OCR GCSE GATEWAY CHEMISTRY A · J248

CHEMISTRY



MARK SCHEME

C4.2 IDENTIFYING THE PRODUCTS OF CHEMICAL REACTIONS

SCORE	PERCENTAGE
/63	%

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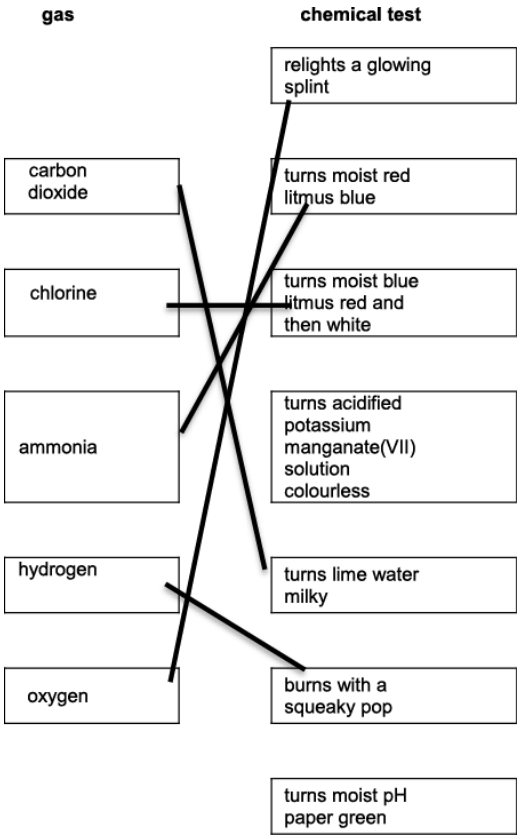
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Question			Answer/Indicative content	Marks	Guidance
1			A	1	
			Total	**1**	
2			C	1	
			Total	**1**	
3	a			5	**Each link** = 1 mark
	b		Use a flame test wire (1) Moisten wire and dip into sample (1) Introduce sample into blue flame of Bunsen burner (1)	3	**ALLOW** use a wooden splint **ALLOW** spray bottle **ALLOW** moisten wooden splint and dip into sample **ALLOW** have ions dissolved in the spray bottle

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Question			Answer/Indicative content	Marks	Guidance
	c		Hydrogen, chloride and sulfate are present (1) Hydrogen ions because pH is 3 (1) Sulfate because white precipitate with barium chloride (1) Chloride because white precipitate with silver nitrate (1)	4	**ALLOW** H^+, Cl^- and SO_4^{2-} **ALLOW** (1) for the three correct ions **ALLOW**(1) for each correct explanation (must be linked to correct ion)
			Total	**12**	

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Question			Answer/Indicative content	Marks	Guidance
4			C	1	
			Total	**1**	
5			Copper(II) ions – add aqueous sodium hydroxide (1) Gives a blue precipitate (1) Bromide ion – add aqueous silver nitrate followed by dilute nitric acid (1) Gives a cream precipitate (1)	4	**ALLOW** any soluble metal hydroxide / aqueous ammonia **ALLOW** blue solid / blue solid that redissolves into dark blue solution if ammonia is used
			Total	**4**	

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Question			Answer/Indicative content	Marks	Guidance
6			[Level 3] Identifies compounds A and B, with explanations AND constructs the word equation Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) [Level 2] Identifies either compound A or B, or the elements or ions present in either A or B AND constructs the word equation OR Identifies both compounds A and B, or the elements or ions present in both A or B, with explanations Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) [Level 1] Identifies one element or ion present in either A or B OR constructs the word equation Quality of written communication impedes communication of the science at this level. (1 – 2 marks) [Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	This question is targeted at grades up to C Indicative scientific points may include: Word equation potassium chloride + silver nitrate ? silver chloride + potassium nitrate allow correct formulae or mix of words and formulae allow $KCl + AgNO_3$? $AgCl + KNO_3$ Compound A • compound A contains sodium (ions) • compound A contains chloride (ions) • compound A is sodium chloride Reasons • because sodium gives a yellow flame test colour • because chloride ions give a white ppt with silver nitrate Compound B • compound B contains iron(II) (ions) • compound B contains bromide (ions) • compound B is iron(II) bromide Reasons • iron(II) (ions) give a green ppt with sodium hydroxide • bromide (ions) give a cream ppt with silver nitrate allow solid instead of ppt Use the L1, L2, L3 annotations in RM Assessor; do not use ticks. Examiner's Comments This 6 mark question was targeted up to grade C. To gain credit at level 3 (5 – 6 marks) candidates needed to write the

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Question			Answer/Indicative content	Marks	Guidance
					word equation for the reaction and to identify compounds A and B with explanations. Most candidates were unable to interpret the results to identify compounds A and B and only gained credit at Level 1 for the word equation.
			Total	6	
7		i	4 (1)	1	
		ii	lime water / calcium hydroxide (solution) (1) (limewater) turns milky / cloudy / chalky / forms white precipitate / forms white solid (1)	2	result mark cannot be awarded if reagent is incorrect **allow** $Ca(OH)_2$ (1) **allow** goes foggy or misty or creamy (1) **allow** bicarbonate indicator (1) changes from red to yellow (1) Examiner's Comments About half of candidates correctly quoted 4 in part (i). 5 was the most common incorrect answer. About a quarter of candidates could recall the test for carbon dioxide in part (ii). There were a number of 'squeaky pop tests' quoted or candidates talking about 'cakes rising', which did not score.
			Total	3	

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Question			Answer/Indicative content	Marks	Guidance
8			Pete is right about **A** but wrong about **B** (no mark) **A** contains copper (ions) because it gives a blue (ppt) with sodium hydroxide (1) **A** contains sulfate (ions) because it gives a white (ppt) with barium chloride (1) **B** contains iron(III) (ions) because it gives a brown (ppt) with sodium hydroxide (1) **B** does **not** contain sulfate (ions) as it does **not** give a white (ppt) with barium chloride (1)	4	**allow** Pete is wrong **not** Pete is wrong about **A** for marks about **A** **not** Peter is correct for **B** for marks about **B** copper sulfate goes blue with sodium hydroxide is **not** sufficient copper sulfate goes white with barium chloride is **not** sufficient iron(III) sulfate goes brown with sodium hydroxide is not sufficient **B** is not iron(III) sulfate because it does not go white with barium chloride is not sufficient **allow B** does not contain sulfate as it does not give a ppt **allow A** and **B** both cannot be sulfates since they do not both go white with barium chloride (2) Examiner's Comments This question was common with the higher tier paper and was poorly answered. Most candidates had little knowledge or understanding of analytical tests and could not relate the colour of the precipitates formed on the addition of sodium hydroxide to the ions present. A common answer was to state that Pete was wrong because copper sulfate would give a brown precipitate with sodium hydroxide solution.
			Total	4	

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Question			Answer/Indicative content	Marks	Guidance
9			Pete is right about **A** but wrong about **B** (no mark) **A** contains copper (ions) because it gives a blue (ppt) with sodium hydroxide (1) **A** contains sulfate (ions) because it gives a white (ppt) with barium chloride (1) **B** contains iron(III) (ions) because it gives a brown (ppt) with sodium hydroxide (1) **B** does **not** contain sulfate (ions) as it does **not** give a white (ppt) with barium chloride (1)	4	**allow** Pete is wrong **not** Pete is wrong about **A** for marks about **A** **not** Peter is correct for **B** for marks about **B** copper sulfate goes blue with sodium hydroxide is **not** sufficient copper sulfate goes white with barium chloride is **not** sufficient iron(III) sulfate goes brown with sodium hydroxide is not sufficient **B** is not iron(III) sulfate because it does not go white with barium chloride is not sufficient **allow B** does not contain sulfate as it does not give a ppt **allow A** and **B** both cannot be sulfates since they do not both go white with barium chloride (2) ?Examiner's Comments?? Candidates found this question very challenging and often they just repeated the information in the table without making any real evaluation of the data. Candidates had to decide if the two statements about **A** and **B** were correct and then justify this answer in terms of the results. Candidates had to mention the reagent, the result and the ion that was being tested in order to score a mark. As an example many candidates just stated that **A** was copper sulfate because it gave a white precipitate with barium chloride and a blue precipitate with sodium hydroxide but failed to state that the blue precipitate was due to presence of copper ions and the white precipitate as a result of sulfate ions being present.

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Question			Answer/Indicative content	Marks	Guidance
			Total	4	
10			D (1)	3	If any other letter given = 0 marks If no letter given maximum of two marks
			contains a sulfate because of white precipitate with barium chloride (1)		allow barium chloride is a test for sulfate
			contains a chloride because of white precipitate with silver nitrate (1)		allow silver nitrate is a test for chloride
					allow for one mark contains a sulfate and a chloride / forms a precipitate with barium chloride and silver nitrate Examiner's Comments This question focused on the analysis of an aqueous solution and was the most demanding question in Section A. Many candidates could not recall the significance of using barium chloride and silver nitrate solution in terms of identifying the sulfate and the chloride ion. Although some candidates chose D as the mixture the explanations given were often based on restating the information in the stem rather than explaining its significance. The very best answers used the tests to state that the mixture contained iron(II) ions, chloride ions and sulfate ions and so it must be a mixture.
			Total	3	

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Question			Answer/Indicative content	Marks	Guidance
11			$2Cu + O_2$? 2CuO formulae (1) balancing (1)	2	balancing mark is conditional on correct formulae **allow** any correct multiple e.g. $4Cu + 2O_2$? 4CuO **allow** = or ? for arrow **not** 'and' or & for + **allow** one mark for correct balanced equation with incorrect use of upper case, lower case and subscript e.g. 2Cu + O2 ? 2Cuo (1) Examiner's Comments The equation was often correct in terms of formulae but some candidates did not attempt to balance the equation. A common misconception was to have the formula for copper oxide as CuO_2. Candidates also need to be careful to insure that they use the correct case when writing the symbol for Cu and avoid writing CU
			Total	2	
12			(bubble through) lime-water / calcium hydroxide (solution) (1) goes milky / goes cloudy / white precipitate / goes white (1)	2	**ignore** method focus on reagent second marking point is dependent on correct reagent Examiner's Comments The test for carbon dioxide was known by some candidates although some referred to a test with a burning splint. A significant proportion of the candidates did not attempt this question.
			Total	2	

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Question			Answer/Indicative content	Marks	Guidance
13	a		H_2O (1)	1	**allow** other ways of indicating correct response eg ringing or ticking the correct answer **but** answer on answer line takes precedence **Examiner's Comments** Some candidates identified water as a molecule from the list but few candidates.
	b		(moist) litmus paper / pH paper (1) bleaches / (goes red) then white (1)	2	**allow** indicator paper for litmus **Examiner's Comments** Few candidates knew how to test for chlorine.
			Total	3	
14			lime water / calcium hydroxide (solution) (1) goes milky / gives a white precipitate (1)	2	**allow** $Ca(OH)_2$ **allow** goes white / misty / cloudy / creamy **Examiner's Comments** The test for carbon dioxide was not well known. Some candidates described carbon dioxide putting out a flame. Many candidates described the test for hydrogen.
			Total	2	
15			lime water / calcium hydroxide (solution) / $Ca(OH)_2$ (1) goes milky / cloudy / white / white precipitate / white solid (1) This mark is **dependent** on the correct test chemical	2	**allow** white suspension **not** white solution **Examiner's Comments** The test for carbon dioxide was not well known and a significant proportion of candidates did not answer the question. A common misconception was to refer to carbon dioxide extinguishing a lighted splint.
			Total	2	

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Question			Answer/Indicative content	Marks	Guidance
16			D ✓	1(AO 1.1)	Examiner's Comments The test for chlorine gas was well known and tended to be ability related. However, many candidates of all abilities opted either for a squeaky pop with a lighted splint or for limewater turning milky.
			Total	1	
17		i	to sterilise (water) / to make solvents / (to make household) bleach / to make plastics (1)	1	**allow** swimming pools cleans water or cleaning pools is **not** sufficient Examiner's Comments Most candidates could recall that chlorine was used in swimming pools although most candidates did not explain why. Candidates did not often refer to chlorine sterilising water and often referred to cleaning water instead.
		ii	(moist) litmus paper (1) bleaches (1) This mark is **dependent** on the correct reagent	2	**allow** (damp) litmus paper **allow** (moist Universal) indicator paper / (damp Universal) indicator paper **allow** removes colour / turns white Examiner's Comments The chemical test for chlorine was not well known. The use of litmus or other indicators was not recalled by candidates. Candidates often gave tests for other gases such as lime- water or a glowing splint.
			Total	3	

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Question			Answer/Indicative content	Marks	Guidance
18			C ✓	1(AO 1.1)	Examiner's Comments Most candidates chose electrical conductivity as a key property of a transition metal. Many of the higher ability candidates tended to realise that option C gave the better description, others opted for option B.
			Total	1	
19			D ✓	1(AO 1.1)	
			Total	1	
20			C ✓	1(AO 1.2)	Examiner's Comments Misconception A was a common misconception in this question.
			Total	1	
21			D ✓	1(AO 1.1)	Examiner's Comments Candidates found this question challenging but there was no pattern of incorrect responses.
			Total	1	
22			B ✓	1 (AO1.2)	
			Total	1	
23			C ✓	1 (AO1.2)	
			Total	1	

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Question			Answer/Indicative content	Marks	Guidance
24	a		Potassium / K^+ ✓	1 (AO1.2)	
	b	i	Carbonate / CO_3^{2-} ✓	1 (AO1.2)	
		ii	(limewater) goes cloudy / milky/white ✓	1 (AO1.2)	
			Total	3	

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