# New Document 1

Name: _____

Class: _____

Date: _____

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Time: **36 minutes**

Marks: **36 marks**

Comments:

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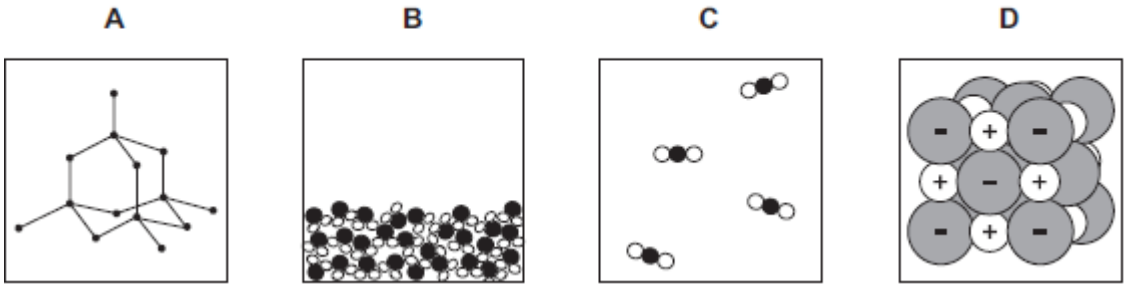
## Q1.

The structures of four substances, **A**, **B**, **C** and **D**, are represented in **Figure 1**.

**Figure 1**




(a) Use the correct letter, **A**, **B**, **C** or **D**, to answer each question.

(i) Which substance is a gas?

**(1)**

(ii) Which substance is a liquid?

**(1)**

(iii) Which substance is an element?

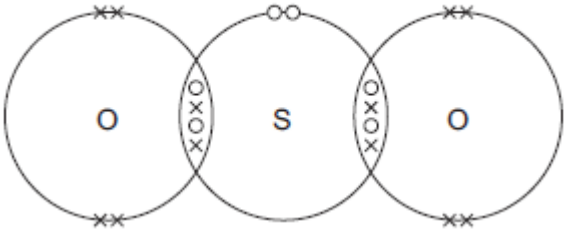
**(1)**

(iv) Which substance is made of ions?

**(1)**

(b) **Figure 2** shows the bonding in substance **C**.

**Figure 2**




(i) What is the formula of substance **C**?

Draw a ring around the correct answer.

**$SO_2$** **$SO^2$** **$S_2O$**

**(1)**

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

| | | |
|---|---|---|
| **delocalised** | **shared** | **transferred** |

When a sulfur atom and an oxygen atom bond to produce substance **C**,

electrons are _____

**(1)**

(iii) What is the type of bonding in substance **C**?

Draw a ring around the correct answer.

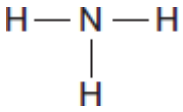
**covalent** **ionic** **metallic**

**(1)**

**(Total 7 marks)**

## Q2.

(a) A particle of ammonia is represented by the formula $NH_3$ or as:




(i) How many different elements are there in a particle of ammonia?

_____

**(1)**

(ii) Draw a ring around the correct answer to complete the sentence.

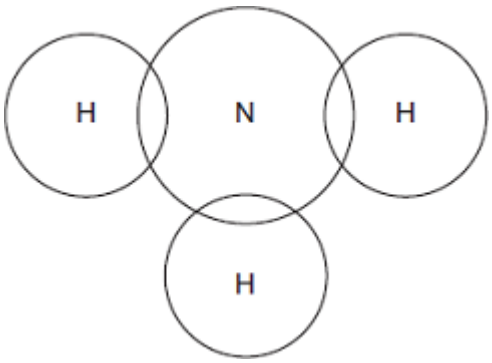
A particle of ammonia is called

- an atom.
- an ion.
- a molecule.

**(1)**

(iii) Complete the dot and cross bonding diagram for ammonia.

Show **only** electrons in the outer energy level of each atom.



**(2)**

(b) Ammonia gas reacts with hydrogen chloride gas to produce a white solid.

The formula of the white solid is $NH_4Cl$

(i) Complete the equation by adding the correct state symbols.

$$NH_3(g) + HCl(\_\_\_\_) \longrightarrow NH_4Cl(\_\_\_\_)$$

**(1)**

(ii) The white solid has the formula $NH_4Cl$

Complete the name of the white solid.

Ammonium _____

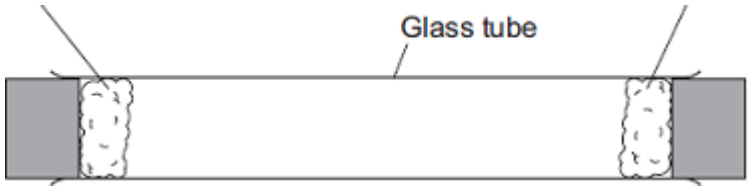
**(1)**

(c) Concentrated ammonia solution gives off ammonia gas.

Concentrated hydrochloric acid gives off hydrogen chloride gas.

Apparatus was set up as shown in **Diagram 1**.

**Diagram 1**




(i) Concentrated hydrochloric acid is corrosive.

Give **one** safety precaution you should take when using concentrated hydrochloric acid.

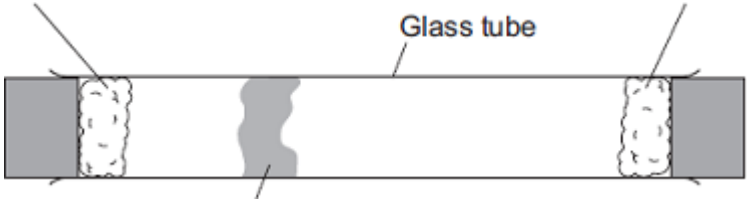
_____

_____

**(1)**

(ii) After 3 minutes a white solid was seen in the glass tube, as shown in **Diagram 2**.

**Diagram 2**




White solid formed here

Suggest why the white solid is seen nearer the concentrated hydrochloric acid than the concentrated ammonia.

_____

_____

**(1)**

(iii) The experiment was repeated at a higher temperature.

Explain why the white solid was produced in less than 3 minutes.

_____

_____

_____

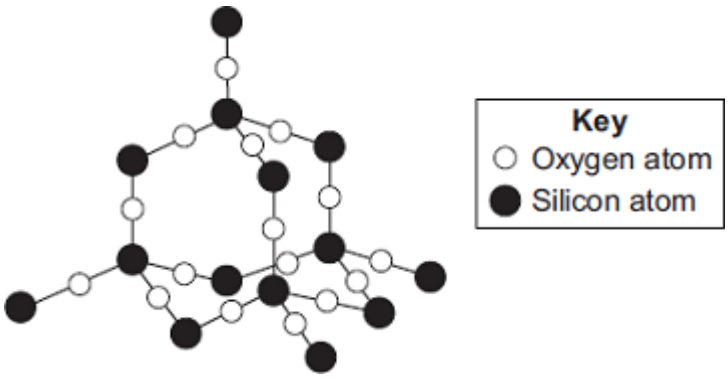
_____

**(2)**

**(Total 10 marks)**

## Q3.

The diagram shows a small part of the structure of silicon dioxide.




(a) Use the diagram above to answer the question.

Draw a ring around the correct answer to complete each sentence.

In silicon dioxide, each silicon atom is bonded with

| |
|---|
| two |
| three |
| four |

oxygen atoms.

The bonds in silicon dioxide are

| |
|---|
| ionic. |
| covalent. |
| metallic. |

**(2)**

(b)

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Silicon dioxide is used as the inside layer of furnaces.

Suggest why.

_____

_____

**(1)**

(c) Nanowires can be made from silicon dioxide.

Draw a ring around the correct answer to complete the sentence.

The word ‘nano’ means the wires are very

| |
|---|
| brittle. |
| thick. |
| thin. |

**(1)**

**(Total 4 marks)**

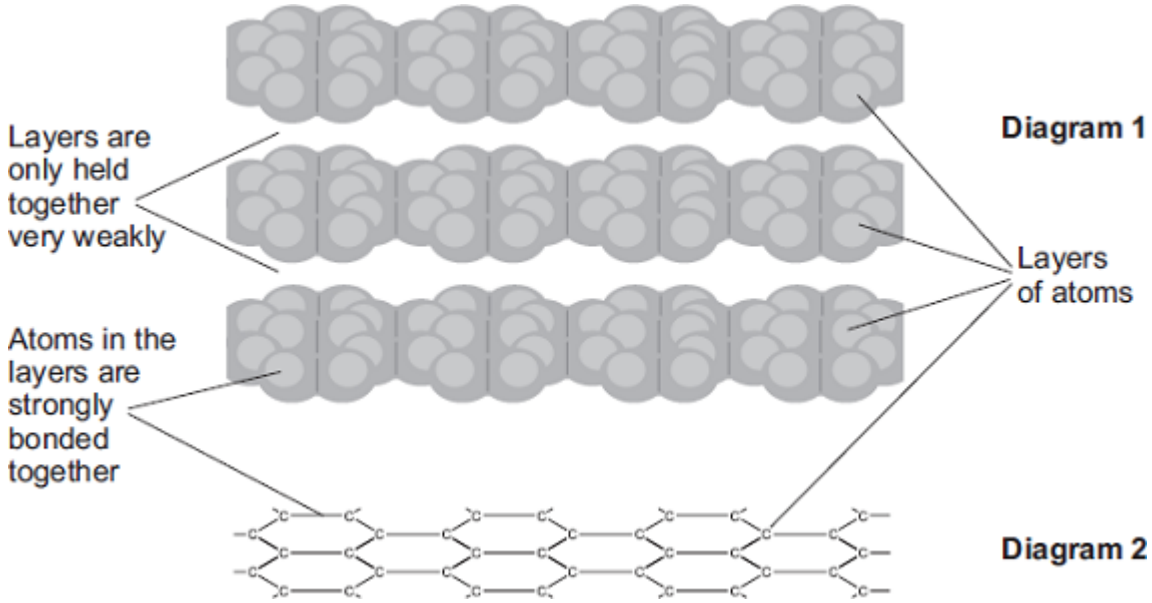
## Q4.

The picture shows a student filling in a multiple choice answer sheet using a pencil.



The pencil contains graphite. Graphite rubs off the pencil onto the paper.

Diagrams **1** and **2** show how the atoms are arranged in graphite.




(a) Use the diagrams to help you explain why graphite can rub off the pencil onto the paper.

_____

_____

_____

_____

**(2)**

(b) Draw a ring around the type of bond which holds the atoms together in each layer.

**covalent** **ionic** **metallic**

**(1)**

**(Total 3 marks)**

## Q5.

This question is about lithium and sodium.

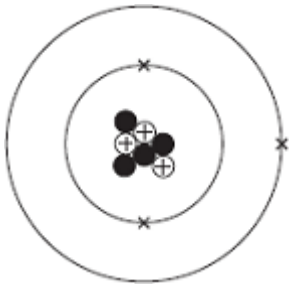
(a) Use the Chemistry Data Sheet to help you to answer this question.

In which group of the periodic table are lithium and sodium? Group ☐

**(1)**

(b) A lithium atom can be represented as $^{7}_{3}Li$

The diagram represents the lithium atom.



(i) Some particles in the nucleus have a positive charge.

What is the name of these particles?

_____

**(1)**

(ii) Some particles in the nucleus have no charge.

What is the name of these particles?

_____

**(1)**

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

| | | |
|---|---|---|
| **3** | **4** | **7** |

The mass number of this atom of lithium is ☐

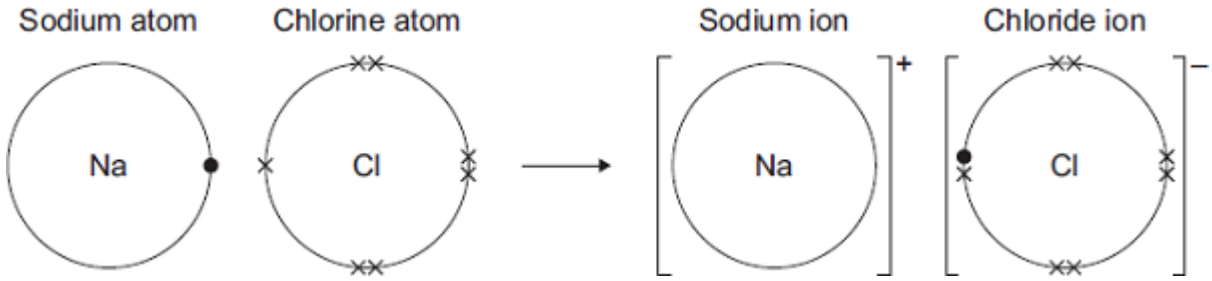
**(1)**

(c) Sodium reacts with chlorine to produce sodium chloride.

sodium + chlorine ⟶ sodium chloride

The diagram shows how the reaction happens.

Only the outer electrons are shown.




Draw a ring around the correct answer to complete each sentence.

(i) A sodium atom changes into a sodium ion by

| |
|---|
| gaining |
| losing |
| sharing |

an electron.

**(1)**

(ii) A sodium ion has

| |
|---|
| a negative |
| no |
| a positive |

charge.

**(1)**

(iii) The ions in sodium chloride are held together by

strong

| |
|---|
| covalent |
| electrostatic |
| magnetic |

forces.

**(1)**

(d) Sodium chloride is an ionic compound.

Tick (✓) **two** properties of ionic compounds.

| Property | Tick (✓) |
|---|---|
| Do **not** dissolve in water | |
| High melting points | |
| Low boiling points | |
| Strong bonds | |

**(2)**

(e) (i) The formula of sodium chloride is NaCl

Calculate the relative formula mass of sodium chloride.

Relative atomic masses: Na = 23; Cl = 35.5

_____

_____

Relative formula mass = _____

**(1)**

(ii) Draw a ring around the correct answer to complete each sentence.

The relative formula mass of a substance, in grams,

is one | ion | isotope | mole | of the substance.

**(1)**

(f) Nanoparticles of sodium chloride (salt) are used to flavour crisps.

What are nanoparticles?

_____

_____

**(1)**

**(Total 12 marks)**

Mark schemes

## Q1.

(a) (i) C

**1**

(ii) B

**1**

(iii) A

**1**

(iv) D

**1**

(b) (i) $SO_2$

**1**

(ii) shared

**1**

(iii) covalent

**1**

**[7]**

## Q2.

(a) (i) two

**1**

(ii) a molecule

**1**

(iii) one pair of electrons between nitrogen and each of 3 hydrogens

**1**

rest correct

*second mark dependent on first*

**1**

(b) (i) (g) (s)

**1**

(ii) chloride

*ignore formulae*

**1**

(c) (i) any **one** from:

- wear goggles
- wear gloves
- do not breathe in fumes
- wipe up spills immediately
- work in a fume cupboard

**1**

(ii) (particles of) ammonia move faster than (particles of) hydrogen chloride

*allow diffuses faster*

*allow hydrochloric acid*

1

(iii) particles / molecules have more energy

*do **not** accept atoms / ions*

1

so they move faster

*ignore references to rate of reaction*

1

**[10]**

## Q3.

(a) four

1

covalent

1

(b) because it has a high melting point

*accept it won't melt*

*accept it won't decompose or react*

*allow withstand high temperatures*

*ignore boiling point*

1

(c) thin

1

**[4]**

## Q4.

(a) layers

which have weak forces / attractions / bonds between them

*second mark must be linked to layers*

1

**or**

which can slide over each other **or** separate

*ignore references to rubbing*

1

(b) covalent

1

**[3]**

## Q5.

(a) 1 / one

1

(b) (i) protons

1

(ii) neutrons

1

(iii) 7

**1**

(c) (i) losing

**1**

(ii) a positive

**1**

(iii) electrostatic

**1**

(d) high melting points

**1**

strong bonds

**1**

(e) (i) 58.5

**1**

(ii) mole

**1**

(f) very small (particles) **or**

*ignore tiny / small / smaller / microscopic etc.*

1-100nm in size **or**

(particle with a) few hundred atoms

**1**

**[12]**