

Curriculum Summary - Chemistry (Year 11)

Autumn

C8: Rates and equilibrium

In this chapter, students will learn about the factors that affect the rate of a reaction, including temperature, surface area, concentration, and pressure. Students should be able to explain the effect of each factor on the rate of reaction using collision theory – understanding that each factor increases the *frequency* of effective collisions, **not** just the number of collisions. They will also be able to explain the effect of catalysts on the rate of a reaction in terms of providing an alternative reaction pathway with a lower activation energy.

Students will learn about reversible reactions and dynamic equilibrium. Students will apply their knowledge on endothermic and exothermic reactions to equilibrium reactions to be able to predict the effect of temperature changes on the reversible reactions and the position of the equilibrium. Higher-tier students will also be able to use Le Châtelier's principle to explain the effect of temperature and pressure on the position of equilibrium.

C9: Crude oil and fuels

In this chapter, students will learn about hydrocarbons and been introduced to the alkanes. They will be able to identify alkanes from their formulae and be able to name and draw the displayed formula of the first four alkanes. Students will learn about some of the reactions of hydrocarbons, including combustion (both complete and incomplete) and cracking. All students will be able to write balanced symbol equations for the complete combustion of hydrocarbons and to describe the conditions of cracking. All students will be able to describe the test for alkenes (a product of cracking).

Students will learn about crude oil as a source of hydrocarbons and the fractional distillation of crude oil. They will be able to describe how the size of the hydrocarbon molecule affects its properties, including viscosity, boiling point, and flammability.

Curriculum Summary - Chemistry (Year 11)

Spring

C12: Chemical analysis

In this chapter, students will learn about various techniques for analyzing substances. All students will understand the difference between a pure substance, a mixture, and a formulation, and what is meant by purity. Students will also have built upon their understanding of chromatography experiments from *Chapter C1* and be able to analyse a chromatogram, both qualitatively and quantitatively using R_f values. Students will also be able to describe the different experimental tests for gases, including both the procedure and positive result.

C13: The Earth's atmosphere

In this chapter, students will learn about the Earth's atmosphere. Students will be able to describe the volcanic activity theory of the origin of the atmosphere and be able to interpret evidence concerning other theories and be able to evaluate them. To describe the history of the atmosphere students will need to have a sense of the timescales involved.

Along with an understanding of the origins of the atmosphere, students will also understand how it has evolved over time. This includes both how the general composition of the atmosphere has changed and how the atmosphere is currently being affected by human activity. Students will be able to describe the human activities that are thought to cause global warming and be able to explain some of the effects this has on the climate of the Earth. Students will also be able to explain the effect of other pollutants on the Earth, including carbon monoxide, sulfur dioxide, nitrogen oxides, and particulates.

Throughout this chapter, students will have many opportunities to develop their 'working scientifically' skills, including evaluating models and interpreting and evaluating evidence for scientific theories.

Curriculum Summary - Chemistry (Year 11)

Summer

C14: The Earth's resources

In this chapter, students will learn about the difference between finite and renewable resources. It is important that students understand that renewable resources are not an infinite supply but are replaceable at a rate similar to the rate they are used up, whereas finite resources are used up faster than they can be replenished. Students understanding of finite and renewable resources will be applied to the need to reuse and recycle, and they will be able to describe and evaluate ways of reducing the use of finite resources and carry out life cycle assessments on products.

Students will look at specific resources that we use, including water and metals (in particular, copper). Students will be able to describe the different ways that water is treated, both to create potable water and to remove waste products so it is safe to release into the environment. Students have already met metal-ore extraction and electrolysis, and higher-tier students will apply that knowledge to the extraction of copper, as well as understanding alternative biological methods used to extract copper.