2 The Period 3 elements show trends in physical and chemical properties across the period.

(a) Fig. 2.1 shows the variation in atomic and ionic radii of the Period 3 elements Na to C*l*.

The ionic radius of Si is **not** shown.

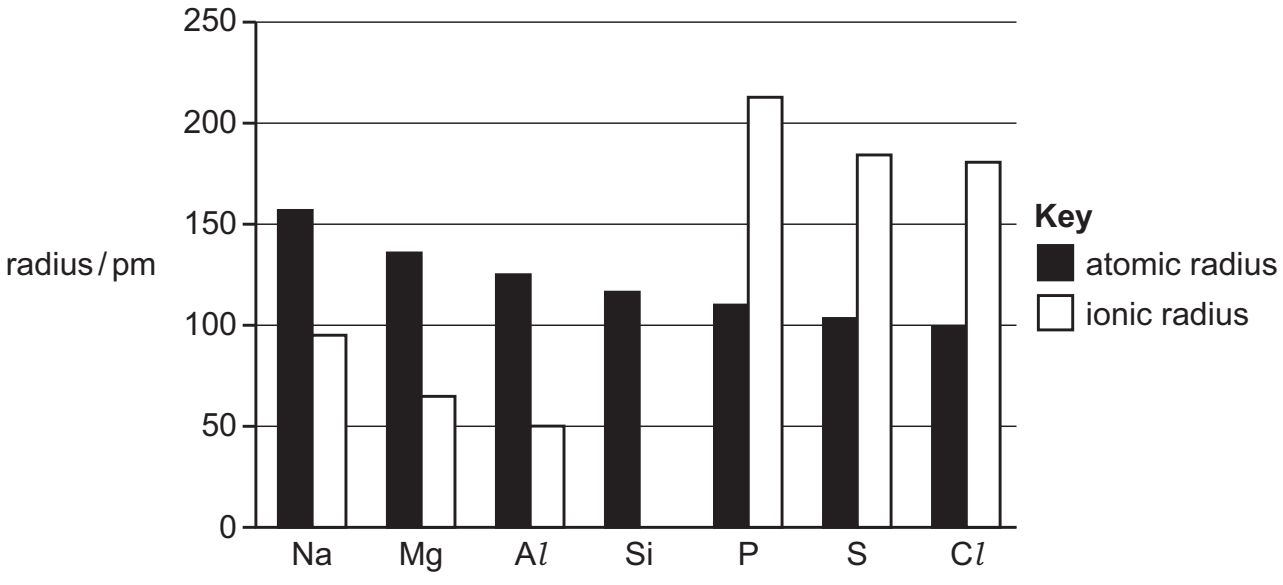

Fig. 2.1

(i) Explain the trend shown in the atomic radii of the Period 3 elements Na to C*l*.

.....

.....

.....

..... [2]

(ii) Explain why there is a large difference in the ionic radii of A*l* and P.

.....

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.....

..... [2]

(b) Table 2.1 gives some information about some of the Period 3 oxides.

Row B gives the pH of the solution that forms when the Period 3 oxide is added to water.

Table 2.1

	formula of Period 3 oxide	Na_2O	MgO	Al_2O_3	SiO_2	P_4O_{10}	SO_3
A	oxidation number of Period 3 element			+3			
B	pH of solution			—	—		

(i) Complete Table 2.1. [2]

(ii) State why there is no data given in row B for Al_2O_3 and SiO_2.

..... [1]

(c) **(i)** Write an equation for the reaction of Na_2O with dilute hydrochloric acid.

..... [1]

(ii) Construct an equation for the reaction of Al_2O_3 with a base to form $NaAlO_2$.

..... [1]

(d) Group 2 nitrates decompose on heating to form oxides.

(i) State the trend in thermal stability of the Group 2 nitrates down the group.

..... [1]

(ii) Identify the other products of the thermal decomposition of Group 2 nitrates.

..... [1]

[Total: 11]