

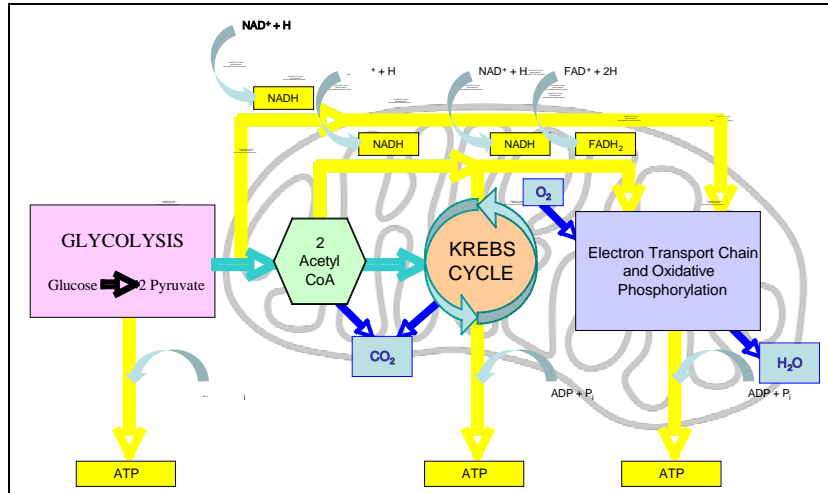
TIME Instructional Resources

DQC Group
Michigan State University

NSF - #0736947

TIME – Cellular Respiration

Glycolysis



Determine whether each of the following statements about glycolysis is true or false.

- A. O_2 is an input to glycolysis.
- B. CO_2 is an output of glycolysis.
- C. NAD^+ and ADP are inputs to glycolysis.
- D. Glucose is an input of glycolysis.
- E. During glycolysis, some of the carbon in glucose is converted into energy.
- F. During glycolysis, a 6-carbon sugar is converted to two 3-carbon sugars.

ANSWERS:

- A. False
- B. False
- C. True
- D. True
- E. False
- F. True

TIME – Cellular Respiration

Glycolysis – energy considerations

Determine whether each statement is true or false based on chemical potential energy and reduction/oxidation relationships of glycolysis.

Hint: The two general rules about respiration and energy are:

- 1) molecules with C-C and C-H bonds have more chemical potential energy than those with C-O bonds;
- 2) reduced forms of a molecule have more chemical potential energy than oxidized forms.

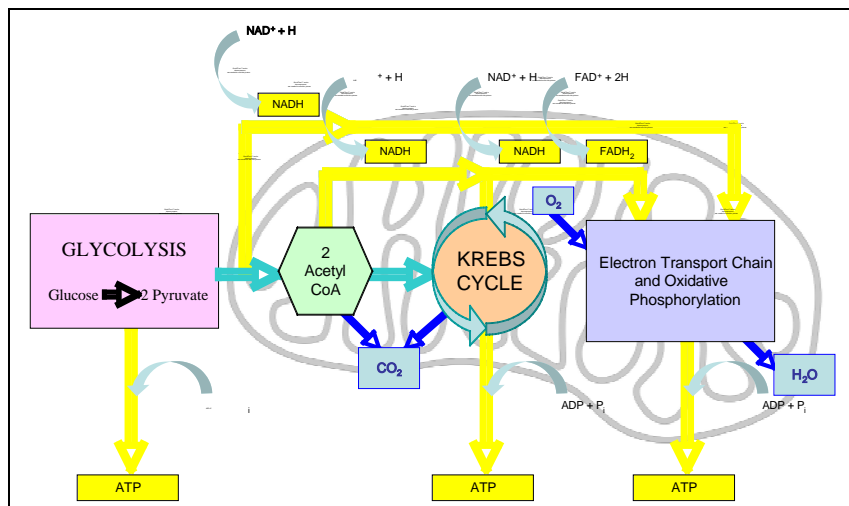
- A. The carbon in glucose is partially reduced during glycolysis
- B. The carbon in glucose is partially oxidized during glycolysis.
- C. The carbon in glucose is completely reduced during glycolysis.
- D. The carbon in glucose is completely oxidized during glycolysis.
- E. Glucose has more chemical potential energy than pyruvate.
- F. Pyruvate has more chemical potential energy than carbon dioxide.
- G. Glucose has less chemical potential energy than pyruvate.
- H. Pyruvate has less chemical potential energy than carbon dioxide.
- I. ADP has more chemical potential energy than ATP.
- J. Some of the chemical potential energy of glucose is transferred to ATP during glycolysis.
- K. Some of the potential energy of NAD^+ is transferred to ATP during glycolysis.
- L. Some of the chemical potential energy of glucose is transferred to NAD^+ during glycolysis.
- M. During glycolysis carbon in glucose is reduced while NAD^+ is oxidized.
- N. During glycolysis carbon in glucose is oxidized while NAD^+ is reduced.
- O. During glycolysis the carbon in glucose and NAD^+ are oxidized.
- P. During glycolysis the carbon in glucose and NAD^+ are reduced.

ANSWERS:

- | | |
|----------|----------|
| A. False | I. False |
| B. True | J. True |
| C. False | K. False |
| D. False | L. True |
| E. True | M. False |
| F. True | N. True |
| G. False | O. False |
| H. False | P. False |

TIME – Cellular Respiration

Reactions of glycolysis



Glycolysis consists of reactions, which can be summarized in a few statements. Match these reactions to the statements below.

- A. $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2 \text{C}_3\text{H}_3\text{O}_3 + 6 \text{H}^+$
- B. $2 \text{NAD}^+ + 4 \text{H}^+ \rightarrow 2 \text{NADH} + 2 \text{H}^+$
- C. $4 \text{ADP} + 4 \text{Pi} \rightarrow 4 \text{ATP} + 2 \text{H}_2\text{O}$
- D. $2 \text{ATP} + 2\text{H}_2\text{O} \rightarrow 2 \text{ADP} + 2 \text{Pi}$

1. The fate of carbon during glycolysis.
2. The use of hydrogen ion during glycolysis.
3. The source of hydrogen ions in glycolysis.
4. Reduction of energy management molecules.
5. Production of energy management molecules.
6. Hydrolysis of energy management molecules.

ANSWERS:

1. A
2. B
3. A
4. B
5. C
6. D