Week 6: Acids and Metals

Lesson 1: Metals and oxygen

Complete Starter (in back of class jotter)

Starter

1) Write word equations for the following two reactions:
   a) Calcium + water
   b) Calcium + sulphuric acid
2) How many elements are present in the compound calcium oxide?

Learning Outcomes

By the end of this lesson you should be able to:

- Describe the relative reactivity of metals with oxygen
- Name products of reactions between metals and oxygen
- Write word equations of reactions between metal and oxygen

Success Criteria

You will have been successful in this lesson if you:

1. Read and learn the notes given
2. Watch the links provided
3. Complete questions provided

If you have any questions about the content of this lesson, you should ask your **class teacher either through your class MS team or via email**.

What to do

Complete tasks 1-6 – This involves **watching selected videos**, reading and highlighting your **Pupil Notes,** completing **Homework 26** and answering questions in your class jotter.

Once completed, **Extension activities** and the answers to today's starter can be found at the end of the document. Solutions allowing pupils to self-assess their work will be posted on **Wednesday 24th February**.

Task 1: Watch video on Metals and Oxygen

Watch [this video]

Task 2: Read the following information and then answer the following questions in your class jotter under the heading Metals and Oxygen

When substances burn in air they join up with oxygen. They make a new substance called an oxide. The oxide is heavier than the starting substance.

Example:

If you burn magnesium in air it joins up with oxygen to make magnesium oxide.

Magnesium + oxygen ➔ magnesium oxide

Copy and complete the following word equations:

1) Zinc + oxygen ➔ _ _ _ _ oxide

2) _ _ _ _ + oxygen ➔ lead oxide

3) Sodium + _ _ _ _ _ _ ➔ sodium oxide

4) Carbon + oxygen ➔ carbon _ _ _ _ _ _ _

5) Write a word equation for the burning of potassium in air.

6) Write a word equation for the burning of calcium in air.

Task 3: Read and highlight notes on Metals and Oxygen (pg 50 printed notes)

These do not need to be copied into jotter but read through and then highlight key sections of pages mentioned in printed notes.
If you wish to add any detail to your printed notes, feel free.

Reactions of metals

Metals and oxygen

The general word equation to represent the reaction when a metal reacts with oxygen is:

metal + acid —> metal oxide

Heating magnesium changes it into magnesium oxide.

MgO

Magnesium oxide has the formula MgO. This tells us that it contains one atom of magnesium joined to one atom of oxygen.

When a piece of magnesium is held in tongs and heated in a Bunsen flame it burns brightly to form a white powder. This powder is a compound of magnesium and oxygen. The two elements have joined to make a new substance called magnesium oxide. The word equation for the reaction which occurs is:

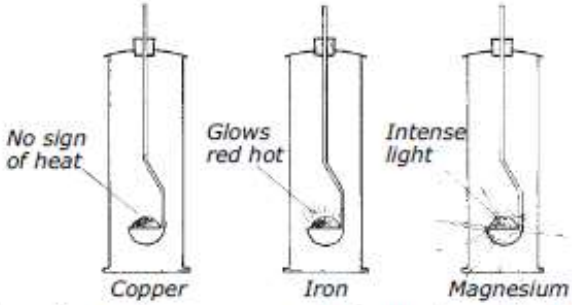
magnesium + oxygen —> magnesium oxide

All metals react with oxygen. For example a copper metal slowly turns black. The copper has reacted with oxygen to make copper oxide. The equation for the reaction is:

copper + oxygen —> copper oxide

A reactivity series

Some metals react faster with oxygen than others and give out more energy when they react. An example can be seen with the metals copper, iron, and magnesium. If copper is heated and put into a jar of oxygen the copper turns black- there is no sign that energy is released. The copper has reacted with the oxygen to make copper oxide.



Fe_2O_3

Iron oxide has the chemical formula Fe_2O_3. This tells us that for every two atoms of iron there are three atoms of oxygen.

When hot iron is put into oxygen, the iron glows brightly. Hot magnesium burns with a pure white bright flame releasing a great deal of energy. We can say that magnesium is the most reactive of the three metals and copper is the least reactive.

Task 4: Questions to try

Self Check 13

1) When a piece of magnesium is places in a Bunsen flame a chemical reaction occurs. The magnesium reacts with the oxygen from the air to form magnesium oxide.

   a) Which elements are present in magnesium oxide?

   b) Write a word equation for the reaction which occurs when magnesium reacts with oxygen.

2) Copper coins slowly turn black as the copper changes into copper oxide.

   a) Which elements are present in copper oxide?

   b) Write a word equation for the reaction which occurs when copper oxide is made.

3) Jean was investigating the reaction between metals and oxygen. She heated pieces of metals and then put the metal into jars filled with oxygen. Her results are shown below.

   a) Write a word equation for the reaction which occurs between oxygen and iron.

   b) Use the results above to put the three metals in order of reactivity, most reactive first.

   c) Name one thing Jean should keep constant to make her experiment fair.

Task 5: Complete Homework 26 on Metals and Oxygen.
This will be a self-assessed exercise

Metals and oxygen 26

1) When a piece of iron wool is placed in a Bunsen flame a chemical reaction occurs. The iron reacts with the oxygen from the air to form iron oxide.

   a) Which elements are present in iron oxide?

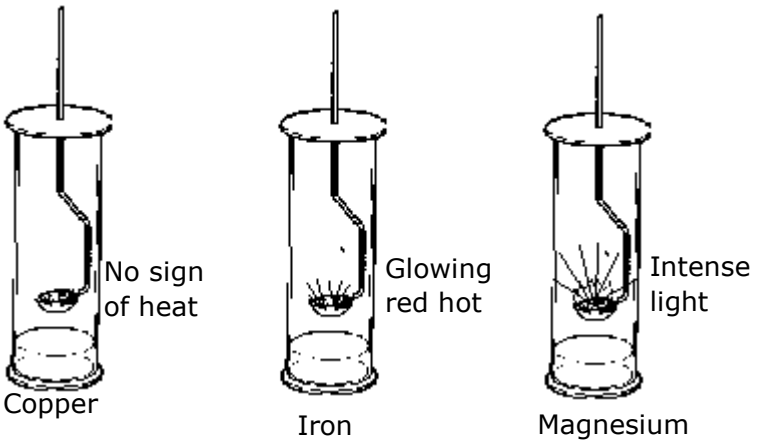
   b) Write a word equation for the reaction which occurs when magnesium reacts with oxygen.

2) Silver coins slowly turn black as the silver changes into silver oxide.

   a) Which elements are present in silver oxide?

   b) Write a word equation for the reaction which occurs when silver oxide is made.

3) Jean was investigating the reaction between metals and oxygen. She heated pieces of metals and then put the metal into jars filled with oxygen. Her results are shown below:



   a) Write a word equation for the reaction which occurs between oxygen and magnesium.

   b) Use the results above to put the three metals in order of reactivity, most reactive first.

4) Here is some information about four alloys:

Alloy A	Alloy B	Alloy C	Alloy D
90% aluminium 10% magnesium	80% aluminium 20% magnesium	70% aluminium 30% magnesium	90% aluminium 10% copper
Strength 340 MN/m^2	**Strength** 405 MN/m^2	**Strength** 420 MN/m^2	**Strength** 320 MN/m^2

a) Which is more effective at increasing the strength of the alloy, magnesium or copper?

b) Predict the strength of an alloy containing 85% aluminium and 15% magnesium.

Self Check 13 Answers and video solutions for Homework 26 will be published on S2 Chemistry Team on Wednesday 24th February. Please use these to self-assess your progress.

Task 6: Correct today's starter

Starter answers

1)

a) Calcium + water → Calcium Hydroxide + Hydrogen

b) Calcium + sulphuric acid → Calcium Sulphate + Hydrogen

2) 2 elements

Extension activities

Once completed all your Chemistry work, here are some links to look further into the Acids and Metals topic:

- BBC Bitesize: Metals and Reactivity
    - **Follow this link**
    - Read through the revision guide pages 1-4
    - This will show you a reactivity series and compare the observations seen when metals react with oxygen, cold water and steam
    - Write down a summary in your jotter of these observations and list the metals involved in these reactions from most reactive to least reactive
- Video on Metal and Oxygen word equations
    - **Follow this link**
    - Copy out both questions and the word equations to demonstrate the reactions of the metals with oxygen