

TITLE: 8A The Periodic Table

Unit Overview (Linked to the KS3 Programme of Study)

Students will be taught:

- The development of the Periodic Table and the contribution of scientists such as Mendeleev
- The arrangement of elements into groups and periods
- The differences between metals and non-metals
- How the physical and chemical properties of elements vary across the Periodic Table
- How patterns can be used to predict the properties and reactions of elements
- The properties and reactions of Group 1, Group 7 and Group 0 elements
- How chemical reactions can be represented using word equations
- How scientists use evidence to classify and organise elements

Prior Learning (KS2)

Students have learnt previously about atoms, elements and compounds. This has involved:

- Describing that all matter is made of particles called atoms
- Explaining the differences between atoms, elements and compounds
- Identifying elements and compounds using chemical symbols and formulae
- Interpreting simple chemical formulae to identify the elements present in a substance
- Using scientific models and diagrams to represent atoms, elements and compounds

Future Learning (KS4)

At GCSE students will build on their knowledge of the Periodic Table by studying how the arrangement of elements is linked to their atomic structure. They will learn how the number of electrons determines an element's position in the Periodic Table and explains patterns in chemical properties.

Students will develop their understanding of metals and non-metals by studying bonding, ion formation and reactivity in greater depth. They will investigate trends in Groups 1 and 7 and explain these trends using electron arrangements. Students will also build on their understanding of chemical reactions by writing and balancing symbol equations and using the Periodic Table to predict the behaviour of unfamiliar elements.

Misconceptions

1. The Periodic Table

- Elements are arranged alphabetically
- Elements in the same row have similar properties
- Mendeleev invented all the elements

2. Metals and Non-metals

- All metals are magnetic

- Non-metals do not react
- Metals and non-metals differ only in appearance

3. Groups and Periods

- Groups and periods mean the same thing
- Elements in the same period have identical properties
- Position in the table is random

4. Reactions and Reactivity

- More vigorous reactions always mean more product
- All metals react with water in the same way
- Word equations are chemical formulae

5. Group Trends

- All Group 1 metals are equally reactive
- All Group 7 elements are equally reactive
- Noble gases have no particles because they are unreactive

Practical Requisitions

[8A Requisitions.docx](#)

Mastery (HPA)

Students explain and justify ideas using evidence from the Periodic Table, linking patterns in groups and periods to the properties and reactions of elements. They apply their knowledge to unfamiliar elements, make predictions using trends, and evaluate how scientists used evidence to develop and improve the Periodic Table.

8A.01 The Periodic Table		HPA Challenge	Skills	EEF Recommendations
Leaning Objectives	• Describe how the modern periodic table developed through the work of scientists such as Mendeleev • Identify metals, non-metals, groups and periods on the periodic table • Describe the location of elements on the periodic table	Evaluate why Mendeleev left gaps in his periodic table and explain how this improved the model. Use evidence from the periodic table to predict where undiscovered elements might have been placed. Explain why the periodic table is considered one of the most important scientific models.	Working Scientifically WS 1.1 (Development of scientific thinking) Understand how scientific ideas develop over time WS 1.2 (Models) Use the periodic table as a scientific model WS 4.1 (Scientific vocabulary) Use terms such as element, group and period	EEF 1 (Preconceptions): Diagnose prior understanding of atoms and elements EEF 3 (Modelling): Model how to navigate and interpret the periodic table EEF 6 (Language): Explicit teaching of scientific vocabulary
Do Now (5 mins)	Purpose: Retrieval from prior learning on atoms, elements and compounds Suggested structure (teacher adapts): • What is an element? • Give the symbol for oxygen • What is the difference between an atom and an			

	element? Diamond (Challenge): Why might scientists need a system to organise elements? Teacher uses responses to assess readiness for classification and organisation of elements.		accurately	
Hook / Intro (5 mins)	Introduce key idea: "The periodic table is one of the most important scientific models ever developed." Suggested strategy: - Display a modern periodic table - Ask pupils how they think it is organised - Reveal that scientists spent many years trying to <u>organise elements logically</u>		Maths Skills 1c (Classification) Sort and organise information 3a (Patterns) Identify patterns in tables and data	
Direct Teaching: Cell Structure (10 – 15 mins)	Content: Development and structure of the Periodic Table Introduce: - Early attempts to organise elements - Mendeleev's contribution - Modern periodic table - Groups (columns) - Periods (rows) - Metals and non-metals Key definitions: - Element = substance made from one type of atom - Group = vertical column - Period = horizontal row Teacher modelling (EEF 3): Model how to locate: - Group 1 - Group 7 - Group 0 - Metals - Non-metals Check for understanding (hinge point): - What is a group? - What is a period? - Why was Mendeleev important?			

	Mini whiteboards / cold calling			
Guided Practice (10 mins)	Task type: Supported identification and classification Pupils: • Label groups and periods • Identify metals and non-metals • Locate selected elements Teacher models the first examples and reinforces correct vocabulary.			
Main Task (20 mins)	Core task: Pupils: • Annotate a periodic table • Identify patterns in organisation • Explain how Mendeleev's work contributed to the modern table Teacher flexibility: • Colour coding activity • Card sort • Annotated diagram • Structured written explanation Success criteria: • Correctly identify groups and periods • Locate elements using the periodic table • Explain Mendeleev's contribution Adaptation prompts: • If pupils struggle → provide partially labelled tables • If secure → predict locations of unfamiliar elements using patterns			
Support / Diamond (challenge)	Support: • Word bank • Colour-coded periodic tables • Guided examples Diamond (Challenge): • Explain why gaps were left in Mendeleev's table • Predict properties of an undiscovered element • Evaluate why scientific models change over time			
Common misconceptions	• Groups and periods are interchangeable • Elements are arranged alphabetically • Mendeleev discovered all elements			
Assessment (5	Formative and summary			

mins)	Quick check options: • MCQ: What is a group? • Identify an element's position • Explain Mendeleev's contribution			
Exit ticket (5 mins)	Purpose: Inform next lesson (and Do Now) Example questions: • What is the difference between a group and a period? • Why was Mendeleev important? Teacher uses this to plan next lesson's Do Now (adaptive link)			
Adaptive teaching	• Retrieval informs starting point • Hinge questions guide pacing • Tasks scaffolded depending on need • Challenge develops disciplinary thinking • Exit ticket informs next lesson planning			
British Values	• Tolerance - Students learn how scientific ideas changed over time and how scientists had different explanations before the modern periodic table was accepted. • Individual Liberty - Students develop independent thinking by using evidence to understand how the periodic table was organised. • Mutual Respect - Students discuss and compare ideas about how elements should be classified, listening respectfully to different viewpoints.			
Teacher Notes for MTP adaptations				

8A.02 Metals and Non-Metals		HPA Challenge	Skills	EEF Recommendations
Learning Objectives	- Explain how elements are classified as metals and non-metals - Use patterns to classify an element as a metal or a non-metal - Describe and compare the physical and chemical properties of metals and non-metals	Evaluate which properties are most useful when classifying an unknown element as a metal or non-metal. Use evidence from an element's properties to justify its classification. Apply knowledge of metals and non-metals to predict the properties of unfamiliar elements.	Working Scientifically WS 1.2 (Classification) Group substances based on observable properties WS 3.5 (Interpret data) Identify patterns from tables and observations WS 3.6 (Explain using evidence) Justify classifications using evidence WS 4.1 (Scientific vocabulary) Use terms such as metal, non-metal, conductor and insulator accurately Maths Skills 1c (Classification) Sort and categorise data 2c (Patterns and trends) Identify similarities and differences between groups of elements	EEF 4 (Memory): Retrieval of prior knowledge about elements and the periodic table EEF 3 (Modelling): Model how scientists classify substances using evidence EEF 6 (Language): Explicit teaching of scientific vocabulary associated with metals and non-metals
Do Now (5 mins)	Purpose: Retrieval from Lesson 1 (The Periodic Table) Suggested structure (teacher adapts): - What is a group? - What is a period? - Where are most metals found on the periodic table? Diamond (Challenge): - Why do you think scientists separate metals and non-metals into different regions of the periodic table? Teacher uses responses to assess understanding of periodic table organisation before introducing classification.			
Hook / Intro (5 mins)	Introduce key idea: "Elements can be grouped according to their properties." Suggested strategy: Present two contrasting objects: - Copper wire - Sulphur powder Ask: - How are these substances different? - Which properties can we observe? - How might scientists classify them? Link to the idea that scientists use evidence and patterns to organise elements.			
Direct Teaching: Cell Structure (10 – 15 mins)	Content: Metals and Non-Metals Introduce the location of metals and non-metals on the periodic table: - Most metals are found on the left and centre - Most non-metals are found on the right Physical properties of metals			

	• Good conductors of heat • Good conductors of electricity • Shiny • Strong • Malleable Physical properties of non-metals • Poor conductors of heat • Poor conductors of electricity • Dull • Brittle (where solid) Chemical properties (KS3 level) • Metals often react to form compounds • Non-metals also react but often behave differently from metals Key idea Elements are classified based on patterns in their physical and chemical properties. Teacher modelling (EEF 3) Model comparison using a simple table: <table><tr><th>Metal</th><th>Non-metal</th></tr><tr><td>Conducts electricity</td><td>Does not conduct electricity</td></tr><tr><td>Shiny</td><td>Dull</td></tr><tr><td>Malleable</td><td>Brittle</td></tr></table> Model reasoning: "Copper is classified as a metal because it conducts electricity and is shiny." "Sulfur is classified as a non-metal because it is dull and brittle." Check for understanding (hinge point) • Which property makes copper useful for electrical wires? • Why is sulphur classified as a non-metal? • Are all shiny substances metals? Mini whiteboards / cold calling	Metal	Non-metal	Conducts electricity	Does not conduct electricity	Shiny	Dull	Malleable	Brittle			
Metal	Non-metal											
Conducts electricity	Does not conduct electricity											
Shiny	Dull											
Malleable	Brittle											
Guided Practice (10 mins)	Task type: Supported classification Pupils: • Match properties to metals and non-metals											

	- Classify elements based on a set of given properties - Identify metals and non-metals on a periodic table Teacher models first examples and reinforces the use of evidence when classifying.			
Main Task (20 mins)	Core task: Pupils: - Compare the properties of metals and non-metals - Complete a classification activity using evidence - Explain why selected elements are classified as metals or non-metals Teacher flexibility Teachers select format based on class need: - Comparison table - Card sort - Venn diagram - Structured written explanation Success criteria - Correctly identify metals and non-metals - Describe key physical properties - Use evidence to justify classifications - Use appropriate scientific vocabulary Adaptation prompts - If pupils struggle → provide word banks, property cards and partially completed tables - If secure → classify unfamiliar elements based on provided data			
Support / Diamond (challenge)	Support - Word bank (conduct, malleable, brittle, lustrous) - Property sorting cards - Scaffolded comparison table Diamond (Challenge) - Explain why a scientist cannot classify an element using just one property - Evaluate which property is most useful for identifying metals - Use data about an unfamiliar element to justify its classification			
Common	All metals are magnetic			

misconceptions	• All non-metals are gases • Shiny materials are always metals • Metals and non-metals differ only in appearance • Properties are unrelated to classification			
Assessment (5 mins)	Formative and summary Quick check options: • MCQ: Which property is typical of most metals? • Classify an unfamiliar element using evidence • Explain why an element is a metal or non-metal			
Exit ticket (5 mins)	Purpose: Inform next lesson (and Do Now) Example questions: • State one physical property of a metal. • Explain how scientists classify elements as metals or non-metals. Teacher uses this to plan next lesson's Do Now (adaptive link)			
Adaptive teaching	• Retrieval checks understanding of periodic table organisation • Hinge questions identify misconceptions about classification • Tasks scaffolded according to confidence with scientific vocabulary • Challenge develops justification and evidence-based reasoning • Exit ticket informs next lesson planning and retrieval focus			
British Values	• Democracy - Students share observations and evidence when classifying elements and justifying whether they are metals or non-metals. • Mutual Respect - Students listen to and build upon the ideas of others when discussing the properties of different elements. • Individual Liberty - Students make their own evidence-based decisions when classifying unfamiliar elements.			
Teacher Notes for MTP adaptations				

8A.03 Patterns in the Periodic Table		HPA CHALLENGE	Skills	EEF Recommendations
Learning Objectives	Describe what is meant by chemical and physical properties	Use patterns in the Periodic Table to predict the properties of unfamiliar elements.	Working Scientifically WS 1.2 (Patterns and	EEF 3 (Modelling): Model how scientists identify patterns and make predictions using

	- Use patterns to predict properties of elements - Explain how an element's position in a group or period can be used to predict its properties	Evaluate how reliable predictions are when based on patterns and trends.	relationships) Identify trends and make predictions	evidence
Do Now (5 mins)	Purpose: Retrieval from Lesson 2 (Metals and Non-Metals) Suggested structure (teacher adapts): - State one property of a metal. - State one property of a non-metal. - Where are most metals found on the periodic table? Diamond (Challenge): - How could the position of an element help a scientist predict its properties? Teacher uses responses to assess understanding of classification before introducing patterns and trends.	Justify predictions using evidence from groups and periods.	WS 3.5 (Interpret data) Use information from tables and diagrams WS 3.6 (Explain using evidence) Support predictions with evidence WS 4.1 (Scientific vocabulary) Use terms such as physical property, chemical property, group and period accurately Maths Skills 1c (Classification) Sort information into categories 2c (Patterns and trends) Recognise and use trends in data 4a (Data interpretation) Use tables to support predictions	EEF 4 (Memory): Retrieval of groups, periods, and metal/non-metal classification EEF 7 (Feedback): Provide feedback on the quality of predictions and explanations
Hook / Intro (5 mins)	Introduce key idea: "Scientists can use patterns in the Periodic Table to predict the properties of elements they have never tested." Suggested strategy: - Display properties of several elements from the same group. - Remove one element from the sequence. - Ask pupils to predict the missing element's properties. Link to how Mendeleev used patterns to make predictions before all elements had been discovered.			
Direct Teaching: Cell Structure (10 – 15 mins)	Key Idea Elements in the same group often have similar properties. Scientists can use: - group number - position in the table - known patterns to make predictions about unfamiliar elements. Teacher Modelling (EEF 3) Model a prediction:			

	"Lithium, sodium and potassium are all in Group 1." "Their reactivity increases down the group." "Therefore, an element below potassium is likely to be even more reactive." Model the reasoning structure: Pattern → Evidence → Prediction Check for Understanding (Hinge Point) • What is a physical property? • What is a chemical property? • Why do elements in the same group often have similar properties? Mini whiteboards / cold calling			
Guided Practice (10 mins)	Task type: Supported pattern recognition Pupils: • Sort examples into physical and chemical properties. • Identify trends from a simple table of element properties. • Complete scaffolded prediction questions. Teacher models the first example and emphasises evidence-based predictions.			
Main Task (20 mins)	Core Task Pupils: • Examine data for selected elements. • Identify patterns in groups and periods. • Predict properties of unfamiliar elements. • Explain predictions using evidence from the periodic table. Teacher Flexibility Teachers select format based on class need: • Data analysis table • Card sort • Structured written explanation • Group prediction activity Success Criteria • Correctly identify physical and chemical properties.			

	• Recognise patterns in groups and periods. • Make evidence-based predictions. • Use scientific vocabulary accurately. Adaptation Prompts • If pupils struggle → provide scaffolded tables and prediction sentence starters. • If secure → provide unfamiliar elements and ask for justified predictions.			
Support / Diamond (challenge)	Support • Word bank (physical, chemical, property, group, period) • Prediction sentence starters • Colour-coded periodic table Diamond (Challenge) • Predict the properties of an undiscovered element based on its position. • Explain why scientists can make reliable predictions using patterns. • Evaluate situations where predictions may be less certain			
Common misconceptions	• Physical and chemical properties are the same thing. • Elements in the same period always have similar properties. • Predictions are guesses rather than evidence-based conclusions. • Properties change randomly across the Periodic Table.			
Assessment (5 mins)	Formative and summary Quick check options: • MCQ: Which is a chemical property? • Classify examples as physical or chemical properties. • Predict the properties of an unfamiliar element using evidence.			
Exit ticket (5 mins)	Purpose: Inform next lesson (and Do Now) Example questions: • What is the difference between a physical and a chemical property? • How can an element's position in the Periodic Table help predict its properties?			

	Teacher uses this to plan next lesson's Do Now (adaptive link)			
Adaptive teaching	• Retrieval informs starting point. • Hinge questions identify misconceptions about properties and trends. • Tasks scaffolded according to confidence with data interpretation. • Challenge develops prediction and justification skills. • Exit ticket informs next lesson planning and retrieval focus.			
British Values	• Individual Liberty - Students use patterns independently to make predictions about unfamiliar elements. • Democracy - Students justify predictions and discuss how evidence supports scientific conclusions. • Tolerance - Students recognise that scientific predictions should be tested and refined when new evidence becomes available.			
Teacher Notes for MTP adaptations				

8A.04 Reactions of Metals		HPA Challenge	Skills	EEF Recommendations
Learning Objectives	- Describe how some metals react with water - Write word equations for reactions between metals and water - Use observations to compare the reactivity of different metals	Explain why some metals react more vigorously with water than others using evidence from observations.	Working Scientifically WS 2.1 (Scientific attitudes) Make observations and identify patterns WS 2.3 (Use of apparatus) Observe demonstrations safely and systematically WS 3.1 (Recording data) Record observations clearly and accurately WS 3.5 (Interpret data) Identify trends in reactivity WS 3.6 (Explain using evidence) Draw conclusions from observations Maths Skills 1c (Classification) Group metals based on observations 2c (Patterns and trends) Identify increasing or decreasing reactivity 4a (Data interpretation) Compare evidence from tables and observations	EEF 3 (Modelling): Model how to convert observations into scientific conclusions EEF 5 (Practical work): Use demonstrations and observations to support conceptual understanding EEF 7 (Feedback): Provide feedback on scientific explanations and interpretation of evidence
Do Now (5 mins)	Purpose: Retrieval from Lesson 3 (Patterns in the Periodic Table) Suggested structure (teacher adapts): - What is a chemical property? - What is a physical property? - How can scientists use patterns to predict properties? Diamond (Challenge): - Why might different metals react differently with the same substance? Teacher uses responses to assess understanding of chemical properties before introducing reactivity.	Interpret data from metal-water reactions to rank metals by reactivity. Evaluate whether observations alone are sufficient to compare reactivity and justify conclusions using evidence.		
Hook / Intro (5 mins)	Introduce key idea: "Not all metals react in the same way." Suggested strategy: - Show video clips or demonstrations of different metals reacting with water. - Ask pupils to rank the reactions from least vigorous to most vigorous. - Discuss how scientists compare and classify reactivity.			
Direct Teaching: Cell Structure (10 – 15 mins)	Content: Metals and Water Introduce key observations when metals react with water: - Fizzing or bubbling - Movement on the water surface - Disappearance of the metal - Heat being released Examples Lithium + water - Floats - Fizzes - Moves slowly			

	Sodium + water • Floats • Fizzes more vigorously • Moves rapidly Potassium + water • Reacts very vigorously • May produce a lilac flame Word Equations Introduce the general pattern: Metal + Water → Metal Hydroxide + Hydrogen Examples: Lithium + Water → Lithium Hydroxide + Hydrogen Sodium + Water → Sodium Hydroxide + Hydrogen Key Idea The more vigorous the reaction, the more reactive the metal. Scientists compare reactivity using: • observations • evidence • patterns Teacher Modelling (EEF 3) Model how to convert observations into conclusions: Observation: "Sodium moves faster and produces more fizzing than lithium." Conclusion: "Sodium is more reactive than lithium." Model writing a word equation from a reaction. Check for Understanding (Hinge Point) • What evidence might suggest a metal is very reactive? • What gas is produced when metals react with water? • What does a word equation show?			
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	Mini whiteboards / cold calling			
Guided Practice (10 mins)	Task type: Observation and explanation Pupils: • Match observations to metals • Complete word equations • Rank metals by reactivity using evidence Teacher models the first example and reinforces the need to justify answers using observations.			
Main Task (20 mins)	Core Task Pupils: • Observe demonstrations or analyse provided results • Record observations systematically • Compare the reactivity of different metals • Write word equations for reactions • Explain conclusions using evidence Teacher flexibility Teachers select format based on class need: • Practical observation sheet • Video analysis • Data interpretation activity • Structured written explanation Success criteria • Accurate observations recorded • Correct word equations • Reactivity comparisons supported by evidence • Appropriate use of scientific vocabulary Adaptation prompts • If pupils struggle → provide observation tables and word equation frameworks • If secure → interpret unfamiliar reaction data and justify rankings			
Support / Diamond (challenge)	Support • Word bank (reactive, vigorous, hydrogen, observation) • Observation tables • Word equation scaffolds			

	Diamond (Challenge) - Explain why scientists need evidence when comparing reactivity. - Rank unfamiliar metals using experimental data. - Evaluate which observations provide the strongest evidence of reactivity.			
Common misconceptions	- All metals react with water in the same way - Bigger fizzing always means more product is made - Reactivity can be judged without evidence - Word equations and chemical formulae are the same thing			
Assessment (5 mins)	Formative and summary Quick check options: - MCQ: What gas is produced when a metal reacts with water? - Complete a word equation. - Explain which metal is more reactive using evidence.			
Exit ticket (5 mins)	Purpose: Inform next lesson (and Do Now) Example questions: - What evidence can be used to compare the reactivity of metals? - Complete: Sodium + Water → _____ + _____ Teacher uses this to plan next lesson's Do Now (adaptive link)			
Adaptive teaching	- Retrieval revisits physical and chemical properties. - Hinge questions identify misconceptions about reactivity. - Practical observations support less confident learners. - Challenge develops evidence-based reasoning. - Exit ticket informs planning for Group 1 trends in the next lesson.			
British Values	Rule of Law - Students follow agreed laboratory rules and procedures when observing chemical reactions and considering practical safety. Mutual Respect - Students work collaboratively by sharing observations and discussing conclusions drawn from evidence. Democracy - Students compare interpretations of observations and justify conclusions using evidence.			

Teacher Notes for MTP adaptations

8A.05 Elements of Group 1		HPA Challenge	Skills	EEF Recommendations
Learning Objectives	- Make simple observations about the reactivity of Group 1 metals in water - Use patterns to predict properties of Group 1 elements - Interpret data to explain patterns in properties of Group 1 elements	Analyse data to explain why the reactivity of Group 1 metals changes down the group. Use evidence from observations and data to predict the properties of unfamiliar Group 1 elements. Evaluate how scientists use patterns to make predictions about elements that are difficult to investigate directly.	Working Scientifically WS 1.2 (Patterns and relationships) Identify trends and make predictions WS 2.1 (Scientific attitudes) Use observations and evidence to draw conclusions WS 3.5 (Interpret data) Analyse tables and results WS 3.6 (Explain using evidence) Justify patterns using observations WS 4.1 (Scientific vocabulary) Use terms such as reactivity, alkali metal and trend accurately Maths Skills 1c (Classification) Group and compare information 2c (Patterns and trends) Recognise increasing and decreasing trends 4a (Data interpretation) Use tables and graphs to support conclusions	EEF 3 (Modelling): Model how to identify trends and make evidence-based predictions EEF 4 (Memory): Retrieve knowledge from previous lessons on metals and reactivity EEF 7 (Feedback): Provide feedback on scientific reasoning and interpretation of data
Do Now (5 mins)	Purpose: Retrieval from Lesson 4 (Reactions of Metals) Suggested structure (teacher adapts): - What happens when some metals react with water? - What gas is produced when metals react with water? - Complete: Metal + Water → _____ + _____ Diamond (Challenge): - Why might some metals react more vigorously than others? Teacher uses responses to assess understanding of reactivity before introducing Group 1 trends.			
Hook / Intro (5 mins)	Introduce key idea: "Elements in the same group show similar properties and patterns." Suggested strategy: - Show video clips or demonstrations of lithium, sodium and potassium reacting with water. - Ask pupils: - Which metal appears most reactive? - How do you know? - Collect observational evidence before drawing conclusions. Link to how scientists use patterns to predict the behaviour of unfamiliar elements.			
Direct Teaching: Cell Structure (10 – 15 mins)	Content: Group 1 – The Alkali Metals Introduce: - Group 1 elements are known as the alkali metals. - They are found in the first column of the Periodic Table. - They are metals with similar properties.			

Examples:

- Lithium
- Sodium
- Potassium

Properties of Group 1 Elements

- Soft metals
- Shiny when freshly cut
- Low density
- React with water

Pattern in Reactivity

Observations show:

- Lithium reacts relatively slowly
- Sodium reacts more vigorously
- Potassium reacts very vigorously

Key Idea

The reactivity of Group 1 metals **increases down the group**.

Scientists use this pattern to predict how other Group 1 elements may behave.

Teacher Modelling (EEF 3)

Model interpretation of data:

Element	Reactivity
Lithium	Low
Sodium	Medium
Potassium	High

Teacher models:

"The pattern shows that reactivity increases down Group 1."

"Therefore, rubidium is likely to be more reactive than potassium."

Model: **Pattern** → **Evidence** → **Prediction**

Check for Understanding (Hinge Point)

- What are Group 1 elements called?
- What trend is seen in Group 1 reactivity?
- How can scientists use patterns to make

	predictions? Mini whiteboards / cold calling			
Guided Practice (10 mins)	Task type: Pattern recognition and prediction Pupils: • Compare observations from different Group 1 reactions • Identify patterns in data • Complete prediction questions using evidence Teacher models the first example and reinforces the need to use evidence.			
Main Task (20 mins)	Core Task Pupils: • Study data and observations for Group 1 elements • Identify trends in reactivity and properties • Predict the behaviour of unfamiliar Group 1 elements • Explain predictions using evidence Teacher flexibility Teachers select format based on class need: • Data interpretation activity • Structured worksheet • Practical observation task • Graph analysis Success criteria • Correctly identify Group 1 trends • Use evidence to support predictions • Explain changes in reactivity • Use scientific vocabulary accurately Adaptation prompts • If pupils struggle → provide scaffolded tables and sentence starters • If secure → make predictions about unfamiliar Group 1 elements using multiple pieces of evidence			
Support / Diamond (challenge)	Support • Word bank (reactivity, alkali metal, trend, prediction) • Colour-coded data tables • Structured explanation frames			

	Diamond (Challenge) - Predict the properties of rubidium or caesium using trends. - Explain why scientists trust predictions based on patterns. - Evaluate the reliability of predictions made from limited data.			
Common misconceptions	- All Group 1 metals have identical reactivity. - Reactivity changes randomly. - Elements in the same group only share physical properties. - The most vigorous reaction always produces the most product. - Predictions are guesses rather than evidence-based conclusions.			
Assessment (5 mins)	Formative and summary Quick check options: - MCQ: What happens to reactivity down Group 1? - Explain which metal is most reactive using evidence. - Predict the behaviour of an unfamiliar Group 1 element.			
Exit ticket (5 mins)	Purpose: Inform next lesson (and Do Now) Example questions: - Describe the trend in reactivity down Group 1. - How can scientists use Group 1 patterns to make predictions? Teacher uses this to plan next lesson's Do Now (adaptive link)			
Adaptive teaching	- Retrieval revisits reactivity and word equations. - Hinge questions identify misconceptions about trends. - Tasks scaffolded according to confidence with data interpretation. - Challenge develops prediction and justification skills. - Exit ticket informs planning for Group 7 and displacement reactions.			
British Values	Rule of Law - Students appreciate the importance of following scientific methods and safety procedures when studying highly reactive metals. Democracy - Students use evidence from observations and data to justify explanations of increasing reactivity.			

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| | <ul style="list-style-type: none">• Individual Liberty - Students apply patterns independently to predict the properties of unfamiliar Group 1 elements. |
| Teacher Notes for MTP adaptations | |

8A.06 Elements of Group 7		HPA Challenge	Skills	EEF Recommendations
Learning Objectives	- Describe what happens in a displacement reaction between halogens - Identify risks of using Group 7 elements using the hazard symbols associated with them - Write word equations to represent displacement reactions	Use evidence from displacement reactions to determine the relative reactivity of halogens. Predict the outcome of unfamiliar displacement reactions using patterns in Group 7. Evaluate how scientists use observations and evidence to establish reactivity trends.	Working Scientifically WS 2.1 (Scientific attitudes) Make observations and identify patterns WS 2.2 (Risk) Recognise hazards and apply safe working practices WS 3.5 (Interpret data) Analyse results from displacement reactions WS 3.6 (Explain using evidence) Draw conclusions about reactivity WS 4.1 (Scientific vocabulary) Use terms such as halogen, displacement, reactivity and hazard accurately Maths Skills 1c (Classification) Organise information and observations 2c (Patterns and trends) Identify reactivity trends 4a (Data interpretation) Interpret observations and reaction results	EEF 3 (Modelling): Model how to interpret displacement reactions and write word equations EEF 4 (Memory): Build on prior learning about Group 1 trends and reactivity EEF 6 (Language): Explicit teaching of key terminology including displacement and halogen
Do Now (5 mins)	Purpose: Retrieval from Lesson 5 (Group 1 trends) Suggested structure (teacher adapts): - What is a trend? - What happens to reactivity down Group 1? - How can scientists use patterns to make predictions? Diamond (Challenge): - If one element is more reactive than another, how might this affect a chemical reaction between them? Teacher uses responses to assess understanding of reactivity before introducing displacement reactions.			
Hook / Intro (5 mins)	Introduce key idea: "Some elements can replace other elements in compounds if they are more reactive." Suggested strategy: - Demonstrate or show a video of a halogen displacement reaction. - Present the result without explanation. - Ask: - What has changed? - Why might one substance replace another? Link discussion to the idea of competition between elements based on reactivity.			
Direct Teaching: Cell Structure (10 – 15 mins)	Content: Group 7 – The Halogens Introduce: - Group 7 elements are known as the halogens. - Examples: - Chlorine - Bromine - Iodine			

- Halogens are non-metals.
- They have similar chemical properties.

Reactivity Trend

Introduce the pattern:

- Reactivity decreases down Group 7.

Therefore:

- Chlorine is more reactive than bromine.
- Bromine is more reactive than iodine.

Displacement Reactions

Define:

A displacement reaction occurs when a more reactive halogen replaces a less reactive halogen from a compound.

Example:

Chlorine + Potassium Bromide → Potassium Chloride + Bromine

Word Equations

Model how to write word equations using examples.

Example:

Bromine + Potassium Iodide → Potassium Bromide + Iodine

Emphasise:

- Reactants on the left
- Products on the right

Hazards and Safety

Introduce relevant hazard symbols.

Discuss:

- Toxic substances
- Harmful substances
- Corrosive substances (where relevant)

Key idea: Scientists must recognise hazards before carrying out practical work.

Teacher Modelling (EEF 3)

Model reasoning:

"Chlorine displaces bromine because chlorine is more

	reactive." "Iodine cannot displace bromine because iodine is less reactive." Model how to decide whether a displacement reaction will occur. Check for Understanding (Hinge Point) • What is a displacement reaction? • Which is more reactive: chlorine or bromine? • Why can chlorine displace bromine? Mini whiteboards / cold calling			
Guided Practice (10 mins)	Task type: Structured reaction analysis Pupils: • Complete displacement reaction examples. • Decide whether a reaction will occur. • Match hazard symbols to descriptions. Teacher models the first example and emphasises use of evidence from the reactivity trend.			
Main Task (20 mins)	Pupils: • Analyse results from halogen displacement reactions. • Identify which reactions occur and which do not. • Write word equations for successful reactions. • Explain results using evidence from Group 7 trends. Teacher flexibility Teachers select format based on class need: • Practical observation activity • Data interpretation task • Card sort • Structured written explanation Success criteria • Correctly identify displacement reactions. • Write accurate word equations. • Use reactivity trends to explain outcomes. • Identify relevant hazard symbols. Adaptation prompts • If pupils struggle → provide reaction templates			

	and scaffolded explanations. If secure → predict outcomes of unfamiliar displacement reactions.			
Support / Diamond (challenge)	Support - Word bank (halogen, displacement, reactivity, hazard) - Reactivity ladder - Word equation framework Diamond (Challenge) - Predict the outcome of unfamiliar displacement reactions. - Explain how displacement reactions provide evidence for a reactivity trend. - Evaluate whether a single reaction provides enough evidence to establish a trend.			
Common misconceptions	- Any halogen can displace any other halogen. - More reactive means heavier. - If substances are mixed, a displacement reaction will always occur. - Word equations and symbol equations are the same thing. - Hazard symbols indicate that a substance should never be used.			
Assessment (5 mins)	Formative and summary Quick check options: - MCQ: Which halogen is most reactive? - Identify whether a displacement reaction will occur. - Complete a word equation for a displacement reaction.			
Exit ticket (5 mins)	Purpose: Inform next lesson (and Do Now) Example questions: - What is a displacement reaction? - Why can chlorine displace bromine from a compound? Teacher uses this to plan next lesson's Do Now (adaptive link)			
Adaptive teaching	- Retrieval revisits trends and evidence from Group 1. - Hinge questions identify misconceptions about displacement and reactivity. - Tasks scaffolded according to confidence with			

	- word equations and reaction analysis. - Challenge develops prediction and justification skills. - Exit ticket informs planning for Group 0 and interpreting trends across groups.			
British Values	Rule of Law - Students recognise the importance of hazard symbols and following safety guidance when working with potentially harmful substances. Individual Liberty - Students use evidence to predict whether displacement reactions will occur. Mutual Respect - Students discuss and evaluate reaction evidence while respecting alternative explanations.			
Teacher Notes for MTP adaptations				

8A.07 Elements of Group 0		HPA Challenge	Skills	EEF Recommendations
Learning Objectives	- Describe the physical and chemical properties of Group 0 elements - Use patterns to predict properties of Group 0 elements	Analyse data to identify trends in the properties of Group 0 elements.	Working Scientifically WS 1.2 (Patterns and relationships) Identify trends and use them to make predictions WS 3.5 (Interpret data) Analyse information from tables and graphs WS 3.6 (Explain using evidence) Justify predictions using data WS 4.1 (Scientific vocabulary) Use terms such as noble gas, inert, trend and predict accurately Maths Skills 1c (Classification) Organise data into groups 2c (Patterns and trends) Identify changes in properties 4a (Data interpretation) Interpret tables and graphical information	EEF 3 (Modelling): Model how to identify trends and make predictions from data EEF 4 (Memory): Build on prior learning about Group 1 and Group 7 trends EEF 6 (Language): Explicit teaching of scientific vocabulary including noble gas and inert
Do Now (5 mins)	Purpose: Retrieval from Lesson 6 (Group 7) Suggested structure (teacher adapts): - What is a displacement reaction? - Which Group 7 element is the most reactive? - What happens to reactivity down Group 7? Diamond (Challenge): - Do you think all groups show the same trend in reactivity? Explain your thinking. Teacher uses responses to assess understanding of group patterns and predictions before introducing Group 0.	Use evidence from patterns to predict the properties of unfamiliar Group 0 elements. Evaluate why scientists classify Group 0 elements together despite differences in their physical properties.		
Hook / Intro (5 mins)	Introduce key idea: "Some elements are so unreactive that they are used where reactions would be dangerous." Suggested strategy: - Show images or examples of helium balloons and neon lights. - Ask: - Why might these gases be useful? - Why do they not react easily with other substances? Link responses to the idea of a family of very unreactive elements.			
Direct Teaching: Cell Structure (10 – 15 mins)	Content: Group 0 – The Noble Gases Introduce: - Group 0 elements are known as the noble gases. - They are found in the far-right column of the Periodic Table. - They are non-metals. Examples: - Helium			

- Neon
- Argon

Physical Properties

Group 0 elements:

- Are colourless gases
- Have low densities
- Have low melting and boiling points

Chemical Properties

Group 0 elements:

- Are very unreactive (inert)
- Rarely form compounds
- Do not easily take part in chemical reactions

Patterns Within Group 0

Data can be used to identify trends:

- Boiling points increase down the group
- Density increases down the group

Key Idea

Although the physical properties change down the group, all Group 0 elements have similar chemical behaviour because they are very unreactive. Scientists use these trends to predict the properties of unfamiliar elements.

Teacher Modelling (EEF 3)

Model a prediction using data:

Element	Boiling Point (°C)
Helium	Very low
Neon	Low
Argon	Higher

Teacher models:

"The boiling point increases down the group."

"Therefore, krypton is likely to have a higher boiling point than argon."

Model: **Pattern** → **Evidence** → **Prediction**

	Check for Understanding (Hinge Point) - What are Group 0 elements called? - Where are they found on the Periodic Table? - What does inert mean?			
	Mini whiteboards / cold calling			
Guided Practice (10 mins)	Task type: Trend identification and prediction Pupils: - Identify patterns in Group 0 data. - Match uses to specific noble gases. - Complete scaffolded prediction questions. Teacher models the first example and reinforces evidence-based reasoning.			
Main Task (20 mins)	Core Task Pupils: - Study data on Group 0 elements. - Identify trends in physical properties. - Predict the properties of unfamiliar noble gases. - Explain why Group 0 elements are grouped together despite differences in physical properties. Teacher flexibility Teachers select format based on class need: - Data interpretation activity - Structured worksheet - Card sort - Written explanation Success criteria - Describe the physical and chemical properties of Group 0 elements. - Identify patterns in data. - Make justified predictions. - Use scientific vocabulary accurately. Adaptation prompts - If pupils struggle → provide scaffolded tables and prediction sentence starters. - If secure → interpret more complex data and evaluate predictions.			
Support / Diamond	Support Word bank (noble gas, inert, trend, prediction)			

(challenge)	• Colour-coded periodic table • Structured explanation frames Diamond (Challenge) • Predict the properties of an unfamiliar Group 0 element using data. • Explain why Group 0 elements are useful in everyday applications. • Evaluate whether physical properties or chemical properties are more important when classifying elements into groups.			
Common misconceptions	• Unreactive means an element never reacts. • Group 0 elements have identical properties. • Noble gases contain no particles because they are unreactive. • Reactivity and physical properties always follow the same pattern. • All gases behave in exactly the same way.			
Assessment (5 mins)	Formative and summary Quick check options: • MCQ: What does inert mean? • Identify a trend in Group 0 data. • Predict the properties of an unfamiliar Group 0 element.			
Exit ticket (5 mins)	Purpose: Inform next lesson (and Do Now) Example questions: • State one chemical property of Group 0 elements. • Describe one trend in the physical properties of Group 0 elements. Teacher uses this to plan next lesson's Do Now (adaptive link)			
Adaptive teaching	• Retrieval revisits trends and predictions from Group 7. • Hinge questions identify misconceptions about unreactive elements. • Tasks scaffolded according to confidence with data interpretation. • Challenge develops predictive reasoning and evaluation skills. • Exit ticket informs future retrieval and end-of-topic review.			

British Values	• Individual Liberty - Students independently identify patterns and make predictions about unfamiliar noble gases. • Democracy - Students share and justify explanations for trends and the uses of Group 0 elements. • Tolerance - Students recognise that scientific classifications are based on evidence and may develop as new discoveries are made.
Teacher Notes for MTP adaptations	