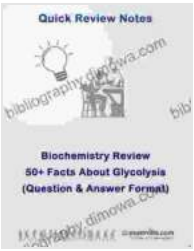
50 Fascinating Glycolysis Facts: A Detailed Biochemical Journey

Embark on an illuminating voyage into the realm of biochemistry as we unveil 50 captivating facts about glycolysis, a fundamental metabolic pathway that plays a pivotal role in converting glucose into pyruvate. This comprehensive guide is meticulously crafted to provide you with quick review notes, empowering you with a profound understanding of the processes involved in glycolysis, whether for academic excellence or professional growth.



50+ Facts About Glycolysis (Q&A Format) - Biochemistry Review (Quick Review Notes)

by Elizabeth Kerian

★★★★★ 5 out of 5

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An Overview of Glycolysis

- Glycolysis is the first stage of cellular respiration, occurring in the cytoplasm of cells.

- It involves the breakdown of one molecule of glucose into two molecules of pyruvate.
- The overall reaction of glycolysis can be summarized as follows: C6H12O6 + 2 NAD+ + 2 ADP + 2 Pi -> 2 C3H4O3 + 2 NADH + 2 H+ + 2 ATP + 2 H2O
- Glycolysis is an anaerobic process, meaning that it does not require oxygen.
- The products of glycolysis can be used to generate ATP through oxidative phosphorylation or fermentation.

The 10 Key Steps of Glycolysis

1. **Phosphorylation of glucose:** Glucose is phosphorylated by hexokinase to form glucose-6-phosphate.
2. **Isomerization of glucose-6-phosphate:** Glucose-6-phosphate is isomerized to fructose-6-phosphate.
3. **Phosphorylation of fructose-6-phosphate:** Fructose-6-phosphate is phosphorylated by phosphofructokinase-1 to form fructose-1,6-bisphosphate.
4. **Cleavage of fructose-1,6-bisphosphate:** Fructose-1,6-bisphosphate is cleaved by aldolase to form glyceraldehyde-3-phosphate and dihydroxyacetone phosphate.
5. **Isomerization of dihydroxyacetone phosphate:** Dihydroxyacetone phosphate is isomerized to glyceraldehyde-3-phosphate.
6. **Oxidation of glyceraldehyde-3-phosphate:** Glyceraldehyde-3-phosphate is oxidized by glyceraldehyde-3-phosphate dehydrogenase

to form 1,3-bisphosphoglycerate.

7. **Phosphorylation of 1,3-bisphosphoglycerate:** 1,3-Bisphosphoglycerate is phosphorylated by phosphoglycerate kinase to form 3-phosphoglycerate.
8. **Isomerization of 3-phosphoglycerate:** 3-Phosphoglycerate is isomerized to 2-phosphoglycerate.
9. **Dehydration of 2-phosphoglycerate:** 2-Phosphoglycerate is dehydrated by enolase to form phosphoenolpyruvate.
10. **Phosphorylation of phosphoenolpyruvate:** Phosphoenolpyruvate is phosphorylated by pyruvate kinase to form pyruvate.

The Net Yield of Glycolysis

- The net yield of glycolysis is 2 molecules of ATP, 2 molecules of NADH, and 2 molecules of pyruvate.
- The ATP generated by glycolysis is used to fuel cellular processes, such as muscle contraction and nerve impulse transmission.
- The NADH generated by glycolysis is used to generate ATP through oxidative phosphorylation.
- The pyruvate generated by glycolysis can be used to generate ATP through oxidative phosphorylation or fermentation.

The Regulation of Glycolysis

- Glycolysis is regulated by a number of factors, including the availability of glucose, the levels of ATP and NADH, and the activity of key enzymes.

- The availability of glucose is the most important factor regulating glycolysis.
- When glucose levels are high, glycolysis is stimulated.
- When glucose levels are low, glycolysis is inhibited.
- The levels of ATP and NADH also regulate glycolysis.
- When ATP levels are high, glycolysis is inhibited.
- When NADH levels are high, glycolysis is inhibited.
- The activity of key enzymes also regulates glycolysis.
- Hexokinase, phosphofructokinase-1, and pyruvate kinase are the three key enzymes that regulate glycolysis.
- These enzymes are allosterically regulated by a number of factors, including the availability of glucose, ATP, and NADH.

The Importance of Glycolysis

- Glycolysis is a fundamental metabolic pathway that is essential for life.
- It provides the cells with the energy they need to function.
- It also provides the cells with the building blocks they need to synthesize new molecules.
- Glycolysis is a complex and highly regulated

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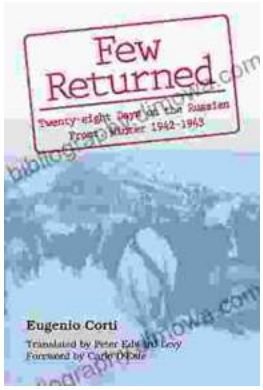

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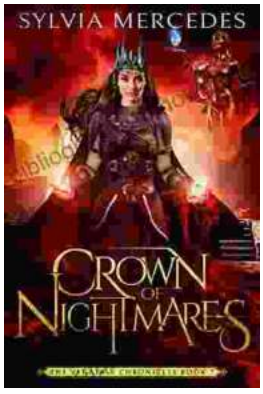

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