

## I should already know:

Atomic structure

Symbols for common elements and compounds.

Ideas around reactivity.

## I will learn:

Describe the reactivity series of metals and their associated reactions.

Create word equations and balanced symbol equations for a range of different reactions.

Compare the reactions of metals with oxygen and metals with acids and carbonates.

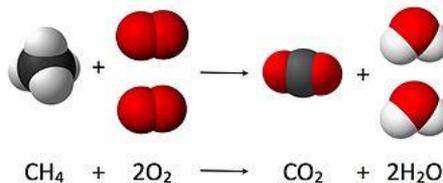
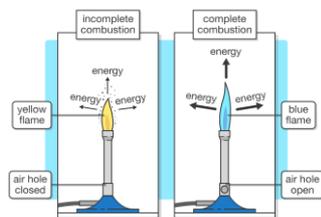
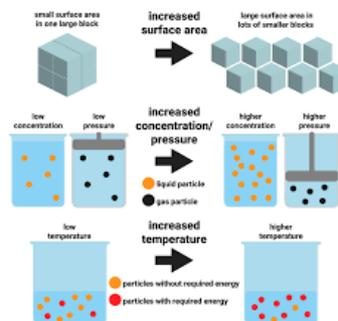
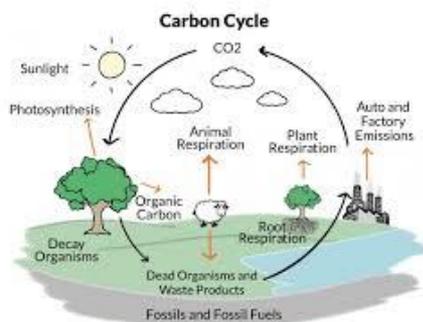
Describe factors that can affect the rate of a reaction.

Discuss the importance of the carbon cycle and effective recycling.

Evaluate the use of fossil fuels and their effect on the environment.

## Key Words

Reactant	Substance that react together
Product	Substances made in a reaction
Oxidation	A substance combining with oxygen
Displacement	When a more reactive metal displaces a less reactive metal from its compound
Catalyst	Provides an alternative pathway with a lower activation energy
Greenhouse gas	Water, carbon dioxide and methane
Combustion	A reaction with oxygen in which energy is transferred to the surroundings
Conservation of mass	Mass of reactants = mass of products
Reduction	A method of extracting metals less reactive than carbon
Metal carbonate	Reacts with an acid to form a salt, carbon dioxide and water
Fossil fuel	Dead plant and animal material trapped under rocks millions of years ago
Reactivity	How reactive a metal is compared to other metals
Finite	A resource that will eventually run out
Concentration	The number of particles in a given volume of solution
Surface area	The area of an outer part or uppermost layer of something
Global dimming	Decrease in the amount of solar radiation reaching the Earth's surface



## Greater Depth Challenge

What actions can humans take to limit the effects of climate change?

Design an investigation to test the reactivity of some metals.

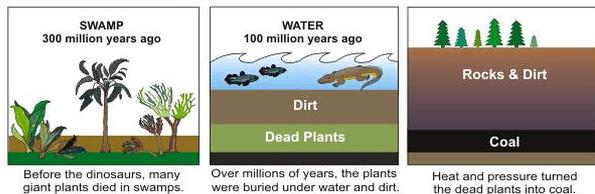
## This will help in the future:

Careers involving chemical reactions and combating climate change.

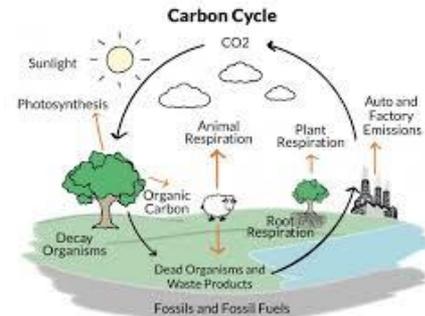
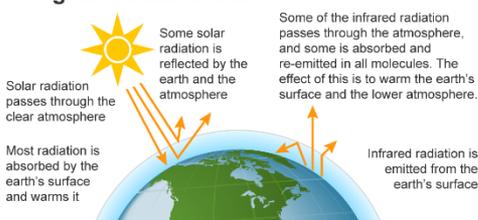
## Further Reading

BBC Bitesize, Educake.

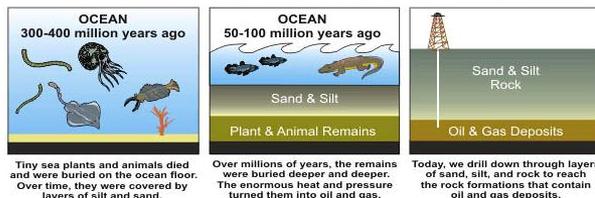
### HOW COAL WAS FORMED



### The greenhouse effect

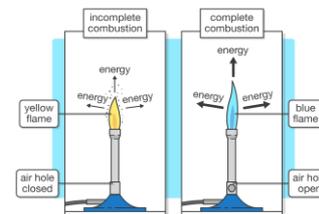


### PETROLEUM & NATURAL GAS FORMATION



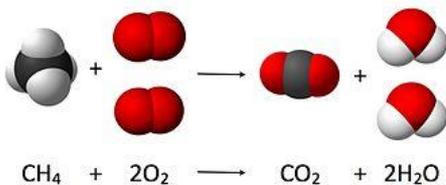
**Complete Combustion**  
In excess oxygen alkanes will burn with complete combustion  
The products of *complete* combustion are CO<sub>2</sub> and H<sub>2</sub>O.  
 $C_6H_{18}(g) + 12.5 O_2(g) \rightarrow 8CO_2(g) + 9 H_2O(l)$

**Incomplete Combustion**  
If there is a **limited amount of oxygen** then *incomplete* combustion occurs, producing CO (which is very toxic) and/or C (producing a sooty flame)  
 $CH_4(g) + \frac{3}{2} O_2(g) \rightarrow CO(g) + 2 H_2O(l)$   
 $CH_4(g) + O_2(g) \rightarrow C(s) + 2 H_2O(l)$



**Global dimming** is defined as the decrease in the amounts of solar radiation reaching the surface of the Earth. The by-product of fossil fuels is tiny particles or pollutants which absorb solar energy and reflect back sunlight into space.

The law of **conservation of mass** states that **mass** in an isolated system is neither created nor destroyed by chemical reactions or physical transformations. According to the law of **conservation of mass**, the **mass** of the products in a chemical reaction must equal the **mass** of the reactants.



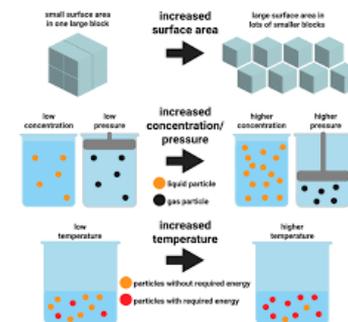
Rust is produced in a chemical reaction between iron, oxygen and water. It is a form of oxidation and it leads to corrosion.



### Metals Activity Series

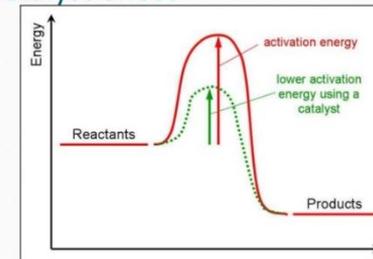
Very Reactive	Li	Lithium		
	K	Potassium		
	Ba	Barium		
	Ca	Calcium		
	Na	Sodium		
	Mg	Magnesium		
	Al	Aluminium		
	C	Carbon		
	Zn	Zinc		
	Fe	Iron		
	Ni	Nickel		
	Sn	Tin		
	Pb	Lead		
	H	Hydrogen		
	Cu	Copper		
	Hg	Mercury		
	Ag	Silver		
	Au	Gold		
Very Unreactive	Pt	Platinum		

*Carbon and Hydrogen are not metals but are included for reference.*

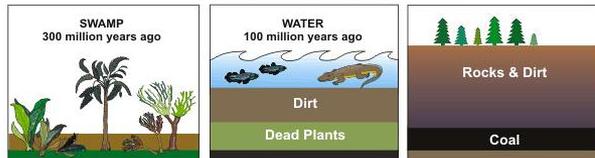


Metal	How reactive	Method of extraction
Potassium	More reactive	Electrolysis
Sodium	reactive	
Calcium		
Magnesium		
Aluminium		
Carbon		Reduction
Zinc		
Iron		
Tin		
Lead		
Copper	Less reactive	

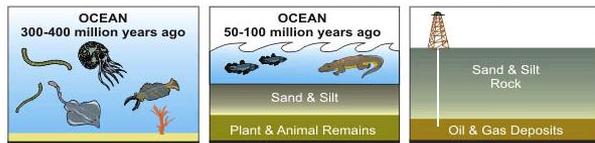
### Catalyst effect



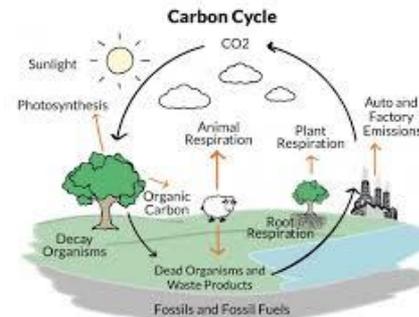
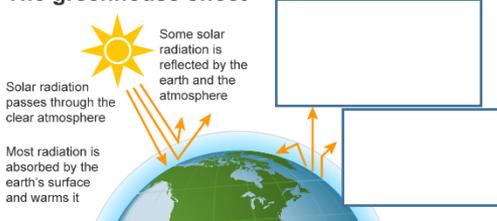
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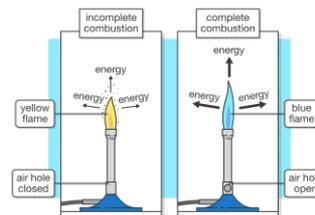


**Complete Combustion**

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**Incomplete Combustion**

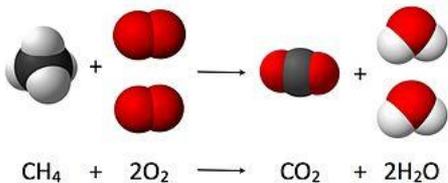
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Global dimming is defined as the

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The law of conservation of mass states that mass in an isolated system is neither



Metal + Oxygen → Metal Oxide

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Acid + Metal oxide →

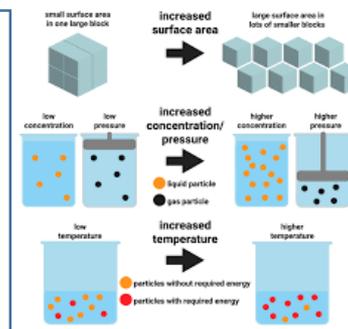
Acid + Metal hydroxide →

Acid + Alkali →

Acid + Metal carbonate →

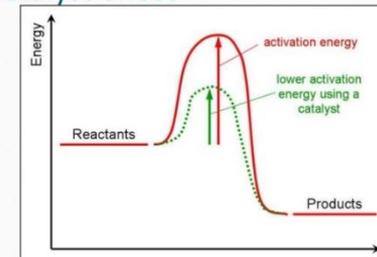
### Metals Activity Series

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	Pb	Lead
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Calcium		
Magnesium		
Aluminium		
Carbon		
Zinc		
Iron		
Tin		
Lead		
Copper		

### Catalyst effect



**Scientific equipment**

	<b>Name</b> Bunsen burner	<b>Use</b> Heating by burning a gas		<b>Name</b> Stopwatch	<b>Use</b> To measure time
				Tongs	To hold hot things (not test tubes)
	Conical flask	To measure volume of liquids		Thermometer	To measure temperature
	Beaker	To hold, pour and heat liquids		Safety Goggles	To protect your eyes
	Measuring cylinder	To measure precise volume of liquid		Tripod	To hold a beaker above a Bunsen burner
	Evaporating basin	To heat and evaporate liquids		Gauze	Used to support a beaker

**Risk assessment**

Hazard / Chemical	Risks	Control measures	Emergency measures

**Hazard** – something that has the potential to cause harm to a person, property or environment.

**Risk** – is the chance or probability of the hazard causing harm or damage to people, property or the environment.

**Control measures** – minimises the risk of the hazard causing harm.

**Drawing equipment**

When drawing scientific equipment it must be drawn in 2D and not 3D.

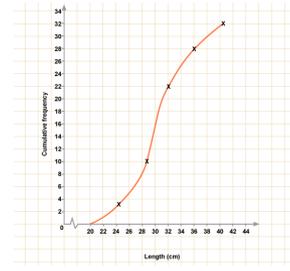
Equipment diagrams should be drawn as part of the method for the experiment.

	Test tube	
	Beaker	
	Conical flask	
	Round bottom flask	
	Measuring cylinder	
	Tripod	
	Gauze mat	
	Bunsen burner	
	Evaporating dish	
	Filter funnel (with filter paper)	

**Hazard symbols**

			
Flammable	Corrosive	Toxic	Explosive
			
Harmful to environment	Serious health hazard	Oxidising	Harmful

**Graphs**

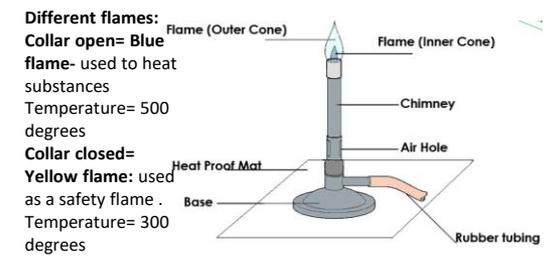


- Rules for a graph**
- Title
  - Size
  - Appropriate scale
  - Labelled axis
  - Plot points accurately
  - Line of best fit

When describing graphs make sure you...

- Identifying if it's an increasing or decreasing trend.
- Support your chosen trend with evidence from the graph.
- Give a reason or opinion for the observed trend.

**Bunsen burner**



**Calculation**

**F**ormula  
**N**umbers  
**A**nswer  
**U**nit

- Write the formula you are using.
- Substitute in the known numbers.
- Calculate the answer.
- Add units if appropriate.