



JABchem



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Past Papers

Standard Grade

Credit

Chemistry

2004

Marking Scheme

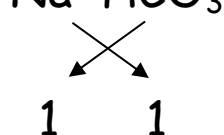
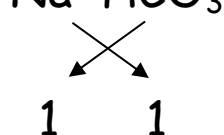
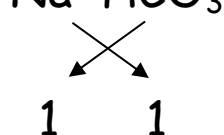
2004 Credit	KU		PS	
	/30	%	/30	%
1	21+	70%	22+	73%
2	15+	50%	15+	50%
See General Paper	<15	<50%	<15	<50%

7	B,C 1 mark each		Particle	Location	Charge	Mass
			Proton	in nucleus	+1	1 amu
			Neutron	in nucleus	0	1 amu
			Electron	outside nucleus	-1	approx zero
8	A,F 1 mark each	<input checked="" type="checkbox"/> A Glucose join together with H ₂ O removed to form starch by condensation polymerisation <input checked="" type="checkbox"/> B Starch is formed by glucose molecules joining together by condensation polymerisation <input checked="" type="checkbox"/> C Sucrose does not react with warm Benedict's solution (glucose, fructose and maltose do) <input checked="" type="checkbox"/> D Glucose (C ₆ H ₁₂ O ₆) has a different formula to sucrose (C ₁₂ H ₂₂ O ₁₁) ∴ not an isomer <input checked="" type="checkbox"/> E Starch is insoluble in water due to its long chain length <input checked="" type="checkbox"/> F Sucrose is hydrolysed (broken down) into a glucose molecule and a fructose molecule				
9	B,D 1 mark each	<input checked="" type="checkbox"/> A Nickel Ni ²⁺ ions are positively charged and move towards the negative electrode <input checked="" type="checkbox"/> B nickel ions formed and break off the nickel electrode ∴ nickel electrode loses mass <input checked="" type="checkbox"/> C This process is called nickel plating. Galvanising is coating steel in zinc. <input checked="" type="checkbox"/> D Nickel/positive electrode has nickel atoms losing electrons ∴ oxidation occurs <input checked="" type="checkbox"/> E Electrons travel through wires and ions travel through solution				



Question	Answer	Chemistry Covered
10a	<pre> H H C = C CN H </pre>	<pre> H H H H H H H H H H C = C + C = C + C = C → — C — C — C — C — C — C — CN H CN H CN H CN H CN H CN H acrylonitrile poly(acrylonitrile) </pre>
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	$5\% \text{ of } 5.74\text{g} = \frac{5}{100} \times 5.74\text{g} = 0.287\text{g}$
11b(ii)	0.0106 mol	1mol Al = 27g $\text{no. of mol} = \frac{\text{mass}}{\text{gfm}} = \frac{0.287\text{g}}{27\text{g mol}^{-1}} = 0.0106\text{mol}$
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	$\frac{1}{2}$ mark - both labels with units $\frac{1}{2}$ mark - both scales $\frac{1}{2}$ mark - points plotted correctly $\frac{1}{2}$ mark - points joined
12c	0.8g	Hydrochloric acid is in excess \therefore marble chips chemically run out Same mass of marble chips in flask \therefore same mass of gas escapes
12d	calcium chloride	<pre> metal carbonate + acid → salt + water + carbon dioxide calcium carbonate + hydrochloric acid → calcium chloride + water + carbon dioxide </pre>
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)	<pre> H •• •• H •• N •• •• H </pre>	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 NH ₃ molecule
13b(ii)	<pre> •• •• •• •• H — N — H H </pre>	Ammonia NH ₃ forms a trigonal pyramidal molecule
14a(i)	<pre> H H — C = O </pre>	Compound must have C=O bond and two C-H bonds if carbon is to have 4 bonds
14a(ii)	removing hydrogen	Reaction: CH ₄ O becomes CH ₂ O - loses 2H atoms
14b	carbon monoxide	Reaction: CH ₄ O becomes C ₂ H ₄ O ₂ - gains 1xC and 1xO



15a	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: $\text{Fe(s)} \rightarrow \text{Fe}^{2+}(\text{aq}) + 2\text{e}^-$ 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	ferroxy indicator turns pink in the presence of OH^- 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	$2\text{Cl}^- \longrightarrow \text{Cl}_2 + 2\text{e}^-$	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	$\text{Na}^+\text{HCO}_3^-$	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center;"> Write down Valency below each ion's symbol $\text{Na} \quad \text{HCO}_3^-$ $1 \quad 1$ </td> <td style="width: 33%; text-align: center;"> Put in Cross-over Arrows $\text{Na} \quad \text{HCO}_3^-$  </td> <td style="width: 33%; text-align: center;"> Follow arrows and cancel down to get formula NaHCO_3 Work out charges on ions. If more than one of ion put ion in brackets and number outside $\text{Na}^+\text{HCO}_3^-$ </td> </tr> </table>	Write down Valency below each ion's symbol $\text{Na} \quad \text{HCO}_3^-$ $1 \quad 1$	Put in Cross-over Arrows $\text{Na} \quad \text{HCO}_3^-$ 	Follow arrows and cancel down to get formula NaHCO_3 Work out charges on ions. If more than one of ion put ion in brackets and number outside $\text{Na}^+\text{HCO}_3^-$
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17b(i)	$3\text{Ag}_2\text{S} + 2\text{Al}$ ↓ $6\text{Ag} + \text{Al}_2\text{S}_3$	$3\text{Ag}_2\text{S} + 2\text{Al} \longrightarrow 6\text{Ag} + \text{Al}_2\text{S}_3$			
17b(ii)	displacement or redox	Displacement: Higher up metal displaces a lower down metal from its ion Redox: Al loses electrons and Ag^+ ion gains electrons			
17c	36%	gfm $\text{Al}_2\text{S}_3 = (2 \times 27) + (3 \times 32) = 54 + 96 = 150\text{g}$ $\%C = \frac{\text{mass of Al}}{\text{gfm}} \times 100 = \frac{54}{150} \times 100 = 36\%$			
18a	ammonia dissolves in water	ammonia is soluble in water and forms ammonium hydroxide solution: $\text{NH}_3(\text{g}) + \text{H}_2\text{O}(\text{l}) \longrightarrow \text{NH}_4\text{OH}(\text{aq})$ <small>ammonia molecule water molecule ammonium hydroxide solution</small> As ammonia gas dissolves in the water in test tube, the decrease in pressure moves water level up test tube to equalise pressure.			
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.			



20b	C_nH_{2n-2}	Name	buta-1,3-diene	penta-1,3-diene	hexa-1,3-diene
		Structure			
		Formula	C_4H_6	C_5H_8	C_6H_{10}
		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_nH_{2n-2}	C_nH_{2n-2}
20c	$C_5H_8Br_4$	Bromine Br_2 add across a $C=C$ double bond. There are two double bonds in C_5H_8 so $2Br_2$ 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- saving 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^3	1 st titre (rough titre) is not used when calculating average volume. Average titre = $\frac{20.7 + 20.5}{2} = \frac{41.2}{2} = 20.6\text{cm}^3$			
21b(ii)	0.00412 mol	no. of mol = volume x concentration = 0.0206litres x 0.20 mol/l = 0.00412 mol			
21b(iii)	0.00824 mol	$\begin{array}{ccccccc} H_2SO_4 & + & 2KOH & \longrightarrow & K_2SO_4 & + & 2H_2O \\ 1\text{mol} & & 2\text{mol} & & & & \\ 0.00412\text{ mol} & & 0.00824\text{mol} & & & & \end{array}$			

