

# Chemistry Revision Guide

Normanhurst School

Year 9



## Contents

- Reactions of metals & metal compounds
- Patterns of reactivity
- Environmental chemistry
- Using chemistry

# Chemistry Revision Guide

## Reactions of metals & metal compounds

### Metals and metal compounds

Properties of metals:

- High boiling and melting points
- Hard
- Malleable
- Sonorous
- Ductile
- Electrical conductor
- Thermal conductor.

Properties of non-metals:

- Low boiling and melting points
- Brittle
- Soft
- Poor conductor of electricity
- Poor thermal conductor.

### How do metals react with acids?

- Metals react with dilute acids to form salts and release hydrogen
- Use word equations to represent the reactions of metals with acids
- Identify patterns of reactions of metals with acids
- Use patterns to predict the reactions.

### How do carbonates react with acids?

- Metal carbonates react with acids to produce carbon dioxide and salts
- Know the test for carbon dioxide (limewater turns milky)
- Write the word equations for the chemical reactions.

### How do metal oxides react with acids?

- Metal oxides react with acids to produce salt and water
- Know the word equation for these reactions.

### How do acids react with alkalis?

- Acid + alkali → salt + water
- This reaction can produce a neutral solution
- This process is called neutralisation
- Know the hazards associated with strong alkalis
- There are many salts that are useful compounds.

### Balancing equations

- The chemical inputs to a reaction are called the reactants
- The outputs are called the products
- Nothing can be gained or lost in a chemical reaction
- All of the elements present in the reactants must be present in the products
- The number of atoms of each element must be conserved in a chemical reaction
- The chemical formula for the word equation must reflect this conservation of elements.

## Patterns of reactivity

### Patterns of reactivity

Although all metals react in similar ways with acids, water and oxygen, some react faster than others.

- Many metals are affected by air and water
- Different metals are affected in different ways.

## Reactions of Group I metals

Group I metals react vigorously with water to produce

- Hydrogen gas
- Hydroxides in solution
- Heat is released.

The lower down in the Periodic Table, the more Group I metals react.

### Metals & acids

- Some metals react more easily with acids than others
- Metals can be placed in order of their reactivity
- This is known as the Reactivity Series.

### Metals and oxygen

- We can use the reactivity series to predict how metals react with oxygen
- Metals react with oxygen to form oxides.

### Displacement reactions

- A more reactive metal will displace less reactive metals from solutions
- Construct a table to show patterns clearly
- Recognise how displacement reactions can be useful.

Understand the thermite reaction between iron (III) oxide and aluminium as a displacement reaction. The energy released by the reaction is sufficient to melt the iron. Molten iron is used in welding, e.g. on railway lines.

### The reactivity series

From most reactive to least reactive:

- Potassium
- Sodium
- Lithium
- Calcium
- Magnesium
- Zinc
- Iron
- Copper
- Silver
- Gold.

## Environmental chemistry

Environmental chemistry includes rocks, soils and building materials that have a variety of chemical characteristics.

- Chemical weathering alters rocks and building materials over time
- The atmosphere and water resources are affected by natural processes and the activity of humans
- Environmental conditions are monitored and controlled
- Know how to distinguish between different environmental issues.

### How are soils different from each other?

Different soils have different characteristics, including:

- pH ranges
- porosity
- density
- texture.

# Chemistry Revision Guide

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## Soil characteristics affect the plants that grow in them

- Use knowledge about acids, alkalis and neutralisation to change soil pH
- Understand that porosity affects how much water surrounds plant roots and the amount of air in the soil.

## What happens to rocks and building materials over time?

- Describe how the appearance of landforms and/or buildings may change over time
- Identify factors that favour chemical weathering (for example, low pH of air and rain together with high rainfall).

## What causes acid rain?

- The atmosphere contains carbon dioxide from natural sources and the burning of fossil fuels
- Carbon dioxide dissolves in rainwater forming a weak acid called carbonic acid
- Oxides of sulphur in the air can arise from human and geological activity
- Burning coal produces sulphur dioxide
- Dissolved oxides of sulphur increase the acidity of rain
- Dissolved oxides of nitrogen increase the acidity of rain.

## The effects of acid rain and how it can be reduced

- Acid rain will react with some building materials such as carbonates (eg limestone, marble)
- Acids in the environment can lead to corrosion of metal
- Acid rain damages living organisms and materials (eg forests and lakes)
- Emissions of oxides causing acid rain can be reduced.

## Using chemistry

### Using chemistry

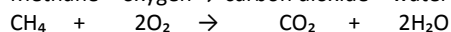
- Chemical reactions can be used as an energy source
- Chemical reactions are used to make new materials.

### Chemical reactions when fuels burn

- Fuels burn with oxygen and release heat energy
- Fuels containing hydrogen burn to produce water
- Fuels with carbon burn to produce carbon dioxide and sometimes carbon monoxide and carbon
- Evaluate the advantages and disadvantages of a fuel.

### Example: Burning methane

Methane + oxygen → carbon dioxide + water



### Other chemical reactions releasing heat energy

- Any chemical reaction releasing heat energy is called an *exothermic reaction*
- Displacement reactions involving metals produce energy
- The energy from these reactions can be used
- The energy produced in displacement reactions relates to differences in the reactivity of the metals involved.

### Types of new material made through chemical reactions

The range of materials made through chemical reactions include:

- Drugs
- Plastics
- Textiles
- Foodstuff
- Building materials.