

Q1. (a) Complete the following table.

Particle	Relative charge	Relative mass
Proton		
Neutron		
Electron		

(3)

- (b) An atom of element **Z** has two more protons and two more neutrons than an atom of $^{34}_{16}\text{S}$. Give the symbol, including mass number and atomic number, for this atom of **Z**.

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(2)

- (c) Complete the electronic configurations for the sulphur atom, S, and the sulphide ion, S^{2-} .

S $1s^2$

S^{2-} $1s^2$

(2)

- (d) State the block in the Periodic Table in which sulphur is placed and explain your answer.

Block

Explanation

(2)

- (e) Sodium sulphide, Na_2S , is a high melting point solid which conducts electricity when molten. Carbon disulphide, CS_2 , is a liquid which does not conduct electricity.

- (i) Deduce the type of bonding present in Na_2S and that present in CS_2

Bonding in Na_2S

Bonding in CS_2

- (ii) By reference to all the atoms involved explain, in terms of electrons, how Na_2S is formed from its atoms.

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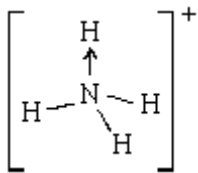
- (iii) Draw a diagram, including all the outer electrons, to represent the bonding present in CS_2

- (iv) When heated with steam, CS_2 reacts to form hydrogen sulphide, H_2S , and carbon dioxide.
Write an equation for this reaction.

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(7)
(Total 16 marks)

- Q2.** (a) An ammonium ion, made by the reaction between an ammonia molecule and a hydrogen ion, can be represented as shown in the diagram below.



(i) Name the type of bond represented in the diagram by N—H

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(ii) Name the type of bond represented in the diagram by N→H

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(iii) In terms of electrons, explain why an arrow is used to represent this N→H bond.

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(iv) In terms of electron pairs, explain why the bond angles in the NH_4^+ ion are all $109^\circ 28'$

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(7)

(b) Define the term *electronegativity*.

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(2)

(c) A bond between nitrogen and hydrogen can be represented as $\overset{\delta-}{\text{N}}-\overset{\delta+}{\text{H}}$

(i) In this representation, what is the meaning of the symbol $\delta+$?

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(ii) From this bond representation, what can be deduced about the electronegativity of hydrogen relative to that of nitrogen?

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(2)
(Total 11 marks)