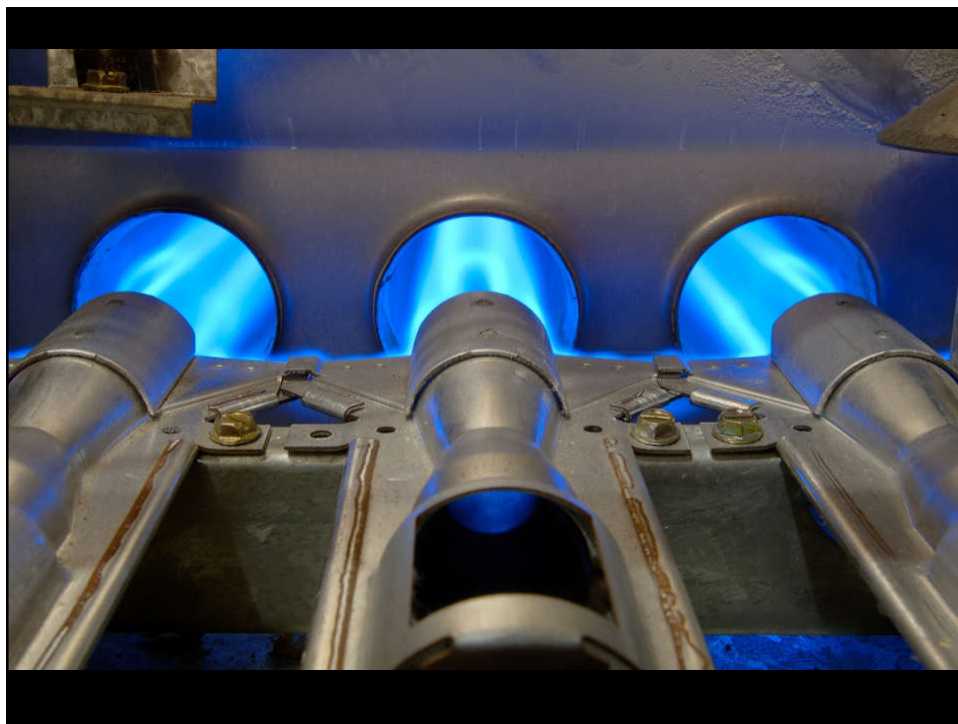


Complete Combustion

- Complete combustion reacts oxygen with a fuel to produce carbon dioxide and water.
Eg: $2\text{C}_8\text{H}_{18} + 25\text{O}_2 \rightarrow 18\text{CO}_2 + 16\text{H}_2\text{O}$
- Because the air we breathe is only 21% oxygen, a large volume of air is required for complete combustion to take place.

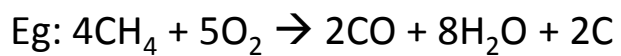
- Combustion is an exothermic reaction that releases energy in the forms of heat and light.
- When a fuel undergoes complete combustion, it releases the maximum amount of energy from the fuel being reacted.
- Complete combustion is usually characterized by a blue flame





Incomplete Combustion

- Incomplete combustion is also a reaction between oxygen and fuel but the products are carbon monoxide, water and carbon.



- Incomplete combustion occurs when a combustion reaction occurs without a sufficient supply of oxygen.

- Incomplete combustion is often undesirable because it releases less energy than complete combustion and produces carbon monoxide which is a poisonous gas.
- Incomplete combustion can also produce pure carbon (soot) which is messy and can build up in equipment. (ie: chimneys)
- Incomplete combustion is characterized by an orange coloured flame.



Uses of Incomplete Combustion

- For centuries, humans have used incomplete combustion of wood to smoke and preserve meat.
- When wood is burned with limited oxygen, a large amount of smoke is produced which dehydrates the meat and forms a protective layer (pellicle) that resists bacteria growth.

- Gasification is the process of incompletely combusting wood or coal to produce flammable gasses (CO and H_2) that can be used as a fuel.
- Until the mid 1900's many cities produced and distributed "town gas" which consisted of CO , H_2 and CH_4 from the incomplete combustion of coal. This town gas was used for heating, cooking and lighting until natural gas became commonly available in the 1930's and 1940's.

- During World War II, a shortage gasoline and diesel fuel led many people, and even militaries, to convert vehicles to run on wood gas.
- By 1945, over one million vehicles worldwide had been converted to run on wood gas, including over 500 000 in Germany.



Isarphoto: Bild 103-10070A
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