



Putteridge
High
School

Extended Learning Science - Chemistry Years 9, 10 & 11



Putteridge
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School

Science - Chemistry

Year 9 - Autumn Term



Extended Learning Opportunities

Subject: Combined science Chemistry

Year: 9

Term: 1

Topic: CC1-2 States of matter and separating substances

Learning Objectives

- Recall the particle model of the three states of matter solids, liquids and gases and the attraction and movement of the particles.
- Recall the names of the changes of state (i.e. boiling and condensing; freezing and melting)
- Describe separation techniques of filtration, crystallisation, paper chromatography, distillation
- Explain how water is stored and treated to make tap (drinking) water
- Interpret graphs of temperature during changes of state to identify how pure a substance is

Extended Learning Opportunities

- BBC Bitesize- States of matter and mixtures
<https://www.bbc.com/education/topics/z9766yc>
- Log in to the school Focus Educational Software site to access an interactive simulation of the core practical for this topic **SC2d Separation techniques** (Log in through Moodle <https://moodle.putteridgehigh.org/course/view.php?id=467>)
- Interesting engineering: How a water treatment plant works
<https://interestingengineering.com/dirty-clean-how-water-treatment-plant-works>
- Investigating materials to make clean water <http://www.planet-science.com/categories/experiments/chemistry-chaos/2012/07/can-you-clean-water.aspx>
- Investigating mixtures in pen inks or sweet colourings using simple paper chromatography
<https://bpes.bp.com/chromatography-video>
- Distillation resources <https://bpes.bp.com/distillation-video>
- Mixing and separating Science web ASTA
http://scienceweb.asta.edu.au/verve/_resources/asta_5-1-1_bi_mixing_yr7_v1_2.pdf



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Science - Chemistry

Year 9 - Spring Term



Extended Learning Opportunities

Subject: Combined science Chemistry

Year: 9

Term: 2

Topic: CC3 Atomic structure and CC4 Periodic table

Learning Objectives

- Recall the structure of an atom including distribution of protons, neutrons and electrons.
- Describe the properties of protons, neutrons and electrons.
- Describe the structure of an atom using the periodic table to determine the numbers of protons, neutrons and electrons and the electron configuration.

Extended Learning Opportunities

- BBC Bitesize- Atomic structure and periodic table
<https://www.bbc.com/education/topics/zw6nng8>
- Find out about careers in chemistry at <http://www.rsc.org/careers/future/>
- Atom builder simulation <https://phet.colorado.edu/en/simulation/build-an-atom>
- Making model atoms <https://www.wikihow.com/Make-a-Small-3D-Atom-Model>
- Ted Ed Just how small is an atom <https://www.youtube.com/watch?v=yQP4UJhNnOI>
- Visit the Royal society of Chemistry RSC website and investigate the properties of different elements by clicking on them in the interactive periodic table. <http://www.rsc.org/periodic-table>
- History of the periodic table
<http://www.rsc.org/education/teachers/resources/periodictable/pre16/develop/mendeleev.htm>
- On this day in chemistry http://www.rsc.org/learn-chemistry/collections/chemistry-calendar/january-1#otdic_content



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Science - Chemistry

Year 9 - Summer Term



Extended Learning Opportunities

Subject: Combined science Chemistry

Year: 9

Term: 3

Topic: CC5 ionic bonding CC6 covalent bonding CC7 Properties of different bonding structures

Learning Objectives

- Describe ionic bonds, simple molecular covalent, giant covalent and metallic bonds
- Explain the properties of ionic, simple molecular covalent, giant covalent and metallic substances including electrical conductivity, solubility, melting/boiling points
- Compare the structure and properties of allotropes of carbon including graphite, diamond, graphene and Buckminster fullerenes
- Show how ionic bond and covalent bonds form using dot and cross diagrams

Extended Learning Opportunities

- BBC Bitesize- Ionic compounds, Simple molecular substances, Giant covalent substances, Metals and non-metals <https://www.bbc.com/education/topics/zw6nng8>
- Chemthink covalent bonding tutorial
<https://www.pbslearningmedia.org/resource/lsp07.sci.phys.matter.covalentbond/covalent-bonding/?#.WzfQBdVKj3g>
- Chemthink ionic bonding interactive tutorial
<https://www.pbslearningmedia.org/resource/lsp07.sci.phys.matter.ionicbonding/ionic-bonding/?#.WzfPs9VKj3g>
- Exploring chemical bonding <http://www.sepllessons.org/node/2241>



Science - Chemistry

Year 10 – Extended learning opportunities

Autumn Term



Extended Learning Opportunities

Subject: Combined science Chemistry

Year: 10

Term: 1

Topic: CC13 Groups in the periodic table CC14 Rates of reaction CC15 Energy changes during reactions

Learning Objectives

- Describe and explain the properties of these groups in the periodic table
 - Group 1 Alkali metals
 - Group 7 Halogens
 - Group 0 Noble gases
- Describe and explain factors that can affect the rate of a chemical reaction
- Describe endothermic and exothermic chemical reactions and interpret data on energy change graphs and bond energies

Extended Learning Opportunities

- BBC Bitesize- Groups in the periodic table <https://www.bbc.com/education/topics/zsg997h>
- BBC Bitesize- Rates of reaction and energy changes <https://www.bbc.com/education/topics/ztyggdm>
- Log in to the school Focus Educational Software site to access an interactive simulation of the core practical for this topic **SC18b Rates of reaction and rates of reaction 2** (Log in through Moodle <https://moodle.putteridgehigh.org/course/view.php?id=467>)
- Explaining the reactivity of the alkali metals <https://www.patana.ac.th/parents/curriculum/Chemistry/units/LR505.html>
- Teachers TV: Periodic table – ferocious elements <https://www.tes.com/teaching-resource/teachers-tv-periodic-table-ferocious-elements-6038964>
- Royal institution Christmas Lectures 2012: the noble gases <http://www.rsc.org/learn-chemistry/resource/res00001127/ri-christmas-lectures-2012-the-noble-gases?cmpid=CMP00002132#!cmpid=CMP00002132>
- Rates of reaction menu understanding chemistry <https://www.chemguide.co.uk/physical/basicratesmenu.html>
- Exothermic and endothermic reactions <https://bpes.bp.com/energetic-reactions>



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Science - Chemistry

Year 10 – Spring Term



Extended Learning Opportunities

Subject: Combined science Chemistry

Year: 10

Term: 2

Topic: CC16 Fuels and CC17 Earth and atmospheric science

Learning Objectives

- Recall the definition of a hydrocarbon and describe the structure of alkanes and alkenes
- Describe crude oil as a mixture of different length hydrocarbons and explain how fractional distillation separates crude oil into groups of hydrocarbons with the same chain length
- Explain how long hydrocarbons can be made into smaller ones by cracking
- Describe the chemical reactions of complete and incomplete combustion and the problems caused by the products of these reactions.
- Compare the earth's early atmosphere with today's atmosphere and explain how it has changed
- Evaluate the evidence for climate change and global warming including the future issues

Extended Learning Opportunities

- BBC Bitesize- Fuels and Earth science
<https://www.bbc.com/education/topics/z2pyy4j>
- Combustion of fuels <https://bpes.bp.com/combustion-of-fuels>
- Fractional distillation
<https://bpes.bp.com/hydrocarbons-from-crude-oil>
<https://bpes.bp.com/fuels-from-crude-oil>
- Work out your carbon footprint <http://footprint.wwf.org.uk/>
- Climate change interactive activities <https://bpes.bp.com/climate-change>



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Science - Chemistry

Year 10 – Summer Term



Extended Learning Opportunities

Subject: Combined science Chemistry

Year: 10

Term: 3

Topic: CC9 Quantitative chemistry

Learning Objectives

Calculations include

- Relative formula mass from relative atomic masses
- Empirical formula
- Describe an experiment to determine empirical formula e.g magnesium oxide
- Calculate masses of reactants and products using balanced symbol equations
- Calculate theoretical yield and percentage yields of a product
- Calculate concentration of solutions in gdm^{-3}
- **HIGHER TIER** recall that a mole of a substance contains 6.02×10^{23} particles of a substance
- **HIGHER TIER** calculations involving moles, concentration and mass of a substance

Extended Learning Opportunities

- BBC Bitesize Calculations for all students and higher calculations sections
<https://www.bbc.com/education/topics/zw6nng8>
- Quantitative chemistry quiz <http://wps.pearsoned.com.au/ibcs/89/22896/5861591.cw/-/5861593/index.html>



Science - Chemistry

Year 11 – Extended learning opportunities

Autumn Term



Extended Learning Opportunities

Subject: Combined science Chemistry

Year: 11

Term: 1

Topic: CC8 Acids and alkalis

Learning Objectives

- Understand chemical symbols identifying the number and types of elements in a compound
- Describe reactions of acids with metals and carbonates using chemical word equations and symbol equations.
- Describe the use of indicators to show acidity or alkalinity
- Core practical methods for making copper sulfate and investigating neutralisation

Extended Learning Opportunities

- BBC Bitesize- Chemical changes <https://www.bbc.com/education/topics/zgd77p3>
- Log in to the school Focus Educational Software site to access an interactive simulation of the core practicals for this topic **SC8c Preparation of copper sulfate, SC8d investigating neutralisation** (Log in through Moodle <https://moodle.putteridgehigh.org/course/view.php?id=467>)
- Balancing chemical symbol equations simulation <https://phet.colorado.edu/en/simulation/legacy/balancing-chemical-equations>
- Writing word equations practice <http://www.rsc.org/education/teachers/resources/aflchem/resources/46/index.htm>
- Making your own red cabbage indicator <http://www.webinnate.co.uk/science/week1.htm>
- Vinegar and bicarbonate soda volcano (also see film canister rockets) http://www.nipissingu.ca/education/jeffs/4284Fall/TLS/Structures_and_Mechanisms_grade5/The_Erupting_Volcano.pdf



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Science - Chemistry

Year 11 – Spring Term



Extended Learning Opportunities

Subject: Combined science Chemistry

Year: 11

Term: 2

Topic: CC10 Electrolytic processes, CC11 Obtaining and using metals, CC12 Reversible reactions and equilibria

Learning Objectives

- Describe the core practical method of electrolysis of copper sulphate
- Explain the products of electrolysis at the anode and cathode
- Write half equations for the oxidation and reduction of ions at the electrodes during electrolysis
- Understand how the reactivity series of metals is linked to their extraction methods from their ores including reduction by heating with carbon and electrolysis
- Define the chemistry terms oxidation and reduction and identify examples
- Describe the factors of a life cycle assessment of a product and how recycling reduces environmental impact
- Explain the term dynamic equilibrium

Extended Learning Opportunities

- BBC Bitesize extracting metals and equilibria
<https://www.bbc.com/education/topics/z3kjty>
- Log in to the school Focus Educational Software site to access an interactive simulation of the core practical for this topic **SC10a Electrolysis of copper sulphate** (Log in through Moodle <https://moodle.putteridgehigh.org/course/view.php?id=467>)
- HIGHER LEVEL <https://www.chemguide.co.uk/inorganic/extraction/introduction.html>