Questions

Q1.

This question is about atomic structure and the Periodic Table.

Atomic emission spectroscopy provides evidence for the existence of

(1)

- ☒ **A** atoms
- ☒ **B** electrons
- ☒ **C** isotopes
- ☒ **D** quantum shells

(Total for question = 1 mark)

Q2.

Which is the electronic configuration for the S^{2-} ion?

(1)

- ☒ **A** $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^2$
- ☒ **B** $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^4$
- ☒ **C** $1s^2\ 2s^2\ 2p^6\ 3p^6$
- ☒ **D** $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$

(Total for question = 1 mark)

Q3.

Which is the most likely sequence of values, in kJ mol^{-1} , for the first four ionisation energies of barium?

(1)

- ☒ **A** 1000 2251 3361 4564
- ☒ **B** 496 4563 6913 9544
- ☒ **C** 503 965 3458 4530
- ☒ **D** 578 1817 2745 11578

(Total for question = 1 mark)

Q4.

This question is about s-block elements and some of their compounds.

Which list contains only s-block elements?

(1)

- ☒ **A** Li, Na, Mg and Cl
- ☒ **B** K, Ca, Co and Rb
- ☒ **C** Mg, Al, Sr and Ba
- ☒ **D** Be, Rb, Ba and Ra

(Total for question = 1 mark)

Q5.

This question is about isotopes, mass spectra and hydrocarbons.

Hydrogen has three isotopes, ^{1}H, ^{2}H and ^{3}H.

Which is the correct number of subatomic particles in ^{3}H?

(1)

	Number of subatomic particles		
	Protons	Neutrons	Electrons
☒ **A**	2	1	2
☒ **B**	1	2	0
☒ **C**	1	2	1
☒ **D**	2	1	3

(Total for question = 1 mark)

Q6.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

What is the electronic configuration of the sulfide ion, S^{2-} ?

- ☐ **A** $1s^2 2s^2 2p^6 3s^2 3p^2$
- ☐ **B** $1s^2 2s^2 2p^6 3p^4$
- ☐ **C** $1s^2 2s^2 2p^6 3s^2 3p^4$
- ☐ **D** $1s^2 2s^2 2p^6 3s^2 3p^6$

(Total for question = 1 mark)

Q7.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

This question is about the electronic structure of some Group 5 elements.

Which is the electronic configuration of the arsenide ion, As^{3-}?

(1)

- ☐ **A** $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2$
- ☐ **B** $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^3$
- ☐ **C** $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6$
- ☐ **D** $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^3 4d^3$

(Total for question = 1 mark)

Q8.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

This question is about atoms, molecules and ions.

The total number of electrons in **all** the occupied **p** orbitals in a chloride ion, Cl^-, is

(1)

- ☐ **A** 5
- ☐ **B** 6
- ☐ **C** 12
- ☐ **D** 18

(Total for question = 1 mark)

Q9.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

This question is about atoms, molecules and ions.

The numbers of subatomic particles in an ^{18}O atom are

(1)

- ☐ **A** 8 protons, 10 neutrons and 8 electrons
- ☐ **B** 9 protons, 9 neutrons and 9 electrons
- ☐ **C** 10 protons, 8 neutrons and 10 electrons
- ☐ **D** 18 protons, 18 neutrons and 18 electrons

(Total for question = 1 mark)

Q10.

Electrons in atoms occupy orbitals.

Successive ionisation energies can give information about the electronic structure of an element.

Which of the following sets of data showing the first four ionisation energies, in kJ mol^{-1}, of four elements is most likely to belong to boron?

(1)

☒ **A** 1086, 2353, 4621, 6223.

☒ **B** 900, 1757, 14 849, 21 007.

☒ **C** 801, 2427, 3660, 25 026.

☒ **D** 578, 1817, 2745, 11 578.

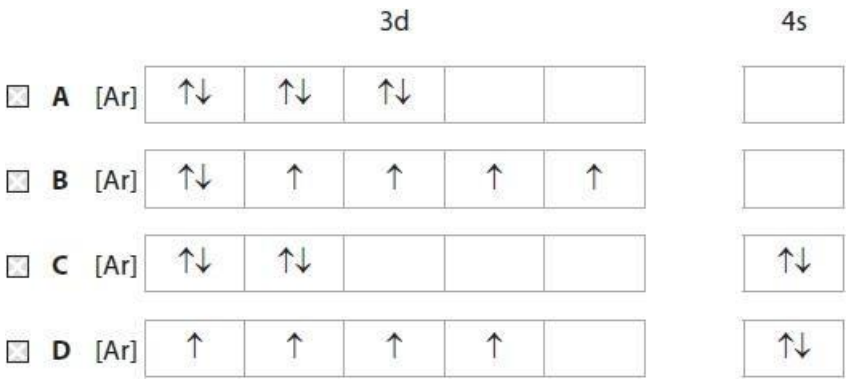
(Total for question = 1 mark)

Q11.

Iron and zinc are in the d-block of the Periodic Table.

Which of these is the electronic configuration of an iron(II) ion, Fe^{2+}?

(1)



(Total for question = 1 mark)

Q12.

This question is about transition metals.

Which of these ions has the electronic configuration [Ar]$3d^5$?

(1)

- ☒ **A** Cr^{3+}
- ☒ **B** Fe^{2+}
- ☒ **C** Mn^{2+}
- ☒ **D** Mn^{3+}

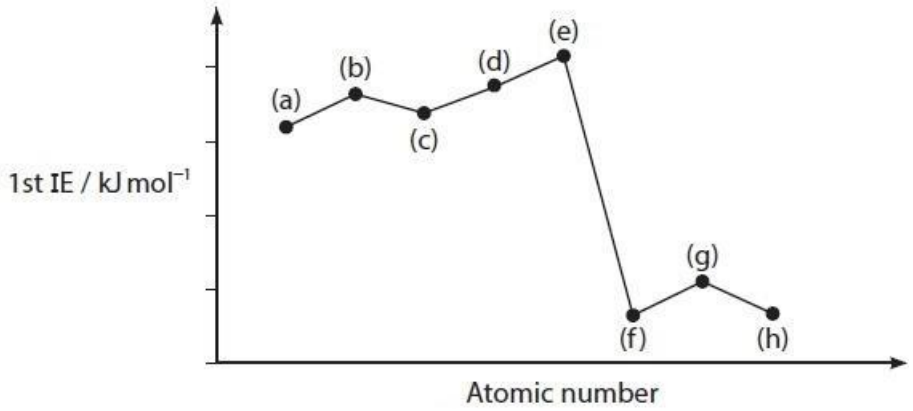
(Total for question = 1 mark)

Q13.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

The graph shows the first ionisation energies (IE) of eight successive elements from the first 20 elements in the Periodic Table.

Which letter represents the first ionisation energy of oxygen?



(1)

- ☒ **A** (a)
- ☒ **B** (b)
- ☒ **C** (c)
- ☒ **D** (h)

(Total for question = 1 mark)

Q14.

Answer the questions with a cross in the boxes you think are correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

This question is about ionisation energies.

(i) Which equation represents the **second** ionisation of bromine?

(1)

☐ **A** $Br(g) + e^- \rightarrow Br^-(g)$

☐ **B** $Br^-(g) + e^- \rightarrow Br^{2-}(g)$

☐ **C** $Br(g) - 2e^- \rightarrow Br^{2+}(g)$

☐ **D** $Br^+(g) - e^- \rightarrow Br^{2+}(g)$

(ii) Which set of successive ionisation energies is most likely to be associated with the element boron?

(1)

☐ **A** 738, 1 451, 7 733, 10 541, 13 629

☐ **B** 801, 2 427, 3 660, 25 026, 32 828

☐ **C** 1 086, 2 353, 4 621, 6 223, 37 832

☐ **D** 1 402, 2 856, 4 578, 7 475, 9 445

(Total for question = 2 marks)

Q15.

Answer the question with a cross in the box you think is correct ☒ . If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒ .

This is a question about atoms, isotopes and ions.

Which of the following pairs of ions is isoelectronic?

(1)

☐ **A** N^{3-} and Cl^{-}

☐ **B** O^{2-} and S^{2-}

☐ **C** Na^{+} and K^{+}

☐ **D** Na^{+} and Mg^{2+}

(Total for question = 1 mark)