

Glycolysis Overview

- Occurs in the cytoplasm
- Not-oxygen dependant
- Breaks down 1 glucose into 2 pyruvate
- Requires 10 steps, each with its own enzyme

Glycolysis Overview

Oxidation of glucose (6 carbons) to two pyruvate (3 carbons) is coupled to the **reduction** of ADP to ATP

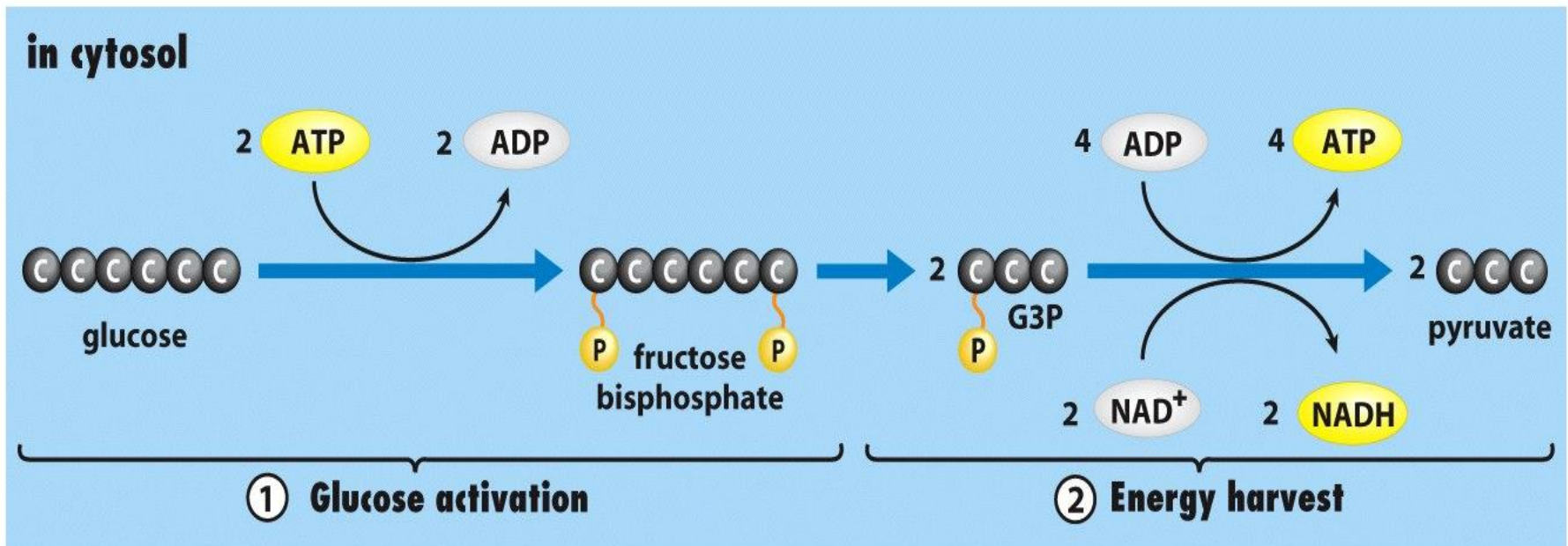


Glycolysis Overview

Major phases

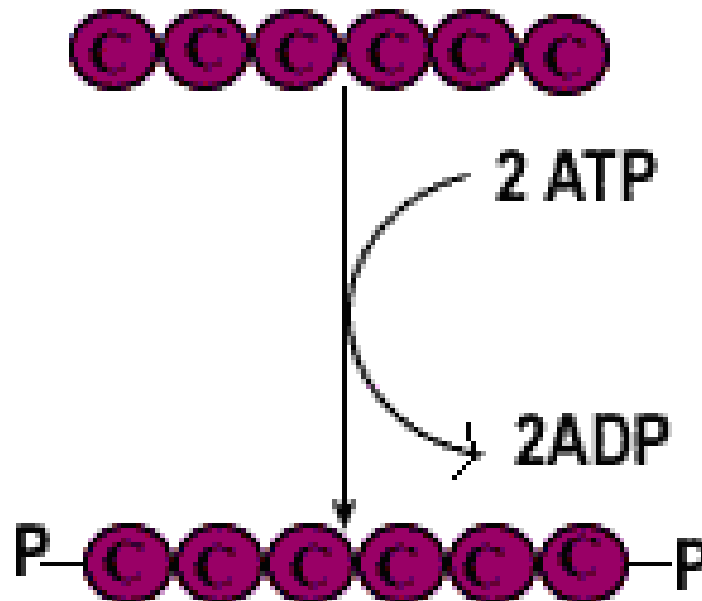
- Energy investment
- Lysis
- Energy harvesting

Animation



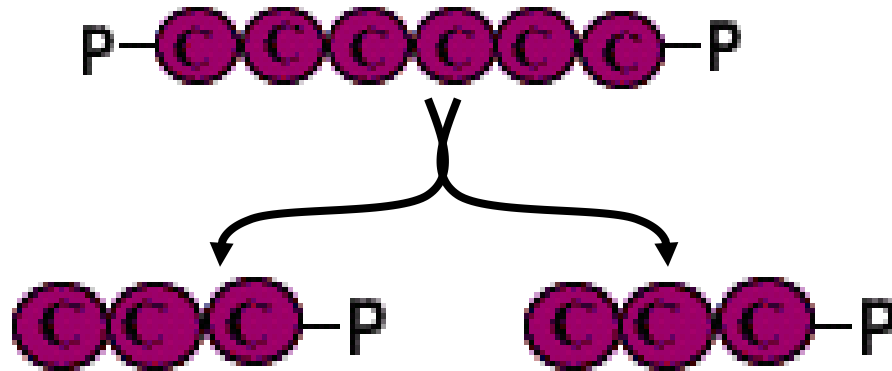
Energy Investment Phase

- ATP phosphorylates glucose twice
- Requires the INVESTMENT of two ATP molecules



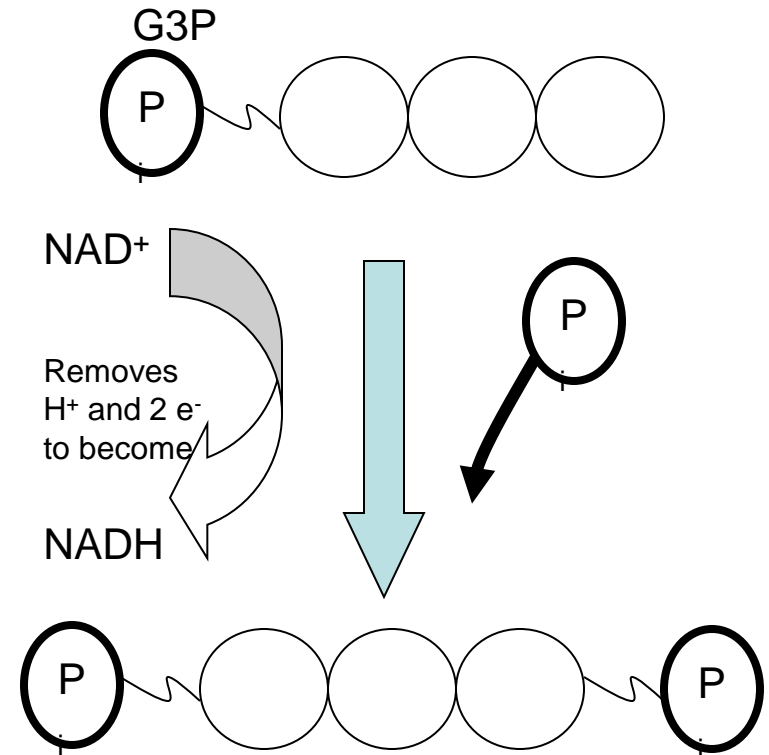
Lysis

- The phosphorylated glucose is broken into two molecules (called G3P)



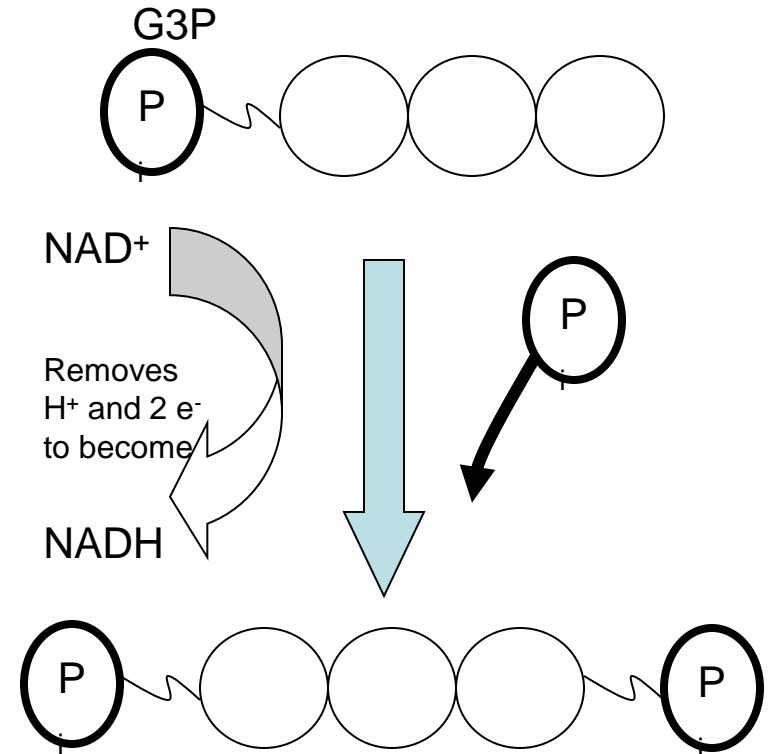
Energy harvesting phase

- each G3P has an inorganic phosphate group added (P_i).



Energy harvesting phase

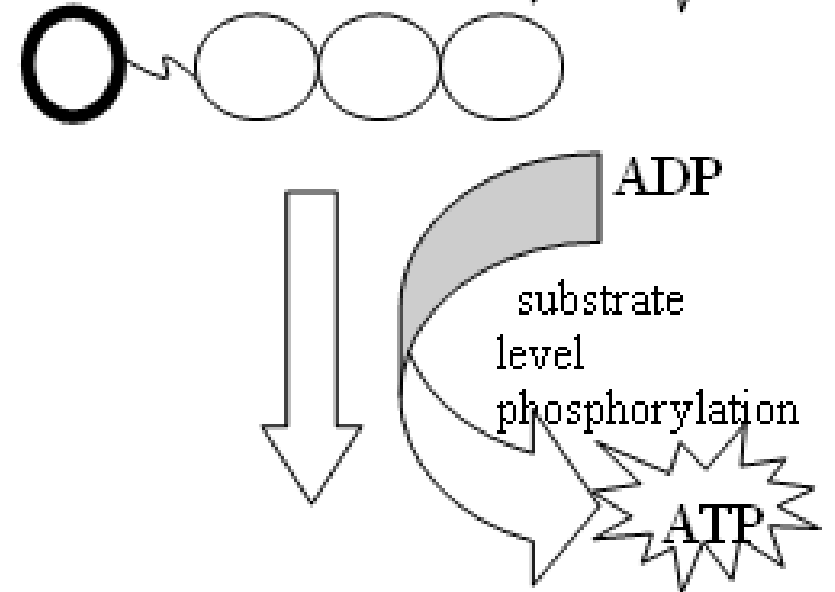
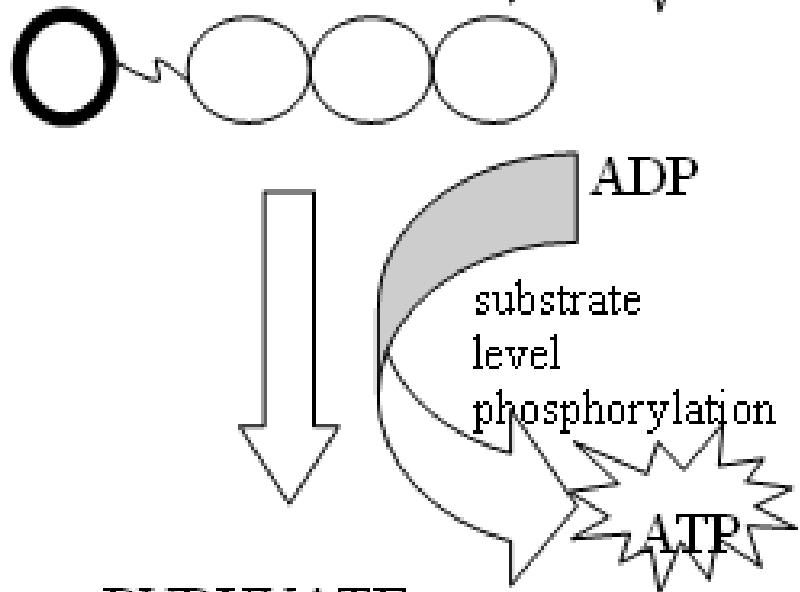
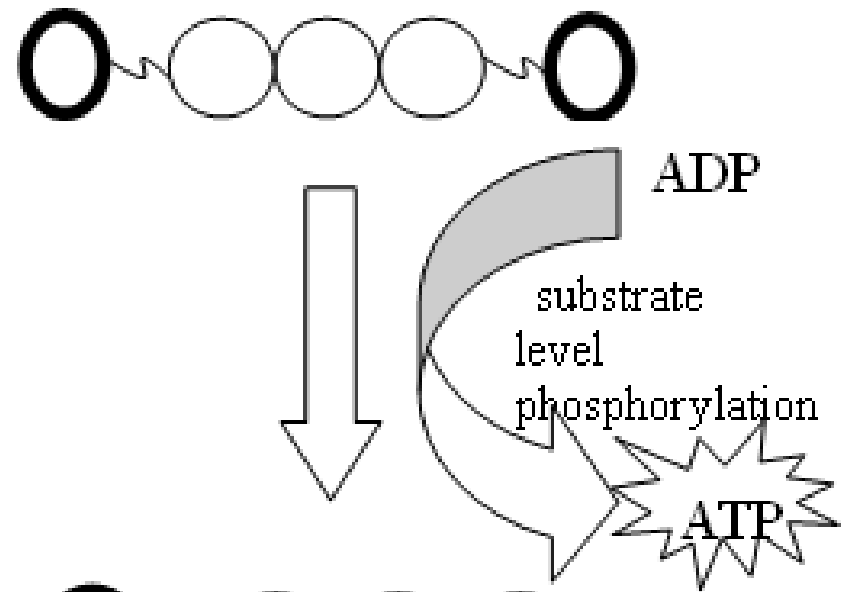
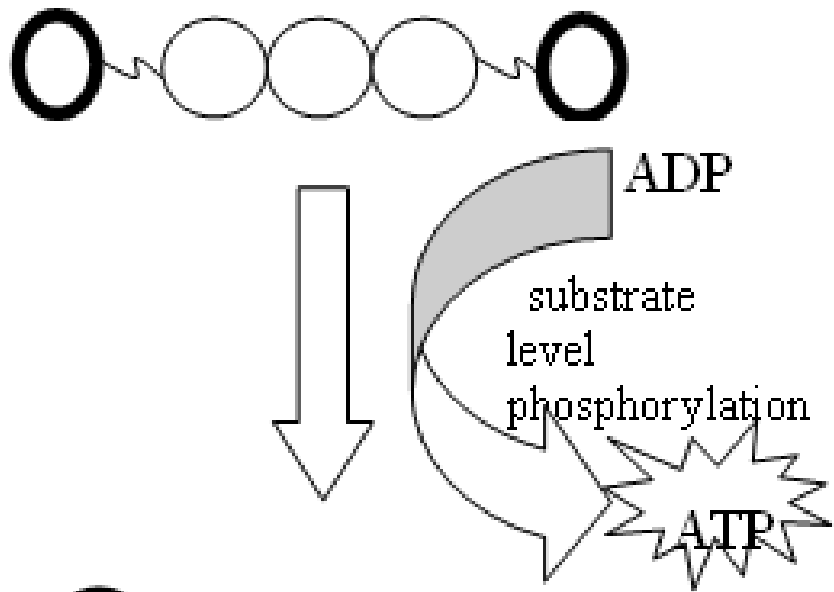
- each G3P has an inorganic phosphate group added (P_i).
- Simultaneously, NAD^+ gains H and $2e^-$ to become NADH



- How NAD+ works

Energy harvesting phase

- In a series of reactions, each molecule is converted into a pyruvate, generating two ATPs per conversion, for a total of four ATPs



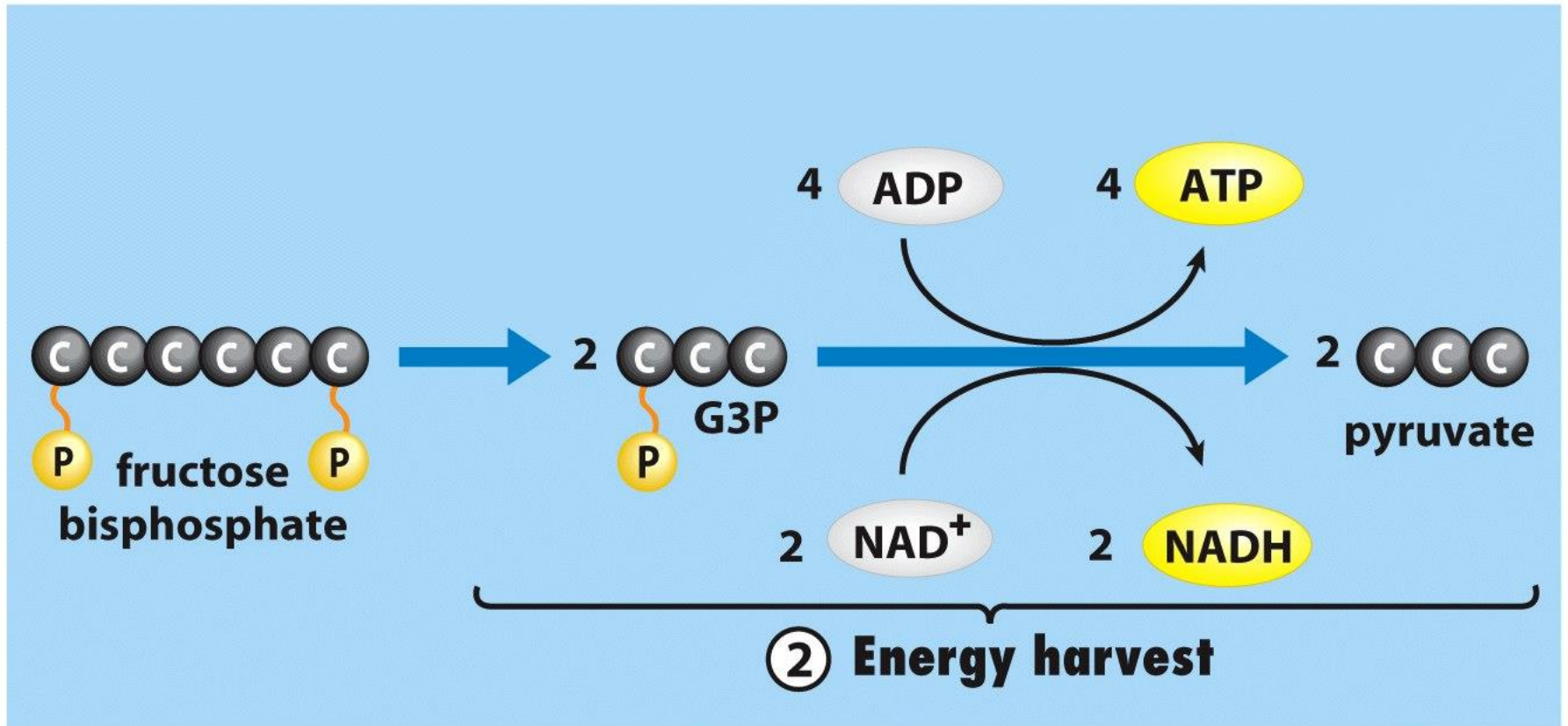
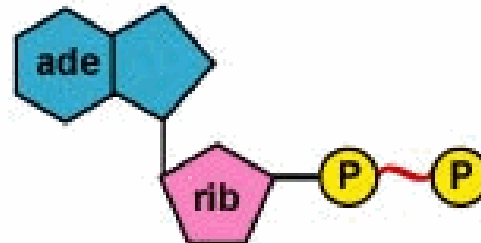


Figure 8-2 part 2 Biology: Life on Earth, 8/e
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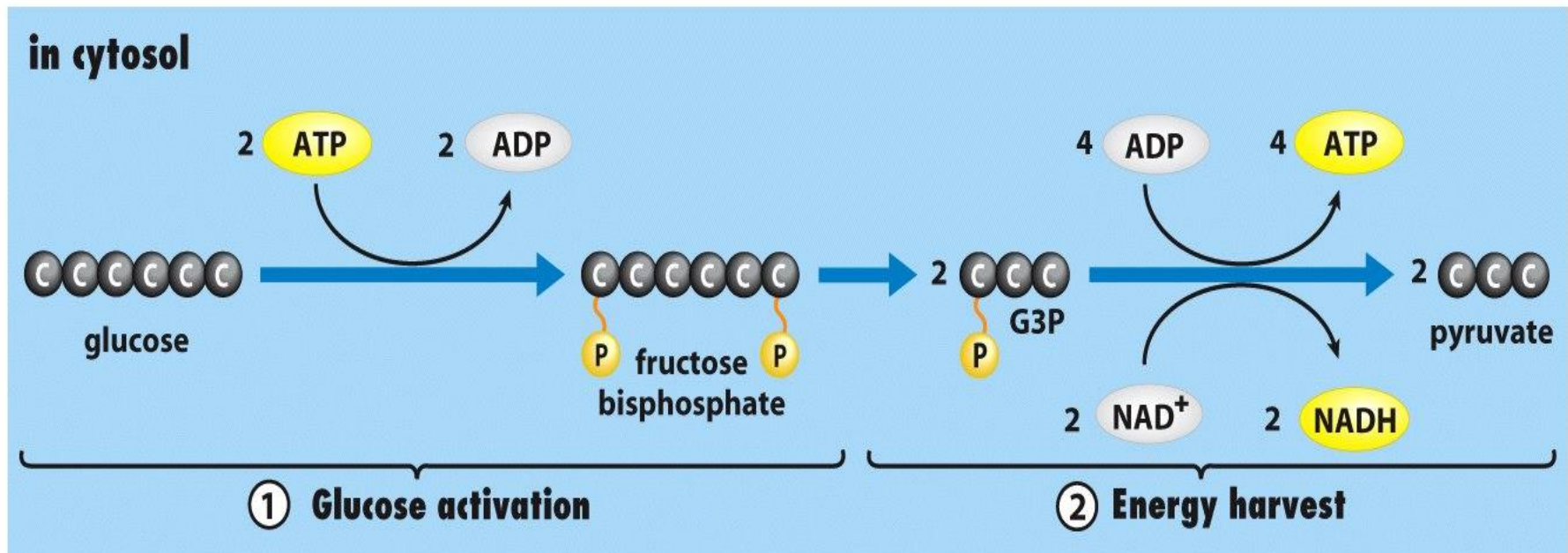
In glycolysis, ATP is formed via **Substrate Level Phosphorylation**

- Creation of ATP by the direct transfer and donation of a phosphate group to ADP



Summary of glycolysis:

- Each molecule of glucose is broken down to two molecules of pyruvate
- A net of two ATP molecules and two NADH (high-energy electron carriers) are formed



Animations

- [Smith](#)
- [McGraw Hill](#)

Assessment Statements

- 3.7.2:** State that, in cell respiration, glucose in the cytoplasm is broken down by glycolysis into pyruvate, with a small yield of ATP.
- 8.1.2:** Outline the process of glycolysis, including phosphorylation, lysis, oxidation and ATP formation.