DEMONSTATE KNOWLEDGE OF CHEMICAL CHANGE (18974) - Level 1, 2 Credits

REVISION SHEET

element 1: Describe simple chemical and physical changes
element 2: Describe chemical changes
element 3: Describe how factors may affect the rate of a chemical change

Features of a chemical change are:

- new products are formed
- the chemical change is irreversible (or very very hard to reverse)
- reactants change in appearance - colour, state, texture
- there is an energy change – reaction gets hot or cold
- a gas is given off – seen as bubbles
- there is a sound – eg explosion

Examples: iron rusting, bread being digested, magnesium burning, copper bracelet tarnishing, an Alka-Seltzer tablet fizzing in water, charcoal burning on a BBQ

Features of a physical change are:

- change of state (solid to liquid, liquid to gas etc)
- no new product is formed (eg ice and water are both H_2O)
- the changes may be easily reversible (eg melt ice / freeze water)

Examples: chocolate melting, salt dissolving in water, a puddle evaporating, a toaster element heating up and cooling down, water freezing

Chemical reactions: These can be represented by word and/or symbol equations. The starting materials (the things on the left of the → are called the reactants. Those on the right of the arrow - the new substances that are made in the chemical reaction - are called the products.

Eg This is a *neutralisation reaction*.

sulfuric acid + sodium hydroxide → sodium sulfate + water

REACTANTS	PRODUCTS
Sulfuric acid is acidic – corrosive Basic/alkaline sodium hydroxide – also corrosive. Both are colourless solutions so there is no obvious sign of a reaction although the mixture does get a bit warm.	Sodium sulfate and water are formed – the mixture is NEUTRAL overall – pH 7.

Iron wool burning is a chemical reaction.

Iron + oxygen → iron oxide

The reactants are iron and oxygen, the product is iron oxide. The iron was a silvery metal and oxygen was a colourless gas: The product, iron oxide is a black solid.

You should also be able to describe how magnesium burns in air, and the appearance of the reactants and products. Magnesium + oxygen → magnesium oxide.

A wax candle burning is a chemical change. It's a bit more complicated because the burning wick melts and then vaporises the wax (a physical change) and then the wax vapour ignites and burns in the oxygen (a chemical change). The products are a mixture of colourless carbon dioxide, carbon (the black sooty part of the flame) and invisible water vapour. The wax that melts and dribbles down the side of the candle and then solidifies is a physical change.

Rates of Reaction (how fast something reacts)

Surface area: Powders react at a faster rate than bigger lumps because more surfaces are exposed in the powder to collisions with the other chemicals. Eg powdered Mg burns faster than a Mg strip. Zinc powder reacts faster with acid than a zinc granule.

Concentration: A more concentrated solution will react faster than a dilute one. This is because there are more particles available for collisions and so they collide more often and the reaction occurs faster.

Temperature: Reactions occur at a faster rate at higher temperatures because the particles collide more often (as they are moving faster) and they have more energy so more of the collisions have enough energy for the reactions to occur.

Differences in chemical reactivity: Some metals are just more reactive than others and so they will react faster or more vigorously with oxygen, water or acid. Some metals like silver and gold are very unreactive. Here is part of the metal reactivity series:

MOST REACTIVE Na Mg Al Zn Fe Pb Cu LEAST REACTIVE.

Note: Rusting is the reaction between iron and water and oxygen to make what is called "hydrated iron oxide" (rust). Rusting is speeded up if chemicals are dissolved in the water – eg salty water, or polluted water (eg acid rain)