

Part A – Multiple-choice questions

Total marks (3)

Attempt Questions 1 – 3

Allow about 5 minutes for this part

- 1 In the laboratory, nitrogen can be prepared by heating an aqueous solution of ammonium nitrite. Which of the following equations correctly shows the reaction?
- (A) $(\text{NH}_3)_3\text{N}_{(\text{aq})} \rightarrow 2\text{N}_{2(\text{g})} + 4\text{H}_{2(\text{g})}$
- (B) $\text{NH}_4\text{NO}_{2(\text{aq})} \rightarrow \text{N}_{2(\text{g})} + 2\text{H}_2\text{O}_{(\text{l})}$
- (C) $(\text{NH}_3)_2\text{NO}_{3(\text{aq})} \rightarrow \text{N}_{2(\text{g})} + 3\text{H}_2\text{O}_{(\text{l})}$
- (D) $\text{NH}_4\text{NO}_{3(\text{aq})} \rightarrow 2\text{N}_{(\text{g})} + 2\text{H}_2\text{O}_{(\text{l})}$
- 2 Which of the following elements is found in all of the ‘spheres’ (biosphere, lithosphere, hydrosphere and atmosphere) and is a major component (> 10% by mass) in each of them?
- (A) carbon
- (B) hydrogen
- (C) nitrogen
- (D) oxygen
- 3 Covalently bonded compounds generally have melting points significantly lower than ionically bonded compounds. Which of the following statements explains this fact?
- (A) The covalent bond requires less energy to break than the ionic bond.
- (B) Covalent compounds are composed of non-metals bonded together. Non-metals have low melting points.
- (C) When a covalent compound is melted, weak intermolecular forces are broken not bonds.
- (D) Ionic compounds contain heavy metal ions which raise the melting point.

Part B

Total marks (17)

Attempt Questions 4 – 10

Allow about 30 minutes for this part

Question 4 (3 marks)

Marks

- (a) Draw the Lewis electron dot structures for magnesium and chlorine atoms and clearly show how they react to form the Lewis electron dot structure of magnesium chloride. 2
- (b) Draw the Lewis electron dot structure for the sulfide ion. 1

Question 5 (2 marks)

A student carried out tests on four solid substances *A*, *B*, *C*, *D* and the results are shown below.

| Substance | Melting point (°C) | Conductivity in solid state | Conductivity in molten state |
|-----------|--------------------|-----------------------------|------------------------------|
| A | 730 | none | good |
| B | 232 | good | good |
| C | 1900 | none | none |
| D | 185 | none | none |

State the *specific* type of bonding present in the solids *A*, *B*, *C* and *D*.

Question 6 (3 marks)

Complete the table below about mixtures. A completed example is given for your reference.

| Mixture | Naturally occurring example | Separation method | Difference in physical property which enables separation |
|----------------------------|-----------------------------|-------------------|--|
| solids of different sizes | gravel | sieving | particle size |
| insoluble solid and liquid | | | |
| dissolved solid in liquid | | | |
| liquids | | | |

Question 7 (2 marks)**Marks**

Name the compounds listed below:

- (a) MgCl_2 $\frac{1}{2}$
- (b) NaHCO_3 $\frac{1}{2}$
- (c) $\text{Fe}(\text{OH})_2$ $\frac{1}{2}$
- (d) $\text{Ba}(\text{H}_2\text{PO}_4)_2$ $\frac{1}{2}$

Question 8 (2 marks)

The table below lists the melting points of six consecutive elements (UVWXYZ) located in Period 3 (Na to Ar) on the Periodic Table.

| Element | U | V | W | X | Y | Z |
|-----------------------------|-----|------|----|-----|------|------|
| m.p. ($^{\circ}\text{C}$) | 660 | 1410 | 44 | 119 | -101 | -189 |

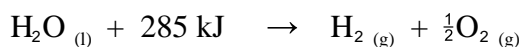
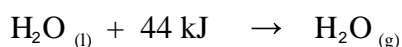
- (a) Which element is composed of monatomic molecules? $\frac{1}{2}$
- (b) Which element would be a semi-conductor? $\frac{1}{2}$
- (c) Which element is composed of diatomic molecules? $\frac{1}{2}$
- (d) Which element would have a covalent network structure? $\frac{1}{2}$

Question 9 (2 marks)

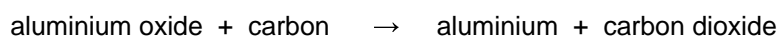
- (a) Write the electronic configuration of a specie composed of:
12 neutrons, 12 protons and 10 electrons **1**
- (b) What is the name of the specie described in (a)? $\frac{1}{2}$
- (c) Write the name of another specie with the same electronic configuration as in (a) $\frac{1}{2}$

Question 10 (3 marks)

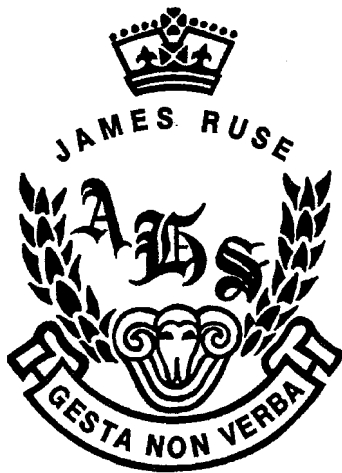
The boiling of water and the electrolysis of water both require a specific amount of energy:



- (a) Explain the reasons for low energy value for boiling and the high value for electrolysis. **2**
- (b) Bauxite (aluminium oxide) is commercially electrolysed using carbon electrodes into aluminium and carbon dioxide.



Translate this word equation into a balanced equation showing chemical formulas. **1**



James Ruse Agricultural High School

2001

**THE CHEMICAL EARTH
MODULE TEST**

STUDENT NUMBER _____

MARK

ANSWER BOOKLET

**All answers must be recorded in this booklet.
Answers marked on the Test Paper will be ignored.**

Part A

Total marks (3)

Attempt Questions 1 – 3

Allow about 5 minutes for this part

Select the alternative A, B, C or D that best answers the question. Fill in the response completely.

Sample $2 + 4 =$ (A) 2 ☒ 6 (C) 8 (D) 9

If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

☒ 2 ☒ 6 (C) 8 (D) 9

If you change your mind and have crossed out what you consider to be the correct answer, then indicate this by writing the word *correct* and drawing an arrow as follows:

☒ 2 ☒ 6 (C) 8 (D) 9

↖ *correct*

Question 1 (A) (B) (C) (D)

Question 2 (A) (B) (C) (D)

Question 3 (A) (B) (C) (D)

Part B

Total marks (17)

Attempt Questions 4 – 10

Allow about 30 minutes for this part

Question 4

(a)

(b)

Question 5

- A _____
- B _____
- C _____
- D _____

Question 6

| Mixture | Naturally occurring example | Separation method | Difference in physical property which enables separation |
|----------------------------|-----------------------------|-------------------|--|
| solids of different sizes | gravel | sieving | particle size |
| insoluble solid and liquid | | | |
| dissolved solid in liquid | | | |
| liquids | | | |

Question 7

- (a) _____
- (b) _____
- (c) _____
- (d) _____

Question 8

- (a) _____
- (b) _____
- (c) _____
- (d) _____

Question 9

- (a) _____
- (b) _____
- (c) _____

Question 10

- (a) _____

- (b) _____