

Photosynthesis

FIGURE 19-36 Solar energy as the ultimate source of all biological energy. Photosynthetic organisms use the energy of sunlight to manufacture glucose and other organic products, which heterotrophic cells use as energy and carbon sources.

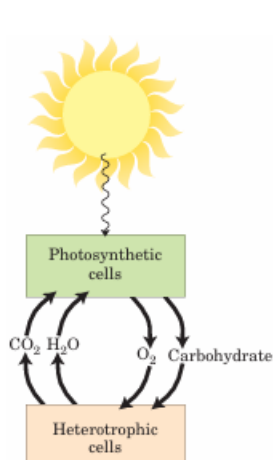


FIGURE 19-37 The light reactions of photosynthesis generate energy-rich NADPH and ATP at the expense of solar energy. These products are used in the carbon-assimilation reactions, which occur in light or darkness, to reduce CO₂ to form trioses and more complex compounds (such as glucose) derived from trioses.

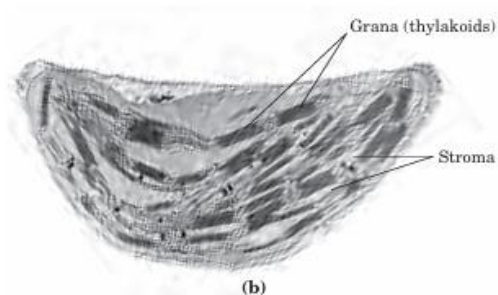
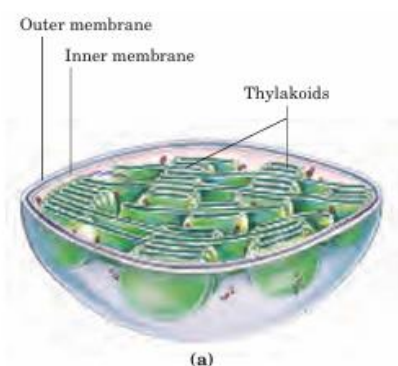
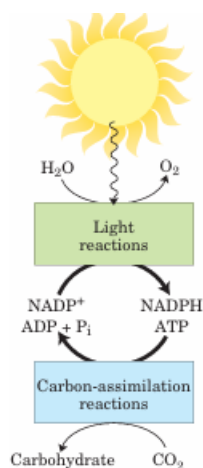
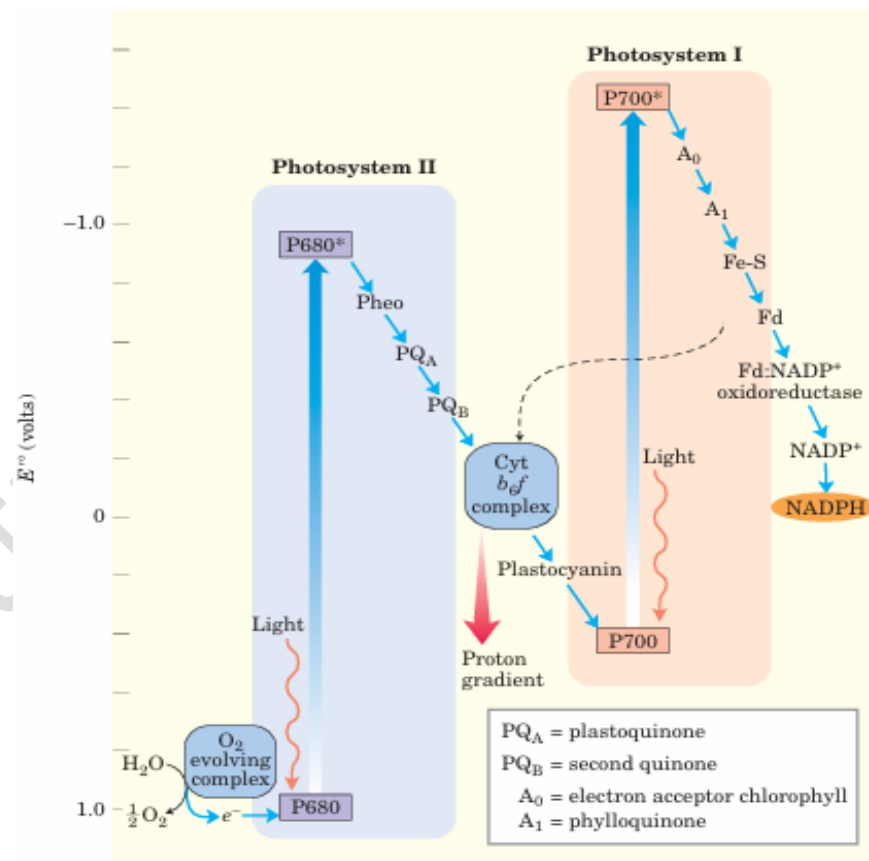
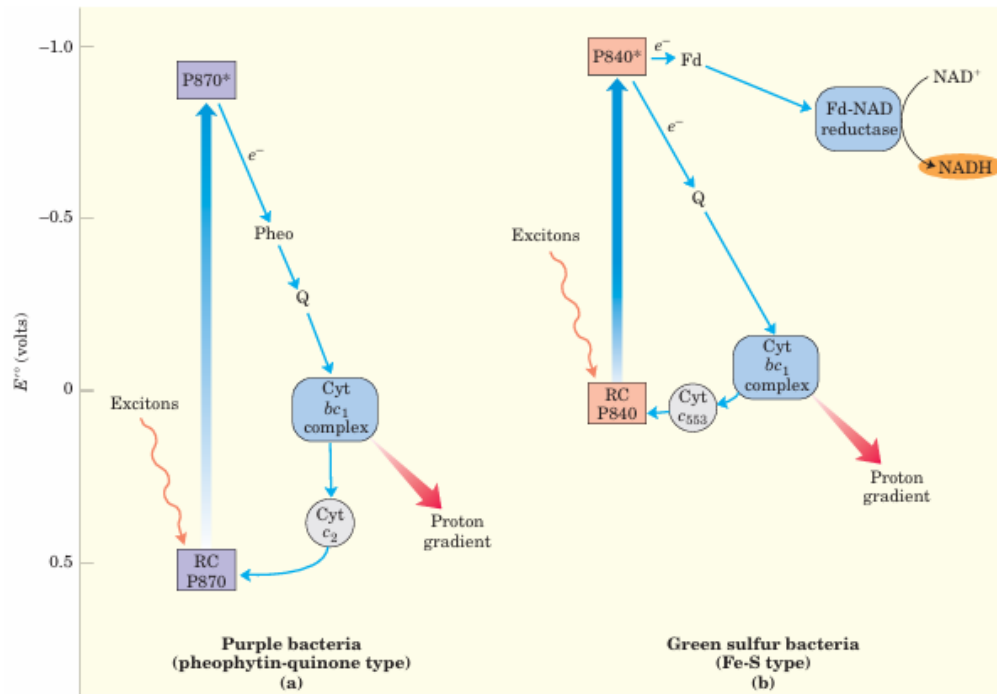


FIGURE 19-38 Chloroplast. (a) Schematic diagram. (b) Electron micrograph at high magnification showing grana, stacks of thylakoid membranes.



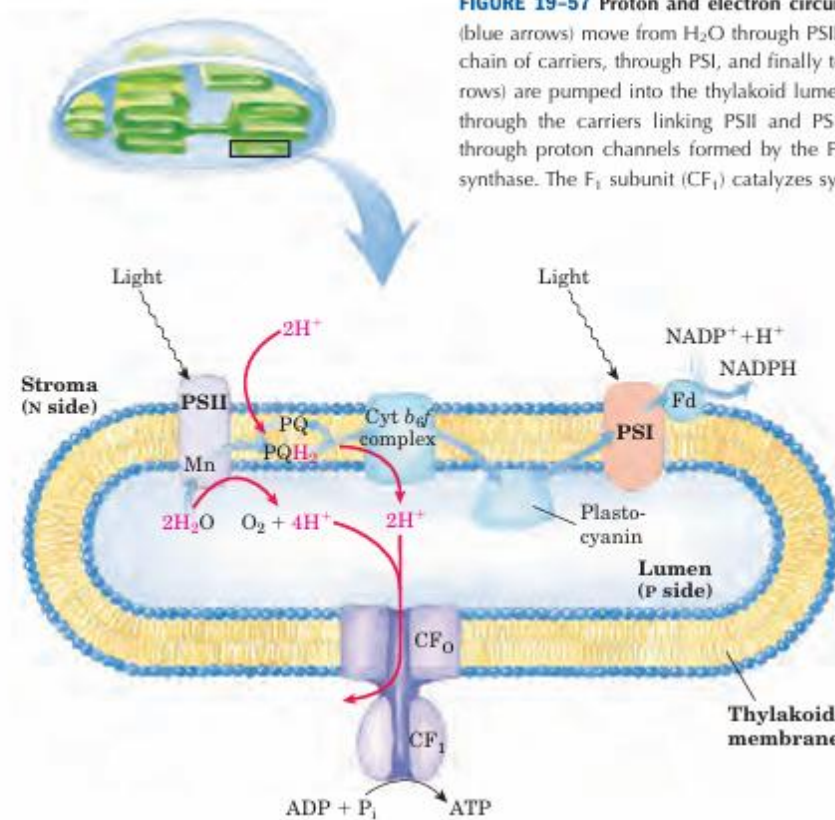


FIGURE 19-57 Proton and electron circuits in thylakoids. Electrons (blue arrows) move from H_2O through PSII, through the intermediate chain of carriers, through PSI, and finally to NADP^+ . Protons (red arrows) are pumped into the thylakoid lumen by the flow of electrons through the carriers linking PSII and PSI, and reenter the stroma through proton channels formed by the F_0 (designated CF_0) of ATP synthase. The F_1 subunit (CF_1) catalyzes synthesis of ATP.

Calvin cycle

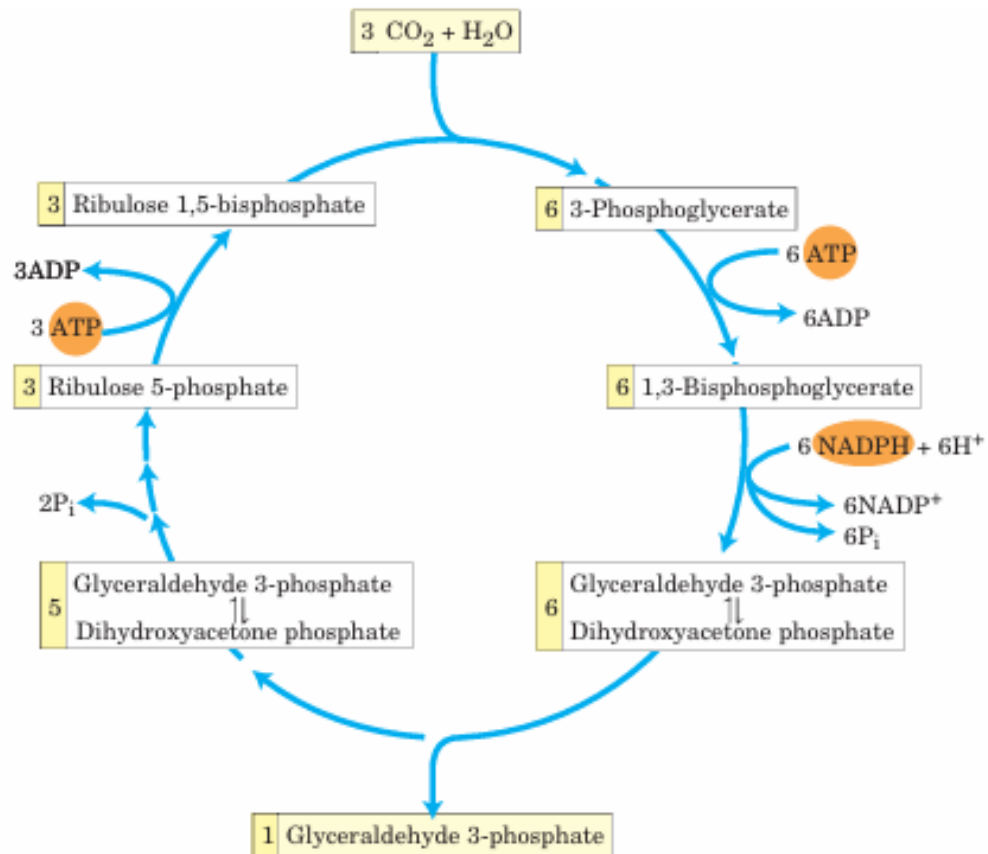
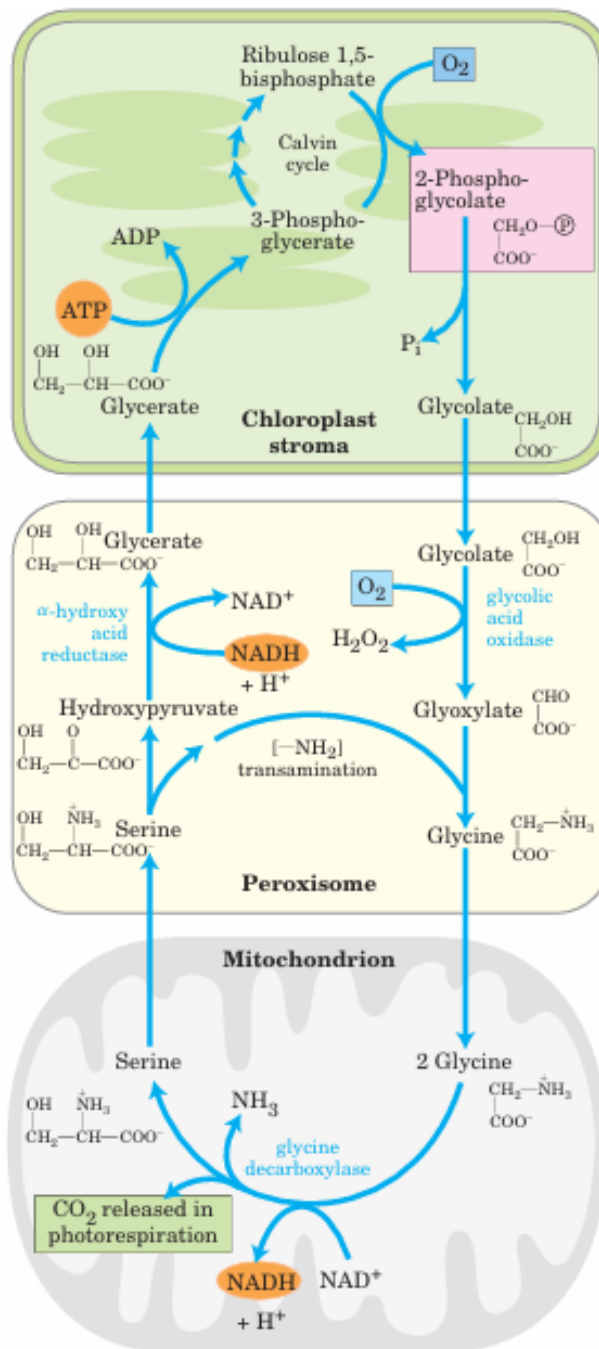
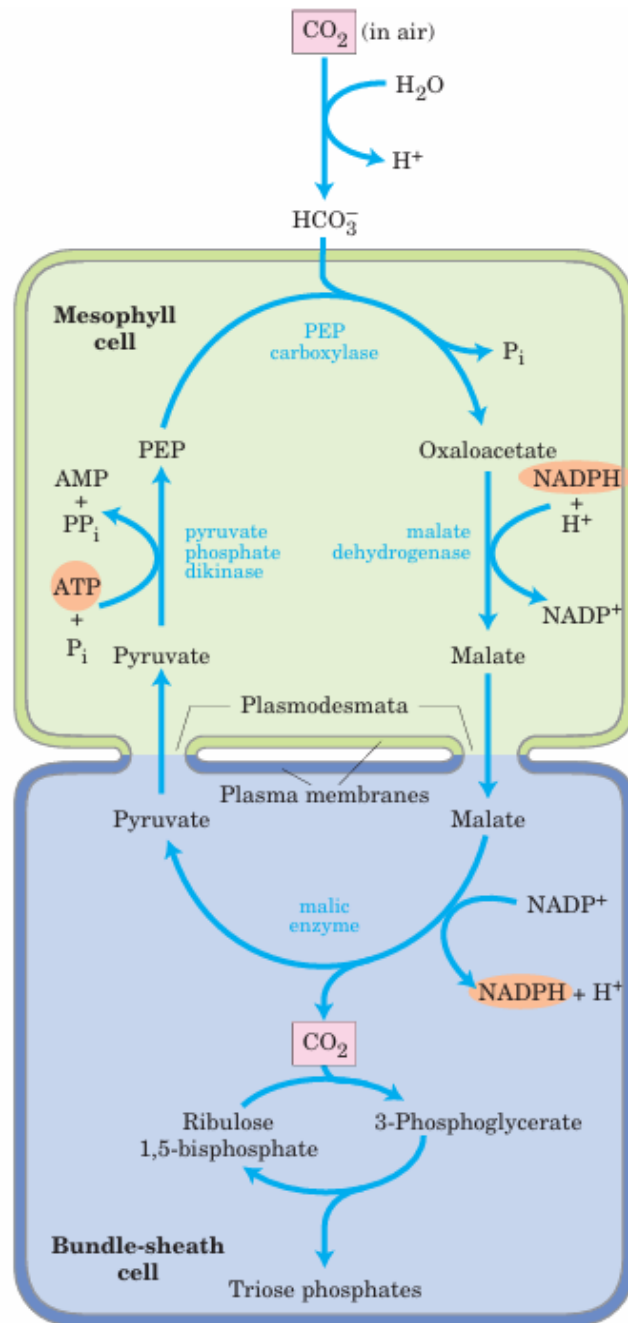


FIGURE 20-14 Stoichiometry of CO₂ assimilation in the Calvin cycle. For every three CO₂ molecules fixed, one molecule of triose phosphate (glyceraldehyde 3-phosphate) is produced and nine ATP and six NADPH are consumed.

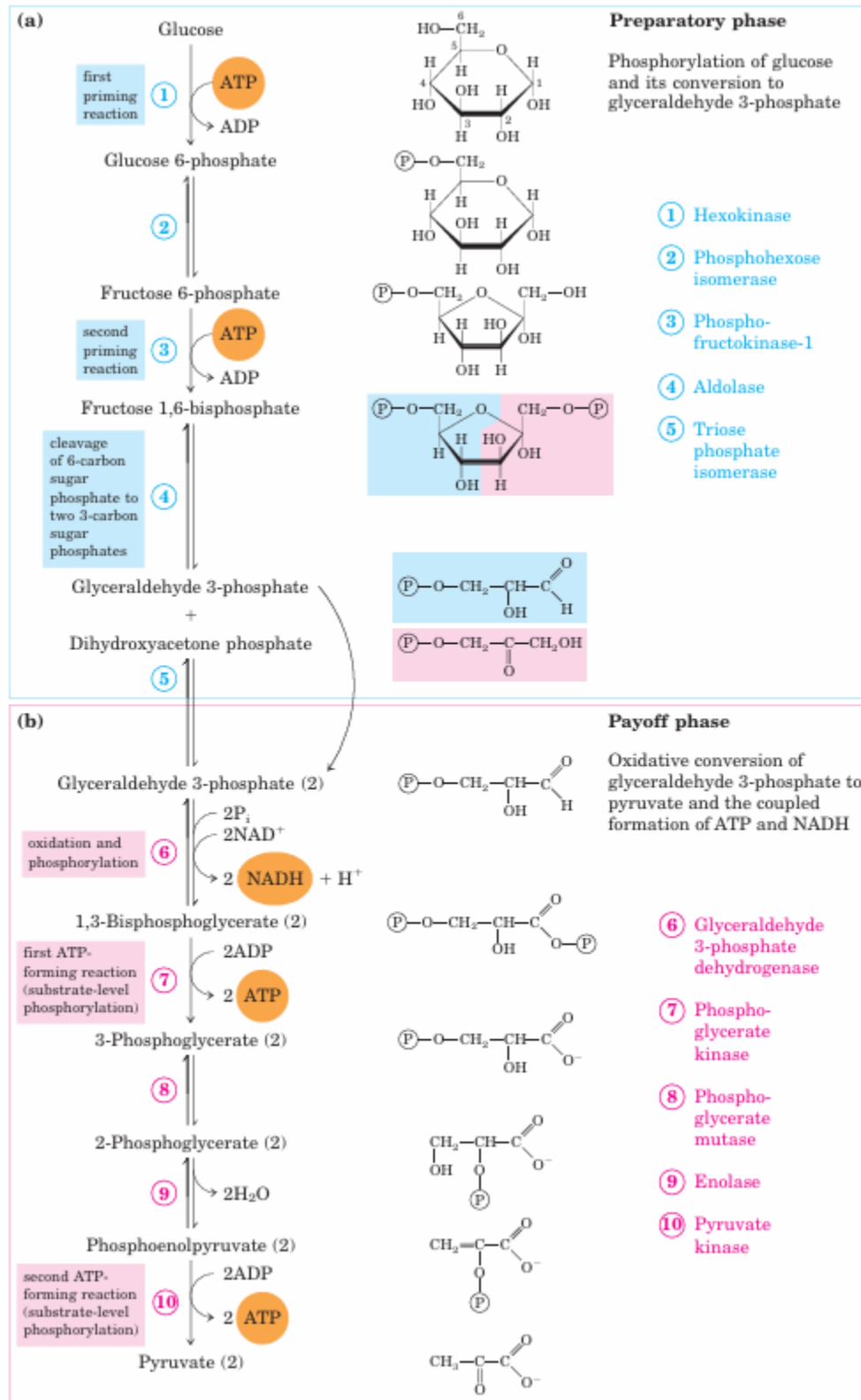
C₂ Cycle

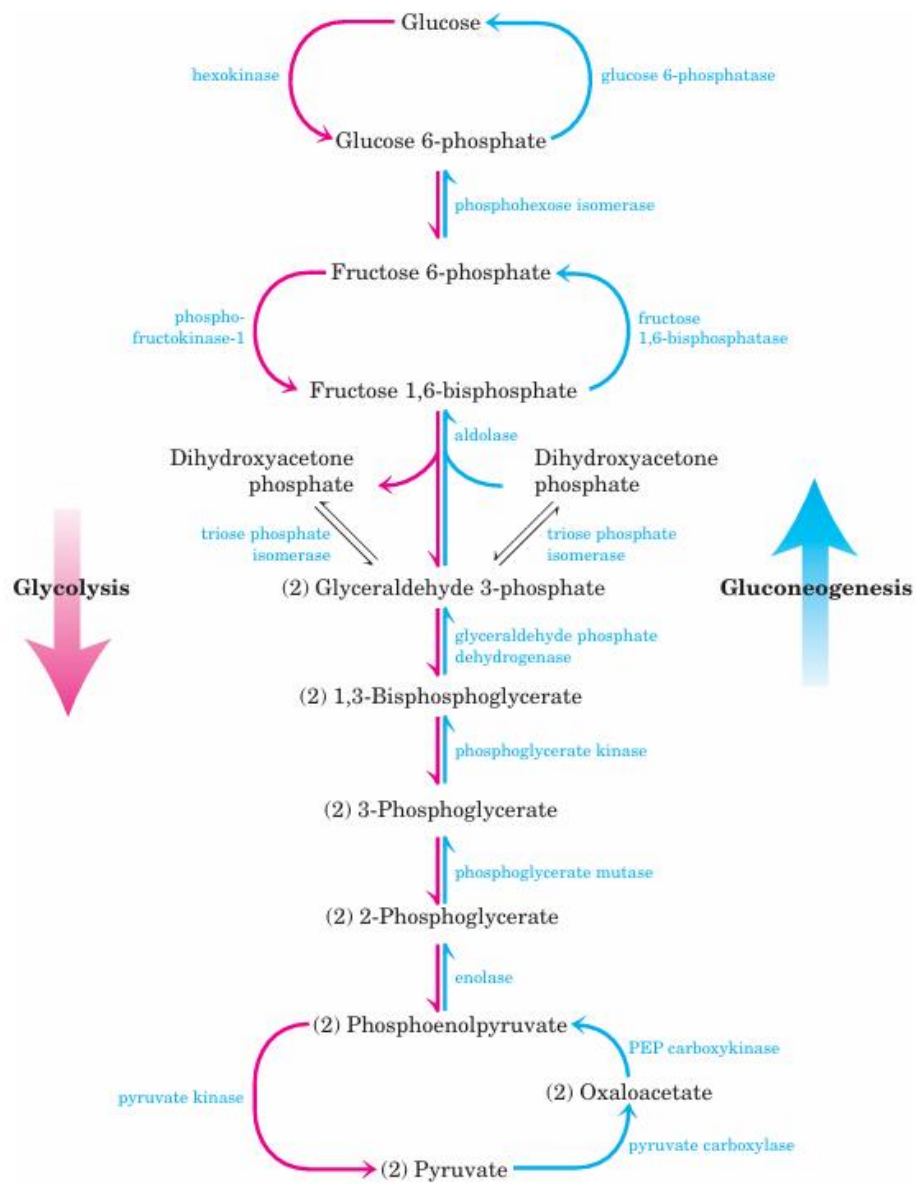


C₄ Cycle



Glycolysis





Citric acid cycle

