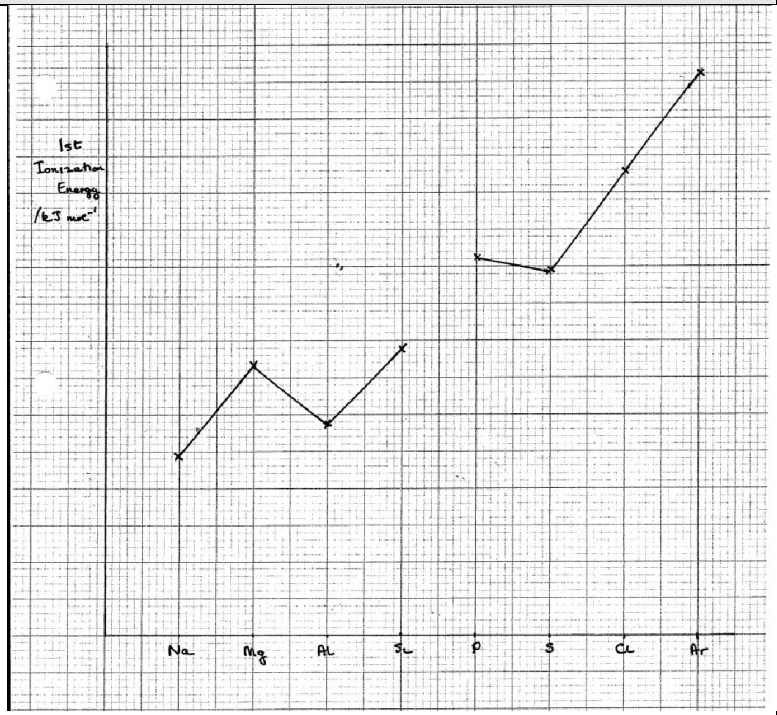
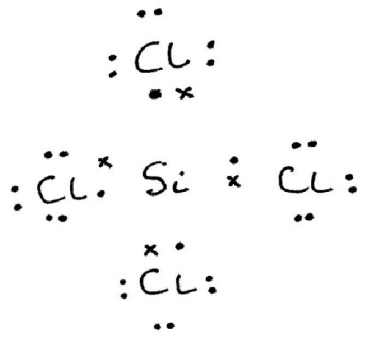
Question Number	Acceptable Answers	Reject	Mark
19(a)	$Mg(g) \rightarrow Mg^{+}(g) + e^{(-)}$ ALLOW $Mg(g) - e^{(-)} \rightarrow Mg^{+}(g)$ Loss of electron to form Mg^{+} (1) IGNORE (g) sign on electron State symbols ALLOW Provided the equation involves magnesium, even if electron is added to the wrong side. (1)	Formation of Mg^{2+}	**(2)**

Question Number	Acceptable Answers	Reject	Mark
19(b)	$(1s^2)\ 2s^2 2p^6\ 3s^2 3p^1$ ALLOW Capital s and/or p, subscripts $2p_x^2\ 2p_y^2\ 2p_z^2\ 3p_x^1$ $3p_y^1$ / $3p_z^1$ for $3p_x^1$		**(1)**

Question Number	Acceptable Answers	Reject	Mark
***19(c)(i)**	**MP1** Mg to Al: Electron removed from Al is from a higher energy level (3p rather than 3s) ALLOW Electron removed in Al is (more) shielded (by 3s) IGNORE Outer electron is further from nucleus Full sub-shell is more stable than part filled sub-shell (1) **MP2** Al to Si: Si has one more proton than Al/ has greater nuclear charge, **and** electrons removed in both cases are 3p / same sub-shell / are equally shielded (1) **MP3** EITHER The attraction of the extra proton in Al is less than the effect of the higher energy level/ the shielding OR Electron removed from Si is closer to nucleus (than Al) ALLOW Silicon is smaller in size (1)		**(3)**

Question Number	Acceptable Answers	Reject	Mark
19(c)(ii)	 **MP1** S does not follow trend (P is above Si followed by dip in graph from P to S rising again to Cl and Ar) (1) **MP2** S has one (3)p orbital which has two electrons/ paired electrons/ is fully occupied OR S has $3p_x^2$, $3p_y^1$, $3p_z^1$ OR Electron in box diagram for S ALLOW S has **a pair of** electrons in the (3)p subshell (1) **MP3** A paired electron is easier to remove OR paired electrons repel each other ALLOW half filled sub-shell (in P) is stable (1)	Just "S has $3p^4$" d orbital P has **a** half filled orbital	**(3)**

Question Number	Acceptable Answers	Reject	Mark
19(d)	Four x round Si sharing one ● with each Cl (1) Seven ● round each Cl sharing one x with each Si (1)  ALLOW Reversed symbols		**(2)**

Question Number	Acceptable Answers	Reject	Mark
***19(e)(i)**	**MP1** I^- / anion becomes distorted / not spherical. May be shown in a diagram (1) **MP2** Mg^{2+} has high(er) charge **and** small(er) radius/ Mg^{2+} has high charge density (1) **MP3** Bonding in magnesium iodide has some covalent character OR Orbitals of Mg^{2+} and I^- overlap/ Mg^{2+} shares some of the I^- electrons OR Mg^{2+} and I^- ions are not completely separate (1)	Iodine becomes distorted Just "electrons in outer shell are attracted" Atoms of Mg have a small (atomic) radius	**(3)**

Question Number	Acceptable Answers	Reject	Mark
19(e)(ii)	Experimental/ Born Haber cycle and theoretical/ calculated lattice energies are **different** OR Experimental/ Born Haber cycle lattice energy is more exothermic/ more negative than theoretical/ calculated lattice energy ALLOW Greater for more negative IGNORE Comments about melting temperature	Just "Compare Experimental/ Born Haber cycle and theoretical/ calculated lattice energies" Use of electron density map	**(1)**

(Total for Question 19 = 15 marks)