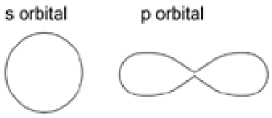
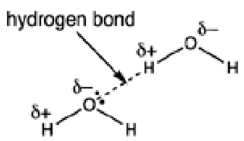
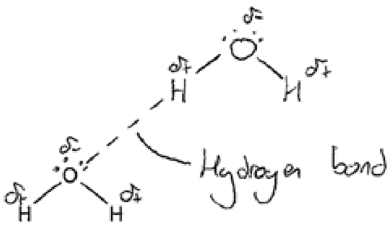
Mark scheme

Question			Answer/Indicative content	Marks	Guidance
1			**C**	1	**Examiner's Comments** Approximately two thirds of candidates gave the correct answer C. The most common incorrect response seen was D, confusing the strength of the σ and π bonds, possibly as a C=C bond is stronger than C-C. Some gave D assuming alkenes are polar due to their reactivity and showing a misunderstanding of the term 'polar'.
			Total	**1**	
2			**B**	1	**Examiner's Comments** This question assessed understanding of important terms used in organic chemistry, with some candidates correctly choosing B as the correct option. The question discriminated well with less successful responses choosing D, presumably thinking that the two double bonds in a cyclic structure makes the compound aromatic. **Misconception** A cyclic organic molecule containing single and/or double bonds is aliphatic. The molecule is described as aromatic if it contains a benzene ring.
			Total	**1**	
3			**C**	1	

					Examiner's Comments Most candidates recognised C as a diagram for a p orbital.
			Total	**1**	
4			 ✓Fe = (1s^2)2s^{2}2p^{6}3s^{2}3p^{6}4s^{2}3d^6 **AND** Fe^{2+} = (1s^2)2s^{2}2p^{6}3s^{2}3p^{6}3d^6 ✓	2	**IGNORE** shading **IGNORE** axes directions x, y, z **DO NOT ALLOW** multiple p orbitals For electron configuration, **ALLOW** 4s^2 after 3d^6 i.e. 1s^{2}2s^{2}2p^{6}3s^{2}3p^{6}3d^{6}4s^2 **ALLOW** upper case D, etc and subscripts, e.g. ……4S$_2$3D$_1$ **ALLOW** 4s^0 **IGNORE** [Ar]3d^6 4s^2 **Examiner's Comments** Many candidates were successful in drawing the orbital shapes. Occasionally candidates linked the question to the formation of a π bond or drew two arrows in a box to represent the electrons. Many candidates did not realise that when transition metal ions are formed, the first electrons removed from atoms are the 4s electrons and so wrote 2s^2 2p^6 3s^2 3p^6 3d^4 4s^2.
			Total	**2**	
5			**D**	1	**Examiner's Comments** The correct answer was D. Most candidates were able to select this response, but the common error was the selection of A. It is important that candidates can distinguish the difference between oxidation states and charge on the ions. Oxidation state is the measure of the number of electrons that an

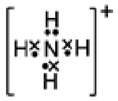
					atom uses to bond with atoms of another element.
			Total	**1**	
6			**D**	1	**<u>Examiner's Comments</u>** The correct answer was D. Wrong answers were very rarely seen as candidates had secure knowledge of filling orbitals individually before pairing.
			Total	**1**	
7	a		The ability/tendency of an atom to attract electrons ✓ in a covalent bond ✓	2	**ALLOW** 'attraction of an atom for electrons' **ALLOW** 'pull' for 'attract' **DO NOT ALLOW** 'element' for 'atom' **DO NOT ALLOW** ability to attract **an** electron (i.e. reference to a single electron) **ALLOW** 'shared pair' or 'bond(ing) pair' for 'covalent bond' 2nd mark is independent of first mark **<u>Examiner's Comments</u>** Many managed to score at least one mark here but most struggled to give a comprehensive definition. A mark was often lost mark for omission of 'atom', i.e. not saying what was attracting electrons, or for saying 'element' instead. The ability to attract **an electron** was not accepted as this is describing electron affinity rather than electronegativity. Many described the formation of dipoles or partial charges across the bond due to the difference in electronegativity but didn't demonstrate a clear understanding of what electronegativity is. Lower-scoring candidates often referred to the formation of ions and/or loss of electrons.

					Assessment for learning Learning key words and terminology is an important part of understanding Chemistry. Encourage students to make their own flash cards for each topic – this can be done on card or electronically using websites such as Quizlet. Display key words and definitions in classrooms. Although the current specifications place less emphasis on rote recall of definitions, students should still practice writing definitions for common terms with appropriate key words.
	b	i	*Dipole* At least one $H^{\delta+}$ **AND** one $O^{\delta-}$ shown correctly on each water molecule (see diagram) ✓ *Hydrogen bonding* H bond between H in one H_2O molecule and lone pair of O in an adjacent H_2O molecule ✓ 	2	**IGNORE** lone pairs for first marking point **All Hydrogen bonds must hit a lone pair**. Hydrogen bond does **NOT** need to be labelled but it must be different from the covalent bond if it is not labelled. **ALLOW** H-bond as label **ALLOW** only one lone pair on O atom **ALLOW** additional, correctly drawn hydrogen bonded water molecules with correct dipoles **DO NOT ALLOW** more than 2 lone pairs on O atom **Examiner's Comments** Around half of candidates scored both marks with a well-drawn diagram (such as that shown in the exemplar below). Practising drawing hydrogen bonds between different molecules is a really good way of exploring students' understanding of what they are. The most common errors were missing the lone pair or

					showing a hydrogen bond that didn't originate from those drawn. Lower-scoring candidates often didn't draw a second water molecule, labelling the covalent bond between O and H as a hydrogen bond. Quite a few diagrams were seen with δ+ and δ− only on one molecule or with δ+ on one structure and δ− on the other. It was essential here to show that the O-H bond in both molecules is polar. Diagrams were often unclear so sometimes difficult to interpret. Exemplar 1  This is an example of a good diagram for hydrogen bonding.
		ii	Dipoles do not cancel out **OR** Has an **overall** dipole✓	1	**ALLOW** (Water is) unsymmetrical/ non-symmetrical/ asymmetrical **IGNORE** polar bonds do not cancel **IGNORE** charges uneven/ do not cancel **<u>Examiner's Comments</u>** Some appropriate answers were seen, mostly discussing the asymmetrical shape of water. More than half didn't score the mark. However, many were able to describe O-H being a polar bond due to the difference in electronegativity but didn't realise that this doesn't always mean that the molecule itself is polar. The relationship between the words electronegative, dipole and polar need more attention and how this all relates to the shapes of molecules. Some candidates said *symmetrical* when they meant *asymmetrical*.

		iii	(In ice) molecules are held apart by H bonds **OR** (Ice) has an open lattice due to H bonds✓	1	**Response must refer to H bonds/bonding** **ALLOW** spread/spaced out/apart instead of 'held apart' **IGNORE** length of hydrogen bonds **DO NOT ALLOW** 'atoms' instead of 'molecules' **ALLOW** H bonding (in ice) creates gaps in the lattice/ structure/between molecules… But **DO NOT ALLOW** if gaps contain 'air' **<u>Examiner's Comments</u>** Some good answers were seen referring to hydrogen bonds holding/keeping water molecules further apart or creating an open lattice. However, a number did not score for not mentioning hydrogen bonds or for referring to alternative intermolecular forces. For example, 'In solid state, the London forces are weaker' and 'Ice has less induced dipole-dipole forces'. Some also indicated that 'air' was in the structure and this wasn't accepted as air molecules are too large to fit in the gaps between water molecules in the ice crystal structure. Responses often demonstrated some significant misconceptions in candidate understanding. Many felt that the length of the hydrogen bond changed, for example 'when ice freezes hydrogen bonds expand' 'Atoms are further apart so longer hydrogen bonds'. Some suggested that the strength of the hydrogen bond changed (for example, 'ice has weaker H-bonds than water'). Some recognised that ice has a crystalline structure but didn't explain how this is different from other solid structures, which would be denser than their liquid counterparts. Lower-scoring candidates struggled to understand density (for example, 'ice is more compact' or 'molecules closer together in ice'). Terminology

					was also a problem with candidates often referring to ‘ice’ or ‘particles’ rather than ‘molecules’.
	c	i	(Ammonia has) weaker hydrogen bonds (than ice/water) ✓ N has **one** lone pair **AND** O has **two** **OR** N less electronegative than O ✓	2	**ORA** but assume ‘it’ refers to ammonia Answer must be comparative between hydrogen bonding in ammonia and ice **ALLOW** Ammonia has less hydrogen bonds **ALLOW** response in terms of energy required to break hydrogen bonds e.g. less energy needed to break hydrogen bonds (in ammonia) **DO NOT ALLOW** reference to breaking N-H and O-H bonds i.e. covalent bonds **IGNORE** reference to other intermolecular forces e.g. London forces, dipole-dipole interactions. **ALLOW** ammonia has **one** lone pair **AND** water/ice has **two** **<u>Examiner’s Comments</u>** Despite being told in the question that ammonia contains hydrogen bonds, many gave responses in terms of ammonia having either London forces and permanent dipole-dipole forces which are weaker than hydrogen bonds. For example, ‘ammonia consists of permanent dipole-dipole interactions which are weaker than hydrogen bonding in ice’ and ‘NH_3 has 17 electrons and H_2O has 18 electrons. Due to NH_3 having fewer electrons, there are fewer London forces’. Lower-scoring candidates often confused hydrogen bonds and covalent bonds, consistent with what was seen in 1(b)(i). For example, ‘O-H bond is stronger than N-H bond’ and ‘more energy needed to break O-H bonds rather than N-H bonds’. Some of these candidates did score a mark for recognising that N is less electronegative than O. For others they understood that

					ammonia has weaker hydrogen bonds but then struggled to give a reason either in terms of lone pairs or electronegativity.
		ii	 **Bonded pairs** Electron pairs in 3 x N-H covalent bonds shown correctly using dots and crosses ✓ **Dative bond** shown with two crosses or two dots ✓	2	**ALLOW** shell circles **IGNORE** inner shell in N **Charge and brackets not required** **DO NOT ALLOW** additional electrons on either N or H for dative bond mark **Examiner's Comments** Less than half of the candidates scored both marks. Most candidates drew 4 x N-H shared covalent bonds and therefore lost the dative bond mark. Some added an additional electron to either N or H. Some drew an additional shaped electron (e.g. using a triangle) on one of the bonding pairs, obviously not realising that both electrons in dative bond originate from N, so have the same symbol. Many diagrams were unclear making it hard distinguish between dots and crosses especially if adding circles for electron shells. A few lower-attaining candidates attempted to draw an ionic dot-cross diagrams.
		iii	**Reagent and conditions** (Heat with) hydroxide ✓ **Observation *(Independent mark)*** pH/litmus/indicator paper turns blue/purple ✓	2	**ALLOW** NaOH/KOH/$Ca(OH)_2$/OH^- **DO NOT ALLOW** Ammonium hydroxide OR ammonia **Examiner's Comments** Higher-attaining candidates often gave a very detailed responses with all stages, including warming the NaOH, use of damp litmus paper and some included an ionic equation. Quite a few lost a mark as they missed the addition of hydroxide, just warmed, but they still gained mark for testing with indicator paper.

					Some thought that the indicator paper would turn red or be bleached and a few gave incorrect ion test e.g. add silver nitrate, add acid. Over a third of candidates did not score on this question, with a significant proportion not even attempting it.
			Total	**12**	
8		i	Be: $1s^22s^2$ F: $1s^22s^22p^5$ ✓ Mg: $1s^22s^22p^63s^2$ C*l*: $1s^22s^22p^63s^23p^5$ ✓ Block: s p ✓	3	**1 mark** per correct row **ALLOW** upper case letter S and P, and subscripts, e.g. $2S_22P_5$ **IGNORE** superscripts/numbers given on block (e.g. s^2 and p^5) if the letter is clear __**Examiner's Comments**__ A very well answered question with most candidates very confident in giving the correct electron configurations and blocks. Errors were rare but included: $2p^5$ or $3p^6$ ending for Cl; using mass number for number of electrons; and assigning group 17 as d block and giving orbital box diagrams rather than block.
		ii	Across period 2, the (2)s subshell fills first, followed by the (2)p ✓ **same pattern or trend** of filling (the subshells) repeated in other periods ✓	2	**ALLOW** Elements in the same group have same number of electrons in their outer shells or subshell e.g. s^2 in group 2/ s^2p^5 in group 17(7) **ALLOW** Elements in the same period have the same number of energy levels/shells **ALLOW** for both marks for indication that the pattern repeats across each period e.g Across each period, elements repeat the pattern of electrons filling the s-subshell then p-subshell ✓ ✓ __**Examiner's Comments**__ Many found this question challenging despite doing well in Question 2(a)(i). The question

					states 'use your answers from (a)(i)' but not many candidates wrote about the electron configurations they had given. Many gave very simplistic responses in terms of the number of electrons increasing but made no reference to how those electrons are arranged (e.g. 'number of electrons increases across a period as the electron configuration gets higher' or 'atomic number increases'). Some candidates struggled with terminology, often referring to 'block' or 'orbital' instead of subshell (e.g. 'outer electrons are in same block', 'going across a period the number of orbitals increases', 'elements in same group have their highest energy electron in same block' or 'orbital'). Candidates need clarity on the terminology used for electron configurations and periodic table i.e. blocks, shells, sub-shells and orbitals. It was rare for candidates to score both marks as this was a question that they were unfamiliar with. However, some did gain a mark for linking the number of outer shell electrons to the group number or stating that elements in the same period have the same number of shells. It was not enough to refer to the highest energy electron being in the s-subshell or p-subshell as this is the link to the block, but all groups in same block will be the same. Some described the trend in other physical or chemical properties. Some examples included: 'Elements have same chemical and physical properties due to similar electronic configuration'; 'as you go across period, number of electrons increase and their boiling and melting points increase'; and 'electrons are more easily lost in a paired orbital, due to greater

					repulsion and so have lower ionisation energies'. **OCR support** We have produced a transition guide on the topic of atomic structure. It covers content from KS4 and how this is developed at KS5 with a wide range of suggested resources to support teaching. At KS4, candidates are expected to be able to explain how the position of an element in the Periodic Table is related to the arrangement of electrons in its atoms, with development at KS5 to arrangement in to s, p and d orbitals. https:/ocr.org.uk/Images/170375-atomic-structure-ks4-ks5.pdf
		iii	Mg loses (2) electrons **AND** Cl gains an electron ✓ To gain a full/complete shell **OR** Noble gas configuration **OR** Stable/full octet✓	2	**ALLOW** Mg is oxidised **AND** Cl is reduced **Examiner's Comments** Generally, this question was well answered with a clear understanding of how and why ions are formed. However, approximately a quarter of students only gained 1 mark as they either didn't explain electrons being lost by Mg and gained by Cl or gave no justification. A common slip was stating Cl has one electron in its outer shell. Some described bonding between Mg and Cl, which wasn't what the question asked, but this didn't prevent them from scoring both marks.
		iv	$2Mg + O_2 \rightarrow 2MgO$ ✓	1	**ALLOW** multiples e.g. $Mg + \frac{1}{2}O_2 \rightarrow MgO$ **IGNORE** state symbols even if wrong

					Examiner's Comments Many candidates correctly gave the balanced equation here. However, some didn't balance but had the correct formula. A few gave Mg_2 as a reactant or MgO_2 as a product. Some had O_2 on both sides of the equation.
			Total	**8**	
9			Cr ✓ Mn ✓	2 (AO 1.2)	**IGNORE** ions **Examiner's Comments** Most candidates chose at least one of the two elements Cr and Mn, with Mn being the most common. Incorrect elements were usually other d block elements.
			Total	**2**	
10			**Level 3 (5–6 marks)** Explains the terms 'd-block element' **AND** 'transition element' **AND** Explains why not all d-block are transition elements **AND** At least **THREE correct** electron configurations (need to be one electron configuration of d block atom, transition element ion and zinc (or scandium) ion *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)** Explains both the terms 'd-block element' and 'transition element' **AND** Explains why not all d-block are transition elements **OR** Explains both the terms 'd-block element' and 'transition element' **AND** Links terms to at least **TWO correct** electron configurations **OR**	6 (AO 1.1 × 4)	**Indicative scientific points may include:** **Terms** **d-block element:** element with highest energy/ valence electron in d-orbital/sub-shell **OR** d subshell is being filled **DO NOT ALLOW** d block for d-subshells **Transition element**: element forming one or more ions (allow atom and ion - IUPAC definition) with incomplete/partially filled d-subshell/d-orbitals **DO NOT ALLOW** d shell **d-block element:** **ALLOW** examples with an ion with an incomplete d-subshell, e.g. Fe^{2+} - $[Ar]4s^03d^6$ **ALLOW** examples with highest energy electrons in a d-subshell, e.g. Fe - $[Ar]4s^23d^6$ **Not all d-block are transition elements**:

			Explains the terms ‘d-block element’ **OR** ‘transition element’ **AND** Explains why not all d-block are transition elements **AND** Links terms to at least **ONE correct** electron configuration *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)** Explains the term ‘d-block element’ **OR** ‘transition element’ **AND** Attempts to link terms with **ONE correct** electron configuration **OR** Explains the term ‘d-block element’ **AND** ‘transition element’ **OR** Explains the term ‘d-block element’ **OR** ‘transition element’ **AND** Explains why not all d-block are transition elements **OR** **Any TWO** out of **THREE correct** electron configurations (one element and one ion that is a transition element and one ion that is not a transition element) *There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.* ***0 mark*** *No response or no response worthy of credit*		Sc and Zn form ions with complete or empty d-shells **ORA** For Sc^{3+}, ALLOW Sc^{+3} OR Sc forms a 3+ ion For Zn^{2+}, ALLOW Zn^{+2} OR Zn forms a 2+ ion Sc^{3+} $1s^22s^22p^63s^23p^6$ Sc^{3+} **AND** d subshell empty / d orbital(s) empty Zn^{2+} $1s^22s^22p^63s^23p^63d^{10}$ Zn^{2+} **AND** d subshell full / ALL d orbitals full **ALLOW** minor slips on **inner shell** electron configurations -- **NOTE**: A clear and logically structured response would link definitions to electron configurations to support the explanations. If stated, for the level, there should be clear indication that the d subshell is full/empty or partially full **<u>Examiner’s Comments</u>** Only the higher-attaining candidates scored full marks. Very few candidates were able to define d-block element correctly without the minor slip of saying outermost electron instead of highest energy or valence electron. Many candidates often did not mention ions for the transition metal definition. Many did not include any of the electron arrangements for d-block elements and transition elements. The majority of candidates who were able to recognise zinc and scandium as d-block elements, but not transition elements, gave their electronic configurations correctly. Common errors included the presence of the 4s electrons in the electron configurations of the ions and incorrect electron configurations of copper and chromium atoms. A

					few candidates thought chromium and copper were not transition elements due to the $4s^1$ electron configuration. Exemplar 3  transition element. Explain why some d-block elements are not transition elements. Use electron configurations to support your explanations. D block elements are elements where their last, outer most electron lies in the d subshell. For example, Titanium is a d-block element because its last electron is in 3d : $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^2$ A transition element is an element which forms ions which have a partially filled d-subshell. An example would be Vanadium, it forms V^{3+} ions which have an incomplete d-subshell : $1s^2 2s^2 2p^6 3s^2 3p^6 3d^2$ Some d-block elements aren't considered transition elements because the their ions do not form incomplete d-subshells. → For example, Sc is not a transition metal because its Sc^{3+} doesn't have an incomplete d subshell : Sc^{3+}: $1s^2 2s^2 2p^6 3s^2 3p^6$ → Another example is zinc, its Zn^{2+} ion forms a full d subshell instead of incomplete, so although it is a d-block element it isn't a transition metal. Zn^{2+}: $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10}$ This candidate has mentioned outer electrons rather than highest energy but was this is a minor slip and they were still given a Level 3 response as everything else is correct. A holistic approach for LoRs is used and not a point-based marking system.
			Total	**6**	
11			**C**	1 (AO 1.1)	**ALLOW 6** **<u>Examiner's Comments</u>** Candidates found this question more difficult than Questions 1–3. The question discriminated well. Most candidates showed the electron configuration in their working. A and D were the main distractors. Rather than the number of p-**orbitals** occupied, option A (2) is the number of p sub-shells (2p and 3p) and D (10) is the total number of p electrons (6 + 4). The errors may be the result of candidates not understanding the meaning of orbital and sub-shell or

					perhaps not reading the question closely enough. Underlining 'p-orbitals' may have helped candidates.
			Total	**1**	
12		i	**FIRST CHECK ANSWER ON ANSWER LINE** **If answer = 47.92 (to 2 DP) seen award 2 marks** (46 x 8.3) + (47 x 7.4) + (48 x 73.7) + (49 x 5.4) + (50 x 5.2) **OR** 381.8 + 347.8 + 3537.6 + 246.6 + 260 **OR** 4791.8 ✓ 4791.8/100 = 47.92 ✓ **2DP required**	2 (AO 2.2) (AO 1.1)	**ALLOW** one mark for **ECF** from **seen** incorrect sum provided final answer between 46 and 50 and to 2 **DP** **<u>Examiner's Comments</u>** Most candidates scored both marks. Some lost marks for minor slips such as not giving their final answer to 2 decimal places or making calculator errors. A few didn't know how to attempt the calculation or calculated the average mass.
		ii	$(1s^2)2s^22p^63s^23p^63d^24s^2$ ✓ Look carefully at $(1s^2)$ $2s^22p^63s^23p^6$ – there may be a mistake	1 (AO1.1)	**ALLOW** subscripts **ALLOW** 4s before 3d i.e. $(1s^2)2s^22p^63s^23p^64s^23d^2$ **ALLOW** upper case D, etc and subscripts, e.g. ……$3S_23P^6$ **DO NOT ALLOW** [Ar] as shorthand for $1s^22s^22p^63s^23p^6$ **<u>Examiner's Comments</u>** Again, most scored this mark. Common errors included using the mass number for number of electrons, no 4s but $3d^4$ instead, 4d rather than 3d, $4p^2$ instead of $3d^2$ or filling up d orbital $3d^{10}$.
		iii	<table><tr><td></td><td>Protons</td><td>Neutrons</td><td>Electrons</td></tr><tr><td>$^{48}Ti^{2+}$</td><td>22</td><td>26</td><td>20</td></tr></table> ✓ **ALL** 3 numbers required for the mark	1 (AO2.1)	**<u>Examiner's Comments</u>** Most candidates gained this mark. Common errors included giving 24 or 22 for number of electrons, or 48 or 24 for neutrons. A few used the relative atomic mass of 47.9 from the periodic table so gave 24.7 for number of neutrons.

<table>
<tr><td></td><td></td><td></td><td></td><td></td><td>Assessment for learning

Fractional numbers of subatomic particles are not possible. Candidates should be aware that the relative atomic mass is the weighted average of the masses of all of an element’s isotopes, and the mass number of an isotope must be used to determine the number of protons and neutrons in the nucleus.</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>4</td><td></td></tr>
<tr><td>13</td><td></td><td></td><td><table><tr><th>Element</th><th>Mass number</th><th>Protons</th><th>Neutrons</th><th>Electrons</th><th>Charge</th><th></th></tr><tr><td>Ni</td><td>62</td><td>28</td><td>34</td><td>$1s^22s^22p^63s^23p^63d^84s^2$</td><td>0</td><td>✓</td></tr><tr><td>P</td><td>33</td><td>15</td><td>18</td><td>$1s^22s^22p^63s^23p^6$</td><td>3–</td><td>✓</td></tr></table>Mark by row</td><td>2 (AO1.2 ×2)</td><td>Easiest to check element first
ALLOW P^{3-} ALLOW names for elements
IGNORE charges with element in 1st column, even if wrong.
For electron configuration, ALLOW $4s^2$ before $3d^8$ i.e. $1s^22s^22p^63s^23p^64s^23d^8$
ALLOW upper case D, etc and subscripts, e.g. ......$4S_23D_1$
ALLOW [Ar)$3d^84s^2$

<u>Examiner’s Comments</u>

This question produced many mixed responses. Most candidates correctly identified nickel. However, its electron configuration was frequently shown as $3d^{10}$ instead of $3d^8$ and some less successful responses gave nickel’s relative atomic mass of 58.7 from the periodic table, instead of the mass number of the isotope provided. Many candidates selected the incorrect element for phosphorus, with argon being a key distractor from the extra 3 electrons in the $P^{3–}$ ion. The numbers of protons and neutrons were largely correct, although the wrong way round for many less successful responses.</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>2</td><td></td></tr>
<tr><td>14</td><td></td><td></td><td>C</td><td>1(AO2.1)</td><td>ALLOW 7

<u>Examiner’s Comments</u></td></tr>
</table>

					This question was answered reasonably well. From the annotations on scripts many candidates wrote out the electron configuration of a sulfur atom. The successful candidates used electrons in a box notation so that they could visually see, and count, the paired orbitals. This is an excellent strategy to use in any similar questions.
			Total	**1**	