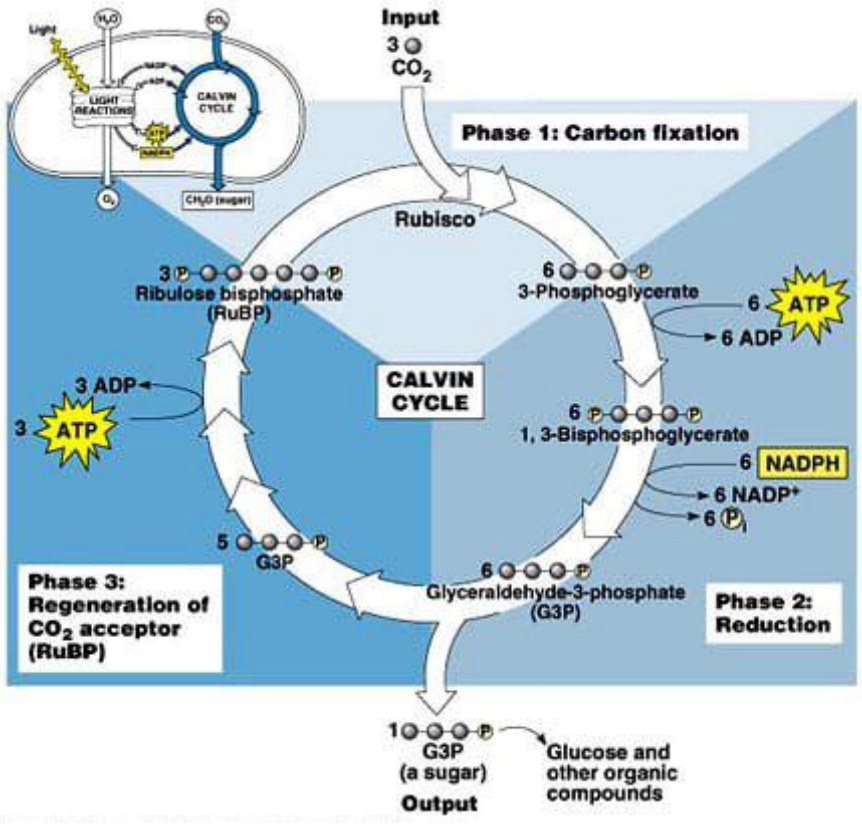
Light-independent Phase of Photosynthesis

Calvin Cycle was named after Melvin Calvin who first investigate its mechanism and won the Nobel Prize in Chemistry in 1961. The Calvin cycle is composed of three phases including carbon fixation, reduction and regeneration of the CO2 acceptor. In order to better understand the series of reaction within the cycle, it is important that the Law of Conservation of mass is observed and is satisfied. This simply implies that the number of all elements, particularly carbon must be accounted in each step of the process.



Calvin cycle starts with presence of a five-carbon compounds carbohydrates called Ribulose-1,5-bis phosphate (RuBP). Three molecules of RuBP are combined with three molecules of CO2 through an enzyme called Ribulose-1,5-bisphosphate carboxylase/oxygenase (Rubisco). Rubisco is one of the most abundant proteins in the chloroplast. Reaction facilitated by Rubisco forms three molecules of short-lived, 6-carbon compound called XXX, which quickly form 6 molecules of 3-Phosphoglycerate (3PG). The last step in the carbon fixation phase is the phosphorylation of the six molecules of 3PGs follow using 6 molecules of ATP that are hydrolyzed to ADP and Pi to form 6 molecules of 1,3-Bisphosphoglycerate (1,3-BPG). Reduction phase involves conversion of 1,3-BPG to Glyceraldehyde-3-

rounds of Calvin cycle is required, hence the final balanced chemical equation becomes:

Enzymes

$$6CO_2 + 12NADPH + 18ATP \rightarrow C_6H_{12}O_6 + 12NADP^+ + 18ADP + 18P_i$$