

Combustion Reactions

A combustion reaction involves the reaction of a substance with oxygen to produce heat and/or light. Combustion reactions are a type of simple oxidation reaction.



A **hydrocarbon** is a substance that contains carbon and hydrogen. Methane (CH_4) and octane (C_8H_{16}) are examples of hydrocarbons. When a hydrocarbon undergoes combustion, carbon dioxide and water are produced.

Eg. combustion of methane

Other organic compounds (carbon, hydrogen with other elements) also undergo combustion.

Example: Combustion of ethyl alcohol

Complete Combustion

- occurs if enough oxygen is present

HC + oxygen \rightarrow carbon dioxide + water

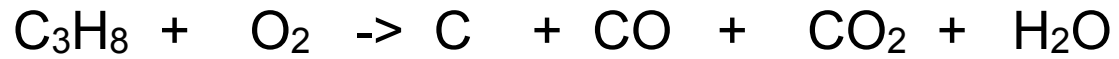
Incomplete Combustion

- occurs if *less* than enough oxygen is present

HC + oxygen \rightarrow C + CO + CO₂ + water

Some or all of these may be present
amounts may vary.

Incomplete Combustion of Propane



Chemical Reactions and Energy

An energy term can be added to a reaction to a chemical equation to indicate whether energy is released or absorbed. Energy terms are not balanced.

Exothermic reactions involve a release of energy (energy **exits** the reactants):



Endothermic reactions involve the absorption of energy (energy **enters** the products):



Combustion Exercise

1. Write the balanced chemical equation for the complete combustion of the following:

- butene (C_4H_8)
- octane (a component of gasoline with chemical formula C_8H_{18})
- kerosene (jet fuel) ($C_{10}H_{22}$)
- methanol (CH_3OH)
- paraffin wax ($C_{22}H_{52}$)

2. Write any chemical equation for the incomplete combustion of each of these compounds:

- butene (C_4H_8)
- octane (C_8H_{18})
- kerosene ($C_{10}H_{22}$)
- paraffin wax ($C_{22}H_{52}$)

Homework: p. 141 # 41-49

Homework

