



KS3 Chemistry – Introduction to Energy and Rates of Reaction



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Grammar School

Learning about this topic is important because:

Energy changes are central to chemistry. Some reactions release energy (like burning fuels), while others need energy to start. This links to the idea of Exothermic reaction and Endothermic reaction, which explain why things get hotter or colder during reactions. Rates of reaction tell you how fast a reaction happens. This is important because reactions don't all occur at the same speed. Understanding factors like temperature, concentration, and surface area helps explain why some reactions are quick (like explosions) and others are slow (like rusting).

This builds on:

Y8 Atoms, elements and compounds, Separating mixtures, Chemical Reactions,

This leads to:

GCSE Chemistry- Energy Changes and Rates of Reaction

We will learn:

How is energy transferred in a chemical reaction?
What is an exothermic reaction and an example?
What is an endothermic reaction and an example?
What is collision theory?
What needs to happen for the chemical reaction to occur?
How do we measure rate of reaction?
What factors affect rate of reaction?
How do we plan an investigation to determine what affects the rate of a reaction?
What are the variables considered in an investigation?

We will develop/practise skills including:

Plan an investigation into rates of reaction and the effect of surface area.
Identifying variables in investigations
Risk assess practical work
Analyse experimental data using graphs to draw logical conclusions

Some of the vocabulary that we will use includes:

Exothermic reaction:

A reaction that **releases energy** (usually heat) to the surroundings.

Exothermic reaction:

A reaction that **takes in energy** from the surroundings.

Collision theory:

The idea that reactions happen when particles **collide with enough energy**.

Activation energy:

The **minimum amount of energy** needed to start a reaction.

Concentration:

The **amount of substance** in a given volume.

You could learn more about this topic by:



[Reactions and temperature changes - Exothermic and endothermic reactions - AQA - GCSE Combined Science Revision - AQA Trilogy - BBC Bitesize](#)

[Rate of reaction - Rates of reaction - AQA - GCSE Chemistry \(Single Science\) Revision - AQA - BBC Bitesize](#)



KS3 Chemistry – Introduction to Energy and Rates of Reaction



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Pressure:

The force of particles hitting the walls of a container (in gases).

Temperature:

A measure of how hot or cold something is.

Surface area:

The total area of a solid that is exposed.

Your teacher will assess your knowledge & understanding throughout the topic by looking at your work, questioning, discussion and giving you feedback in lots of different ways. The key pieces of work in this topic are:

End of topic test

Assessed homework

Retrieval practice in unit booklet and regular whiteboard quizzes

Educake Quizzes



KS3 Chemistry – Chemical Reactions (Part 2)



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Learning about this topic is important because:

Chemical reactions help us understand the properties of a substance. By studying the way a substance interacts with another substance, we can learn its chemical properties. These properties can be used to identify an unknown sample. By observing chemical reactions, we are able to understand how the natural world works.

This builds on:

Y8 Atoms, elements and compounds, Y7 Separating mixtures, Y8 Chem Reactions (Part 1), Introduction to bonding, and The Periodic Table

This leads to:

Material Science

We will learn:

How can we identify a chemical reaction?

What is a physical change?

How can we represent chemical reactions?

How do we balance symbol equations?

What are the general equations for the reactions between metals / metal oxides / metal hydroxides and metal carbonates with acids?

What is a salt?

How do we name salts?

What are the main stages in the method to produce dry, soluble salt crystals?

What is oxidation and reduction?

What is combustion?

What are the conditions for complete vs incomplete combustion?

What are the general equations for complete and incomplete combustion?

What is a displacement reaction?

What is an endothermic / exothermic reaction?

What is the test for hydrogen / oxygen / carbon dioxide?

What is thermal decomposition?

What is a catalyst?

We will develop/practise skills including:

Be able to make predictions using scientific knowledge

Be able to plan scientific investigations, ensuring a fair test

Being able to distinguish between chemical reactions and physical changes

Constructing word equations for the reactions in this topic

Constructing and balancing symbol equations for the reactions in this topic

Using information about reactions to compare the reactivity of elements

Identifying variables in investigations

Risk assess practical work

Record data accurately

Analyse experimental data using graphs to draw logical conclusions using good science

Using experimental data to determine whether a reaction is endothermic or exothermic

Using chemical tests to identify common gases

Some of the vocabulary that we will use includes:

You could learn more about this topic by:

[Chemical reactions - KS3 Chemistry - BBC Bitesize](#)





KS3 Chemistry – Chemical Reactions (Part 2)



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Displacement – A reaction in which a more reactive element replaces a less reactive element in a compound.

Metal – An element that is usually shiny, strong, and a good conductor of heat and electricity.

Acid – A substance with a pH less than 7.

Salt – An ionic substance formed when an acid reacts with a metal, alkali, or carbonate.

Oxidation – A reaction in which a substance gains oxygen.

Reduction – A reaction in which a substance loses oxygen.

Combustion – A reaction in which a substance burns in oxygen, releasing energy.

Thermal Decomposition – breaking down of a substance using heat.

[6 Chemical Reactions That Changed History - YouTube](#)

Your teacher will assess your knowledge & understanding throughout the topic by looking at your work, questioning, discussion and giving you feedback in lots of different ways. The key pieces of work in this topic are:

End of topic test

Assessed homework

Retrieval practice in unit booklet and regular whiteboard quizzes

Educake



KS3 Introduction to Bonding and the Periodic Table



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Learning about this topic is important because:

This topic builds up an understanding of how compounds are made. They will learn that different compounds form from different elements and different bonds are formed between atoms or ions.

This builds on:

Y7 Particles- States of Matter, Y8 Atoms, Elements and Compounds.

This leads to:

The Periodic Table and Chemical Reactions (Part 2)

We will learn:

What is covalent bond?

What is an ionic bond?

How is a Covalent bond formed?

What type of atoms does this occur between?

Draw a dot and cross diagram to represent a Covalent bond.

How is an Ionic bond formed?

What type of atoms does this occur between?

Draw a dot and cross diagram to represent an Ionic bond.

How do you work out the charge of an ion using the Periodic Table?

Why are all atoms neutral?

How do you write chemical formula using monatomic ions?

How do you write chemical formula using polyatomic ions?

We will develop/practise skills including:

Be able to draw atoms using dot and cross diagrams

Be able to draw a dot and cross diagram to represent Ionic and Covalent bonding.

Be able to determine what type of bonding is present from a given formula.

Be able to write simple chemical formula.

Some of the vocabulary that we will use includes:

Molecule

A group of two or more atoms chemically bonded together. Molecules can be elements (e.g. O₂) or compounds (e.g. H₂O).

Ionic Bonding

A type of bonding where electrons are transferred from one atom to another, forming positive and negative ions that attract each other. Usually occurs between metals and non-metals.

Covalent Bonding

A type of bonding where atoms share pairs of electrons. Usually occurs between non-metal atoms.

You could learn more about this topic by:

[What Are Covalent Bonds | Properties of Matter | Chemistry | FuseSchool - YouTube](#)

[What are Ionic Bonds? | Properties of Matter | Chemistry | FuseSchool - YouTube](#)

[Forming ions - Ionic compounds - AQA - GCSE Chemistry \(Single Science\) Revision -](#)

[AQA - BBC Bitesize](#)

[Covalent bonds - Small molecules - AQA - GCSE Chemistry \(Single Science\) Revision -](#)

[AQA - BBC Bitesize](#)





KS3 Introduction to Bonding and the Periodic Table



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Atom

The smallest part of any substance.

Element

Contains only one type of atom. Elements cannot be broken down into simpler substances by chemical means.

Example: oxygen, carbon

Compound

A substance formed when two or more different elements are chemically bonded together.

Example: water (H₂O), carbon dioxide (CO₂)

Ion

An atom that has gained or lost electrons, giving it a positive or negative charge.



KS3 Introduction to Bonding and the Periodic Table



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The Periodic Table

Learning about this topic is important because:

It allows us to make links between how elements react and their position in the periodic table and therefore make predictions about elements we are unfamiliar with.

This builds on:

Atoms, Elements and Compounds
Introduction to Bonding

This leads to:

Chemical Reactions (Part 2)

We will learn:

Why is the Periodic Table called the Periodic Table?
How and why have our ideas about how the elements should be grouped has changed over time
How are the elements arranged in the modern periodic table?
What are the Groups and Periods in the Periodic table?
What is the link between atomic structure and the position of an element in the periodic table?
Why do elements in the same group react in similar ways?
How is the electronic structure of Group 0 elements the same/different to other groups?
What is the reactivity of the Group 0 elements and why?
What is the trend in boiling point down group 0 elements?
What are the observations of the reactions of Group 1 metals with water?
What is the trend in melting point down Group 1?
What is the trend in reactivity down Group 1?
How do Group 7 elements exist as elements?
What is the trend in melting/boiling point down Group 7?
What is the Trend in reactivity down Group 7?

We will develop/practise skills including:

Drawing electronic structure
Making tables and recording observations of scientific experiments
Using evidence to make links and come to conclusions



KS3 Introduction to Bonding and the Periodic Table



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Some of the vocabulary that we will use includes: Periodic Table – A chart that organises all the elements by their properties and atomic number. Groups – The vertical columns in the Periodic Table. Elements in the same group have similar properties. Periods – The horizontal rows in the Periodic Table. Elements in the same period have the same number of electron shells. Alkali Metals – The very reactive metals found in Group 1 of the Periodic Table. Noble Gases – The unreactive gases found in Group 0 (or Group 18) of the Periodic Table. Halogens – The reactive non-metals found in Group 7 (or Group 17) of the Periodic Table. Displacement – A reaction in which a more reactive element replaces a less reactive element in a compound.	You could learn more about this topic by:  How Does The Periodic Table Work Properties of Matter Chemistry FuseSchool - YouTube Group 7 - The Halogens Properties of Matter Chemistry FuseSchool - YouTube GCSE Chemistry - Modern Periodic Table #9 - YouTube GCSE Chemistry - Group 1 Alkali Metals #11 - YouTube GCSE Chemistry - Halogens and Noble Gases #12 - YouTube
Your teacher will assess your knowledge & understanding throughout the topic by looking at your work, questioning, discussion and giving you feedback in lots of different ways. The key pieces of work in this topic are: Assessed Homework on Bonding and The Periodic Table Educake Quizzes Retrieval practice in unit booklet and regular whiteboard quizzes End of topic test	



KS3 Chemistry – Materials Science



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Learning about this topic is important because:

Everything around is made out of different substances, some natural and some synthetic. As a species we are unique in the extent we have been able to manipulate materials and substances to make the world around us more habitable. From building bridges and skyscrapers out of metals and alloys, to developing fuels to help us travel the world, or plastics to design materials in any shape we desire or even formulations like medicines to help us live longer lives. All of these things are borne out of the chemistry of materials.

This builds on:

Y8 Atoms, elements and compounds, Separating mixtures, Introduction to bonding, The Periodic Table, Chemical Reactions

This leads to:

The Earth & The Environment (GCSE) Using Resources (GCSE)

We will learn:

How are metals found in the earth's crust?
How can we extract metals from ores?
How does the method of metal extraction depend on the reactivity of the metal?
What is a redox reaction?
What is the structure and bonding in a metal?
How does the structure of a metal affect its properties?
What is an alloy and how does it affect the property of a metal?
What is a pure / impure substance?
How does purity affect physical properties?
What is a formulation?
What is crude oil?
How is it separated into fractions?
What are these fractions used for?
What is a hydrocarbon?
What is an alkane?
What gases are in our atmosphere?
What is a greenhouse gas?
What is global warming and how can we reduce its affects?
What is a polymer?
What are examples of natural and synthetic polymers?

We will develop/practise skills including:

Constructing word equations for the reactions in this topic
Constructing and balancing symbol equations for the reactions in this topic
Using information about reactions to compare the reactivity of metals
Identifying variables in investigations
Risk assess practical work
Analyse experimental data using graphs to draw logical conclusions



KS3 Chemistry – Materials Science



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Some of the vocabulary that we will use includes:

Polymer

A large molecule made from many small repeating units called monomers joined together.

Oxidation

A chemical reaction where a substance gains oxygen or loses electrons.

Reduction

A chemical reaction where a substance loses oxygen or gains electrons.

Crude oil

A natural, unrefined fossil fuel found underground, made of a mixture of hydrocarbons.

Alkane

A type of hydrocarbon that contains only single bonds between carbon atoms.

General formula: $C_n H_{2n+2}$

Hydrocarbon

A compound made up of only hydrogen and carbon atoms.

Formulation

A mixture designed to produce a useful product with specific properties.

Example: fuels, medicines, paints

Global warming

The long-term increase in Earth's average temperature, mainly caused by increased greenhouse gases in the atmosphere.

You could learn more about this topic by:

[Materials - KS3 Chemistry - BBC Bitesize](#)

[Extracting metals - The reactivity series - KS3 Chemistry - BBC Bitesize - BBC Bitesize](#)

[Atmospheric pollution guide for KS3 chemistry students - BBC Bitesize](#)

[What are pure substances? - BBC Bitesize](#)



Your teacher will assess your knowledge & understanding throughout the topic by looking at your work, questioning, discussion and giving you feedback in lots of different ways. The key pieces of work in this topic are:

End of topic test

Assessed homework on global warming

Educake Quizzes

Retrieval practice in unit booklet and regular whiteboard quizzes