

At high ATP/ADP ratios, this enzyme is inactivated, resulting in a reduced rate of glycolysis and reduced ATP synthesis.

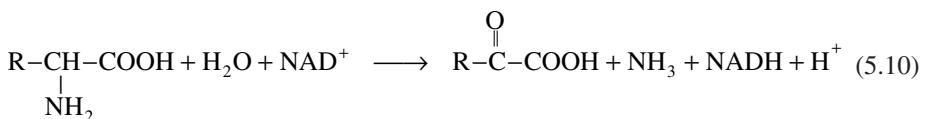
The concentration of dissolved oxygen or oxygen partial pressure has a regulatory effect on rate of glycolysis, known as the *Pasteur effect*. The rate of glycolysis under anaerobic conditions is higher than that under aerobic conditions. In the presence of oxygen, ATP yield is high, since the TCA cycle and electron transport chain are operating. As a result of high levels of ATP, ADP and Pi become limiting, and phosphofructokinase becomes inhibited. Also, some enzymes of glycolysis with —SH groups are inhibited by high levels of oxygen. A high NADH/NAD⁺ ratio also reduces the rate of glycolysis.

Certain enzymes of the Krebs cycle are also regulated by feedback inhibition. Pyruvate dehydrogenase is inhibited by ATP, NADH, and acetyl CoA and activated by ADP, AMP, and NAD⁺. Similarly, citrate synthase is inactivated by ATP and activated by ADP and AMP; succinyl CoA synthetase is inhibited by NAD⁺. In general, high ATP/ADP and NADH/NAD⁺ ratios reduce the processing rate of the TCA cycle.

Several steps in the electron transport chain are inhibited by cyanide, azide, carbon monoxide, and certain antibiotics, such as amytal. Such inhibition is important due to its potential to alter cellular metabolism.

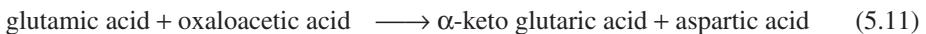
5.6. METABOLISM OF NITROGENOUS COMPOUNDS

Most of the organic nitrogen compounds have an oxidation level between carbohydrates and lipids. Consequently, nitrogenous compounds can be used as nitrogen, carbon, and energy source. Proteins are hydrolyzed to peptides and further to amino acids by proteases. Amino acids are first converted to organic acids by deamination (removal of amino group). Deamination reaction may be oxidative, reductive, or dehydrative, depending on the enzyme systems involved. A typical oxidative deamination reaction can be represented as follows:



Ammonia released from deamination is utilized in protein and nucleic acid synthesis as a nitrogen source, and organic acids can be further oxidized for energy production (ATP).

Transamination is another mechanism for conversion of amino acids to organic acids and other amino acids. The amino group is exchanged for the keto group of α -keto acid. A typical transamination reaction is



Nucleic acids can also be utilized by many organisms as carbon, nitrogen, and energy source. The first step in nucleic acid utilization is enzymatic hydrolysis by specific