Aerobic respiration is an enzymatically controlled release of energy in a stepwise catabolic process of complete oxidation of organic food into carbon dioxide and water with oxygen acting as terminal oxidant. The common mechanism of aerobic respiration is also called common pathway because its first step is called glycolysis. The common aerobic respiration consists of three steps

-glycolysis

-Krebs cycle and;

-Oxidative phosphorylation.

During glycolysis, the 6-carbon glucose molecule undergoes a series of reactions that break it down into two 3-carbon pyruvate molecules. The purpose of this process is to release electrons from the bonds in the glucose, which are scooped up by an acceptor molecule called NAD+, turning it into NADH when it accepts the electrons. In this process, two molecules of ATP are made. This step occurs in the cytoplasm, and the pyruvate and NADH molecules then enter the mitochondria for the next step.

The next phase of aerobic respiration is the Kreb’s cycle, also known as the Citric acid cycle.In this phase,the pyruvate molecules from glycolysis are converted to a 2-carbon compound called Acetyl CoA.

With each turn of the cycle, the Acetyl CoA is broken down and rebuilt into carbon chains. The purpose is to extract electrons from them and generate more ATP, similar to the more simple process of glycolysis. NAD+ is used again to pick up the electrons released, as is another acceptor molecule, FADH, which becomes FADH2 when reduced. These acceptor molecules get loaded up with electrons, and carbon dioxide is released as the carbon chains are broken down and new Acetyl CoA comes in.

During Oxidative phosphorylation,eukaryotes occur in the mitochondrial cristae. It comprises the electron transport chain that establishes a proton gradient (chemiosmotic potential) across the boundary of the inner membrane by oxidizing the NADH produced from the Krebs cycle. ATP is synthesized by the ATP synthase enzyme when the chemiosmotic gradient is used to drive the phosphorylation of ADP. The electron transfer is driven by the chemical energy of exogenous oxygen and, with the addition of two protons, water is formed.