

1. (a) Complete this table showing information about atoms of some elements.

name of element	atomic number	mass number	number of protons in one atom	number of neutrons in one atom	number of electrons in one atom
hydrogen	1	1	1	0	1
helium	2		2	2	2
lithium		7	3	4	3
	1	2	1	1	1
helium	2	3	2	1	2

(3)

- (b) When atoms of different elements combine together, compounds are formed. Complete these word equations to show the formation of compounds.

sodium + chlorine →

copper + oxygen →

(2)

(Total 5 marks)

2. (a) The table contains information about protons, neutrons and electrons. Complete the table.

relative mass	relative charge	name
$\frac{1}{1840}$	-1	
1	0	
1	+1	

(2)

- (b) The numbers of protons, neutrons and electrons in four particles, **W**, **X**, **Y** and **Z**, are shown in the table.

particle	protons	neutrons	electrons
W	10	10	10
X	11	12	11
Y	11	13	10
Z	12	12	12

(i) Which **two** of the particles are isotopes of the same element?

Give a reason for your answer.

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(1)

(ii) Which one of the particles is an ion?

Give a reason for your answer.

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(1)

(iii) What is the charge on the ion you identified in part (ii)?

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(1)

(iv) **X** reacts with chlorine to form an ionic compound.

Explain how this happens in terms of electrons in the atoms.

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(2)

(Total 7 marks)

3. (a) Water is a covalent compound formed when hydrogen burns.

Write the balanced equation for the burning of hydrogen.

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(3)

(b) A small piece of sodium is dropped into a large beaker of water.
It reacts to form sodium hydroxide solution and a gas.

(i) Describe **three** things you would see.

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(3)

(ii) Give the name of the gas formed by this reaction.

..... (1)

(iii) Use the periodic table provided to help you predict how the reaction of caesium with water would be different to the reaction of sodium with water.

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..... (1)

(c) Sodium chloride is an ionic compound which dissolves in water.

(i) Explain why sodium chloride solution conducts electricity.

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..... (2)

(ii) Explain why solid sodium chloride does not conduct electricity.

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..... (2)
(Total 12 marks)

4. The ancient Greeks first thought of the idea of atoms. They had no experimental evidence of atoms but they liked the idea. Between 1803 and 1808, John Dalton worked out his atomic theory. He used the results of his own experiments and those of the French scientist Antoine Lavoisier.

Dalton stated:

- every chemical element is made up of atoms.
- the atoms of one element are different to those of all other elements.
- all atoms of a particular element are identical and have the same mass.
- chemical compounds are formed when atoms of different elements join together to form molecules.
- atoms cannot be split.



(a) Why was John Dalton's theory more scientific than that of the ancient Greeks?

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(1)

(b) In 1811, Avogadro suggested that hydrogen gas contained molecules made from two hydrogen atoms joined together. Dalton would not accept this idea. He asked "If two hydrogen atoms in a container filled with this gas can cling together, why do not all cling together and condense to a liquid?"

(i) What was Dalton suggesting?

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(1)

(ii) Explain, using a dot and cross diagram, why a hydrogen molecule contains only two hydrogen atoms.

(4)

(iii) In 1908, the scientists Wilhelm Ostwald and Ernst Mach still opposed the atomic theory of matter. They were unwilling to accept purely indirect evidence. Explain why the evidence for the existence of atoms was indirect.

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(1)

(Total 7 marks)