



# Department: Science

## Subject: Chemistry

Program of Study: Key stage 3 to Key stage 5

### Key Concepts

Atomic structure and the periodic table	Bonding, structure, and the properties of matter	Quantitative chemistry	Chemical changes	Energy changes	The rate and extent of chemical change	Organic chemistry	Chemical analysis	Chemistry of the atmosphere	Using resources
The periodic table provides a structured organisation of the known chemical elements. The arrangement can be explained in terms of atomic structure which provides evidence for the model of a nuclear atom with electrons in energy levels.	Chemists use theories of structure and bonding to explain the physical and chemical properties of materials. Scientists use this knowledge of structure and bonding to engineer new materials with desirable properties.	Chemists use quantitative analysis to determine the formulae of compounds and the equations for reactions. Analysts can then use quantitative methods to determine the purity of chemical samples and to monitor the yield from chemical reactions.	Understanding of chemical changes meant that scientists could begin to predict exactly what new substances would be formed and use this knowledge to develop a wide range of different materials and processes. It also helped biochemists to understand the complex reactions that take place in living organisms.	Energy changes are an important part of chemical reactions. The interaction of particles often involves transfers of energy due to the breaking and formation of bonds.	Chemical reactions can occur at vastly different rates. There are many variables that can be manipulated in order to speed them up or slow them down. Understanding energy changes that accompany chemical reactions is important in industry to determine the effect of different variables on reaction rate and yield.	The main sources of organic compounds are living, or once-living materials from plants and animals. These sources include fossil fuels which are used in the petrochemical industry. Chemists take organic molecules and modify them in many ways to make new and useful materials.	Analysts have developed qualitative tests to detect specific chemicals. The tests are based on reactions that produce a gas with distinctive properties, or a colour change or an insoluble solid that appears as a precipitate.	The Earth's atmosphere is dynamic and forever changing. The causes of these changes are sometimes man-made and sometimes part of many natural cycles. Scientists use very complex software to predict weather and climate change.	Industries use the Earth's natural resources to manufacture useful products. In order to operate sustainably, chemists seek to minimise the use of limited resources, use of energy, waste and environmental impact in the manufacture of these products.

## Key Themes

Atoms	Elements	Periodic table	Bonding	Structure	Rates of Reaction	Energy changes
Matter is composed of tiny particles called atoms and there are about 100 different naturally occurring types of atoms called elements	Elements show periodic relationships in their chemical and physical properties	Periodic properties can be explained in terms of the atomic structure of the elements	Atoms bond by either transferring electrons from one atom to another or by sharing electrons	The shapes of molecules (groups of atoms bonded together) and the way giant structures are arranged is of great importance in terms of the way they behave	There are barriers to reaction so reactions occur at different rates	Energy is conserved in chemical reactions so can therefore be neither created or destroyed.

## Key Stage 3

### YEAR: 7

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Big Question: What are we made of? (Chemistry + Biology)							Big Question: What makes things move ? (Physics) How do organisms manage to live and survive together? (Biology)							Big Question: Where does the electricity in our homes come from? What is it? (Physics)						Big Question: Where do babies come from? (Biology)						Big Question: How do we fit into our Universe? (Physics)						Big Question: Is the phrase "you are what you eat" really true? (Biology) How do rocks form and change? (Chemistry)						
Key Concepts							Key Concepts							Key Concepts						Key Concepts						Key Concepts						Key Concepts						
Key Themes							Key Themes							Key Themes						Key Themes						Key Themes						Key Themes						
Assessment Method: GL Initial assessment Educake + ERA/Prac + End of topic test							Assessment Method: Educake + ERA/Prac + End of topic test							Assessment Method: Educake + ERA/Prac + End of topic test						Assessment Method: Educake + ERA/Prac + End of topic test						Assessment Method: Educake + ERA/Prac + End of topic test GL assessment (tbc)						Assessment Method: Educake + ERA/Prac + End of topic test						

### YEAR: 8

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Big Question: What makes me, me? Where did we all come from? (Biology) How do we see? (Physics)							Big Question: What is the Periodic Table? (Chemistry) Do we really live on a ball of rock? (Chemistry)							Big Question: Can space travel help me lose weight? (Physics) Why do magnets 'stick'? (Physics)						Big Question: Are all acids dangerous? What is a chemical reaction? (Chemistry)						Big Question: Why don't all my house lights go out when a bulb blows? What is 'green energy'? (Physics)						Big Question: Do plants eat sunshine? Where do we get our energy from? (Biology) If a tree falls in the woods but no one sees, does it still make a sound? (Physics)						
Key Concepts							Key Concepts							Key Concepts						Key Concepts						Key Concepts						Key Concepts						
Key Themes							Key Themes							Key Themes						Key Themes						Key Themes						Key Themes						
Assessment Method: GL Initial assessment Educake + ERA/Prac + End of topic test							Assessment Method: Educake + ERA/Prac + End of topic test							Assessment Method: Educake + ERA/Prac + End of topic test						Assessment Method: Educake + ERA/Prac + End of topic test						Assessment Method: Educake + ERA/Prac + End of topic test GL assessment (tbc)						Assessment Method: Educake + ERA/Prac + End of topic test						

## Key Stage 4

### YEAR: 9

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Fundamental atomic structure Introduction to the Periodic Table							Chemical changes – reactivity and acid reactions								Chemical bonding					Rates of reaction and collision theory				Quantitative chemistry – changes in mass More acid reactions						Chemistry of the Atmosphere								
Key Concepts							Key Concepts								Key Concepts					Key Concepts				Key Concepts						Key Concepts								
Key Themes							Key Themes								Key Themes					Key Themes				Key Themes						Key Themes								
Assessment Method: Educake + ERA/Prac + End of topic test							Assessment Method: Educake + ERA/Prac + End of topic test								Assessment Method: Educake + ERA/Prac + End of topic test					Assessment Method: Educake + ERA/Prac + End of topic test				Assessment Method: Educake + ERA/Prac + End of topic test GL assessment (tbc)						Assessment Method: Educake + ERA/Prac + End of topic test								

### YEAR: 10

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Recap bonding Chemical changes - Electrolysis							Purity, formulations and chromatography Properties of matter								Reactions of metals Endothermic and exothermic reactions					Rates of reaction and equilibrium				Quantitative chemistry – mass changes, mole calculations and yield						Alkanes and alkenes, crude oil.								
Key Concepts							Key Concepts								Key Concepts					Key Concepts				Key Concepts						Key Concepts								
Key Themes							Key Themes								Key Themes					Key Themes				Key Themes						Key Themes								
Assessment Method: Educake + ERA/Prac + End of topic test							Assessment Method: Educake + ERA/Prac + End of topic test								Assessment Method: Educake + ERA/Prac + End of topic test					Assessment Method: Educake + ERA/Prac + End of topic test				Assessment Method: Educake + ERA/Prac + End of topic test PPE (paper 1)						Assessment Method: Educake + ERA/Prac + End of topic test								

### YEAR: 11

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Using resources – water treatment, metal alloys and Haber							Organic chemistry and nano-science								Chemical analysis – identification of ions					REVISION				EXAMS														
Key Concepts							Key Concepts								Key Concepts					Key Concepts				Key Concepts														
Key Themes							Key Themes								Key Themes					Key Themes				Key Themes														
Assessment Method: Educake + ERA/Prac PPE 1 (paper 1)							Assessment Method: Educake + ERA/Prac + End of topic test								Assessment Method: PPE 2 (full set) Educake + ERA/Prac+Exam					Assessment Method:				Assessment Method:														

