

The Chemical Earth

Topic Test

Part 1: Multiple Choice

Choose the **best** alternative and indicate your response on the answer sheet

- An element Z has a mass number of 24 and an atomic number of 12. Z is:
(A) Calcium
(B) Carbon
(C) Chromium
(D) Magnesium
- An ionic salt formed between aluminium and a non-metal X has the formula Al_2X_3 . The valency of element X is:
(A) 2
(B) 3
(C) -2
(D) -3
- Element M has an electron configuration of 2,8,8,2. Which of the following is a correct statement?
(A) Element M is a non-metal
(B) Element M is a metal
(C) Element M is a halogen
(D) Element M is aluminium
- Which of the following is not a physical property?
(A) Electrical conductivity
(B) Boiling point
(C) Density
(D) Stability to heat
- Elements A, B and C have the following melting (m.p) and boiling points (b.p).

	Melting Point (m.p)	Boiling Point (b.p)
Element A	-220°C	-188°C
Element B	-39°C	357°C
Element C	114°C	183°C

These elements can be classified (at standard temperature and pressure) respectively, as:

- Solid, liquid, gas
- Gas, liquid, solid
- Liquid, solid, gas
- Liquid, gas, solid

6. Select the alternative that correctly identifies the nature of particles in a gas:
- (A) The particles are fixed in a lattice and can only vibrate
 (B) The particles are far apart and in rapid motion
 (C) Gases are always composed of diatomic molecules
 (D) The particles can move about or flow because they are not locked into fixed proportions
7. Which of the following correctly shows the synthesis of magnesium oxide as an ionic substance?
- (A) $\text{Mg}_2 + \text{O}_2 \rightarrow 2\text{MgO}$
 (B) $\text{Mg} + \text{O} \rightarrow \text{Mg}^+ \text{O}^-$
 (C) $\text{Mg}(s) + 2\text{O}(g) \rightarrow \text{Mg}^{2+}(s) + 2\text{O}^-(s)$
 (D) $2\text{Mg}(s) + \text{O}_2(g) \rightarrow 2\text{MgO}(s)$
8. The electron dot diagram for the molecule O_2 is shown below.



From this diagram we can see that:

- (A) Two electrons are shared, forming a double covalent bond
 (B) Four electrons are shared, forming a network covalent bond
 (C) Two pairs of electrons are shared, forming a double covalent bond
 (D) Four electrons are shared, forming an ionic bond
9. Metallic bonding involves:
- (A) Strong attractive forces operating in all directions
 (B) The transfer of electrons to form ions
 (C) The sharing of outer shell electrons to form covalent bonds
 (D) A lattice of anions surrounded by mobile delocalized electrons
10. Which of the following substances does not exist as a molecule?
- (A) helium
 (B) sodium chloride
 (C) carbon dioxide
 (D) water
11. Which of the following correctly identifies the conducting species when electricity is passed through these substances?

	Mercury	Molten NaCl	Graphite
(A)	cations	cations & anions	electrons
(B)	electrons	cations & anions	electrons
(C)	electrons	cations & anions	atoms
(D)	cations	electrons	electrons

12. Which of the following is **not** a property of metals?
- (A) shiny
 (B) conducts heat
 (C) malleable
 (D) brittle

13. Which of the following exists as a covalent lattice?

- (A) argon
- (B) carbon
- (C) hydrogen
- (D) mercury

14. What is the charge on a Calcium ion?

- (A) 2^+
- (B) 2^-
- (C) 3^+
- (D) 3^-

Part 2: Written Response

Answer the questions in the spaces provided

1. The table shows some information about an ion. Complete the table. **(2 marks)**

Charge	1+
Mass Number	23
Atomic Number	11
Number of neutrons	
Number of electrons	
Number of protons	
Electron configuration	

2. Write equations for the following reactions. **(3 marks)**

a) Decomposition of copper carbonate on heating

b) Synthesis of ammonia from nitrogen and hydrogen

c) Decomposition of water by an electric current

3. Explain in terms of bonding why:

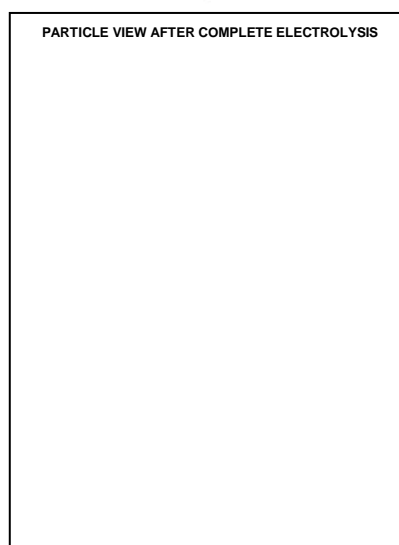
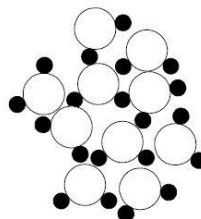
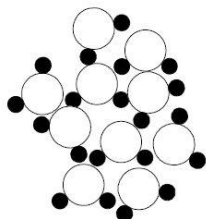
a) Copper is a good conductor. **(2 marks)**

b) Potassium chloride conducts electricity when molten but not when solid. **(3 marks)**

4. The diagrams show two samples of liquid water containing **ten** molecules...



a) Complete the diagrams showing the result after boiling and electrolysis.



b) To electrolyse one gram of water requires seven times more energy than to boil one gram of water. Explain the large difference. **(2 marks)**

5. Name the following compounds and identify them as being ionic or covalent molecular. **(4 marks)**

- a) SrCl_2 _____
- b) PBr_3 _____
- c) SF_4 _____
- d) CuO _____

