1 Look at the information about a chlorine atom and an oxide ion.

$$^{37}_{17}Cl \qquad\qquad ^{16}_{8}O^{2-}$$

(a) Complete the table to show the number of protons, neutrons and electrons in each particle.

Two have been done for you.

	Chlorine atom, Cl	**Oxide ion, O^{2-}**
Number of protons	.....	8
Number of neutrons	.....	.....
Number of electrons	17	.....

[3]

(b) Many scientists have helped in the development of the theory of atomic structure.

Two of these scientists were J. J. Thomson and Niels Bohr.

Describe what J. J. Thomson and Niels Bohr contributed to the theory of atomic structure.

J. J. Thomson .....

.....

Niels Bohr .....

..... **[2]**

2 This question is about atomic structure and bonding.

(a) Atoms are made up of protons, neutrons and electrons.

Complete the table.

Particle	Relative charge	Relative mass
proton	+1	1
neutron	0	.....
electron	.....	0.0005

[2]

(b) Sodium chloride is an **ionic** compound.

Carbon dioxide is a **covalent** compound.

Look at the table.

	Sodium chloride	Carbon dioxide
Formula	NaCl	CO_2
Type of particles present	ions	.....
Melting point	.....	low

(i) Complete the table. **[2]**

(ii) Carbon dioxide has a low melting point.

Explain why, using ideas about forces.

.....

..... **[1]**

[Total: 5]

3 An aluminium atom can be shown as

$$^{27}_{13}Al$$

(a) What can be deduced from this information about the structure of an aluminium atom and the position of aluminium in the Periodic Table?

The quality of written communication will be assessed in your answer to this question.

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..... **[6]**

(b) Rutherford was a scientist who contributed to the development of the theory of atomic structure.

He worked with two other scientists called Geiger and Marsden.

Write about Geiger and Marsden's experiment and how it contributed to the development of ideas about atomic structure.

.....

.....

.....

..... **[2]**

[Total: 8]

4 Atoms contain electrons, neutrons and protons.

Look at the table. It shows the number of electrons, neutrons and protons in some atoms and ions.

Atom or ion	Number of		
	electrons	**neutrons**	**protons**
$^{1}_{1}H$	**1**		
$^{2}_{1}H$	**1**		
$^{31}_{15}P$	15	16	15
.....	15	17	15
$^{32}_{16}S^{2-}$	.....	16	16

(a) Complete the table. **[2]**

(b) $^{1}_{1}H$ and $^{2}_{1}H$ are **isotopes** of hydrogen.

What is meant by the term **isotope**?

.....

..... **[1]**

(c) In 1808, a scientist named Dalton published his atomic theory.

About a century later, a scientist called Rutherford published another atomic theory.

Why is it important that scientists publish their theories?

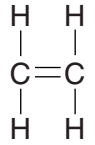
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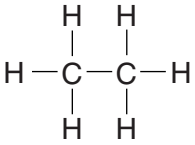
..... **[2]**

[Total: 5]

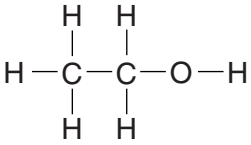
5 This question is about compounds containing carbon. Look at the displayed formulas of some compounds.



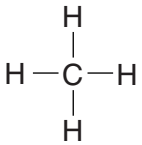
compound **A**



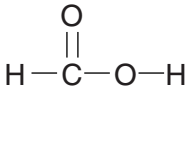
compound **B**



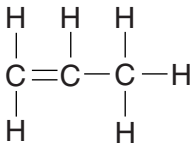
compound **C**



compound **D**



compound **E**



compound **F**

(a) What is the **molecular formula** for compound **B**?

..... **[1]**

(b) Explain why compound **B** is a hydrocarbon but compound **C** is not a hydrocarbon.

.....

.....

.....

..... **[3]**

(c) Two compounds are **unsaturated**.

Which two?

..... and ..... **[1]**

[Total: 5]