| | | *Curriculum Checkpoints: What do students know and what can they do?* | | |
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| **Unit** | **Developing** | **Securing** | **Flourishing** | **Excelling** |
| **1. Atomic Structure and the Periodic Table** | State that the number of protons in an element is the atomic number and the total number of protons and neutrons is the mass number. State the difference in elements, compounds and mixtures. | Understand that atoms of an element all have the same number of protons but can have different numbers of neutrons, giving different isotopes. Write methods for separating a mixture. | Compare models of atoms during the development of the periodic table. Explain the importance of Mendeleev and compare his periodic table to the modern periodic table. | Explain how properties of the elements in the group 1 depend on the outer shell of electrons of the atoms. Predict properties of elements from data and its position in the group. |
| **2. Chemical Changes Part 1** | Understand that metals have different reactivities and therefore can be placed in a reactivity series. Know how metals react with acids and the product it makes. | Describe the extraction of metals and explain why certain methods are used for specific metals. | Be able to write a method for how to collect a soluble salt from acids reacting with metals and other chemicals. Complete word equations where metals reacts with something else. | Write ionic equations for displacement reactions. Write symbol equations to metal reactions. |
| **3. Chemistry of the Atmosphere** | Know the composition of the earth's atmosphere. Describe how the earth has evolved over billions of years. | Describe effects of global climate change and be able to discuss the risk and implications of these effects. | Explain the difference in complete and incomplete combustion. Be able to finish and balance combustion symbol equations. | Evaluate models and data about global warming. Given appropriate information, interpret evidence and evaluate different theories about the Earth's early atmosphere. |
| **4. Bonding, Structure and the Properties of Materials** | State the three main types of chemical bonding: ionic, covalent and metallic. | Be able to draw dot and cross diagrams for ionic and covalent bonding. | Describe the properties of ionic compounds and that of small molecules. Be able to spot allotropes of carbon and explain why they have slightly different uses, e.g. conductivity for graphite. | Calculate the surface area of nanoparticles and explainging its uses in everyday life. Compare structures of bonding and explain why its properties are useful e.g. copper kettle. |
| **5. Energy Changes** | State that reactions that cause a temperature increase are exothermic and reactions that cause a temperature decrease are endothermic. Give examples of common exothermic and endothermic reactions. | State that bond-breaking requires energy, so is endothermic, and bond-forming releases energy so is exothermic. Explain why polystyrene cups are used when measuring the temperature change of a reaction. | Be able to construct an energy profile diagram and use it to conclude whether a reaction is exothermic or endothermic. Distinguish between the change in temperature of the surroundings and the change in energy in a reaction. | Calculate the overall energy change of a reaction by considering the net difference of bonds broken vs bonds formed. |
| **6. Chemical Changes Part 2** | State that different metals are extracted by different methods. State that oxidation is the gaining of oxygen and reduction is the loss of oxygen. | Be able to identify species that have been oxidised/reduced by observing a gain/loss of oxygen in a chemical equation. State the products of the electrolysis of a range of different electrolytes. | Know that it is more appropriate to consider oxidation as the loss of electrons and reduction is the gaining of electrons. That oxidation and reduction need to happen simultaneously and that these reactions are known as REDOX reactions. Be able to explain how certain products are formed during electrolysis and why they are found at their respective electrodes. | Be able to apply knowledge of the reactivity series to explain why molten electrolytes and aqueous electrolytes produce different products during electrolysis. Construct and balance ionic half equations to show the oxidation and reduction processes that occur during electrolysis. |
| **7. Quantitative Chemistry** | State the law of the conservation of mass. Recall the different molar formulae. Identify the mass numbers of elements from the periodic table. | Apply knowledge of the conservation of mass to predict the mass of reactants or products. Know how to calculate the relative formula mass of a compound. Recall and rearrange the different molar formulae. | Be able to explain why certain reactions appear to conflict with the idea of the conservation of mass. Be able to find the percentage by mass of a compound. Use molar formulae to calculate missing quantities in chemical reactions. | Be able to select appropriate experimental data and calculate missing quantities in a chemical reaction, both in terms of mass and concentration. Justify why certain practical constraints may lead to a loss of material in a reaction and how to quantify these errors. |
| **8. Rates of Reaction** | Recall the basic factors that affect the rate of a reaction. State the definition of a catalyst. Be able to identify that a reaction is reversible by recognising the symbol in the chemical reaction. | Describe the relationship between the rate of a reaction and reaction conditions, limited to temperature, concentration, surface area and the use of a catalyst. Explain how a catalyst affects the rate of a reaction. Apply ideas of exothermic and endothermic energy changes to reversible reactions. | Be able to use collision theory to explain why reactions happen and how the reaction conditions dictate the reaction rate. Be able to use Le Chatelier's principle to predict the effect of on a system at equilibrium. | Evaluate and improve practical methods that investigate how certain conditions affect the rate of a reaction. Apply Le Chatelier's principle to state the ideal reaction conditions needed to produce an optimal equilibrium shift. Be able to combine kinetic ideas for the notion of equilibrium to justify why certain reaction conditions are considered a compromise. |