CWK CWK

Global Dimming

- State the adverse effect of Global Dimming and discuss why these pollutants are of global concern
- Relate this to particle theory and light diffraction/reflection.

Lesson 27

Advanced Symbols Equation

We have learned to use symbol equations to represent the chemicals in a reaction.

We have learned to use the particle diagrams to help us balance these symbol equations.

This means we have the same atoms on both side of the equation without changing any of the molecules, but just by adding more of the same molecules to each side until the reaction is balanced.

Advanced Symbols Equation

In real life reactions thousands of molecules are reacting at a time. This means that our symbol don't represent individual molecules any more but thousands of them.

In this way our symbol equation represents the proportions between the atoms, or the ratio.

Advanced Symbols Equation

methane$_{(g)}$ + oxygen$_{(g)}$ —> carbon dioxide$_{(g)}$ + water$_{(g)}$

$CH_{4(g)}$ + **2**$O_{2(g)}$ —> $CO_{2(g)}$+ **2**H_2O

1 : 2 : 1: 2

In this way after we have balanced an equation we know the ratios of the reactants and products.

eg. 1000 molecules of methane will always combust to produce 2000 molecules of water and 1000 molecules of carbon dioxide.

Incomplete combustion

It is very rare that a flame will get all the **oxygen** it needs to combust a fuel **completely**. Many fuels are more complicated than methane and can have many atoms of **hydrogen** and **carbon** in them.

No matter what all the hydrogen is turned into **water**, but if there isn't enough oxygen not all of the carbon atoms will form **carbon dioxide** or even **carbon monoxide**, some of the carbon atoms will just turn back to carbon.

We call this carbon soot.

Soot

Soot in the air is called **smoke**, whenever you see a **flame** producing smoke it is producing **carbon atoms.**

Another way we can tell if a flame is producing soot is if it is **yellow**, when you heat carbon atoms to a **high temperature** they **give off a yellow light** - this is why most flames are yellow.

!If a flame is producing carbon (ie yellow) it is probably producing **carbon monoxide** as well, make sure the area is **ventilated**.

methane$_{(g)}$ + oxygen$_{(g)}$ —> carbon$_{(s)}$ + water$_{(g)}$

$CH_{4(g)} + O_{2(g)} \longrightarrow C_{(s)} + \mathbf{2}H_2O$

What is the ratio of the reactants and products?

Explosions

Explosions occur in a chemical reaction when the **ratio of gas products** is much higher than the **ratio of gas reactants**.

This is because gasses take up a lot of space and if the space isn't available they explode.

petrol$_{(g)}$ + oxygen$_{(g)}$ —> carbon dioxide$_{(g)}$ + water$_{(g)}$

$C_9H18_{(l)} + \mathbf{14}O_{2(g)} \longrightarrow 9CO_{2(g)} + \mathbf{10}H_2O$

1 : 14 : 9: 10

Petrol can be explosive because the ratio of gas reactants to products is 14:19 Actual explosives often use oxygen in the form of a solid to make this ratio even faster.

What are the problems with soot or smoke?

Think Pair share

What are the problems with soot or smoke?

People with asthma

Makes buildings dirty

Smog

Blocks out sunlight

Less photosynthesis

Plants cant grow as much food

Less food to feed people

In the last few years, some scientists have been measuring how much sunlight is reaching the surface of the Earth and comparing it to records from the last 50 years.

They have been amazed to find that in some areas nearly 25% less sunlight has been reaching the surface compared to 50 years ago.

They have called this global dimming.

They think that it is caused by particles of soot and ash that are produced when fossil fuels are burnt.

These particles reflect sunlight back into space, or they can help to produce more clouds that reflect the sunlight back into space.

However, there are many scientists who don't believe the change is real and blame it on inaccurate recording equipment.