Respiration vs Combustion

Respiration is of two main types (Sachs, 1890) - anaerobic (without oxygen) and aerobic (with oxygen as terminal oxidant). In aerobic respiration, the substrate is completely broken down to form CO_2 and water. A large amount of energy is released.

$C_6H_{12}0_6 + 60_2 \rightarrow 6CO_2 + 6H_20 + 686$ kcal or 2867 kJ.

In anaerobic respiration, the substrate is not fully broken down so that an organic end product is always present. Only small amount of energy is liberated.

$C_6H_{12}0_6 \rightarrow 2C_2H_5OH + 2\ CO_2 + 59$ kcal/247 kJ.

Higher organisms cannot perform anaerobic respiration for long because of accumulation of end products, insufficient amount of available energy and near stoppage of many active processes.

External respiration is exchange of respiratory gases (O_2 and CO_2) between an organism and its environment. Internal or tissue respiration is cellular respiration and exchange of respiratory gases between tissue cells and extracellular environment. Cellular respiration is multistep enzyme controlled biological oxidation or oxidative breakdown of organic substrates that releases energy in a number of steps. About 50% of the liberated energy is converted into heat and dissipated. The remaining 50% is trapped in A TP molecules for use in biosynthesis, overcoming entropy and performing various activities.