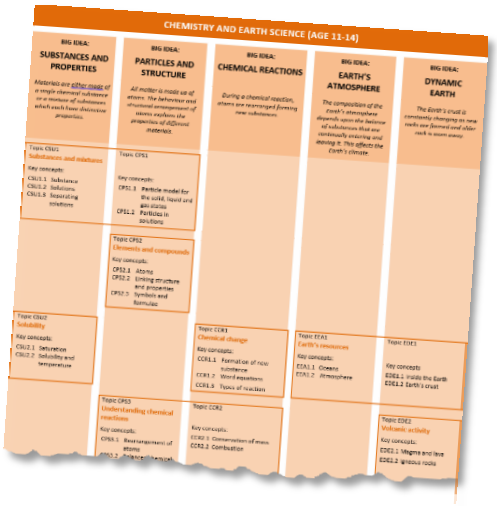
Chemistry and Earth science (age 11-14)
Subject map

Big ideas and key concepts



The **Best Evidence Science Teaching** resources can be used with your existing scheme of work, if desired. However, we have used research evidence on learning pathways and effective sequencing of ideas to develop subject maps for biology, chemistry, Earth science and physics.

This subject map shows how three **big ideas** of chemistry and two of Earth science can be developed through a series of **key concepts**, organised into teaching topics.

Each key concept requires approximately 1-3 lessons' worth of teaching time.

The numbering in the subject map gives some guidance about teaching order based on our review of the research and teaching experience. In general, key concepts that appear earlier in the subject map need to be understood before progression to key concepts that appear later. However, the teaching order can be tailored for different classes as appropriate.

Notes about the chemistry and Earth science subject map

Some topics develop understanding of more than one big idea; these are presented as stretching across more than one column.

Two topics are included that cover some introductory key concepts of materials science. Although they help to develop understanding of the big ideas, they are distinguished from the other topics using the code CMS. They were developed with the support of the Horners' Company Charity.

Publication of resources

Teaching and learning resources will be added on a topic-by-topic basis, with the final topics due to be added in the first few months of 2020.

The resources are being developed based on careful consideration of the best available research evidence on learning pathways, common student misunderstandings, and effective teaching approaches.

To find out when new topics have been published, please email uyseg@york.ac.uk and ask to subscribe to BEST project updates, or follow @BestEvSciTeach on Twitter.

This document last updated: June 2020

CHEMISTRY AND EARTH SCIENCE (AGE 11-14)

BIG IDEA: SUBSTANCES AND PROPERTIES	BIG IDEA: PARTICLES AND STRUCTURE	BIG IDEA: CHEMICAL REACTIONS	BIG IDEA: EARTH CHEMISTRY	BIG IDEA: DYNAMIC EARTH
Materials are either made of a single chemical substance or a mixture of substances which each have distinctive properties.	*All matter is made up of atoms. The behaviour and structural arrangement of atoms explains the properties of different materials.*	*During a chemical reaction, atoms are rearranged forming new substances.*	*Substances can move within and between the atmosphere, hydrosphere, geosphere and biosphere as part of large-scale Earth systems.*	*The Earth's crust is constantly changing as new rocks are formed and older rock is worn away.*
Topic CMS1 **Properties and materials** CMS1.1 Combining materials CMS1.2 Classifying materials				
Topic CSU1 **Substances and mixtures** Key concepts: CSU1.1 Substance CSU1.2 Solutions CSU1.3 Separating solutions	Topic CPS1 Key concepts: CPS1.1 Particle model for the solid, liquid and gas states CPS1.2 Particles in solutions			

Topic CPS2
Elements and compounds

Key concepts:

CPS2.1 Atoms and molecules
CPS2.2 Symbols and formulae

Topic CMS2
Designing materials

Key concepts:

CMS2.1 Polymer properties

Topic CSU2
Solubility

Key concepts:

CSU2.1 Comparing solubility

Topic CPS3
Chemical change

Key concepts:

CPS3.1 Rearrangement of atoms

Topic CCR1

Key concepts:

CCR1.1 Formation of new substance

Topic EDE1
Earth's resources

Key concepts:

EDE1.1 What's in a rock?
EDE1.2 Inside the Earth
EDE1.3 Making rocks by heating

Topic CPS4
Understanding chemical reactions

Key concepts:

CPS4.1 Representing reactions
CPS4.2 Conservation of mass

Topic CCR2

Key concepts:

CCR2.1 Reactions in solution
CCR2.2 Combustion

Topic EEC1
Air pollution

Key concepts:

EEC1.1 Air quality

Topic CPS5
Water cycle
Key concepts:
CPS5.1 Explaining evaporation

Topic CCR3
Energy and reactions
Key concepts:
CCR3.1 Exothermic and endothermic reactions

Topic EEC2
Water cycle
Key concepts:
EEC2.1 Water cycle processes

Topic CSU3
Acids and alkalis
Key concepts:
CSU3.1 pH scale

Topic CCR4
Key concepts:
CCR4.1 Neutralisation

Topic EEC3
Key concepts:
EEC3.1 Acid rain

Topic EEC4
Weathering and erosion
Key concepts:
EEC4.1 Chemical weathering

Topic EDE2
Key concepts:
EDE2.1 Physical weathering and erosion

Topic CSU4
Periodic table
Key concepts:
CSU4.1 Trends in physical properties

Topic CPS6
Key concepts:
CPS6.1 Atomic model

Topic CCR5
Key concepts:
CCR5.1 Periodic patterns

Topic EDE3
Rock changes
Key concepts:
EDE3.1 Making rocks by pressure and cementing
EDE3.2 Making fossil fuels