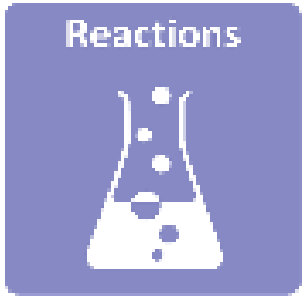
Knowledge organiser



Y7 topic: METALS & NON-METALS

I have already learned:
KS2: Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets
Y7: Particle Model, Separating Mixtures, Acids & Alkalis
This topic links to:
Y8: Types of Reaction and Chemical Energy
KS4: Chemical Changes

It is important to study about metals and non-metals because…
About 80% of all elements are metals. Metals take part in a variety of reactions with other elements and are very useful materials for a range of applications. Due to their strength and ability to conduct electricity metals can be used in construction and electronics. Science is progressing so quickly; it is likely that you might have a job in the future that doesn't even exist at the moment- and a very high chance that this will involve technology driven by metals!

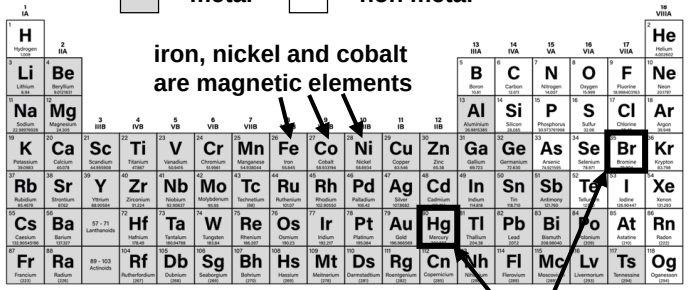
Possible careers involving metals and non-metals are…
- Welder
- Engineer (Metallurgical, Electrical, Robotics etc.)
- Goldsmith or Jeweller
- Blacksmith
- Chemist
- Materials Scientist

KNOWLEDGE ORGANISER
BIG IDEA: REACTIONS
TOPIC: METALS AND NON METALS

Key word	Definition
conductor	allows heat or electrical energy to pass through
density	the mass of a material in a certain volume
displacement	reaction where a more reactive element takes the place of a less reactive element in a compound
ductile	can be stretched into wires
malleable	easily shaped
oxidation	when a chemical reacts with oxygen in the air
physical properties	can be observed or measured without changing the chemical
reactivity	the tendency of a substance to undergo a chemical reaction
reactivity series	A list of metals in order of reactivity (most reactive at the top)

Key facts

= metal = non metal



Physical properties of metals and non metals

property	metal	non-metal
density	high	low
appearance	shiny	dull
conductivity	good conductors of heat and electricity	poor conductors of heat and electricity
response to force	malleable and ductile	brittle

Reactivity series

less reactive

element	reaction with oxygen	reaction with dilute acid
potassium	react with oxygen in the air at room temperature	explode
sodium		
lithium		
calcium		bubbles, give off hydrogen, form a salt
magnesium	react with oxygen in the air when heated	
aluminium		
zinc		
iron		
tin		slow reaction with warm acid
lead		
hydrogen		no reaction
copper		
silver		
gold	no reaction	

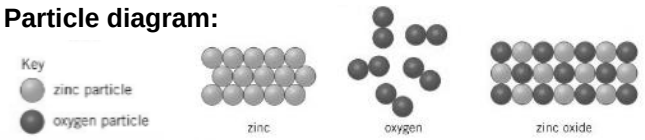
Oxidation reactions

Metals and non metals react with oxygen in the air forming oxides. Metal oxides (eg. sodium oxide) are bases and non-metal oxides (eg. sulfur dioxide) are acids.

Word equation: *element* + oxygen → *element* oxide

eg: *zinc* + oxygen → *zinc* oxide

Particle diagram:



Metals and acids

Metals react with acids forming salts and hydrogen. The name of the salt formed depends on the acid used.

acid	salt formed
hydrochloric	*metal* chloride
sulfuric	*metal* sulfate
nitric	*metal* nitrate

metal + acid → salt + hydrogen

lithium + hydrochloric acid → *lithium* chloride + hydrogen

lithium + sulfuric acid → *lithium* sulfate + hydrogen

Displacement reactions

This is when a more reactive *metal* takes the place of a less reactive *metal* in a compound. If the less reactive *metal* is by itself, no reaction takes place.

zinc + *lithium* chloride → **no reaction** as *zinc* is less reactive than *lithium*

In this example *calcium* is more reactive than *zinc* so a reaction takes place – the metals 'swap'.

zinc + *copper* oxide → *zinc* oxide + *copper*