

Chemistry Learning Journey

YEAR 11

What are the uses and possible risks of nanoparticles?

What are the properties of metals, ceramics and polymers?

How are positive and negative ions identified using laboratory tests?

What evidence is there for the composition of the early atmosphere?

Why is crude oil so useful?

How can we investigate exothermic and endothermic reaction?

What are the properties and reactions of Group 1, 7 and 0?

Why do batteries go flat? What are fuel cells?

How do we calculate concentrations of solutions from acid-alkali titrations?

How do we calculate percentage yield and atom economy in a chemical reaction?

How can we explain the properties of alloys?

How is electroplating of metals carried out and why?

How does sacrificial protection prevent rusting?

What is a life cycle assessment for a new product?

How do metals react with acids, water and other metal compounds?

What happens to ions during the process of electrolysis?

How do we balance a chemical equation?

How do we calculate the formula of a compound?

What are the factors that affect the rate of a chemical reaction?

What are fertilisers, and how is the Haber process used to make them?

What problems do complete and incomplete combustion cause?

What are the properties and uses of alkanes, alkenes, alcohols and carboxylic acids?

How do we make different polymers and why are they so useful?

How do we calculate the formula of a compound?

What are precipitation reactions?

How do you calculate the number of moles of a substance?

What useful products can be made using electrolysis?

How can we decide which method of extraction to use for metals?

How is ammonia produced?

What are the properties of typical transition metals?

How can we calculate the number of protons, neutrons and electrons in an atom?

How can we explain the properties of metals?

How do we balance a chemical equation?

How do we calculate the formula of a compound?

What are the properties of molecular substances?

What are the properties of ionic compounds?

How are the elements arranged in the modern Periodic Table?

How was the Periodic Table developed?

How can we describe and identify isotopes of an element?

How has the model of the atom changed over the past 200 years?

How can a salt be prepared from a neutralization reaction?

What does the pH tell us about the ions in a solution?

How are ions formed? What is an ionic bond?

How are electrons arranged in an atom?

How can we describe different rocks?

How are igneous and metamorphic rocks formed?

How have geologists developed theories about the Earth?

What are the properties of ceramics and polymers?

What happens to particles during a change of state?

How is drinking water produced?

How can filtration be used?

What mixtures can we separate using fractional distillation?

How can we use the reactivity series to extract metals from ores?

How do rocks wear away?

How do we get metals from the Earth?

How do melting points help to identify purity?

How can we calculate Rf values in chromatography experiments?

How do we describe substances and write their chemical formulae?

How can we decide how reliable source materials are?

How do we get energy from chemical reactions?

How do metals react with water and acids?

What happens during rusting and corrosion?

How do we deal with anomalous results?

How can burning fuels cause pollution and climate change?

How can we stop a combustion reaction?

What are atoms like?

YEAR 10

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welcome

Chemistry Big Ideas

In the curriculum pupils progress on their learning journey towards an understanding of the key ideas in chemistry. These “big ideas” are shown below and are colour coded so that you can see where the ideas repeat along the journey so as to consolidate learning and deepen understanding.

- **BIG IDEA: SUBSTANCES AND PROPERTIES** - Materials are either made of a single chemical substance or a mixture of substances which each have distinctive properties.
- **BIG IDEA: PARTICLES AND STRUCTURE** - All matter is made up of atoms. The behaviour and structural arrangement of atoms explains the properties of different materials.
- **BIG IDEA: CHEMICAL REACTIONS** - During a chemical reaction, atoms are rearranged forming new substances.
- **BIG IDEA: EARTH'S ATMOSPHERE** - The composition of the Earth's atmosphere depends upon the balance of substances that are continually entering and leaving it. This affects the Earth's climate.
- **BIG IDEA: DYNAMIC EARTH** - The Earth's crust is constantly changing as new rocks are formed and older rock is worn away.
- Literacy in Science – developing the skills to be a good communicator of science.
- Working Scientifically- developing the skills necessary to carry out scientific investigations and to understand how scientific ideas are developed.

Physics Big Ideas

- **BIG IDEA: MATTER** - Objects are made of particles with mass. Understanding particles helps us to design our world.
- **BIG IDEA: FORCES AND MOTION** - Forces make things change. Understanding forces helps us to predict and control physical change.
- **BIG IDEA: SOUND, LIGHT AND WAVES** - Waves radiate information. Understanding waves helps us to communicate.
- **BIG IDEA: ELECTRICITY AND MAGNETISM** - The everyday world is largely a consequence of electrical charge. Understanding electricity and magnetism helps us develop technology to improve lives.
- **BIG IDEA: EARTH IN SPACE** - Understanding the uniqueness of the Earth and the vastness of space gives us perspective and awe.

- Chemistry Learning Journey in Units from Exploring Science:

Year 7

- 7E Mixtures and Separation
- 7F Acids and Alkalis
- 7G The Particle Model
- 7H Atoms Elements and Molecules

Year 8

- 8E Combustion + Begin the Unit with 8Fa Dalton's Atomic Model, 8Fb Chemical Properties.
- 8G Metals and Their Uses (+ 9Fc Energy and Reactions, 9Fd Displacement, 9Fe Extracting Metals)
- 8H Rocks (+ 9Ea About Ceramics, 9Eb Polymers)

Year 9

- Sc1 -2 States of Matter and Methods of Separation
- Sc3-4 Atomic Structure/ Periodic Table

Year 10

- Sc5-7 Ionic and Covalent Bonding/ Types of Substance
- Sc 8 Acids and Alkalis
- Sc 9 Calculations involving masses.
- Sc 10-13 Electrolytic Processes/ Obtaining Metals/ Reversible Reactions/ Transition Metals

Year 11

- Sc 14-16 Quantitative Analysis/ Dynamic Equilibria/ Fuel Cells
- Sc 17-19 Groups in the Periodic Table/ Rates of Reaction/ Heat energy changes
- Sc 20-21 Fuels / Earth and Atmosphere
- Sc 22-24 Hydrocarbons/ Alcohols/ Polymers
- Sc 25-26 Qualitative Analysis/ Bulk and Surface Properties.

Biology – Big Ideas

- **BIG IDEA: THE CELLULAR BASIS OF LIFE** - Organisms are made of one or more cells, which need a supply of energy and molecules to carry out life processes.
- **BIG IDEA: HEREDITY AND LIFE CYCLES** - Genetic information is passed from each generation to the next; this information and the environment affect the features, growth and development of organisms.
- **BIG IDEA: ORGANISMS AND THEIR ENVIRONMENTS** - All organisms, including humans, depend on, interact with and affect the environments in which they live and other organisms that live there.
- **BIG IDEA: VARIATION, ADAPTATION AND EVOLUTION** - Differences between organisms cause species to evolve by natural selection of better adapted individuals. The great diversity of organisms is the result of evolution.
- **BIG IDEA: HEALTH AND DISEASE** - Organisms must stay in good health to survive and thrive; the health of an individual results from interactions between its body, behaviour, environment and other organisms.