JUNE 09 Q4

EQ BOOKLET : PARTICLES + EQUATIONS

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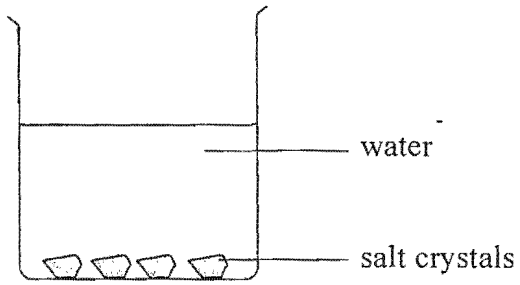
1. A few crystals of a green salt are placed in a beaker of cold water. The crystals start to dissolve.



(a) Describe how the appearance of the contents of the beaker change over a period of time.

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(2)

(b) Name the process that occurs after the crystals dissolve.

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(1)

(c) How will the results of the experiment differ if hot water is used in place of cold water? Explain your answer.

Difference .....

.....

Explanation .....

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(2)

2. (a) On cooling, the $H_2O(g)$ produced in the combustion of hydrogen is converted into $H_2O(l)$.

Describe how the speed of, and the distance between, the particles change during this conversion.

Speed of particles .....

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Distance between particles .....

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(2)

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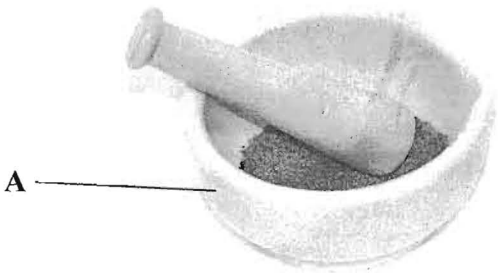
4. Rock salt is a naturally occurring mineral containing sodium chloride, clay and sand. Some properties of the components of rock salt are shown in the table.

Component	Colour	Solubility in water
sodium chloride	white	soluble
clay	brown	insoluble
sand	yellow	insoluble

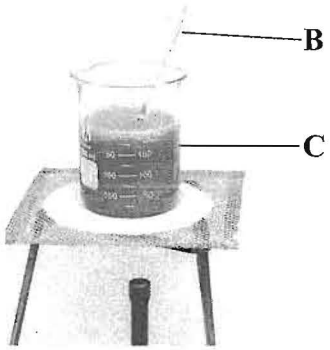
Pure sodium chloride can be obtained using the following method.

Picture 1



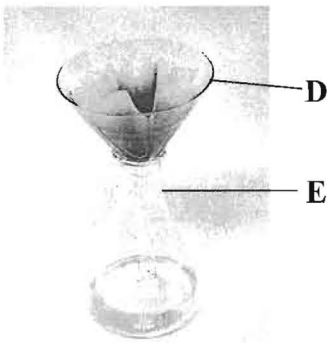
The rock salt is ground into smaller pieces.

Picture 2



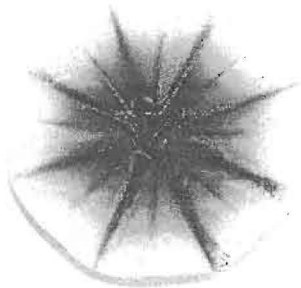
The rock salt is added to water, heated and stirred.

Picture 3



The solids are removed from the mixture.

Picture 4

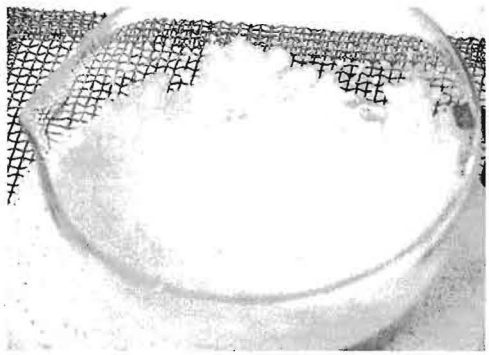


The solids remain on the filter paper.

Picture 5

The solution obtained is heated in an evaporating basin.

Picture 6



A white solid is left in the evaporating basin.

3.

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(a) Give the names of the pieces of apparatus labelled **A** to **F** in the pictures.
Use only the names given in the box.

basin	**beaker**	**Bunsen burner**	**conical flask**	**funnel**
gauze	**glass rod**	**mortar**	**pipette**	**tripod**

A .....

B .....

C .....

D .....

E .....

F .....

(6)

(b) Suggest a reason why the mixture was heated and stirred in Picture 2.

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(1)

(c) Name the process shown in Picture 3.

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(1)

(d) What are the solids left on the paper shown in Picture 4?

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(1)

(e) Name the white solid left in the evaporating basin in Picture 6.

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(1)

Q1

(Total 10 marks)

Q1

Leave blank

SECTION A

5. (a) Complete the table of information about the three types of particle found in an atom.

Name of particle	Relative mass	Relative charge
electron		–1
neutron	1	
proton		

(4)

(b) An atom of chlorine can be represented by the symbol

$$^{35}_{17}\mathrm{Cl}$$

(i) Explain the meaning of the term **mass number**. State the mass number of this chlorine atom.

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(2)

(ii) How many neutrons are in this atom of chlorine?

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(1)

(c) There are two types of boron atoms. Some contain 5 protons and 5 neutrons while others contain 6 neutrons.

(i) How many protons do the second type of boron atoms contain?

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(1)

(ii) What name is given to atoms of the same element with different numbers of neutrons?

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(1) Q1

(Total 9 marks)

Leave blank

SECTION B

6 (a) The table shows the electronic configurations of atoms of the elements in Period 3 of the Periodic Table.

Element	Na	Mg	Al	Si	P	S	Cl	Ar
Electronic configuration	2.8.1	2.8.2	2.8.3	2.8.4	2.8.5	2.8.6	2.8.7	2.8.8

(i) How is the electronic configuration of an atom of an element related to its position in the Periodic Table?

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(1)

(ii) Give the electronic configuration of an atom of the element directly below magnesium in the Periodic Table.

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(1)

(b) Explain the meaning of the term **isotopes**.

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(2)

6

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(c) An element exists as three isotopes. The table gives some information about them.

Number of neutrons	Number of protons	Atomic number of isotope	Mass number of isotope	Percentage of each isotope in the element
		12	24	79
13	12	12		
14	12		26	11

(i) Complete the table for the isotopes of the element.

(5)

(ii) Use the information in the table and the Periodic Table on page 2 to identify the element.

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(1)

(iii) Use the information in the table to calculate the relative atomic mass of the element. Give your answer to **three** significant figures.

(3)

(iv) When a sample of the element containing only atoms with a mass number of 24 was added to dilute sulphuric acid, effervescence was seen.
What would be seen if a sample of the element containing only atoms with a mass number of 26 was added to dilute sulphuric acid? Explain your answer.

Observation .....

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Explanation .....

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(2)

(Total 15 marks)

Q5

Leave blank

SECTION B

7. (a) What is meant by the term **atomic number**?

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(1)

(b) (i) What name is given to two atoms of the same element that contain different numbers of neutrons?

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(1)

(ii) Complete the table about two atoms of argon.

Number of protons in an atom	Number of electrons in an atom	Number of neutrons in an atom	Mass number
18	18	20	
			40

(4)

(iii) Explain why argon is chemically unreactive.

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(1)

(c) (i) In a sample of copper, 69.1% of the atoms have a mass number of 63 and the remainder have a mass number of 65.
Use this information to calculate the relative atomic mass of copper. Give your answer to 3 significant figures.

(3)

(ii) Explain why copper atoms with different numbers of neutrons have identical chemical properties.

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(1)

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8 (a) Lithium burns in oxygen to form the ionic compound lithium oxide.

(Analysis Topic)

(i) State the colour of the flame when lithium burns.

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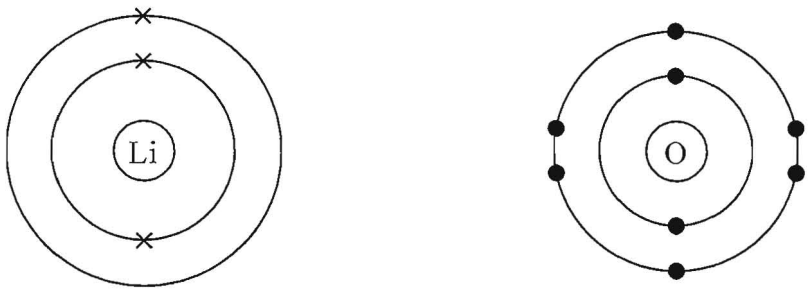
(1)

(ii) The diagrams show the electron configurations of an atom of lithium and an atom of oxygen.



Describe what happens, in terms of electrons, when lithium reacts with oxygen.

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(3)

(iii) Write the formula of each of the ions in lithium oxide.

Lithium ion .....

Oxide ion .....

(2)

Q1

Q3

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9. The reaction between magnesium and chlorine forms the ionic compound magnesium chloride, $MgCl_2$.

(a) By reference to electrons, describe how magnesium and chlorine atoms form magnesium chloride.

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(3)

10 (a) (i) A hydrogen chloride molecule contains a covalent bond.

Draw a dot and cross diagram to show the electrons in this molecule.
Show only the outer electrons of each atom.

(2)

(ii) How does the covalent bond hold the hydrogen and chlorine atoms together?

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(2)

Leave blank

18. (a) The combustion of hydrogen gives out a lot of heat. What term is used to describe reactions that give out heat?

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(1)

(b) The atoms in a molecule of hydrogen are joined by a strong covalent bond.

What is a covalent bond?

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(2)

(c) Explain why hydrogen is a gas at room temperature.

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(2)

(d) A molecule of oxygen can be represented by a dot and cross diagram:

Draw a dot and cross diagram, showing only the outer electrons, to represent a molecule of water.

(2)