

Lesson/Learning Sequence	Intended Knowledge: <i>Students will know that...</i>	Prior Knowledge: <i>In order to know this, students need to already know that...</i>	Working Scientifically	Tiered Vocabulary and Reading Activity	Support
Lesson: Reactions of Metals	- Students will know that when acids and metals react together the products are salt and hydrogen - Students will know that the reactions between metals and acids can be represented with symbol and ionic equations - Students will know how to describe the reactions as redox reactions - Students will know how to determine which species has been oxidised (lost electrons) or reduced (gained electrons). - Students will know how to represent the reactions of magnesium, zinc and iron with hydrochloric and sulfuric acid using symbol and ionic equations	- Students need to already know how to name salts - Students need to already know how to balance symbol equations	Development of scientific thinking	<i>Ion: an atom that has lost or gain electrons</i>	Tassomai Kay science videos BBC bitesize Knowledge organiser
Lesson: The Reactivity series PRACTICAL Water + (Potassium, sodium, lithium, calcium) Dilute acid + (Calcium, magnesium, zinc, iron and copper)	- Students will know that when metals react with other substances they form positive ions - Students will know that the reactivity of a metal is related to its tendency to form positive ions. - Students will know that the order of reactivity of metals (from highest to lowest) is: potassium, sodium, lithium, calcium, magnesium, zinc, iron and copper - Students will know that the reactivity series of metals was determined through observations made of the metal's reactivity with water and dilute acids - Students will know that when reacting with water, the following observations are made: potassium - violent reaction sodium - very quick reaction lithium - quick reaction calcium - slow reaction - Students will know that when reacting with dilute acid, the following observations are made: calcium - very quick reaction magnesium - quick reaction zinc - slow reaction iron - slower reaction than zinc copper - very slow reaction - Students will know how to deduce an order of reactivity of metals based on experimental results.	Students need to already know signs a chemical reaction is taking place	Analysis and evaluation – interpreting trends Scientific communication – forming conclusions	<i>Reactivity: measure of how much a substance reacts</i> <i>Vigorous: A reaction that is rapid</i>	Tassomai Kay science videos BBC bitesize Knowledge organiser

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Lesson: Metal Oxides Practical (Mg + O₂)	- Students will know that metals react with oxygen to produce metal oxides. - Students will know that these reactions are oxidation reactions because the metal gains oxygen - Students will know how to explain reduction and oxidation in terms of loss or gain of oxygen (reduction is loss of oxygen, oxidation is gain of oxygen)	Students need to already know how to represent chemical reactions using equations	Experimental skills and strategies – forming a hypothesis Measurements – making and recording observations Scientific communication – forming conclusions	<i>Oxidation: the gain of electrons/loss of electrons</i>	Tassomai Kay science videos BBC bitesize Knowledge organiser
Lesson: Displacement reaction PRACTICAL	- Students will know that more reactive metals can displace less reactive metals from a compound - Students will know how to analyse displacement reactions based on tabulated data.	Students will already know that metals have different reactivities and this can be shown by observations during a reaction.	Measurements – making and recording observations Scientific communication – forming conclusions	<i>Displacement reaction: When the more reactive element replaces the less reactive element in a compound</i>	https://www.youtube.com/watch?v=-2aTLhmEyE – Displacement of halogens https://www.youtube.com/watch?v=tkPJdV2flQlU&t=137s – Displacement and redox reactions Tassomai Kay science videos BBC bitesize Knowledge organiser
Lesson: Oxidation and Reduction (Higher Tier)	- Students will know that oxidation is the loss of electrons and reduction is the gain of electrons - Students will know how to write ionic equations for displacement reactions Students will know how to identify which species have been oxidised or reduced when looking at an equation	Students need to already know how to write ionic equations	Scientific communication – describing using equations the ion formation	<i>Reduction: the loss of oxygen/gain of electrons.</i>	Tassomai Kay science videos BBC bitesize Knowledge organiser
Lesson: Extraction of Metals	- Students will know that unreactive metals, such as gold, are found in the Earth as the metal itself but most metals are found as compounds that require chemical reaction to be extracted the metal - Students will know that metals less reactive than carbon can be extracted from their oxides by reduction - Students will know that an ore is a metal containing compound that contains enough	Students need to already know that oxidation is the gain of oxygen and reduction is the loss of oxygen.	Analysis and evaluation – students to identify patterns to identify the correct extraction method for metals Scientific communication – present rationale for extraction methods used	<i>Ore: a rock that contains enough metal to extract and make money from</i> <i>Reduction: a reaction that removes oxygen</i>	https://www.youtube.com/watch?v=Au0WJ34RkA8 – What is an ore? Tassomai Kay science videos BBC bitesize

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	metal for it to be economically viable to extract - Students will know how to evaluate a specific metal extraction process when given appropriate information - Students will know how to identify substances which are oxidised or reduced				Knowledge organiser
Lesson: HT Alternative Methods of Extracting Metals- Phytomining and Bioleaching	- Students will know that Earth's resources of metal ores are limited - Students will know that copper ores are becoming scarce and new ways of extracting copper from low-grade ores including Phyto mining and bioleaching. - Students will know that Phyto mining uses plants to absorb metal compounds. - Students will know that once plants have absorbed metal compounds they are burned to produce ash that contains metal compounds - Students will know that bioleaching uses bacteria to produce leachate solutions that contain metal compounds. - Students will know that the metal compounds that are produced during bioleaching are processed to obtain the metal. - Students will know how to evaluate alternative biological methods of metal extraction - Students will already know that metals are extracted from ores.	- Students will know about the extraction methods; electrolysis, displacement reactions and physical removal. - Students will know that metals are a finite resource and conserving them is important. - Students will have some understanding of greenhouse effect from KS3 and the negative effects of global warming.	Analysis and evaluation – students to identify patterns to identify the correct extraction method for metals Scientific communication – present rationale for extraction methods used	<i>Phytomining: using plants to extract metals from low grade ores</i> <i>Bioleaching: using bacteria to extract metals from their ores or waste</i>	https://www.youtube.com/watch?v=xTUoNxKZIS4 - Phyto mining https://www.youtube.com/watch?v=8d9VtG2osiE – Kay Science pros and cons of bioleaching and Phyto mining Tassomai Kay science videos BBC bitesize Knowledge organiser
TRIPLE Lesson: Preventing corrosion	- Students will know the definition of corrosion to be the gradual deterioration of materials by chemical or electrochemical reaction with their environment. - Students will know the definition of sacrificial protection to be a method of corrosion prevention where a more reactive metal is used to protect a less reactive one.	Students will already know about corrosion due to biological, chemical and physical weathering from KS3.	Development of scientific thinking – understanding how corrosion occurs and the methods to tackle this.	<i>Corrosion to be the gradual deterioration of materials by chemical or electrochemical reaction with their environment.</i> <i>Sacrificial protection to be a method of corrosion prevention</i>	Tassomai Kay science videos BBC bitesize Knowledge organiser

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	- Students will know that iron rusts due to reactions with water and oxygen to form hydrated iron (III) oxide. - Students will know how to write the equations involved in rusting to be; $4\text{Fe} + 3\text{O}_2 + 6\text{H}_2\text{O} \rightarrow 4\text{Fe}(\text{OH})_3$ - Students will know that corrosion can be prevented by; 1. Removing the substances that causes rust. Oxygen can be removed by storing the metal in an atmosphere of unreactive nitrogen and argon. 2. Placing a physical barrier to oxygen and water by using paint, oiling/greasing, coating with plastic. This includes galvanising, when zinc coats the iron. 3. Iron can be protected from rusting by using a more reactive metal such as zinc. This means that the more reactive metal becomes oxidised.			<i>where a more reactive metal is used to protect a less reactive one.</i> <i>Deterioration to be the process of becoming progressively worse</i>	