

# A level chemistry transition



## Atomic structure, balancing equations and state symbols

### Section 1 – Atomic structure

1. Draw and fully label an atom of Lithium. Include all sub atomic Particles. (3)

2. Fill in the following table (5)

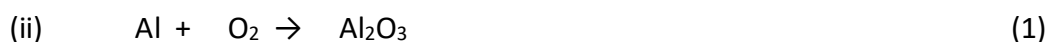
Species	Protons	Neutrons	Electrons
Oxygen-16 atom			
Sodium-23 ion			
Carbon-13 atom			
Sulphur-32 ion			
Aluminium-27 ion			

- 3.

### Section 2 – Balancing equations

- 4.

- a. Balance these chemical equations.



- b. Briefly explain why an unbalanced chemical equation cannot fully describe a reaction.

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(2)

Q2. The following passage was taken from a chemistry textbook.

Germanium is a white, shiny, brittle element. It is used in the electronics industry because it is able to conduct a small amount of electricity.

It is made from germanium oxide obtained from flue dusts of zinc and lead smelters.

The impure germanium oxide from the flue dusts is changed into germanium by the process outlined on the next page

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- STEP 1 The germanium oxide is reacted with hydrochloric acid to make Germanium tetrachloride. This is a volatile liquid in which the germanium and chlorine atoms are joined by covalent bonds.
- STEP 2 The germanium tetrachloride is distilled off from the mixture.
- STEP 3 The germanium tetrachloride is added to an excess of water to produce germanium oxide and hydrochloric acid.
- STEPS 1 to 3 are repeated several times.
- STEP 4 The pure germanium oxide is reduced by hydrogen to form germanium.

5.

- a. Balance the equation below which represents the reaction in step 1.

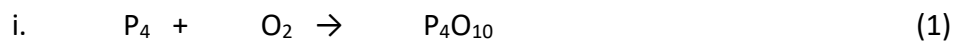


- b. Write a word equation for the reaction in step 3.

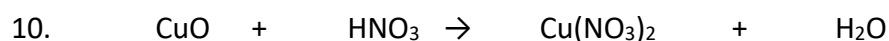
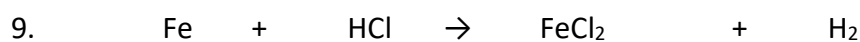
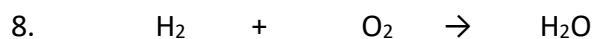
\_\_\_\_\_ (1)

6. Cola drinks contain phosphoric acid,  $\text{H}_3\text{PO}_4$ . The two equations show how phosphoric acid can be made from phosphorus.

- a. Balance these two equations.



More practice: 1 mark each

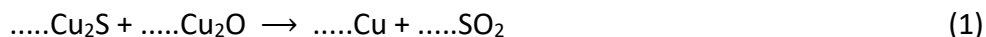
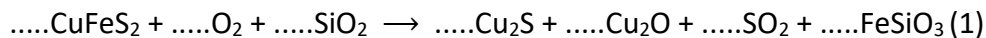


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### A-Level question to give a go!

14. Copper can be produced from rock that contains  $\text{CuFeS}_2$   
Balance the equations for the two stages in this process.



### Section 3 – Fully balanced equations with state symbols

Turn the following statements into balanced symbol equations with state symbols

15. Each Question is 3 marks, 1 for formulae, 1 for balancing and 1 for state symbols.
- Hydrogen gas can be produced from the electrolysis of sodium chloride solution, which is a mixture of sodium chloride and water. Sodium hydroxide solution and chlorine gas are also produced in the process.
  - Solid lead nitrate ( $\text{Pb}(\text{NO}_3)_2$ ) will undergo thermal decomposition to produce the brown gas nitrogen dioxide and oxygen gas leaving a residue of lead oxide.
  - The Haber process is an important industrial process. It produces ammonia gas from hydrogen and nitrogen gasses.
  - Butane ( $\text{C}_4\text{H}_{10}$ ) is a compressed liquid used in BBQ canisters. When it undergoes complete combustion it reacts with oxygen in the air to produce carbon dioxide and water vapour.
  - Calcium carbonate is one of the main ingredients in most indigestion tablets. It reacts with the hydrochloric acid in your stomach to produce the soluble salt calcium chloride as well as water and carbon dioxide gas.

**Total: / 40**