



## COMBUSTION

## STEM

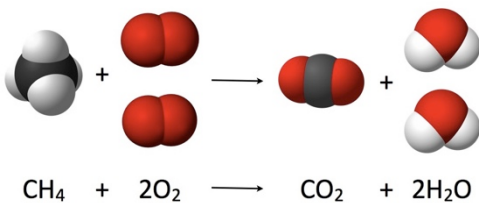


Combustion is the scientific word for burning. In a combustion reaction, a **substance reacts with oxygen** from the air. Combustion reactions happen at high temperatures, and **transfer energy** to the surroundings as **light and heat**. This is why you see flames when things burn.

The most common form of combustion is fire. Most forms of combustion happen when oxygen joins with another substance. For example, when wood burns, oxygen in the air joins with carbon in wood. Many common substances can undergo combustion - for example, paper, cloth, and natural gas. Combustion begins when the substance reaches a temperature called its **ignition point**.

One important combustion reaction is that of methane. Methane reacts with oxygen from the air and produces either a hot blue or an orange flame. The energy that the reaction produces can be used to heat water, cook food, generate electricity or even power vehicles.

The products of combustion reactions are compounds of oxygen, called **oxides**. Since methane is made up of atoms of carbon and hydrogen, the products of its combustion reaction are oxides of carbon and hydrogen. The names of these oxides are **carbon dioxide and water**.



The fuel used in the Gravity Jet Suit is called kerosene, or Jet A1 fuel. Like methane, this fuel contains hydrogen and carbon molecules. The chemical formula is a bit more complicated than for methane but the process is the same. The combustion inside the gas turbines causes hot gases to blast out of the exhaust nozzles.



The **flash point** is the lowest temperature at which a liquid (e.g. a fuel) will form a vapour in the air that will “flash,” or briefly ignite, **when exposed to an open flame**. The flash point is an indication of how easily a fuel will burn. Materials with higher flash points are less flammable or hazardous than chemicals with lower flash points.

*The flash point is not the same as the **auto-ignition temperature**. This is the minimum temperature required to ignite a gas or vapor in air without a spark or flame present. For example if it touches hot metal.*

The combustion inside the Gravity Jet Suit engines combines fuel and compressed air. The large amount of air compressed into the small combustion chamber provides lots of oxygen molecules to produce a combustion reaction with the hydrogen and carbon molecules in the vapour of the kerosene or Jet A1 fuel.

Jet A1 fuel has a much higher flash point than petrol for a car engine. This is an important safety feature because the risk of a fire is low for general use, or in the event of an accident.

