Q1. (a) (i) Define the term *relative atomic mass* (A_r) of an element.

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(2)

(ii) A sample of the metal silver has the relative atomic mass of 107.9 and exists as two isotopes. In this sample, 54.0% of the silver atoms are one isotope with a relative mass of 107.1

Calculate the relative mass of the other silver isotope.

State why the isotopes of silver have identical chemical properties.

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(4)

(b) The isotopes of silver, when vaporised, can be separated in a mass spectrometer.

Name the **three** processes that occur in a mass spectrometer before the vaporised isotopes can be detected.

State how each process is achieved.

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(6)

(c)   State the type of bonding involved in silver.

Draw a diagram to show how the particles are arranged in a silver lattice and show the charges on the particles.

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(3)

(d)   Silver reacts with fluorine to form silver fluoride (AgF).

Silver fluoride has a high melting point and has a structure similar to that of sodium chloride.

State the type of bonding involved in silver fluoride.

Draw a diagram to show how the particles are arranged in a silver fluoride lattice

and show the charges on the particles.

Explain why the melting point of silver fluoride is high.

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(5)
(Total 20 marks)

Q2.   (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.

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(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.

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(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)

Q3.   (a)   (i)   Describe the bonding in a metal.

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(ii)   Explain why magnesium has a higher melting point than sodium.

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(4)

(b)   Why do diamond and graphite both have high melting points?

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(3)

(c)   Why is graphite a good conductor of electricity?

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(1)

(d)   Why is graphite soft?

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(2)
(Total 10 marks)

Q4. Which one of the following does **not** contain any delocalised electrons?

A   poly(propene)

B   benzene

C   graphite

D   sodium

(Total 1 mark)