

Enzymes

Enzymes are molecules that catalyze (or speed up the rate of) chemical reactions. Most enzymes are proteins that act on specific substrates, converting them into different molecules. Enzymes are not consumed, but are reused in the reactions they catalyze, and do not change equilibrium rates. Enzymes are simply responsible for lowering the activation energy for the specific reactions they catalyze. They can be affected by other molecules – inhibitors decrease enzymatic activity while activators increase this activity. Enzymes contain an active site, where substrates may temporarily bind to form an enzyme/substrate complex. Then the enzyme works to change this molecule into an enzyme/product complex, and the products eventually leave the enzyme, which may be reused. In the case of yeast, they use their natural enzyme, invertase (sucrase) to catalyze the hydrolysis of sucrose (a disaccharide) into glucose and fructose (both monosaccharides). Yeast cannot metabolize sucrose for energy until the enzymes have broken the disaccharides into glucose and fructose.

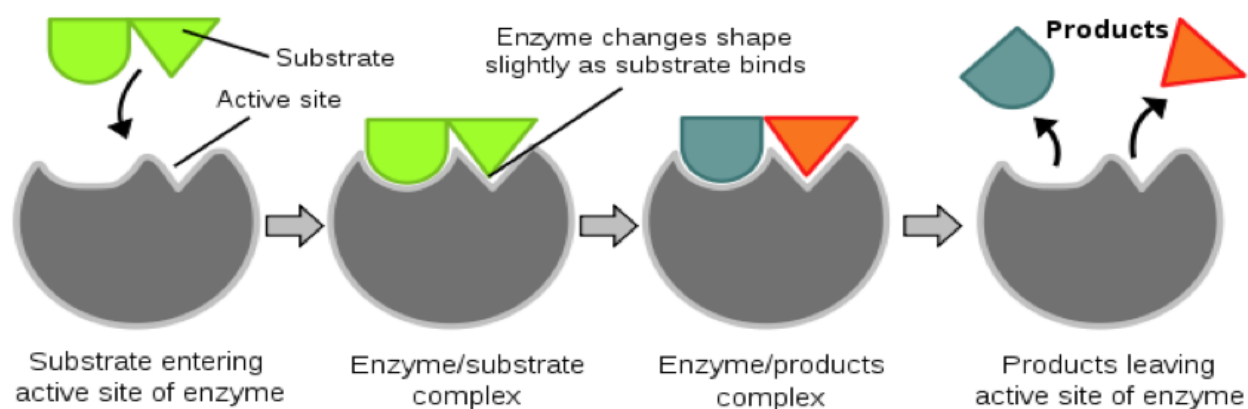


Figure 3: Enzyme function. The enzyme in this diagram represents invertase; the substrate is sucrose. Sucrose is a disaccharide, which is broken into two monosaccharide products, glucose and fructose, by the enzyme.

Yeast metabolize sugars as a food source, producing ethanol and CO₂.

Yeast are small organisms that are classified as fungi. Most reproduce asexually by budding, and a few reproduce through binary fission. Their main sources of nutrition are hexose sugars, such as fructose and glucose, or disaccharides like maltose and sucrose (table sugar). They prefer glucose, but have enzymes to change some other forms of carbohydrates into glucose for use. Yeast can grow over a wide temperature range, but prefer warm conditions, typically between 30-37 °C. Yeasts perform both aerobic cellular respiration (requires oxygen) or anaerobic respiration, depending on the conditions; however, ethanol is produced in the anaerobic state.