Subject: Science

Medium term plan - Unit planning and Evaluation sheet:

Year group : 11	**Subject: Topic C4 Predicting and identifying products and reactants**
Prior learning- linked to National curriculum	Learners should be familiar with the principles underpinning the Mendeleev Periodic Table; the Periodic Table from C1: In C2 they covered periods and groups; metals and non-metals; the varying physical and chemical properties of different elements; the chemical properties of metals and non-metals; the chemical properties of metal and non-metal oxides with respect to acidity and how patterns in reactions can be predicted with reference to the Periodic Table. Learners should be familiar with cations and anions from their work on electrolysis in C3.
Covid gaps	Pupils will have been taught the previous modules in school but will be weak on practical skills. They covered the periodic table in booster lessons at the end of year 9 however they may still need this refreshing at the start of the module.
Rationale	C4 builds on concepts from C1, C2 and C3. Pupils will need to have a strong understanding of the structure of the periodic table and its links to atomic structure to understand trends in groups. They will have been taught atomic structure in C1 and the links to the periodic table in C2. A knowledge of the elements in the periodic table as well as the displacement reactions is needed when looking at metal extraction in C6. They will also need to understand why chemicals react in C5. Models of how substances react and the different types of chemical reactions that can occur enable us to predict the likelihood and outcome of a chemical reaction. The current Periodic Table was developed based on observations of the similarities and differences in the properties of elements. The way that the Periodic Table is arranged into groups and periods reveals the trends and patterns in the behaviour of the elements. The model of atomic structure provides an explanation for trends and patterns in the properties of elements. The arrangement of elements in groups and periods reveals the relationship between observable properties and how electrons are arranged in the atoms of each element. Types of substances can be classified according to their general physical and chemical properties. This section explores the tests that can be used to identify the products of reactions by looking at their physical and chemical properties.

Vocabulary:	**Keywords** *Physical properties* *Chemical properties* *Groups* *Periods* *Alkali metals* *Halogens* *Noble gases* *Halides* *Reactivity series* *Gas tests* *Anions* *Cations* *Flame tests (triple science)*
Cultural Capital:	Link to international collaboration to discover new elements and their properties Possible careers opportunities: Health service (Nurses, doctors, dentistry, social care, pharmacist), Forensic scientist, Science lab work, Environmental worker, Beautician/ hairdresser, Chemical engineer
Key assessments- name the assessments	*C4.3b Displacement reaction LAT* *End of module test*
What do children know/ can do now	Emerging Students will be able to recall the group names, general properties and trends in reactivity of group 1, 7 and 0. In general they will be able to: • demonstrate mostly accurate and appropriate knowledge and understanding and apply these mostly correctly to familiar and unfamiliar contexts, using mostly accurate scientific terminology • use appropriate mathematical skills to perform multi-step calculations • analyse qualitative and quantitative data to draw plausible conclusions supported by

	some evidence • evaluate methodologies to suggest improvements to experimental methods, and comment on scientific conclusions. Developing and mastered students will be able to: Complete the criteria for emerging as well as explain the trends in reactivity and physical properties in terms of ease of ionising and forces of attraction. In general they will be able to: • demonstrate mostly accurate and appropriate knowledge and understanding and apply these mostly correctly to familiar and unfamiliar contexts, using mostly accurate scientific terminology • use appropriate mathematical skills to perform multi-step calculations • analyse qualitative and quantitative data to draw plausible conclusions supported by some evidence • evaluate methodologies to suggest improvements to experimental methods, and comment on scientific conclusions. Mastered pupils will be able to cover the main points above and be able to make links between them demonstrate relevant and comprehensive knowledge and understanding and apply these correctly to both familiar and unfamiliar contexts using accurate scientific terminology • use a range of mathematical skills to perform complex scientific calculations • critically analyse qualitative and quantitative data to draw logical, well-evidenced conclusions • critically evaluate and refine methodologies, and judge the validity of scientific conclusions. For LA students what are the key learning objectives - which lessons are these in? Identify key groups (1,7 and 0) on the periodic table Recall properties of elements in each of these groups (appearance, state at room temperature) Recall the that Fluorine and Francium are the most reactive elements Recall that group 0 elements (noble gases) are unreactive

Misconceptions	Learners consider the properties of particles of elements to be the same as the bulk properties of that element. They tend to rely on the continuous matter model rather than the particle model. Learners confuse state changes and dissolving with chemical changes. Also, since the atmosphere is invisible to the eye and learners rely on concrete, visible information, this means they therefore often avoid the role of oxygen in their explanations for open system reactions. Even if the role of oxygen is appreciated, learners do not realise that solid products of an oxidation reaction have more mass than the starting solid. Learners confuse mass and density so in reactions involving change of state, learners reason that the products from a precipitation reaction are heavier than the starting materials and that when a gas is produced the reaction has lost mass overall.
What **amendments** are you going to make following evaluation of this module?	Split lessons that cover several outcomes. Remove practical lessons where a demo is sufficient. Add follow on lessons to PAG (practical assessment lessons) to evaluate results

C4.1	**Group 1 elements**
Lesson Objective	Understand the properties of group 1 elements
Blue	Discuss why and how reactivity of group 1 elements changes linking to interactions between subatomic particle
Red	Describe how reactivity and mass of group 1 elements change going down the group.
Yellow	Recall the structure of the atom and its subatomic particles
Key word	**Lesson Outline**
Groups Periods Alkali metals Subatomic particles	Demo of alkali metals with water. Pupils need to describe and explain trends in reactivity and physical properties

Electron configuration	
Shells	

C4.2	Group 7 elements
Lesson Objective	Understand the properties of group 7 elements
Outcomes	Describe similarities and differences between the properties of different halogens. Relate the reactivity of the halogens to their position in the periodic table and their reactivity.
	Relate the properties of halogens to the precautions necessary to work with them.
	List the names and chemical symbols for the elements in group 7. Describe the appearance and properties of separate halogens.
Key word	**Lesson Outline**
Halogens	Pupils need to describe and explain trends in reactivity and physical properties
Halides	

Title	C4.2b Displacement reaction
Outcomes	Explain your results and write a results based conclusion for your experiment.
	Record your results and describe your observations in the given table of results
	Safely complete the experiment listing the main safety measures that your take when doing a practical
Key word	**Definition**
Displacement reaction	Pupils complete a practical on the displacement of halides by halogens. Practical skills required

Halide	
Reactivity	
Trends	
Title	C4.3 Noble Gases, Group 0
Outcomes	Compare the properties of elements in group 0, and 1. Explain why there are these differences in properties. Discuss the reactions of each group
	Relate the properties of the group 0 elements to its electronic structure. Make basic comparisons to group 1.
	Describe all key properties of group 0 elements. Explain why we say they are in group 0 rather than 8.
Key word	**Lesson Outline**
Noble gas	Pupils need to describe and explain trends in reactivity and physical properties
Inert	
Electronic structure	
Properties	
C4.4	**Transition Metals**
Lesson objective	**What are the transition metals and how do they behave?**
Outcomes	**Links uses of transition metals to their properties.** **Suggests reasons transition metals make good catalysts**
	Compares properties of transition metals with the alkali metals.
	Describes all properties of transition metals correctly

Key words	**Lesson Outline**
Transition Metal	Pupils need to describe and explain trends in reactivity and physical properties
Lustrous	
Malleable	
Precipitation	
Thermal decomposition	

C4.5	**Reactions of metals**
Lesson objective	Understand what is meant by the reactivity series
Outcomes	Evaluate the effectiveness of experimental results to create an order of reactivity. Link the idea of differing reactivity to why some metals are more valuable than others.
	Use experimental observations to decide an order of reactivity.
	Describe the reactions of metals with acid/water. State how we know a reaction has happened.
Key word	**Lesson Outline**
Reactivity	Complete practical to deduce reactivity series. Practical skills required
Reactivity Series	

C4.6	Gas tests
Lesson Objective	How do we test for the presence of Oxygen, Hydrogen, Carbon Dioxide and Chlorine gas
Outcomes	Explain how to investigate the presence of Oxygen, Hydrogen, Carbon Dioxide and Chlorine in the products of a given reaction.
	Write a word equation for each chemical reaction.
	Describe the test for the presence of Oxygen, Hydrogen, Carbon Dioxide and Chlorine
Key word	**Lesson Outline**
Test for oxygen	Practical skills required
Test for hydrogen	
Test for carbon dioxide	
Test for chlorine	

C4.7i	Precipitation test
Outcomes	Suggest uses and benefits of these techniques linking to socio-economic factors.
	Describe and put into practice techniques that allow us to test the presence of cations and anions in a given solution.
	Recall definition for ions, ionic compounds, cations and anions.
Key word	**Lesson outline**
Ion	Practical skills required
Ionic compound	
Anion	

Cation	
Solution	
Precipitate	

C4.8i	Flame tests and spectra
Outcomes	Describe in detail, with reference to electron shell configuration, why different colours are formed when different elements are heated.
	Explain how the use of spectroscopy has led to new discoveries. Identify the different colours that elements can burn with and explain what a spectroscope is
	Describe what a spectroscope is. Identify that different elements can burn as a different colour in a flame, using examples.
Key word	**Lesson Outline**
Spectra	Practical skills required
Flame test	
Spectroscopy	

C4.9	Anion Tests
Outcomes	Write balanced symbol equations to for tests
	Identify the different anions based on experimental observations.
	Describe anion tests.
Key word	Lesson Outline
Anion	Practical skills required

Halogen	
Halide	
State symbols	
Balanced equation	
Symbol equation	
Word equation	