

Chapter 15

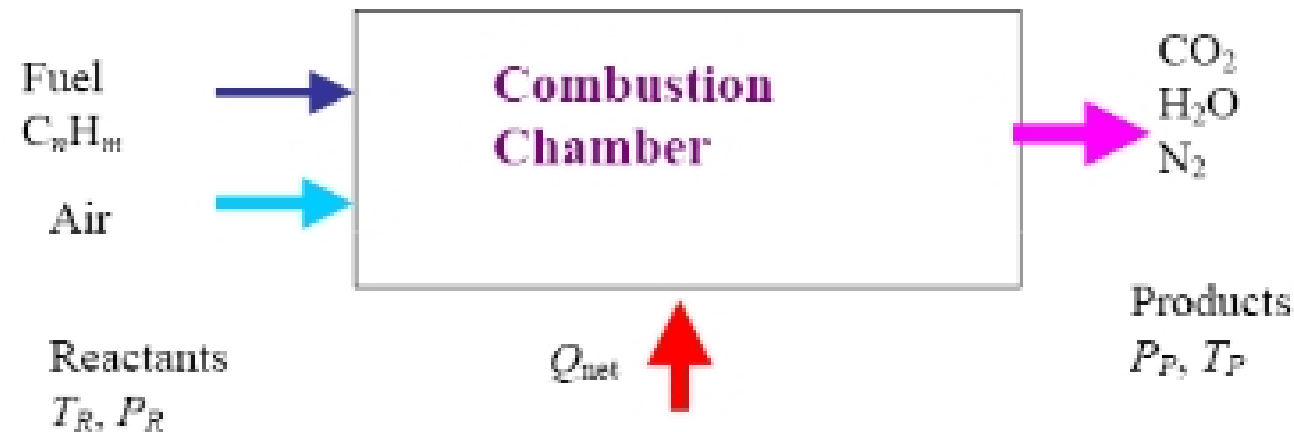
Chemical Reactions

Study Guide in PowerPoint

to accompany

Thermodynamics: An Engineering Approach, 8th edition
by Yunus A. Çengel and Michael A. Boles

The combustion process is a chemical reaction whereby fuel is oxidized and energy is released.



Fuels are usually composed of some compound or mixture containing carbon, C, and hydrogen, H₂.

Examples of hydrocarbon fuels are

CH₄ Methane

C₈H₁₈ Octane

Coal Mixture of C, H₂, S, O₂, N₂ and non-combustibles

Initially, we shall consider only those reactions that go to completion. The components prior to the reaction are called reactants and the components after the reaction are called products.

Reactants → Products

For complete or stoichiometric combustion, all carbon is burned to carbon dioxide (CO_2) and all hydrogen is converted into water (H_2O). These two complete combustion reactions are as follows:



Example 15-1

A complete combustion of octane in oxygen is represented by the balanced combustion equation. The balanced combustion equation is obtained by making sure we have the same number of atoms of each element on both sides of the equation. That is, we make sure the mass is conserved.



Note we often can balance the C and H for complete combustion by inspection.

