1 Atomic structure
Answers to practice questions

Question number	Answer	Marks	Guidance
1 (a)	Cross between the Na cross and the Mg cross	1	
1 (b)	Al(g) → Al^+ (g) + $e^–$ Al(g) $e^–$ → Al^+ (g) Al(g) + $e^–$ → Al^+ (g) + $2e^–$	2	One mark for state symbols consequential on getting equation correct. Electron does not have to have the – sign on it Ignore (g) if put as state symbol with e^- but penalise state symbol mark if other state symbols on e^-
1 (c)	2nd / second / 2 / II	1	Only
1 (d)	Paired electrons <u>in (3)p orbital</u> Repel	1 1	Penalise wrong number If paired electrons repel allow M2
1 (e)	Neon/ Ne $1s^2\ 2s^2\ 2p^6$ / $[He]2s^2\ 2p^6$	1 1	No consequential marking from wrong element Allow capital s and p Allow subscript numbers
1 (f)	Decreases Atomic radius increases/ electron removed further from nucleus or nuclear charge/ electron in higher energy level/ Atoms get larger/ more shells As group is descended more shielding	1 1 1	CE if wrong Accept more repulsion between more electrons for M2 Mark is for distance from nucleus Must be comparative answers from M2 and M3 CE M2 and M3 if mention molecules Not more sub-shells
2 (a) (i)	atoms with the same number of protons and with different numbers of neutrons		Always learn definitions. Then they are ‘easy’ marks.
2 (a) (ii)	isotopes have the same electron configuration	3	
2 (b)	$1s^2 2s^2 2p^6 3s^1$	1	This asks for all sub-levels, so **don’t** use the abbreviated form using [Ne].
2 (c)	$^{15}_{7}N$	2	There have been a few questions like this over the years. It’s just

			getting your head around the numbers, then it's just a bit of arithmetic.
3 (a)	enthalpy change when 1 mole of electrons is removed / knocked out from 1 mole of gaseous atoms (of the same element)	1 1	
3 (b)	$Mg^{+}(g) \rightarrow Mg^{2+}(g) + e^{-}$	2	When you have done the equation, check that the charges balance as well.
3 (c)	increased nuclear charge smaller atom *or* electrons enter the same level *or* similar shielding	1 1	Don't forget that the number of protons / nuclear charge increases from left to right of the Periodic Table.
3 (d)	electron removed from a level of lower energy *or* e– removed from 2p rather than from 3s less shielding	1 1	Electrons are lost from the highest energy level (which contains the electrons) first.
4 (a) (i)	atoms with the same number of protons / same atomic number but different number of neutrons / different mass number	1 1	Don't say the same number of electrons.
4 (a) (ii)	*detected by*: positive ions collide with / are deflected to / are collected at the detector causing current to flow / detected electrically *abundance measured*: idea that current depends on number of ions hitting detector	1 1 1	Learn this.
4 (b)	$((54 \times 5.8) + (56 \times 91.6) + (57 \times 2.6)) / 100$ $= 55.9$	2	% given so divide the abundance by 100.
5 (a)	Neutral atoms pick up a positive charge (ie lose an electron) to the sample needle.	1	
5 (b)	Molecules of air would cause the beam of ions to collide with them and obstruct its path.	1	

5 (c)	They are attracted towards the negatively charged plate and pas through the hole. The smaller ions attain a greater velocity and arrive at the detector first.	3	
5 (d)	The positive ions pick up an electron from the detector and cause a flow of current.	1	
5 (e) (i)	12p/12n; 12p/13n; 12p/14n	1	
5 (e) (ii)	24.3	1	