**C5 Learning Journey**

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| 1 | **Energy** is **conserved** within a chemical reaction which means that the total amount of energy before a reaction is the same as the amount of energy after the reaction – the energy in the universe stays the same.  **Exothermic** reaction – energy is transferred to the surroundings (as heat) so temperature increases. Examples include combustion, oxidation and neutralisation.  **Endothermic** reaction – energy is transferred into the reaction so temperature decreases. Examples include thermal decomposition, Citric acid and sodium hydrogen carbonate and photosynthesis. |
| 2 | Required practical- **Energy changes** are measured by recording **temperature changes** in an **insulated** reaction vessel.  Practical involves neutralisation reaction of acid and alkali in polystyrene cup with lid placed in a cotton wool filled beaker and thermometer placed into reaction. Highest temperature reached is recorded. |
| 3 | **Reaction profiles** show energy changes as a graph.  X axis is progress of reaction, Y axis is energy. Reactants energy level is drawn first, then products, and a curve is used to join the two.  Exothermic- Reactant energy is higher than Product energy and there is a ‘hump’ which is the activation energy.  Endothermic- Reactant energy is lower than Product energy but there is still a slight hump for the activation energy. |
| 4 | All chemical reactions require **bonds** of reactants to be **broken** (energy in, **endothermic**) before bonds are **formed** in products (energy out, **exothermic**).  All bonds have their own values of **bond energy** which you will be given.  To complete bond energy calculations:  1. Add up all of the bond energies for the bonds in the REACTANTS (R) – remembering to multiply according to the balanced equation.  2. Add up all of the bond energies for the bonds in the PRODUCTS (P) – remembering to multiply according to the balanced equation.  3. R – P = overall energy change, if it is a minus value then the reaction is Exothermic. |
| 5 | **Cells** contain chemicals which react to produce electricity which is dependent on which **electrode** or **electrolyte** is in the cell- the bigger the difference in reactivity between the electrodes the bigger the voltage produced.  A **battery** is set of cells connected in series. **Non-rechargeable** batteries have an irreversible reaction whereas **rechargeable** batteries have a reaction which can be reversed when an electrical current is applied. |
| 6 | **Fuel cells** use a fuel and oxygen to produce electricity as the fuel is **oxidised** setting up a potential difference in the cell.  **Hydrogen-oxygen fuel cells** produce water and release energy and can be used in cars.  Pros – less polluting than fuels and (disposal) of batteries, store more energy, cheaper to produce and no limit to number of recharges.  Cons – harder to store as a gas and explosive. Also have to generate Hydrogen… |