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Year 9 Overview 2024-25 – *Chemistry*

Date	Wk	Week	Units Studied & Learning Outcomes
8 weeks (8 Lessons) (38Days)			
2-Sep	A	1	Overview of Unit/No. lessons Separation techniques & Atomic structure (8 lessons) Lesson **Sequence** of Content: **1 & 2**. Atoms, elements, compounds & mixtures (2 lessons) **3 & 4**. Separating mixtures (2 lessons) **5 & 6.** Required Practical – Chromatography (2 lessons) **7.** Structure of the atom (1 lesson) **8**. Electron configuration (1 lesson)
9-Sep	B	2	
16-Sep	A	3	
23-Sep	B	4	
30-Sep	A	5	
7-Oct	B	6	
14-Oct	A	7	
21-Oct	B	8	

Prior	Current	Next
Year 7 – Separation techniques Year 8 – atoms, elements, compounds & mixtures Year 8 – structure of the atom	Understand separation techniques Understand chromatography Understand the structure of the atom	Year 10 – Purity Year 10 – atomic structure, configuration, isotopes & ions

- **GW:** recall what an atom, element, compound & mixture are and recall different separation techniques
- **BI:** describe what an atom, element, compound & mixture are and describe different separation techniques
- **EW:** explain the difference between atoms, elements, compounds and mixtures and evaluate different separation techniques

- Recall of knowledge, application of knowledge, identify patterns from observations, interpret data about Rf values

Assessment:
- Quick quiz
- Practical application skills
- Exam style questions
- Molecular models
- Q&A

Foundational concepts:
Substances, structures & properties and Atomic structure & the periodic table and quantitative

Outcomes:
- Understand what an atom, element, compound & mixture are
- Understand how to separate different mixtures
- Investigate how chromatography can be used to separate a mixture & calculate Rf value
- Understand the structure of the atom
- Understand patterns in electron configuration

Tier 2/3 Vocabulary
- Glossaries, quick quizzes, within exam questions, PowerPoints.

KW: Atom, element, compound, mixture, molecule, nucleus, proton, neutron, electron, evaporation, condensation, filtration, crystallisation, distillation, chromatography

Links to root words (etymology):
- Chromatography "a treatise on colours," 1731, from chromato-, Latinized combining form of Greek khrōma "color", denoting "colour" or "chromatin" + **-graphy**.
- Atom - late 15c., as a hypothetical indivisible extremely minute body, the building block of the universe, from Latin *atomus* "indivisible particle," from Greek *atomos* "uncut; indivisible"

- **History**: 400 B.C. Democritus' atomic theory posited that all matter is made up small indestructible units he called atoms.
- To write with colors -- literally translated from its Greek roots chroma and graphein , chromatography was first developed by the Russian botanist Mikhail Tswett in 1903 as he produced a colorful separation of plant pigments through a column of calcium carbonate.

Career links – CSI investigator use separation techniques to test samples collected from crime scenes

Equality Diversity and Inclusion (EDI) links?
- Maria Goeppert-Mayer won a Nobel Prize for formulating the nuclear shell model which made it possible to understand how the nucleus of an atom works
- Albert Einstein – refugee developed ideas about the structure of the atom
- Scientists from different nationalities

Misconceptions:
- Sieve is a separation technique
- Use filtering to separate salt water

Half-Term	7 weeks (7 lessons) (35 Days)

4-Nov	A	9	**Overview of Unit/No. lessons** Organic Chemistry (7 lessons) **Lesson Sequence of Content:** **1**. Electron configuration (1 lesson) **2**. Organic Chemistry – crude oil (1 lesson) **3**. Fractional distillation of crude oil (1 lesson) **4**. Fractional distillation – properties of fractions (1 lesson) **5 & 6**. Atmospheric pollutants – how they are produced and their environmental impact (2 lessons) **7**. Cracking (1 lesson) **8**. Revision (1 lesson)
11-Nov	B	10	
18-Nov	A	11	
25-Nov	B	12	
2-Dec	A	13	
9-Dec	B	14	
16-Dec	A	15	

Prior	Current	Next
Year 8 – combustion	Understand what crude oil is & how it is separated Recall atmospheric pollutants, how they form and the environmental impact Recall the process of cracking	Year 11 – organic Chemistry (S) Year 11 – reactions of alkenes (S)

- **GW**: recall what crude oil is and how it is separated, recall main atmospheric pollutants and state the main gases present in the early atmosphere and todays atmosphere
- **BI:** describe describe the process of fractional distillation, describe the environmental impact of each pollutant and describe how the proportion of gases changed over time
- **EW**: explain the process of fractional distillation, explain how different pollutants are formed and explain how the proportion of gases changed over time

- Recall of knowledge, application of knowledge, identify patterns from observations, interpret data, present word & chemical equations, name compounds, use models to represent compounds, practical skills, evaluate information

Assessment:
- Quick quiz
- Practical application skills
- Exam style questions
- Model kits
- Q&A

Foundational concepts:
Earths resources

Outcomes:
- Understand patterns in electron configuration
- Explain what crude oil is
- Explain the process of fractional distillation
- Recall properties of different fractions
- Recall the products of burning
- Identify the common atmosphere pollutants & explain the environmental impact of each
- Alkenes and how to test for them
- Understand what cracking is and why it is carried out.

Tier 2/3 Vocabulary
- Glossaries, quick quizzes, within exam questions, PowerPoints, word match activities

KW: hydrocarbon, saturated, alkane, mixture, compound, fractional distillation, evaporation, condensation, vapour, viscous, volatile, flammable, carbon dioxide, carbon monoxide, sulfur dioxide, nitrogen oxides, particulates, combustion, cracking, thermal decomposition, catalyst, bromine water, alkane, alkene

Links to root words (etymology):
- Hydrocarbon - compound of hydrogen and carbon
- Pollute - late 14c., "to defile," a back formation from pollution, or else from Latin pollutus, past participle of polluere "to defile, pollute, contaminate."

Career links
- Conservation Scientist, Environmental Science and Protection Technician, Environmental Engineer, Environmental Lawyer

History:
- The first thermal cracking process for breaking up large hydrocarbons into gasoline came into use in 1913; it was invented by William Merriam Burton, a chemist who worked for the Standard Oil Company (Indiana), which later became the Amoco Corporation.
- Fractional distillation and vacuum distillation were invented near the end of the 18th century. The first columns invented for fractional distillation were simple open tubes and it wasn't until the period 1900-1930 that vast improvements were made.

EDI:
Scientists from different nationalities

Christmas Holiday	6 weeks (6 lessons) (30 Days)

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6-Jan	B	16	**Overview of Unit/No. lessons** Reactions of metals (3 lessons) **Lesson Sequence of Content:** **1**. Revision (1 lesson) **2 & 3**. Exam & feedback (2 lessons) **4.** Conservation of mass during a chemical reaction (1 lesson) **5**. Group 1 – Alkali metals (1 lesson) **6**. Metals & acids (1 lesson)
13-Jan	A	ST1	
20-Jan	B	ST1	
27-Jan	A	19	
3-Feb	B	20	
10-Feb	A	21	

Prior	Current	Next
Year 8 – displacement & conservation of mass Year 8 – structure of the atom Year 8 – reactions of metals	Recall properties of elements Understand reactions of metals	Year 10 – groups of the Periodic table Year 10 – atomic structure, configuration, isotopes & ions Year 11 – reactions of metals & making soluble salts

- **GW**: recall what happens to mass in a chemical reaction, recall properties of group 1 metals and recall reactions of metals
- **BI**: describe why mass is conserved in a chemical reaction, describe chemical properties of group 1 metals and identify products of reactions of metals
- **EW**: explain conservation of mass in terms of atoms, explain properties of group 1 metals, explain reactions of metals

Recall of knowledge, application of knowledge, identify patterns from observations, interpret data, present word & chemical equations for reactions

Assessment:
- Quick quiz
- Exam style questions
- Q&A

Foundational concepts:
Atomic structure & the Periodic table

Outcomes:
- Understand that mass is conserved in a chemical reaction
- Recall properties of group 1 metals
- Understand how to test for hydrogen gas
- Recall products of a reaction between a metal and acid and write equations to represent these reactions

Tier 2/3 Vocabulary
- Glossaries, quick quizzes, within exam questions, PowerPoints, word match activities

KW: Atom, nucleus, proton, neutron, electron, mass, alkali metals, hydrogen, hydroxide

History:
- Niels Bohr (1923) incorporated Langmuir's model that the periodicity in the properties of the elements might be explained by the electronic structure of the atom.
- The British chemist and meteorologist John Daniell, invented one of the very first practical batteries in 1836. In his cell, Daniell utilized a very common single replacement reaction.

Career links
- Extraction Metallurgist, construction & engineering

EDI:
Scientists from different nationalities

Half-Term 6 weeks (6 lessons) (29 Days)

25-Feb	B	22	INSET 24th Feb **Overview of Unit/No. lessons** Extracting Metals (5 lessons) **Lesson Sequence of Content:** **1.** Displacement (1 lesson) **2.** Mining (1 lesson) **3 & 4.**. Extraction of metals – copper from malachite (smelting) (2 lessons) **5.**. Extraction of metals – scrap iron and electrolysis of solutions (H) (1 lesson) 6. Extraction of metals from low-grade ores (phytomining & bioleaching) (H) (1 lesson)
3-Mar	A	23	
10-Mar	B	24	
17-Mar	A	25	
24-Mar	B	26	
31-Mar	A	27	

Foundational concepts:
Earths resources

Outcomes:
- Understand advantages & disadvantages of mining
- Understand how copper is extracted from malachite
- Explain extraction in terms of reactivity
- Explain how copper is extracted using scrap iron and electrolysis of solutions
- Understand how copper is extracted form low grade ores

Tier 2/3 Vocabulary

Prior	Current	Next
Year 7 & 9 – separation techniques Year 8 & 9 – reactions of metals	Understand the process of extracting copper from its ore	Year 10 – metallic bonding Year 11 – reactions of metals & electrolysis

- **GW**: recall steps in extraction of copper from its ore
- **BI:** describe the steps in extraction of copper from its ore
- **EW**: explain different methods of extracting copper and represent these using chemical equations

- Recall of knowledge, application of knowledge, identify patterns from observations, interpret data, present word & chemical equations, name compounds, use models to represent compounds, practical skills

Assessment:
- Quick quiz
- Practical application skills
- Exam style questions

- Glossaries, quick quizzes, within exam questions, PowerPoints, word match activities

KW: ore, reduction, oxidation, displacement, thermal decomposition, electrolysis, solution

Links to root words (etymology):
- Electrolysis - 1834; the name was introduced by Faraday, from electro- + Greek lysis "a loosening," from lyein "to loosen, set free"
- Hydrocarbon - compound of hydrogen and carbon

History:
- The modern oil industry can trace its origins to Baku in 1837, where the first commercial oil refinery was established to distil oil into paraffin (used as lamp and heating oil). This was followed by the first modern oil well in 1846, which reached a depth of 21 metres.
- Smelting. ... The Egyptians and Sumerians smelted gold and silver from ore 6,000 years ago. As a result, these metals began to have a value that was transferable between people and between cultures. Approximately 5,500 years ago in this history of mining, came the discovery of tin.

- **Career links** – Energy engineer, Geoscientist, Engineering geologist, Hydrographic surveyor, Mining engineer.

EDI:
- Resources available in different countries
- Impact of mining in countries such as Brazil

Scientists from different nationalities

Easter Holiday 5 weeks (5 lessons) (23 Days)

22-Apr	B	28	Easter Monday 21st Early May bank hol 6/5 **Overview of Unit/No. lessons** Earth's Atmosphere (3 lessons) **Lesson Sequence of Content:** **1**. Earth's early atmosphere (1 lesson) **2**. Todays Atmosphere (1 lesson) **3**. Carbon Footprint (1 lesson) **4 & 5**. Revision (2 lessons)
28-Apr	A	29	
5-May	B	30	
12-May	A	31	
19-May	B	32	

Prior	Current	Next
Year 8 – combustion	Understand how the Earth's atmosphere has evolved over time	N/A

- **GW:** state the main gases present in the early atmosphere and todays atmosphere
- **BI**: describe how the proportion of gases changed over time
- **EW:** explain how the proportion of gases changed over time

- Recall of knowledge, application of knowledge, identify patterns from observations, interpret data, present word & chemical equations, name compounds, evaluate information

Foundational concepts:
Earth's atmosphere

Outcomes:
- Explain what phytomining and bioleaching are
- Understand that evidence about the atmosphere is limited because of the timescale involved.
- Describe the theory that it evolved from volcanic activity.
- Interpret evidence and evaluate different theories about the early atmosphere.
- Understand how the proportion of different gases changed through time

Tier 2/3 Vocabulary
- Glossaries, quick quizzes, within exam questions, PowerPoints, word match activities

KW:
- volcanoes, respiration, photosynthesis, combustion, condensed, locked-up, fossil fuels, dissolved

Links to root words (etymology):
- Photosynthesis - 898, loan-translation of German Photosynthese, from photo- "light" (see photo-) + synthese "synthesis" (see synthesis).

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Assessment:

- Quick quiz
- Practical application skills
- Exam style questions

Career links

- Conservation Scientist, Environmental Science and Protection Technician, Environmental Engineer, Environmental Lawyer

History:

- vante Arrhenius (1859-1927) was a Swedish scientist that was the first to claim in 1896 that fossil fuel combustion may eventually result in enhanced global warming. ... This is called the natural greenhouse effect.

EDI:

Scientists from different nationalities

Misconceptions:

- Oxygen is the most predominant gas in the atmosphere
- There is a high percentage of carbon dioxide in the atmosphere

Half-Term 7 weeks (7 lessons) (34 Days)

2-Jun	A	33
9-Jun	B	ST2
16-Jun	A	ST2
23-Jun	B	36
30-Jun	A	37
7-Jul	B	38
14-Jul	A	39

SJBF INSET 4/7

Overview of Unit/No. lessons

Environmental Science (5 lessons)

Lesson Sequence of Content:

1 & 2 – Exam & Feedback (2 lessons)
3. Sustainability (1 lesson)
4. LCA (1 lesson)
5 & 6. Environmental impacts of global climate change (2 lessons)
7. Testing for gases (1 lesson)

Prior	Current	Next
Year 8 – combustion & reactions of metals Year 8 – combustion	Understand the Greenhouse effect and its impact on global climate change Understand what a life cycle assessment is Understand what a carbon footprint is Understand what sustainability is Understand how to test for gases	Year 11 – reactions of metals Year 11 – testing ions

- **GW:** state which gases contribute to the greenhouse effect, state what sustainability is, state what a carbon footprint, state the 4 main gases
- **BI:** describe how the main greenhouse gases are produced, describe factors that contribute to our carbon footprint, describe ways of being sustainable, describe the tests for the 4 main gases
- **EW:** explain the greenhouse effect in terms of short wavelength and long wavelength radiation, explain limitations of reducing the carbon footprint, explain the importance of sustainability, explain the test and positive result for each of the 4 gases

Foundational concepts:

Earth's resources & Chemical Reactions

Outcomes:

- Describe the greenhouse effect in terms of the interaction of long wavelength and short wavelength radiation
- Identify some impacts of global warming and climate change
- Explain what we can do to reduce the impact
- Understand what a carbon footprint is
- Describe ways of reducing their carbon footprint.
- Explain limitations of reducing the carbon footprint
- Define sustainability
- Explain what finite resources are.
- Explain renewable resources
- Understand what a carbon footprint is
- Describe ways of reducing their carbon footprint.
- Explain limitations of reducing the carbon footprint
- Define sustainability
- Explain what finite resources are.
- Explain renewable resources
- Identify some impacts of global warming and climate change
- Explain what we can do to reduce the impact
- Identify the four common gases using these tests
- Explain the importance of chemistry in improving agriculture and industry in a sustainable way

Tier 2/3 Vocabulary

- Glossaries, quick quizzes, within exam questions, PowerPoints, word match activities

KW:

- radiation, emits, sustainability, renewable, finite, synthetic, carbon dioxide, oxygen, chlorine, hydrogen, sustainability, renewable, finite, synthetic

• Recall of knowledge, application of knowledge, identify patterns from observations, interpret data, name compounds, evaluate information, use models to describe phenomena	**Links to root words (etymology):** • finite - from Latin finitum, past participle of finire "to limit, set bounds; come to an end" **Career links** • Conservation Scientist, Environmental Science and Protection Technician, Environmental Engineer, Environmental Lawyer **History:** • vante Arrhenius (1859-1927) was a Swedish scientist that was the first to claim in 1896 that fossil fuel combustion may eventually result in enhanced global warming. ... This is called the natural greenhouse effect. **EDI:** • Scientists from different nationalities • Greta Thunburg – young climate change activist **Misconceptions:** refer to the ozone layer, rather than green house gases
(Total: 189 Days)	

Prompt Questions

Now that the revised curriculum has been taught, please consider the Implementation and Impact of the curriculum you taught. What changes might need to be made to the Curriculum Intent (See Curriculum Map and Overviews) in light of this year's experiences?

Please revisit the prompts from last year:

- What are the Key concepts for this unit?
- How will it link to wider disciplinary knowledge/cultural capital: history, culture, authentic artefacts, music, art, literature?
- How does it build on prior knowledge and link to other units, concepts, years, GCSE?
- What is it intended students will have learned?
  - For each Unit? By the end of the Year?
    - GW: ; BI: ; EW
- Is it worth summarising in a knowledge organiser?
- **Assessment: how do you know they have learned the foundational concepts, curriculum and wider disciplinary knowledge? Does assessment look like GCSE light? Should it?**
- Skills used/learned
- Tier 2/3 vocabulary ((Etymology e.g. of Greek/Latin)