a	Mixture of metals	Alloys are mixtures of metals (can have some non-metals too)
11b(i)	0.287g	5% of 5.74g = $\frac{5}{100}$ × 5.74g = 0.287g
11b(ii)	0.0106 mol	1mol Al = 27g no. of mol = $\frac{mass}{gfm}$ = $\frac{0.287g}{27g mol^{-1}}$ = 0.0106mol
12a	gas produced escapes from flask	carbon dioxide gas produced will escape from flask which make the mass inside flask lighter
12b	line graph question	$\frac{1}{2} \text{ mark - both labels with units} \qquad \frac{1}{2} \text{ mark - both scales}$ $\frac{1}{2} \text{ mark - points plotted correctly} \qquad \frac{1}{2} \text{ mark - points joined}$
12c	0.8g	Hydrochloric acid is in excess marble chips chemically run out Same mass of marble chips in flask same mass of gas escapes
12d	calcium chloride	metal carbonate + acid> salt + water + carbon dioxide calcium + hydrochloric> calcium carbonate + acid> calcium + water + carbon dioxide
13a	Answer to include:	2 electrons form a shared pair between atoms. Atoms must be set distance apart for electrons to form a stable pair instead of remaining as two unpaired electrons
13b(i)	H H • N • H	Nitrogen has 5 outer electrons (1 pairs and 3 unpaired) Hydrogen has 1 unpaired electron 3 hydrogen atoms, each with a unpaired electron, pair up with the 3 unpaired electrons of an nitrogen to form a NH3 molecule
13b(ii)	H H	Ammonia NH3 forms a trigonal pyramidal molecule
14a(i)	H   H— C=O	Compound must have C=O bond and two C-H bonds if carbon is to have 4 bonds
14a(ii)	removing hydrogen	Reaction: CH4O becomes CH2O - loses 2H atoms
14b	carbon monoxide	Reaction: CH4O becomes C2H4O2 - gains 1xC and 1xO



15α	arrow pointing from iron (left) to carbon (right) through wires	Electrons always travel through wires in cells (not through the solution) Oxidation Reaction at Iron Nail: $Fe(s) \rightarrow Fe^{2+}(aq) + 2e^{-}$ $Fe^{2+}$ ions produced detected by ferroxyl indicator turning blue Electrons produced by this reaction travel through wires to carbon electrode to perform reduction reaction							
15b	pink colour formed	ferroxyl indicator turns pink in the presence of OH <sup>-</sup> ions							
16a	The breaking up a compound using electricity	Electrolysis splits up an ionic compound in the molten or solution states as the ions are free to move to the oppositely charged electrode where oxidation/reduction takes place to produce the elements in the ionic compound							
16b	Aluminium too reactive for reaction to occur.	Aluminium is too high up electrochemical/reactivity series for carbon to remove oxygen from $Al_2O_3$ .							
16c	$2Cl^{-} \longrightarrow Cl_2 + 2e^{-}$	reverse of equation on p10 of data booklet							
16d	Iron rusts sacrificially to protect tin	Iron is higher up electrochemical/reactivity series than tin. Iron corrodes/rusts and electrons are lost from the iron and are transferred to tin to protect tin from corrosion							
17a	Na⁺HCO₃⁻	Write down Valency below each ion's symbolPut in Cross-over ArrowsFollow arrows and cancel down to get formulaNaHCO3^-NaHCO3^-NaHCO3^-1111NaHCO3^-Work out charges on ions. If more than one of ion put ion in brackets and number outside							
17b(i)	3Ag₂S + 2Al ↓ 6Ag + Al₂S₃	$3Ag_2S + 2AI \rightarrow 6Ag + Al_2S_3$							
17b(ii)	displacement or redox	Displacement: Higher up metal displaces a lower down metal from its ion Redox: Al loses electrons and Ag <sup>+</sup> ion gains electrons							
17c	36%	$gfm Al_2S_3 = (2\times27) + (3\times32) = 54 + 96 = 150g$ $%C = \frac{mass of Al}{gfm} \times 100 = \frac{54}{150} \times 100 = 36\%$							
18a	ammonia dissolves in water	ammonia is soluble in water and forms ammonium hydroxide solution: $\begin{array}{c} NH_{3}(g) + H_{2}O(l) \longrightarrow NH_{4}OH(aq) \\ & \text{ammonia molecule} \\ As ammonia gas dissolves in the water in test tube, the decrease in pressure \\ moves water level up test tube to equalise pressure. \end{array}$							
18b	Above 7	Ammonium hydroxide solution produced so an alkaline pH (above 7) is formed in the water							
19a	gas	Problem solving question in interpreting graph data							
19b	-5°C	Problem solving question in interpreting graph data							
20a	Family of compounds with similar chemical properties and a general formula	alkanes, alkenes, cycloalkanes, alcohols and carboxylic acid are all different homologous series with similar chemical properties and a general formula.							



		Name	buta-1,3-diene	penta-1,3-diene	hexa-1,3-diene				
		Structure	$ \begin{array}{cccc} H & H & H \\                            $	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				
20b	CnH2n-2	Formula	C4H6	C₅H <sub>8</sub>	C <sub>6</sub> H <sub>10</sub>				
		Relationship	If n=4, 2n-2=6	If n=5, 2n-2=8	If n=6, 2n-2=10				
		General Formula	$C_nH_{2n-2}$	C <sub>n</sub> H <sub>2n-2</sub>	C <sub>n</sub> H <sub>2n-2</sub>				
20c	$C_5H_8Br_4$	Bromine Br <sub>2</sub> add across a C=C double bond. There are two double bonds in $C_5H_8$ so 2Br <sub>2</sub> molecules (and therefore 4Br atoms) adds to the molecule to form $C_5H_8Br_4$ .							
20d		A double bond saves two hydrogens in the formula. A cyclo- ring saves two hydrogens in the formula.							
21a	colour change in flask	Indicator in flask is designed to shown the end point of a chemical reaction accurately.							
21b(i)	20.6cm <sup>3</sup>	1 <sup>st</sup> titre (rough titre) is not used when calculating average volume. Average titre = $\frac{20.7 + 20.5}{2} = \frac{41.2}{2} = 20.6$ cm <sup>3</sup>							
21b(ii)	0.00412 mol	<b>n</b> o. of mol	= volume x cond = 0.0206litres x 0. = 0.00412 mol						
21b(iii)	0.00824 mol	H2SO4 1mol 0.00412	+ 2KOH - 2mol mol 0.00824mol	→ K <sub>2</sub> SO <sub>4</sub>	+ 2H <sub>2</sub> O				

