Mark scheme

Question			Answer/Indicative content	Marks	Guidance
1			C ✓	1 (AO 2.2)	**Examiner's Comments** Almost all candidates interpreted the table correctly.
			Total	**1**	
2			C ✓	1 (AO 2.1)	**Examiner's Comments** The nature of bonding continues to be a source of misunderstanding for most candidates, and option A was a frequent choice.
			Total	**1**	
3			C ✓	1 (AO 2.1)	**Examiner's Comments** Very few candidates could recognise which equation was balanced, and options such as B or D were chosen far more often than C.
			Total	**1**	
4			B ✓	1 (AO 1.1)	**Examiner's Comments** Higher scoring candidates remembered the room temperature states of all three halogens.
			Total	**1**	
5	a	i	$Fe + H_2SO_4 \rightarrow FeSO_4 + H_2$ ✓	1 (AO 2.1)	**ALLOW** any correct multiple, including fractions **DO NOT ALLOW** and / & instead of '+' **Examiner's Comments** This part was answered well, with both high scoring and medium scoring candidates understanding how to write a simple equation.
		ii	**First check the answer on answer line** **If answer = 71.1(%) award 3 marks**	3 (2 × AO 2.2) (AO 1.2)	

			% yield = (am ÷ pm) × 100 **OR** = $\frac{5.4}{7.6}$ × 100 ✓ = 71.05263 (%) ✓ To 1 decimal place = 71.1 (%) ✓		**ALLOW ECF** for wrong answer to correct numbers **ALLOW** decimal place mark if an incorrect answer **Examiner's Comments** Answers to this question showed an unusual distribution. Candidates either scored all 3 marks, or appeared to get totally confused over what to do, though still picked up 1 mark for the number of decimal places in their answer.
	b		**Y** ✓ Because it does not conduct electricity ✓	2 (2 × AO 2.2)	**Examiner's Comments** Almost all candidates identified Y as the non-metal for the first mark, and well over half of them gave electrical conductivity as the most appropriate reason. Candidates who gained 1 mark often listed all properties for Y, rather than selecting the relevant one.
	c		**W** ✓ **AND** Low density / low melting point ✓	2 (AO 2.1) (AO 1.1)	Second mark can only be awarded if first correct **ALLOW** 'low boiling point' instead of melting point **Examiner's Comments** This was slightly less well answered with some candidates suggesting Y for both parts.
	d	i	**Any two from:** Group 1 metals have a lower density ✓ lower melting point ✓ lower boiling point ✓ are softer ✓ are less strong / hard-wearing ✓ Both Group 1 metals and transition	3 (2 × AO 2.1) (AO 1.1)	Assume unqualified answer refers to Group 1 metals **ALLOW ORA** for transition metals **ALLOW** transition metals form coloured compounds / variable valency / catalysts **IGNORE** incorrect or uncertain statements for properties not on the list e.g., 'shinier'

			metals conduct electricity ✓ **AND** Group 1 metals are more reactive ✓		Must be a comparison between Group 1 and Transition metals, not an individual element **ALLOW ORA** for transition metals **Examiner's Comments** A large number of candidates did not attempt this question, so were unable to gain any marks. The question asked candidates to compare, so it was essential that they discussed both transition metals as well as Group 1. Many suggested that Group 1 metals have higher boiling points and don't conduct electricity.
		ii	Substance that speeds up a reaction ✓ (But) is not used up in the reaction / not chemically changed ✓	2 (2 × AO 1.1)	**ALLOW** speeds up reaction time **DO NOT ALLOW** doesn't take part in the reaction **IGNORE** slows down reaction, it's very much a lesser property. **IGNORE** activation energy arguments **Examiner's Comments** Most candidates knew that catalysts speed up reactions, and higher scoring candidates went on to say that they are not used up. **Assessment for learning** There are almost always 2 marks available for a catalyst definition, one for 'speeds up the reaction' and the other for 'and are not used up/are recoverable'.
			Total	**13**	
6			**C**	1 (AO 2.1)	**Examiner's Comments** High scoring candidates correctly

					chose option C, with B the second most popular choice.
			Total	**1**	
7			**B**	1 (AO 2.1)	**Examiner's Comments** High scoring candidates often, but by no means always, chose the correct option, B. A lot of candidates went for the reverse pattern, C.
			Total	**1**	
8			**Level 3 (5–6 marks)** Applies knowledge and understanding to identify the elements in relation to their position the Periodic Table **AND** Describes their properties and reactivity of all three elements. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Level 2 (3–4 marks)** Applies knowledge and understanding to identify the elements in relation to their position the Periodic Table **AND** Attempts to describe their properties or reactivity. *There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.* **Level 1 (1–2 marks)** Applies knowledge and understanding to identify the elements in relation to their position the Periodic Table **OR** Attempts to describe their properties and reactivity. *There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant*. **0 marks** *No response or no response worthy of credit.*	6(3 × 1.1)(3 × 2.1)	**AO2.1 Apply knowledge and understanding of scientific ideas** Identifies the elements in relation to their position in the Periodic Table and uses this to explain their properties and reactivity: • X is a Group 1 metal / X is sodium • Group 1 elements have 1 electron in the outer shell, which is easily lost (to get a full outer shell) • Y is a transition metal / Y is silver • Z is a Group 7 element or non-metal / Z is chlorine • Links metallic structure to properties • Group 7 elements have 7 electrons in their outer shell and gain 1 electron to get a full outer shell **AO1.1 Demonstrate knowledge and understanding of scientific ideas** <u>Element X</u> • Very reactive (with oxygen/air and water) • Reacts with Group 7 elements • Metal • Shiny when freshly cut • Soft • Low density / floats on water <u>Element Y</u> • Shiny when freshly cut

					• Good conductor of electricity • Strong • Malleable • Higher density (than X) • Less reactive (than X) <u>Element Z</u> • Very reactive • Reacts with Group 1 elements • Gas • Low melting point / boiling point **<u>Examiner's Comments</u>** Most candidates were clearly familiar with the Periodic Table and discussed reactivity trends down Groups 1 and 7, and also electron configurations. They often tied electron shells in to ideas of how tightly electrons are held, and discussed electron loss and gain. In this respect the seemed to do better than in Question 12, which looked at metal ion formation and reactivity. That the Group 1 elements are less reactive at the top of the group had gone in really strongly, but unfortunately it led to many candidates stating that sodium must be unreactive. There were others who remembered the trends the wrong way round, but it was clear that the underlying ideas had definitely gone in. They were less certain about properties, and frequently did not mention any, or assumed that their statement about electron configuration would be enough.
			Total	**6**	
9			A ✓	1(AO2.1)	**<u>Examiner's Comments</u>** Answers B and C were most often chosen, suggesting candidates find it

					much easier to think in terms of electrons rather than ion formation.
			Total	**1**	
10			C ✓	1(AO1.1)	**Examiner's Comments** This question showed up considerable confusion in the minds of candidates, and answers were evenly spread across all four alternatives.
			Total	**1**	