

Question 1 (Answer: **B**)

- Aluminium has 13 electrons when neutral: $1s^2 2s^2 2p^6 3s^2 3p^1$.
- The + charge means one electron has gone, and it leaves from the highest-energy 3p orbital first.
- That leaves 12 electrons: $1s^2 2s^2 2p^6 3s^2$.

Question 1 (Answer: **D**)

- Iron is $[\text{Ar}]3d^6 4s^2$, and when it ionises the 4s electrons leave *first*.
- Fe^{3+} has lost both 4s electrons and one 3d, leaving $[\text{Ar}]3d^5$.
- Five electrons in five 3d orbitals means one in each, all unpaired, with 4s empty.

Question 4 (Answer: **C**)

- $\text{Ca } 40.1 + \text{C } 12.0 + 3 \times \text{O } 16.0 = 100.1$.
- A confuses relative *isotopic* mass (exactly 35 for ^{35}Cl) with the relative atomic mass 35.5.
- B gives the mass of one O atom rather than the O_2 molecule, and D quotes magnesium's relative atomic mass for a single isotope.

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1(a)(i)	25 protons 30 neutrons 25 electrons
1(a)(ii)	(atoms of an element) with the same number of protons and different number of neutrons
1(a)(iii)	M1 (relative) isotopic mass. OR (relative isotopic) mass of Mn-55 and Mn-53 M2 (relative) abundance of each isotope
1(b)(i)	$1s^2 2s^2 2p^6 3s^2 3p^6$ ($3d^5 4s^2$)
1(b)(ii)	5
1(c)(i)	Mn / MnO_2 AND it gains electrons
1(c)(ii)	(+)4
1(c)(iii)	<i>Due to an issue with question 1(c)(iii), the question has been removed from the question paper.</i>