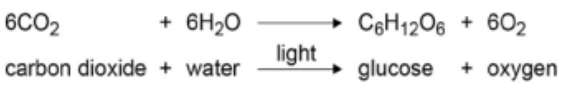
AQA Trilogy-Chemistry key terms – Chemistry of the Atmosphere

Changing Atmosphere	
Atmosphere now is **78% nitrogen**, **21% oxygen** & small amounts of **carbon dioxide, argon & water vapour**. Been stable like this for last 200 million years.	**Early atmosphere** thought to have a lot of carbon dioxide, ammonia, methane & water vapour (like Mars today)
Earth was formed about 4.5 billion years ago. At first **intense volcanic activity** released the gases that formed the early atmosphere.	As Earth cooled (below 100ºC) water vapour condensed to form the oceans. Some CO_2 dissolved in oceans.
Plants & algae took in CO_2 and made **oxygen** in atmosphere during photosynthesis.  	CO_2 in early atmosphere also '**locked away'** in sedimentary rocks (eg limestone) as carbonates (made from fossilised shells & bones)) and fossil fuels (made from dead plants/animals).
But last 100 years **CO_2 and methane levels have been increasing** due to burning fossil fuels - thought to cause **global warming**	*Air is a mixture of gases – have different boiling pts so can separate with fractional distillation - like crude oil, but much lower temps: First remove water and CO_2 (so solid ice does not block pipes); cool air (-200ºC) to condense gases to liquid; allow to warm, one gas evaporates at a time – lowest boiling point first.*
Global Warming	
Greenhouse gases in the atmosphere maintain temperatures on Earth high enough to support life. Water vapour, carbon dioxide and methane are greenhouse gases.	Over time scientists believe that the temperature of Earth's atmosphere will increase enough to result in global climate change e.g ice caps melting, sea levels rising, flooding, extreme weather. But it is difficult to model such complex systems as global climate change and therefore simplified models reported in the media may be biased.
The carbon footprint is the total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle of a product, service or event. The carbon footprint can be reduced by reducing emissions of carbon dioxide and methane.	Most fuels contain carbon, hydrogen and sometimes sulphur. When a fuel burns (combustion) it can release **water**, **carbon dioxide, carbon monoxide, nitrogen oxide, sulphur dioxide** or **particulates** (solid particles) into atmosphere
Sulphur dioxide & nitrogen oxides cause **acid rain**. Nitrogen dioxide forms because the nitrogen and oxygen in the air can react in the very high temperatures in an engine.	**Sulphur dioxide** forms when sulphur in 'dirty' fuel reacts with oxygen from the air**.** Sulfur can be removed from fuels before they are burnt (e.g. in cars) or SO_2 can be taken out of the waste products after combustion (e.g. power stations)
Carbon dioxide is linked to **global warming**. **Particulates** (tiny particles of unburned fuel) cause **global dimming**	**Carbon monoxide** is formed if there is incomplete combustion, due to not enough oxygen supplied. It is toxic.