

Name of the Student: _____

Max. Marks : 27 Marks

Time : 27 Minutes

Q1.

- (a) **P** and **Q** are oxides of Period 3 elements.

Oxide **P** is a solid with a high melting point. It does not conduct electricity when solid but does conduct when molten or when dissolved in water. Oxide **P** reacts with water forming a solution with a high pH.

Oxide **Q** is a colourless gas at room temperature. It dissolves in water to give a solution with a low pH.

- (i) Identify **P**. State the type of bonding present in **P** and explain its electrical conductivity. Write an equation for the reaction of **P** with water.

(5)

- (ii) Identify **Q**. State the type of bonding present in **Q** and explain why it is a gas at room temperature. Write an equation for the reaction of **Q** with water.

(4)

- (b) **R** is a hydroxide of a Period 3 element. It is insoluble in water but dissolves in both aqueous sodium hydroxide and aqueous sulphuric acid.

- (i) Give the name used to describe this behaviour of the hydroxide.

(1)

- (ii) Write equations for the reactions occurring.

(4)

- (iii) Suggest why **R** is insoluble in water.

(1)

(Total 15 marks)

Q2.

- (a) State the meaning of the term *electronegativity*.

(2)

- (b) State and explain the trend in electronegativity values across Period 3 from sodium to chlorine.

Trend _____

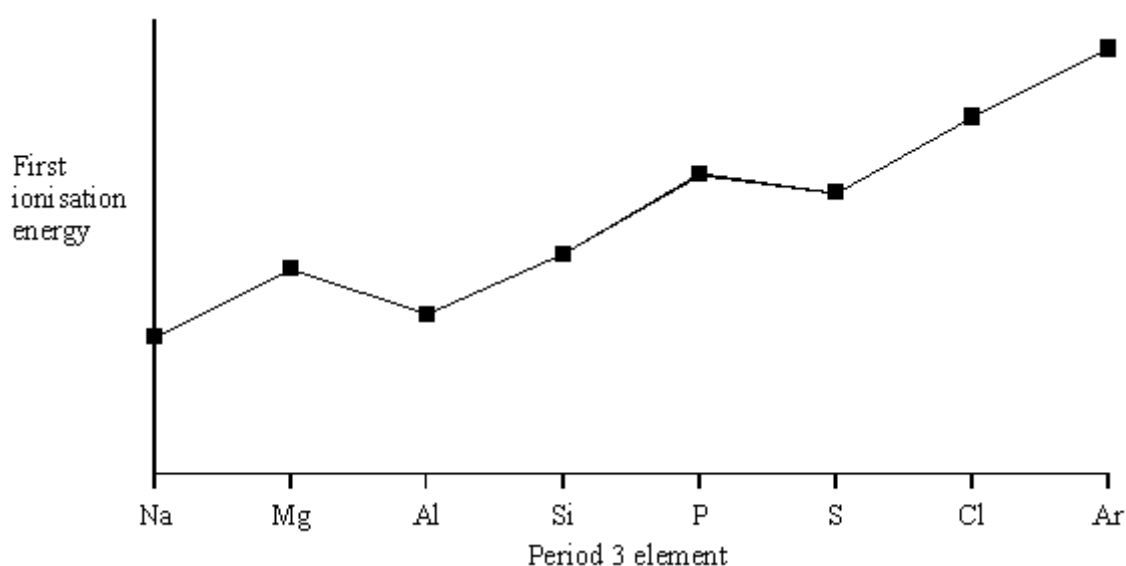
Explanation _____

(3)

- (c) What is meant by the term *first ionisation energy*?

(2)

- (d) The diagram below shows the variation in first ionisation energy across Period 3.



- (i) What is the maximum number of electrons that can be accommodated in an s sub-level?

- (ii) What evidence from the diagram supports your answer to part (d)(i)?

- (iii) What evidence from the diagram supports the fact that the 3p sub-level is higher in energy than the 3s?

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- (iv) What evidence from the diagram supports the fact that no more than three unpaired electrons can be accommodated in the 3p sub-level?

(5)

(Total 12 marks)