Q1. (a) State the meaning of the term *first ionisation energy* of an atom.

.....

.....

(2)

(b) Complete the electron arrangement for the Mg^{2+} ion.

1s^2 .....

(1)

(c) Identify the block in the Periodic Table to which magnesium belongs.

.....

(1)

(d) Write an equation to illustrate the process occurring when the **second** ionisation energy of magnesium is measured.

.....

(1)

(e) The Ne atom and the Mg^{2+} ion have the same number of electrons. Give **two** reasons why the first ionisation energy of neon is lower than the third ionisation energy of magnesium.

Reason 1 .....

Reason 2 .....

(2)

(f) There is a general trend in the first ionisation energies of the Period 3 elements, Na – Ar

(i) State and explain this general trend.

Trend …….....

Explanation .....

.....

.....

(ii) Explain why the first ionisation energy of sulphur is lower than would be predicted from the general trend.

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.....

.....

(5)
(Total 12 marks)

Q2. Which one of the following statements is correct?

A The first ionisation energies of the elements in Period 3 show a general decrease from sodium to chlorine.

B The electronegativities of Group 2 elements decrease from magnesium to barium.

C The strength of the intermolecular forces increases from hydrogen fluoride to hydrogen chloride.

D The ability of a halide ion to act as a reducing agent decreases from fluoride to iodide.

(Total 1 mark)

Q3. (a) When aluminium is added to an aqueous solution of copper(II) chloride, $CuCl_2$, copper metal and aluminium chloride, $AlCl_3$, are formed. Write an equation to represent this reaction.

.....

(1)

(b) (i) State the general trend in the first ionisation energy of the Period 3 elements from
Na to Ar.

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(ii) State how, and explain why, the first ionisation energy of aluminium does not follow this general trend.

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(4)

(c) Give the equation, including state symbols, for the process which represents the second ionisation energy of aluminium.

.....

(1)

(d) State and explain the trend in the melting points of the Period 3 metals Na, Mg and Al.

Trend .....

Explanation .....

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(3)
(Total 9 marks)

Q4. This question is about the elements in Period 3 from Na to P

(a) (i) Explain the meaning of the term *first ionisation energy*.

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(2)

(ii) State and explain the general trend in first ionisation energies for the elements Na to P

Trend .....

Explanation .....

.....

.....

(3)

(iii) State which one of the elements from Na to P deviates from this general trend and explain why this occurs.

Trend .....

Explanation .....

.....

.....

(3)

(b) State which one of the elements from Na to P has the highest melting point and explain your answer.

Element .....

Explanation .....

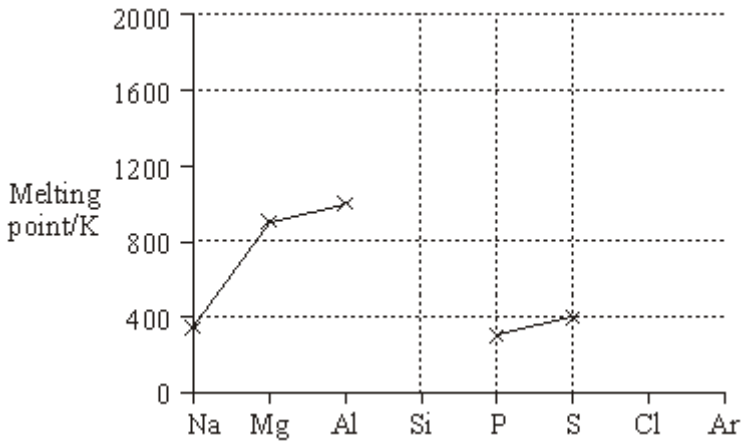
.....

.....

(3)

(Total 11 marks)

Q5. (a) The diagram below shows the melting points of some of the elements in Period 3.



(i) On the diagram, use crosses to mark the approximate positions of the melting points for the elements silicon, chlorine and argon. Complete the diagram by joining the crosses.

(ii) By referring to its structure and bonding, explain your choice of position for the melting point of silicon.

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(iii) Explain why the melting point of sulphur, S_8, is higher than that of phosphorus, P_4

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.....

(8)

(b) State and explain the trend in melting point of the Group II elements Ca–Ba.

Trend .....

Explanation .....

.....

.....

(3)
(Total 11 marks)

Q6. The elements phosphorus, sulfur, chlorine and argon are in the p block of the Periodic Table.

(a) State why these elements are classified as p block elements.

.....

(1)

(b) State the trend in atomic radius from phosphorus to chlorine and explain the trend.

Trend .....

Explanation .....

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(3)

(c) In terms of structure and bonding, explain why sulfur has a higher melting point than phosphorus.

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(3)

(d) In terms of atomic structure, explain why the van der Waals' forces in liquid argon are very weak.

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(2)
(Total 9 marks)