



## New Document 1

Name: \_\_\_\_\_

Class: \_\_\_\_\_

Date: \_\_\_\_\_

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Time: **43 minutes**

Marks: **41 marks**

Comments:

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**Q1.**

John Newlands arranged the known elements into a table in order of atomic weight.

**Figure 1** shows part of Newlands' table.

**Figure 1**

| Group | 1  | 2  | 3  | 4  | 5  | 6 | 7 |
|-------|----|----|----|----|----|---|---|
|       | H  | Li | Be | B  | C  | N | O |
|       | F  | Na | Mg | Al | Si | P | S |
|       | Cl | K  | Ca |    |    |   |   |

(a) What are the names of the elements in Group 5 of Newlands' table?

Tick **one** box.

Calcium and sulfur

Carbon and silicon

Chlorine and silver

Chromium and tin

(1)

(b) In what order is the modern periodic table arranged?

Tick **one** box.

Atomic mass

Atomic number

Atomic size

Atomic weight

(1)

(c) Give **two** differences between Group 1 of Newlands' table and Group 1 of the periodic table.

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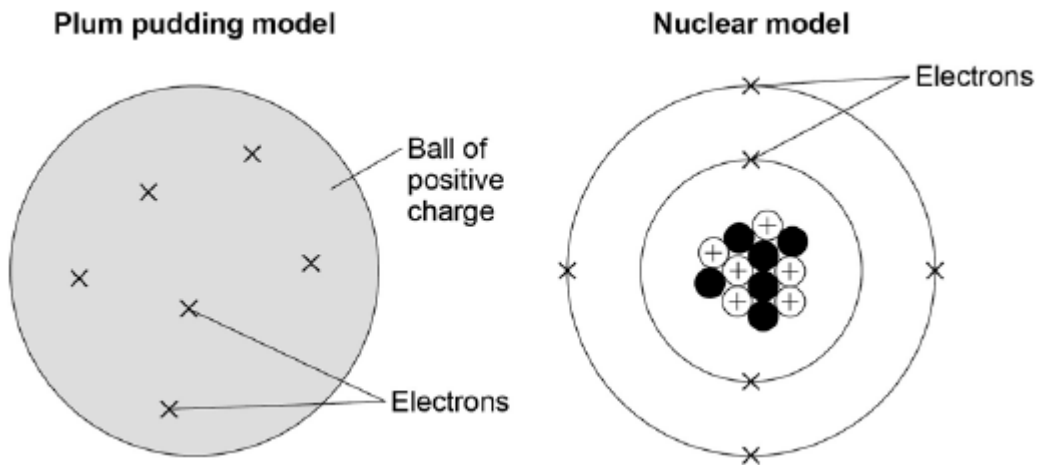
(2)

- (d) In 1864, atoms were thought to be particles that could not be divided up into smaller particles.

By 1898, the electron had been discovered and the plum pudding model of an atom was proposed.

**Figure 2** shows the plum pudding model of an atom of carbon and the nuclear model of an atom of carbon.

**Figure 2**



Compare the position of the subatomic particles in the plum pudding model with the nuclear model.

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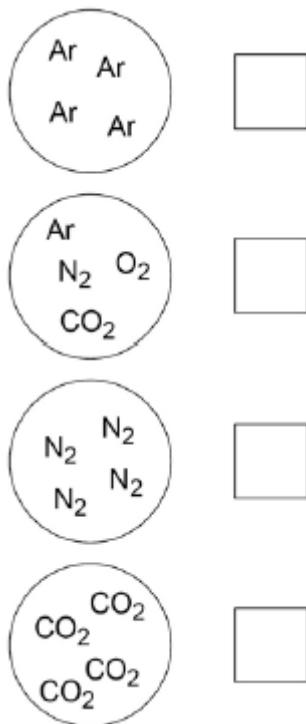
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(4)

- (e) Models are used to show the differences between elements, compounds and mixtures.

Which circle shows a model of a mixture?

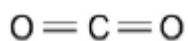
Tick **one** box.



(1)

(f) **Figure 3** shows a model of carbon dioxide.

**Figure 3**



What does each line between the atoms in **Figure 3** represent?

Tick **one** box.

Covalent bond

Intermolecular force

Ionic bond

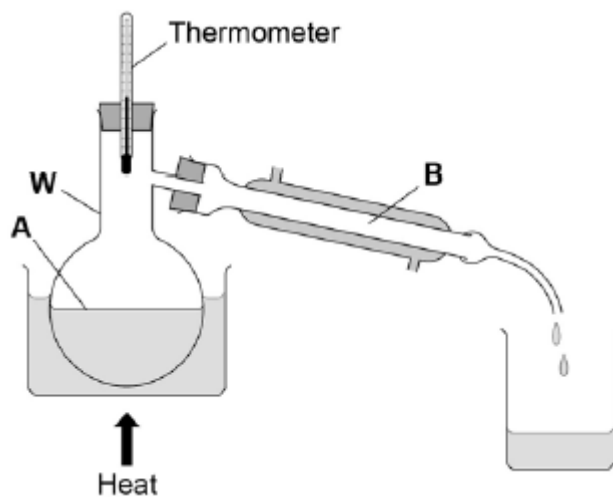
Metallic bond

(1)

(Total 10 marks)

**Q2.**

The apparatus in the figure below is used to separate a mixture of liquids in a fuel.



(a) What is apparatus **W** on above the figure above?

Tick **one** box.

Beaker

Boiling Tube

Flask

Jug

(1)

(b) What is the name of this method of separation?

Tick **one** box.

Crystallisation

Electrolysis

Filtration

Distillation

(1)

(c) Name the changes of state taking place at **A** and **B** in the figure above.

Use words from the box.

**boiling**

**condensing**

**freezing**

**melting**

Change of state at **A**: \_\_\_\_\_

Change of state at **B**: \_\_\_\_\_

(2)

- (d) **Table 1** shows the boiling points of the hydrocarbons in the fuel.

**Table 1**

| Hydrocarbon | Boiling point in °C |
|-------------|---------------------|
| Pentane     | 36                  |
| Hexane      | 69                  |
| Heptane     | 98                  |
| Octane      | 125                 |

Which hydrocarbon will be the last to collect in the beaker?

Tick **one** box.

- Pentane
- Hexane
- Heptane
- Octane

(1)

- (e) The fuel is a mixture of liquids that has been designed as a useful product.

What name is given to this type of mixture?

Tick **one** box.

- Catalyst
- Formulation
- Polymer
- Solvent

(1)

- (f) Describe how this fuel is different from crude oil.

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(2)

(g) A student measured the melting point of a solid hydrocarbon four times.  
The student's results are in **Table 2**.

**Table 2**

|                     | <b>Trial 1</b> | <b>Trial 2</b> | <b>Trial 3</b> | <b>Trial 4</b> |
|---------------------|----------------|----------------|----------------|----------------|
| Melting point in °C | 35             | 48             | 37             | 37             |

Calculate the mean melting point of the hydrocarbon, leaving out any anomalous result.

Give your answer to two significant figures.

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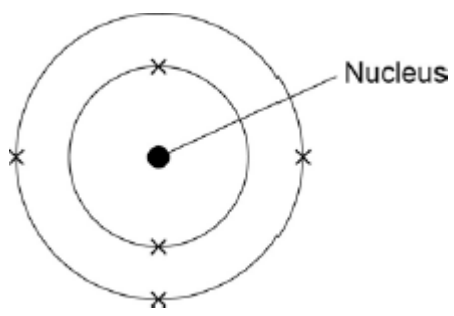
Mean melting point = \_\_\_\_\_ °C

(2)

(Total 10 marks)

**Q3.**

The figure below shows an atom of boron.



(a) When the mass of the boron atom is calculated, the mass of the electrons is ignored.

Why is the mass of the electrons ignored?

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(1)

(b) How many electrons are there in the boron atom?

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(1)

(c) What is the electrical charge on the nucleus of the boron atom?

Tick **one** box.

+1

+5

+6

+11

(1)

(d) The mass number of boron is 11.

Use the figure above to calculate the number of neutrons in the nucleus of the boron atom.

Explain how you worked out the answer.

Number of neutrons = \_\_\_\_\_

Explanation \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

(3)

(e) Phosphorus has a mass number of 31 and has 16 neutrons.

What percentage of the mass number of phosphorus is the number of neutrons?

Give your answer to two significant figures.

\_\_\_\_\_  
\_\_\_\_\_

Percentage = \_\_\_\_\_

(2)

(Total 8 marks)

#### Q4.

The elements in the periodic table are arranged in groups.

(a) What is similar about the elements in the same group?

Tick **one** box.

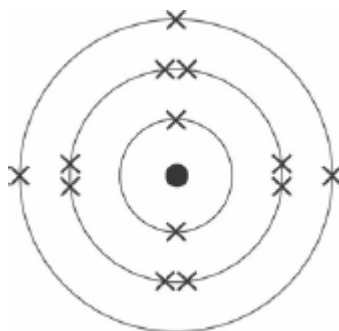


- Chemical properties
- Atomic numbers
- Relative atomic masses

(1)

(b) **Figure 1** shows the arrangement of electrons in an atom.

**Figure 1**



What group of the periodic table is this atom in?

Group \_\_\_\_\_

(1)

(c) Why are the elements in Group 0 unreactive?

Tick **one** box.

They are all gases at room temperature

They all have the same atomic number

They are all in the same group of the periodic table

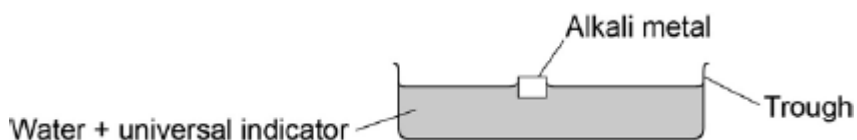
They all have a stable arrangement of electrons

(1)

(d) A teacher demonstrates the reaction of some alkali metals with water.

Look at **Figure 2**.

**Figure 2**



(1)

The students write what they see.

1. The alkali metals float on water.
2. The alkali metals fizz when they react with water.
3. The universal indicator changes from green to purple.
4. The sodium disappears faster than the lithium.

Give a reason for each of the four things that the students see.

1. The alkali metals float on water.

Reason \_\_\_\_\_  
\_\_\_\_\_

2. The alkali metals fizz when they react with water.

Reason \_\_\_\_\_  
\_\_\_\_\_

3. The universal indicator changes from green to purple.

Reason \_\_\_\_\_  
\_\_\_\_\_

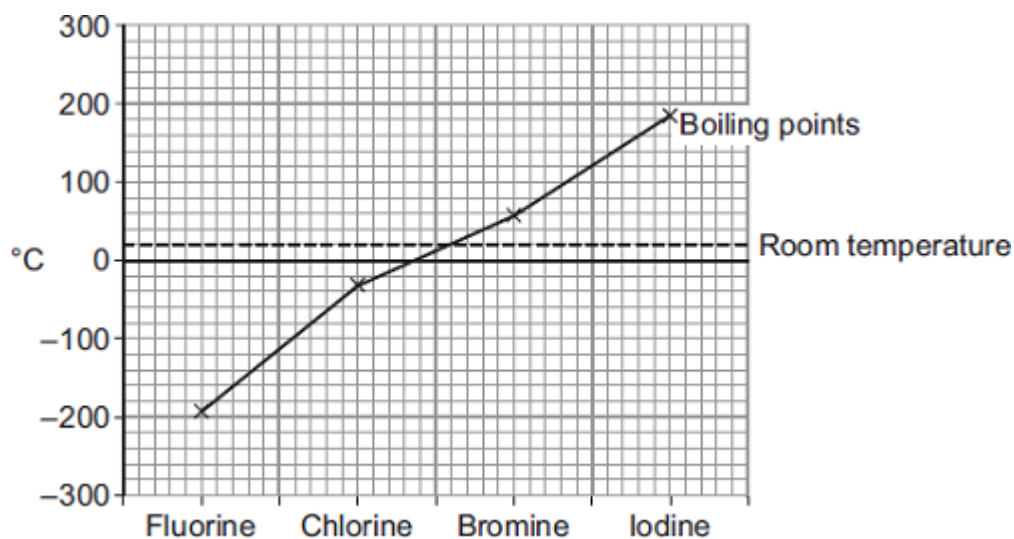
4. The sodium disappears faster than the lithium.

Reason \_\_\_\_\_  
\_\_\_\_\_

(4)  
(Total 7 marks)

### Q5.

The graph shows the boiling points of the halogens.



- (a) Use the graph to help you answer these questions.

(i) Use the correct answer from the box to complete the sentence.

|     |        |       |
|-----|--------|-------|
| gas | liquid | solid |
|-----|--------|-------|

At room temperature chlorine is a \_\_\_\_\_ .

(1)

(ii) Describe the trend in boiling point from fluorine to iodine.

\_\_\_\_\_  
\_\_\_\_\_

(1)

(b) Chlorine reacts with metals to produce metal chlorides.

(i) When a chlorine atom forms a chloride ion it gains one electron.

What is the charge on a chloride ion?

\_\_\_\_\_

(1)

(ii) Write a word equation for the reaction between sodium and chlorine.

\_\_\_\_\_

(1)

(c) In the UK water companies add chlorine to tap water.

Why is chlorine added to tap water?

\_\_\_\_\_

(1)

(d) Water companies add fluoride to tap water in some parts of the UK.

Fluoride is added to improve dental health.

Suggest **one** reason why some people are against adding fluoride to tap water.

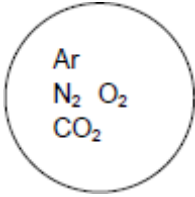
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(1)

(Total 6 marks)

## Mark schemes

### Q1.

- (a) Carbon and silicon 1
- (b) Atomic number 1
- (c) Hydrogen / fluorine / chlorine are not in Group 1 of the periodic table  
**or**  
Hydrogen and fluorine / chlorine are not in the same group of the periodic table 1  
Lithium / sodium / potassium are in Group 1 of the periodic table 1
- (d) plum pudding model has a single ball of positive charge and nuclear model has positive charges in the centre / nucleus 1
- plum pudding model has electrons in random positions and nuclear model has electrons in fixed positions 1
- plum pudding model has no nucleus and the nuclear model has a nucleus 1
- plum pudding model has no neutrons and the nuclear model has neutrons in the nucleus 1
- (e)  1
- (f) Covalent bond 1
- [10]**

### Q2.

- (a) Flask 1
- (b) Fractional distillation 1
- (c) **A** – boiling  
*in this order* 1
- B** – condensing 1

- (d) Pentane 1
- (e) Formulation 1
- (f) the fuel is a pure compound 1  
and crude oil is a mixture
- or**
- the fuel is made up of four hydrocarbons  
*allow crude oil contains a large number of compounds and  
the fuel contains four*
- and crude oil could have many more 1
- (g)  $(35 + 37 + 37 / 3) = 36.33$  1
- 36 1
- allow  $(35 + 48 + 37 + 37 / 4) = 39(.25)$  for 1 mark*

[10]

**Q3.**

- (a) because the mass of an electron is very small  
*do not accept has no mass* 1
- (b) 5 / five 1
- (c) +5 1
- (d) 6 1
- (because) mass number = no. protons + no. electrons  
*allow atomic number = 5* 1
- (so the number of) neutrons =  $11 - 5$   
*allow mass number – number of protons* 1
- (e)  $(16 / 31) \times 100 = 51.6$  1
- = 52  
*incorrect sig. figs max 1 mark* 1

[8]

**Q4.**

- (a) Chemical properties 1
- (b) three / 3 1
- (c) They all have a stable arrangement of electrons 1
- (d) less dense than water  
*allow lighter than water* 1
- gas / hydrogen produced 1
- an alkali / hydroxide is produced 1
- sodium is more reactive than lithium 1

[7]

**Q5.**

- (a) (i) gas 1
- (ii) Increases 1
- (b) (i) -1  
*allow Cl<sup>-</sup>*  
*allow -*  
*allow negative* 1
- (ii) sodium + chlorine → sodium chloride  
*allow correct symbol equation* 1
- (c) reduce microbes  
*accept sterilise*  
*accept prevent diseases*  
*allow disinfect*  
*allow kill bacteria / germs / microbes / micro-organisms*  
*allow to make it safe to drink*  
*ignore get rid of bacteria* 1
- (d) any **one** from:
- no freedom of choice  
*allow unethical*
  - fluoride in toothpaste
  - too much can cause fluorosis  
*allow too much can cause damage to teeth*

