**YEAR: 11 SUBJECT: Science (Double Award) Chemistry**

Knowledge Focus: 5.2 Acids, Bases and Salts, 5.3 Metals and Their Extraction, 5.4 Chemical Reactions and Energy, 5.5 Crude oil, Fuels and Carbon Compounds

**Skills, knowledge and understanding to be developed in this Learning Plan:**
Investigate the reactions of acids in depth. Pupils can practice reaction techniques such as neutralisation and titration. The chemistry of extracting metals is explored and this topic introduces pupils to the reactivity series and displacement reactions. Next, we investigate the energy changes that take place when chemical reactions occur. The energy associated with both making and breaking chemical bonds is looked at. Lastly, we look at organic chemistry. The formation and fractional distillation of crude oil, cracking and polymerisation are explored and the products of each process explained.

**Key terms to be learned in this LP:** Acids, bases, indicators, neutralization, titration, reactivity, displacement reactions, extraction, electrolysis, exothermic, endothermic, hydrocarbons, alkanes, alkenes

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| ***Weeks 1 - 2 Learning Objectives*: 5.2 Acids, Bases and Salts**<br>What is the pH scale? And how can we use it to describe acids and alkalis?<br>Acids and bases cancelling each other out to form a salt and water.<br>**Neutralisation involving $H^+$ ions and $OH^-$ ions forming water.**<br>Name the salts formed in neutralisation reactions.<br>Write a method for the preparation of crystals of $CuSO_4$. | ***Objective assessments:***<br>Be able to:<br>Identify acids and bases using various indicators.<br>Describe neutralisation reactions in terms of $H^+$ ions and $OH^-$ ions.<br>**(*specified practical*)**<br>Preparation of crystals from an insoluble base/carbonate. | **Homework/Gwaith cartref:**<br><br>Set:<br>Due: |
| ***Week 3 Learning Objectives:* 5.2 Acids, Bases and Salts**<br>Preparing salts though titrations.<br>Identify when the titration reaction is complete.<br>Outline the method used in a titration reaction.<br>Accurately describe and identify the producs of various acid and metal reactions including.<br>Describe tests used to identify ions present in these reactions including what a positive result shows.<br><br>Assessment:<br>5.2 End of Topic | ***Objective assessments:***<br>Be able to:<br>**(*specified practical*)**<br>Titration of a strong acid against a strong base using an indicator.<br>Identify the products formed in acid and metal reations.<br>Identify the tests for $CO_3^{2-}$ and $SO_4^{2-}$ ions. | **Homework/Gwaith cartref:**<br><br>Set:<br>Due: |
| ***Weeks 4-5 Learning Objectives:* 5.3 Metals and Their Extraction**<br>Where can we source metals from? (Ores)<br>How can we compare metals (the reactivity series) and how can we use this to predict reactions (displacement reactions)?<br>Reduction and oxidation in terms of gaining and losing oxygen in a reaction.<br>How does a 'blast furnace' extract pure iron from iron oxide?<br>The electrolysis of lead bromide and aluminium oxide.<br>What is electrolysis and where to locate a factory to carry out electrolysis?<br>General properties of iron, aluminium, copper and titatnium being linked to their uses.<br>Alloys being a mixture of metals, including steel and carbon.<br><br>Assessment:<br>5.3 End of Topic | ***Objective assessments:***<br>Be able to:<br>Order metals in terms of their reactivity by observing displacement reactions.<br>Identify ox and redox reactions using word equations.<br>Describe the process of extracting iron using a blast furnace.<br>Describe the process of electrolysis.<br>Identifying the factors effecting the sustainability of extracting metals.<br>Describe the properties of different metals and explain why they are used for specific jobs based on their properties. | **Homework/Gwaith cartref:**<br><br>Set:<br>Due: |

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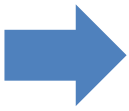
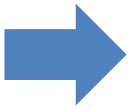
| ***Week 6 Learning Objectives:*** **5.4 Chemical Reactions and Energy**<br>Exothermic and endothermic reactions in terms of temperature change and energy transfer.<br>Energy profile diagrams of exothermic and endothermic reactions including activation energies.<br>Calculate bond enthalpies for reactants and products in a reaction. |  | ***Objective assessments:***<br>Be able to:<br>Interpret energy profile diagrams including; reactant and product energies and activation energy.<br>Identify an exothermic or endothermic reaction based on the energy profile diagram.<br>Calculate bon enthalpy of reactions.<br>Using bond enthalpy calculations to determine if a reaction is exothermic or endothermic. | **Homework/Gwaith cartref:**<br><br>Set:<br>Due: |
| ***Week 7 Learning Objectives:*** **5.5 Crude oil, Fuels and Carbon Compounds**<br>How is crude oil formed?<br>What are hydrocarbons?<br>The fractional distillation of crude oil using the differing boiling points of compounds.<br>What are the components of crude oil used for?<br>The environmental impact of mining and using crude oil in comparison to renewable energy.<br>How we can use cracking to make more useful compounds from long chain hydrocarbons? |  <br>Assessment:<br><br>5.4 & 5.5 End of Topic | ***Objective assessments:***<br>Be able to:<br>Explain how crude oil is formed and why it is considered to be a finite resource.<br>Describe the process of the fractional distillation of crude oil to gain useful compounds.<br>Identify the global, economical and environmental inpacts of using crude oil.<br>Describe the trends, properties and uses of different fractions of crude oil.<br>Write a word equations to demonstrate the cracking of large hydrocarbon into smaller alkanes and alkenes. | **Homework/Gwaith cartref:**<br><br>Set:<br>Due: |