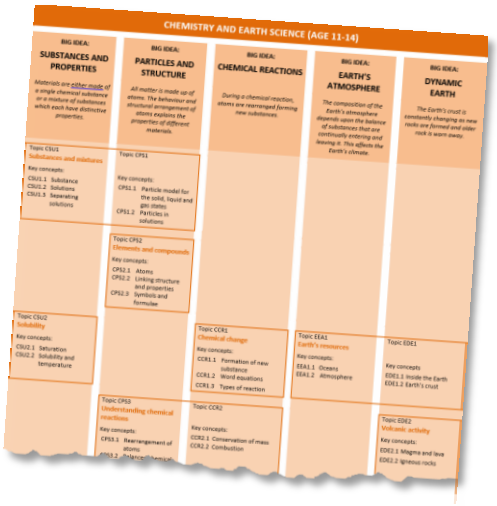
Chemistry and earth science (age 11-14)
Subject map

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.

Publication of resources

Teaching and learning resources will be added on a topic-by-topic basis throughout 2018 and 2019.

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.

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CHEMISTRY AND EARTH SCIENCE (AGE 11-14)

BIG IDEA: SUBSTANCES AND PROPERTIES	BIG IDEA: PARTICLES AND STRUCTURE	BIG IDEA: CHEMICAL REACTIONS	BIG IDEA: EARTH'S ATMOSPHERE	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.*	*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.*	*The Earth's crust is constantly changing as new rocks are formed and older rock is worn away.*
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 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 EEA1
Earth's resources

Key concepts:

EEA1.1 Oceans
EEA1.2 Atmosphere

Topic EDE1

Key concepts

EDE1.1 Inside the Earth
EDE1.2 Earth's crust

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 EDE2
Volcanic activity

Key concepts:

EDE2.1 Magma and lava
EDE2.2 Igneous rocks

Topic CPS5
Energy and change of state
Key concepts:
CPS4.3 Explaining change of state graphs
CPS4.4 Evaporation

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

Topic EEA2
Changing atmosphere
Key concepts:
EEA2.1 Composition of the modern atmosphere
EEA2.2 Natural changes to the atmosphere
EEA2.3 Human activities and the atmosphere

Topic CSU3
Acids and alkalis
Key concepts:
CSU3.1 Distinguishing acids and alkalis
CSU3.2 pH scale

Topic CCR4
Key concepts:
CCR4.1 Neutralisation
CCR4.2 Making salts

Topic EDE3
Changing landscapes
Key concepts:
EDE3.1 Weathering and erosion
EDE3.2 Sedimentary rocks
EDE3.3 Geological time

Topic CSU4 **Periodic table** Key concepts: CSU4.1 Patterns in physical properties of the elements	Topic CPS6 Key concepts: CPS6.1 Atomic model CPS6.2 Patterns in atomic structure	Topic CCR5 Key concepts: CCR5.1 Reactivity series CCR5.2 Patterns in chemical properties of the elements	Topic EEA3 **Earth cycles** Key concepts: EEA3.1 Water cycle EEA3.2 Carbon cycle	Topic EDE4 Key concepts: EDE4.1 Rock cycle EDE4.2 Metamorphic rocks