

# Principles of combustion

- Combustion refers to the rapid oxidation of fuel accompanied by the production of heat, or heat and light.
- Complete combustion (complete oxidation) of a fuel is possible only in the presence of an adequate supply of oxygen. (Air: 20.9% oxygen, 79% nitrogen and other gases).
- Rapid fuel oxidation results in large amounts of heat.
- Solid or liquid fuels must be changed to a gas before they will burn.
- Fuel gases will burn in their normal state if enough air is present.
- Nitrogen is considered to be a temperature reducing diluter.
- Nitrogen reduces combustion efficiency by absorbing heat from the combustion of fuels and diluting the flue gases.
- Nitrogen reduces the heat available for transfer through the heat exchanger surfaces.
- It also increases the volume of combustion by-products, which then have to travel through the heat exchanger and up the stack faster to allow the introduction of additional fuel-air mixture.
- Nitrogen also can combine with oxygen (particularly at high flame temperatures) to produce oxides of nitrogen ( $\text{NO}_x$ ), which are toxic pollutants.
- Carbon may also combine with oxygen to form carbon monoxide, which results in the release of a smaller quantity of heat. Carbon burned to  $\text{CO}_2$  will produce more heat per unit of fuel than when CO or smoke are produced.

# Principles Of Combustion

**Lauren Gardner**



## **Principles Of Combustion:**

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