St Bedes Catholic Voluntary Academy



Chemistry Paper 1 Foundation Revision Booklet

Name:…………………………………………………………….

Class:………………………………………………………………

 The diagram represents an atom. Choose words from the list to label the diagram.

**1**

**electron**  **ion**  **neutron**  **nucleus**



**(3 marks)**

Choose words from this list to complete the sentences below.

 **carbonate** **chloride** **compound** **mixture** **oxide** **solution**

1. When two elements react, the new substance formed is called a .............................. .

**(1)**

1. The white powder formed when zinc reacts with oxygen is called zinc .......................... .

**(1)**

 **(Total 5 marks)**

 There are millions of different substances that make up our world. All these substances are

**2**

made from chemical elements.

1. What is an element?

.............................................................................................................................

.............................................................................................................................

.............................................................................................................................

.............................................................................................................................

 **(1)**

1. Many substances are compounds. What is a compound?

.............................................................................................................................

.............................................................................................................................

.............................................................................................................................

.............................................................................................................................

**(2)**

**(Total 3 marks)**The diagram represents the electronic structure of an atom of an element.

**3**



 The periodic table on the Data Sheet may help you with this question.

1. Name this element.

...................................................................................................................

**(1)**

1. Complete this sentence.

The nucleus of an atom contains neutrons and ..........................................................

**(1)**

**(Total 2 marks)**

 The periodic table on the Data Sheet may help you to answer this question.

**4**

 The diagram shows an outline of the periodic table.



 Choose your answers **only** from the letters shown on this outline table.

 Which letter, **A** to **H**, represents an element which: (a) is in Group 3,

Letter ............................

**(1)**

1. is in Period 2,

Letter ............................

**(1)**

1. is a transition element,

Letter ............................

**(1)**

1. is the least reactive element in Group 7,

Letter ............................

**(1)**

1. is the most reactive metal?

Letter ............................

**(1)**

**(Total 5 marks)**

 The elements in Mendeleev’s periodic table were arranged in order of increasing atomic mass.

**5**

Part of the modem Periodic Table is shown.



1. Complete the sentence by writing in the missing words.

 The modem Periodic Table is arranged in order of increasing

......................................... ......................................... .

**(1)**

1. (i) Name a metal in the same group as lithium.

...................................................................................................................

**(1)**

(ii) Name a non-metal in the same period as magnesium.

...................................................................................................................

**(1)**

**(Total 3 marks)**

This question is about the periodic table of elements.

**6**

Use the Chemistry Data Sheet to help you to answer these questions.

In 1869 Dmitri Mendeleev produced an early version of the periodic table.

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

|  |
| --- |
| atomic weight.date of discovery. electron number. |

* 1. Mendeleev first arranged the elements in order of their

**(1)**

|  |
| --- |
| groups. periods. shells. |

* 1. Mendeleev then placed elements with similar properties in columns called

 **(1)**

* 1. When the next element did not fit the pattern,

|  |
| --- |
| ignored the element. left a gap. put the element at the end of the row. |

 Mendeleev

**(1)**

* 1. Mendeleev was not able to include the noble gases (Group 0) in his periodic table

|  |
| --- |
| are not elements. are not reactive. had not been discovered by 1869. |

 because the noble gases

**(1)**

1. Use the correct word from the box to complete each sentence.

|  |  |  |  |
| --- | --- | --- | --- |
| **electrons** | **molecules** | **neutrons** | **protons** |

In the modern periodic table elements are arranged in order of the number of

........................................... in their nucleus. Elements in the same group have the same

number of ........................................... in their highest energy level (outer shell).

**(2)**

1. Sodium (Na) is in Group 1 of the periodic table.

Nickel (Ni) is a transition element.

Tick () **two** correct statements about sodium and nickel.

|  |  |
| --- | --- |
| **Statement** |  **Tick (** **)** |
| Sodium and nickel are both metals. |   |
| Sodium has a higher melting point than nickel. |   |
| Sodium is more reactive than nickel. |   |
| Sodium is harder than nickel. |   |

**(2)**

1. Chlorine, bromine and iodine are in Group 7 of the periodic table.

Chlorine is more reactive than bromine.

* 1. Complete the word equation for the reaction between chlorine and sodium bromide.

 chlorine + sodium bromide  ....................... + sodium chloride

**(1)**

* 1. Why does iodine **not** react with sodium bromide solution?

...............................................................................................................

...............................................................................................................

**(1) (Total 10 marks)**

This question is about drinking water.

**7**

1. Name **two** methods of treating water from rivers, lakes or the sea to produce drinking water.

Tick **two** boxes.

|  |  |
| --- | --- |
|  |   |
| Cracking |   |
|  Desalination |   |
|  Electrolysis |   |

1. The table below shows the amounts of dissolved ions in a sample of drinking water.

|  |  |
| --- | --- |
| **Dissolved ion** | **Mass in mg per dm3** |
| Cl– | 250 |
| Na+ | 200 |
| NO3+ | 40 |

What is the name of the ion with the symbol Cl–?

Tick **one** box.

 Calcium ion

 Carbonate ion

 Chloride ion

 Chlorine ion

**(1)**

1. Use the information in the table above to complete the bar chart in **Figure 1**.

**Figure 1**



**(1)**

1. Look at the questions labelled **A, B, C, D**.
	1. How many substances are there in drinking water?
	2. How much fluoride is in drinking water?
	3. Is fluoride soluble in drinking water?
	4. Should fluoride be added to drinking water?

Which **one** of the questions cannot be answered by science alone?

Tick **one** box.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** |   |   | **B** |   |   | **C** |   |   | **D** |   |

**(1)**

1. Give **two** reasons why the answer you have chosen cannot be answered by science alone.
	1. .....................................................................................................................

........................................................................................................................

* 1. .....................................................................................................................

........................................................................................................................

**(2)**

1. A sample of drinking water contains 1.5 mg of fluoride per dm3 of water.

A person drinks 1 dm3 of this water.

The recommended daily amount of fluoride is 4.0 mg.

Which calculation gives the percentage of the recommended daily amount of fluoride in 1 dm3 of this water?

Tick **one** box.

**(1)**

1. **Figure 2** shows the effect of fluoride in drinking water on tooth decay in different age groups.

**Figure 2**



Describe the pattern of tooth decay in **Figure 2** for water without fluoride.

Use data to justify your answer.

........................................................................................................................

........................................................................................................................

........................................................................................................................

........................................................................................................................

**(2)**

1. Describe the effect of adding fluoride to drinking water for the age groups in **Figure 2**.

........................................................................................................................

........................................................................................................................

........................................................................................................................

........................................................................................................................

**(2) (Total 12 marks)**

 8. Two isotopes of hydrogen are hydrogen-1 () and hydrogen-2 ().

The diagrams represent atoms of hydrogen-1 and hydrogen-2.



1. Use the correct words from the box to complete the sentences.

|  |  |  |  |
| --- | --- | --- | --- |
| **electrons** |  | **neutrons** | **protons** |

* 1. The positive particles,  , in the nucleus of atoms are called

............................................................................ .

**(1)**

* 1. The particles with no charge, ● , in the nucleus of atoms are called

............................................................................ .

**(1)**

1. The diagrams show two different types of water molecule.



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

|  |
| --- |
| heavier than lighter thanthe same mass as |

Molecule **A** molecule **B**.

is

Explain your answer.

........................................................................................................................

........................................................................................................................ (2)

 (Total 4 Marks)

 Sando-K is a medicine. It is given to people whose bodies contain too little of a particular

**9**

element.

 Sando-K is a mixture of two compounds. The formulae of the two compounds are given below.

**KHCO3** **KCl**

1. Use the Data Sheet to help you to name all the elements in these compounds.

.............................................................................................................................

.............................................................................................................................

.............................................................................................................................

.............................................................................................................................

**(3)**

1. Which metal do people given Sando-K need?

.............................................................................................................................

**(1)**

**(Total 4 marks)**

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

**10**

**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 |   |   |   |   |

1. What are the names of the elements in Group 5 of Newlands’ table?

Tick **one** box.

|  |  |
| --- | --- |
|  |   |
|  Carbon and silicon |   |
|  Chlorine and silver |   |
|  Chromium and tin |  |

 Calcium and sulfur 

**(1)**

1. In what order is the modern periodic table arranged?

Tick **one** box.

 Atomic mass

 Atomic number

 Atomic size

 Atomic weight

**(1)**

1. Give **two** differences between Group 1 of Newlands’ table and Group 1 of the periodic table.

........................................................................................................................

........................................................................................................................

........................................................................................................................

........................................................................................................................

**(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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**(4)**

1. Models are used to show the differences between elements, compounds and mixtures.

Which circle shows a model of a mixture?

Tick **one** box.



**(1)**

1. **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)**

1. You may find the Data Sheet helpful to complete the word equation.

**11**

 These two gases react as shown in the balanced symbol equation.

2H2 + O2 → 2H2O

 Complete the word equation for this reaction.

hydrogen + ............................... → ......................................

**(2)**

1. Complete this sentence by crossing out the **two** words in the box that are wrong.

 This chemical reaction is much faster if a molecule if a

**(1)**  is used.

**(Total 3 marks)**

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

**12**



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

* 1. Which substance is a gas? 

**(1)**

* 1. Which substance is a liquid? 

**(1)**

* 1. Which substance is an element? 

**(1)**

* 1. Which substance is made of ions? 

**(1)**

1. **Figure 2** shows the bonding in substance **C**.



* 1. What is the formula of substance **C**?

Draw a ring around the correct answer.

 **SO2 SO2 S2O**

**(1)**

* 1. 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)**

* 1. What is the type of bonding in substance **C**?

Draw a ring around the correct answer.

 **covalent ionic metallic**

**(1) (Total 7 marks)**

 The picture shows a student using a pencil to complete a multiple choice answer sheet.

**13**



 By albertogp123 [CC BY 2.0] , via Flickr

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

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



1. Use **Diagram 2** and your Data Sheet to help you to name the element from which graphite is made.

........................................................................................................................

**(1)**

1. Use **Diagram 1** to help you explain why graphite can rub off the pencil onto the paper.

........................................................................................................................

........................................................................................................................

........................................................................................................................

........................................................................................................................

**(2)**

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

 **covalent ionic metallic**

1. **(Total 4 marks)**

The diagram represents a magnesium atom.

**14**

 

(a) Use words from the box to answer these questions.

|  |  |  |  |
| --- | --- | --- | --- |
| **electron** | **neutron** | **nucleus** | **proton** |

1. What is the name of the central part of the atom? ............................................

**(1)**

1. What is the name of the particle with no charge? ..............................................

**(1)**

1. What is the name of the particle with a negative charge? ..................................

# (1)

(b) Use the diagram above to help you answer these questions.

(i) Draw a ring around the atomic (proton) number of this magnesium atom.

 **12 24 36**

# (1)

(ii) Draw a ring around the mass number of this magnesium atom.

 **12 24 36**

# (1)

(c) The diagram shows how magnesium and iodine atoms form magnesium iodide.

Only the outer electrons are shown.

The dots (●) and crosses (×) are used to represent electrons.

 

**Use the diagram** to help you to answer this question.

Describe, as fully as you can, what happens when magnesium reacts with iodine to make magnesium iodide.

To gain full marks you should use the words atom, electron and ion in your answer.

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# (4) (Total 9 marks

1. (i) The electronic structure of a magnesium atom is shown below.



Use the correct answer from the box to complete each sentence.

|  |  |  |  |
| --- | --- | --- | --- |
| **electrons** | **neutrons** | **protons** | **shells** |

The nucleus contains protons and ..................

The particles with the smallest relative mass that move around the nucleus are called

..................

Atoms of magnesium are neutral because they contain the same number of electrons and ..................

**(3)**

(ii) A magnesium atom reacts to produce a magnesium ion.

Which diagram shows a magnesium ion?

Tick () **one** box.



**(1)**

1. Magnesium and dilute hydrochloric acid react to produce magnesium chloride solution andhydrogen.

 Mg(s) + 2 HCl(aq)  MgCl2(aq) + H2(g)

* 1. State **two** observations that could be made during the reaction.
		1. ............................................................................................................

...............................................................................................................

* + 1. ............................................................................................................

...............................................................................................................

**(2)**

* 1. **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Describe a method for making pure crystals of magnesium chloride from magnesium and dilute hydrochloric acid.

In your method you should name the apparatus you will use.

You do **not** need to mention safety.

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**(6) (Total 12 marks)**

Sodium chloride is an ionic compound.

**15**

**(2)**

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.

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

 In silicon dioxide, each silicon atom is bonded with oxygen atoms.

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

 The bonds in silicon dioxide are

**(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.

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

 The word ‘nano’ means the wires are very

**(1) (Total 6 marks)**

This question is about lithium and sodium.

**16**

1. 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)**

1. A lithium atom can be represented as 

The diagram represents the lithium atom.

 

* 1. Some particles in the nucleus have a positive charge.

What is the name of these particles? ......................................................................

**(1)**

* 1. Some particles in the nucleus have no charge.

What is the name of these particles? ........................................................................

**(1)**

* 1. Use the correct answer from the box to complete the sentence.

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

The mass number of this atom of lithium is 

**(1)**

1. 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.

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

(i) A sodium atom changes into a sodium ion byan electron.

**(1)**

|  |
| --- |
| a negative noa positive |

(ii)

 A sodium ion hascharge.

**(1)**

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

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

**(1)**

1. 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)**

1. (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.

|  |
| --- |
| ionisotopemole |

The relative formula mass of a substance, in grams, is of the substance. one

**(1)**

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

What are nanoparticles?

........................................................................................................................

........................................................................................................................

1. **(Total 12 marks)**

The three states of matter are solid, liquid and gas.

**17**

1. Lithium reacts with water to produce lithium hydroxide solution and hydrogen.

Use the correct state symbols from the box to complete the chemical equation.

 aq g l s

 2Li(s) + 2H2O(l)  2LiOH(.......) + H2(.......)

lithium + water  lithium hydroxide + hydrogen

**(2)**

1. The table gives information about two isotopes of hydrogen, hydrogen-1 and hydrogen-2.

|  |  |  |
| --- | --- | --- |
|   | **Hydrogen-1** | **Hydrogen-2** |
| Atomic number | 1 | 1 |
| Mass number | 1 | 2 |

An atom of hydrogen-1 is represented as:

|  |
| --- |
|     |

Show how an atom of hydrogen-2 is represented.

**(1)**

1. (i) Calculate the relative formula mass (*M*r) of water, H2O

Relative atomic masses: H = 1; O = 16.

...............................................................................................................

...............................................................................................................

 Relative formula mass (*M*r ) = ...........................................

**(1)**

(ii) Simple molecules like water have low boiling points.

Explain why, in terms of molecules.

...............................................................................................................

...............................................................................................................

...............................................................................................................

...............................................................................................................

**(2)**

1. Molecules of heavy water contain two atoms of hydrogen-2 instead of two atoms ofhydrogen-1.

Explain why a molecule of heavy water has more mass than a normal water molecule. You should refer to the particles in the nucleus of the two different hydrogen atoms in your answer.

........................................................................................................................

........................................................................................................................ **(2) (Total 6 marks)**

This question is about carbon and gases in the air.

**18**

1. Carbon atoms have protons, neutrons and electrons.

Complete the table by writing the relative mass of a neutron and an electron.

|  |  |
| --- | --- |
| **Name of particle** | **Relative mass** |
| proton | 1 |
| neutron |   |
| electron |   |

**(2)**

1. What is the total number of protons and neutrons in an atom called?

 Tick () **one** box.

 The atomic number 

 The mass number 

 One mole of the atom 

**(1)**

1. An atom of carbon has six electrons.

Which structure, **A, B** or **C**, represents the electronic structure of the carbon atom?



 The carbon atom is structure 

**(1)**

1. Carbon reacts with oxygen to produce carbon dioxide (CO2).
2. How many different elements are in one molecule of carbon dioxide?

............................................................

**(1)**

1. What is the total number of atoms in one molecule of carbon dioxide?

............................................................

**(1)**

1. Sometimes carbon reacts with oxygen to produce carbon monoxide (CO).
	1. Calculate the relative formula mass (*M*r) of carbon monoxide. Relative atomic masses (*A*r): C = 12; O = 16

...............................................................................................................

...............................................................................................................

*Mr* of carbon monoxide = ..............................

**(1)**

* 1. Calculate the percentage by mass of carbon in carbon monoxide.

...............................................................................................................

...............................................................................................................

Percentage by mass of carbon in carbon monoxide = ..........%

**(1)**

1. Carbon dioxide is one of the gases in the air.
	1. The graph shows the percentage of argon and the percentage of carbon dioxide inthe air.



What is the percentage of argon in the air?

Percentage of argon = ........................................ %

**(1)**

* 1. An instrumental method is used to measure the amount of carbon dioxide in theair.

Give **one** reason for using an instrumental method.

...............................................................................................................

...............................................................................................................

**(1) (Total 10 marks)**

Calcium oxide (quicklime) is made by heating calcium carbonate (limestone).

**18**

calcium carbonate → calcium oxide + carbon dioxide

 100 g ? 44 g

1. 44 grams of carbon dioxide is produced when 100 grams of calcium carbonate is heated.

 Calculate the mass of calcium oxide produced when 100 grams of calcium carbonate is heated.

....................................................................................................................................

mass ......................... g

**(1)**

1. What mass of carbon dioxide could be made from 100 tonnes of calcium carbonate?

mass ....................... tonnes

**(1)**

**(Total 2 marks)**

The pH scale is a measure of the acidity or alkalinity of a solution.

**19**

1. Draw one line from each solution to the pH value of the solution.

 **Solution pH value of the solution**

 5

|  |  |  |
| --- | --- | --- |
| Acid |   | 7 |

 9

|  |  |  |
| --- | --- | --- |
| Neutral |   | 11 |

 13

**(2)**

1. Which ion in aqueous solution causes acidity?

Tick **one** box.

 H+

 Na+

 O2−

 OH−

**(1)**

1. When sulfuric acid is added to sodium hydroxide a reaction occurs to produce twoproducts.

The equation is:

 H2SO4 + 2NaOH  Na2SO4 + 2H2O

How many elements are in the formula H2SO4?

Tick **one** box.

 3

 4

 6

 7

**(1)**

1. What is this type of reaction?

Tick **one** box.

 Decomposition

 Displacement

 Neutralisation

 Reduction

**(1)**

1. Name the salt produced.

........................................................................................................................

**(1)**

1. Describe how an indicator can be used to show when all the sodium hydroxide has reacted with sulfuric acid.

........................................................................................................................

........................................................................................................................

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........................................................................................................................

........................................................................................................................

........................................................................................................................

**(3) (Total 9 marks)**

**20**

 This is the headline from a newspaper:



1. The bar chart shows the percentages of metals in UK coins in 1991.



Use the bar chart to answer these questions.

* 1. Which metal is in all of these coins?

 ......................................................................

**(1)**

* 1. Which coin does **not** contain zinc?

 ......................................................................

**(1)**

* 1. What is the percentage of nickel in a 50p coin?

 Percentage = .............................. %

**(1)**

* 1. Draw a ring around the correct metal to complete the sentence.

Pure copper is too soft to be used for 1p and 2p coins.

|  |
| --- |
| nickeltin iron |

Copper is mixed with zinc andfor 1p and 2p coins.

**(1)**

1. The value of the metal in 2p coins which were made in 1991 is now 3.3p.
	1. Suggest why a 2p coin made in 1991 is worth 3.3p.

...............................................................................................................

...............................................................................................................

...............................................................................................................

**(1)**

* 1. Suggest why copper-plated steel is now used for 1p and 2p coins.

...............................................................................................................

...............................................................................................................

...............................................................................................................

**(1) (Total 6 marks)**

Where copper ore has been mined there are areas of land that contain very low percentages of

**21**

copper compounds.

One way to extract the copper is to grow plants on the land.

The plants absorb copper compounds through their roots.

The plants are burned to produce copper oxide.

The copper oxide produced from plants can be reacted to produce copper or copper sulfate solution, as shown in **Figure 1**.

**Figure 1**



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

|  |
| --- |
| carbon neutral. economical. reversible. |

Copper ores contain enough copper to make extraction of the

 (i)

metal

**(1)**

|  |
| --- |
| photosynthesis. phytomining. polymerisation. |

* + 1. Using plants to extract metals is called

**(1)**

|  |
| --- |
| carbon dioxide.oxygen.sulfur dioxide. |

* + 1. Copper oxide reacts with carbon to produce copper and

**(1)**

1. Copper is produced from copper sulfate solution by displacement using iron or byelectrolysis.
	1. Complete the word equation.

copper sulfate + iron  ...................... + ......................

**(2)**

* 1. **Figure 2** shows the electrolysis of copper sulfate solution.

**Figure 2**



Why do copper ions go to the negative electrode?

...............................................................................................................

...............................................................................................................

**(1)**

1. Suggest **two** reasons why copper should **not** be disposed of in landfill sites.

........................................................................................................................

........................................................................................................................

........................................................................................................................

........................................................................................................................

**(2) (Total 8 marks)**

Hydrogen peroxide decomposes slowly to give water and oxygen.

**22**

The reaction is *exothermic*.

 2H2O2 → 2H2O + O2

1. In an *exothermic* reaction, energy is given out.

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

|  |
| --- |
| goes down. goes up. stays the same. |

In an *exothermic* reaction, the temperature

**(1)**

1. The energy level diagram for this reaction is shown below.



The energy changes, **A**, **B** and **C**, are shown on the diagram.

Use the diagram to help you answer these questions.

* + - 1. Which energy change, **A**, **B** or **C**, is the activation energy? 

**(1)**

* + - 1. Which energy change, **A**, **B** or **C**, shows that this reaction is exothermic? 

**(1)**

* + - 1. Hydrogen peroxide decomposes quickly when a small amount of manganese(IV) oxide is added.

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

Hydrogen peroxide decomposes quickly because

|  |
| --- |
| a catalyst. an element. a solid. |

manganese(IV) oxide is

|  |
| --- |
| activation energy.boiling point. temperature. |

The manganese(IV) oxide has lowered the

**(2)**

1. A student did an experiment to find the amount of energy produced when hydrogenperoxide solution is decomposed using manganese(IV) oxide.

The apparatus the student used is shown in the diagram.



The student first measured the temperature of the hydrogen peroxide. Then the student added the manganese(IV) oxide, stirred the mixture and recorded the highest temperature.

* 1. Suggest why the student stirred the mixture before recording the highest temperature.

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**(1)**

* 1. The biggest error in this experiment is heat loss.

Suggest how the student could change the apparatus so that less heat is lost.

**...............................................................................................................(1) (Total 7 marks)**