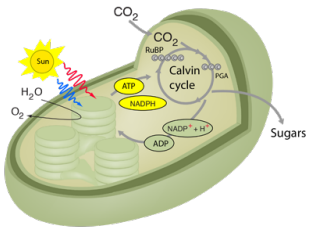
# Calvin Cycle (Light Independent Reactions) Questions

loreescience

1. What products of the light reactions are used in the Calvin Cycle?
   **ATP & NADPH**
2. Why can the Calvin Cycle be correctly referred to as light independent reactions but not as dark reactions?
   **Does not directly require light but does require products from light reactions**
3. Where do the reactions that convert carbon dioxide into carbohydrate molecules occur? Specifically
   **Chloroplast stroma**




4. How is the Calvin Cycle similar to the Krebs's cycle?
   **Both start & end with a carbon based molecule (oxaloacetate & ribulose bisphosphate)**
   **Series of catalyzed reactions that produce high energy molecules (NADH/NADPH & ATP)**
5. Describe the first reactions of the Calvin Cycle.
   **Rubisco catalyzed reaction of joining 3 molecules of $CO_2$ with 3 molecules of RuBP, creating unstable 6 carbon molecules which split into 6 molecules of phosphoglycerate (PGA)**
6. What enzyme is responsible for catalyzing the first reaction?
   **Rubisco**
7. What compound is the oxidizing agent in the next steps of the Calvin Cycle?
   **1,3-bisphosphoglycerate ($NADP^+$ → NADPH)**
8. During the reduction reactions, what final product exits from the Calvin Cycle?
   **Glyceraldehyde 3-phsophate (G3P)**
9. What happens to the remaining G3P molecules within the Calvin Cycle?
   **Restructured/rearranged to form 3 molecules of RuBP**
10. How many turns of the Calvin Cycle are required to produce 1 molecule of glucose? A 36-C molecule?
    **2 turns to create glucose (2 x G3P needed), 12 turns (36/3 = 12, so 12 G3P molecules are needed)**
11. What are some possible fates of G3P when it exits the Calvin Cycle?
    **Glucose, starches, cellulose & other carbohydrates can be formed**
12. How many molecules of CO2, NADPH & ATP are required to make one molecule of glucose?
    **6 CO2, 18 ATP & 12 NADPH (2 turns of Calvin cycle)**
13. What is the ration of NADPH:ATP needed for Calvin Cycle? How does this explain the need for both cyclic & non-cyclic electron flow in the light reactions?
    **6 NADPH : 9 ATP (2:3)**
    **Since more ATP is needed, cyclic electron flow in light reactions can make ATP without producing NADPH to make up this difference. Non-cyclic produces a 1:1 ratio NADPH: ATP.**