

Cellular Respiration Review

KEY

1. What are the 3 phases of the cellular respiration process?
Glycolysis, Krebs Cycle, Electron transport
2. Where in the cell does the glycolysis part of cellular respiration occur?
In the cytoplasm
3. Where in the cell does the Krebs (Citric Acid) cycle part of cellular respiration occur?
In the mitochondria
4. Where in the cell does the electron transport part of cellular respiration occur?
In the mitochondria
5. How many ATP (net) are made in the glycolysis part of cellular respiration?
2
6. How many ATP are made in the Krebs's cycle part of cellular respiration?
2
7. How many ATP are made in the electron transport part of cellular respiration?
32 to 34
8. In which phase of cellular respiration is carbon dioxide made?
The Krebs Cycle
9. In which phase of cellular respiration is water made?
The Electron Transport
10. In which phase of cellular respiration is oxygen a substrate?
The electron transport
11. In which phase of cellular respiration is glucose a substrate?
glycolysis
12. On average, how many ATP can be made from each NADH during the electron transport process?
3
13. On average, how many ATP can be made from each FADH₂ during the electron transport process?
2
14. What would happen to the cellular respiration process if the enzyme for one step of the process were missing or defective?
The process beyond that stage could not occur

15. What happens to the high-energy electrons (and hydrogen) held by NADH if there is no O₂ present?

If there is no oxygen present at the time, the electrons (and hydrogens) are received by pyruvic acid

16. Explain why this happens.

This happens because of the limited number of NAD⁺ molecules in a cell. The NAD⁺ molecules must be reused again and again in order to keep glycolysis moving. This means that they have to get rid of the electrons from NADH by giving them to some other molecule. Pyruvic acid receives it because it isn't able to continue to the Krebs Cycle when there is no oxygen present. This allows glycolysis to continue even without oxygen there.

17. What is the overall reaction for fermentation in yeast?

Glucose → 2 Ethyl alcohol + 2 CO₂ + 2 ATP + Heat

18. What is the overall reaction for lactic acid fermentation?

Glucose → 2 Lactic Acid + 2 ATP + Heat

19. Only a small part of the energy released from the glucose molecule during glycolysis is stored in ATP. How is the rest of the energy released? (HINT: It is a product in the overall reaction for cellular respiration.)

The energy is released as heat.

20. Write the complete overall chemical equation for cellular respiration using chemical symbols instead of words:

C₆H₁₂O₆ + 6 O₂ → 6 H₂O + 6 CO₂ + ATP + HEAT

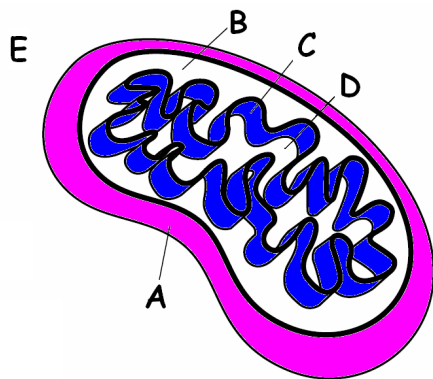
21. Compare this reaction to the one used for PHOTOSYNTHESIS:

(6 H₂O + 6 CO₂ + light energy → C₆H₁₂O₆ + 6 O₂) How are these equations related?

The products of photosynthesis are the reactants for cellular respiration and the inverse for the reactants in photosynthesis.

22. MATCH THE LETTER IN THE DIAGRAM WITH THE LABEL:

(You can use them MORE THAN ONCE or NOT AT ALL)



 E Place where glycolysis happens

 C Place where enzymes for the Electron Transport Chain are located

 B Place that fills with H⁺ ions as electrons move down the Electron transport chain

 C Place where ADP and P join to make ATP

 D Place where oxygen acts as the final electron acceptor to make water

CELLULAR RESPIRATION VOCABULARY REVIEW

1. **Citric acid** is a 6 carbon molecule that is produced first when acetyl-CoA joins with a 4 carbon molecule to enter the Krebs cycle.
2. **Glycolysis** is the process of splitting a glucose molecule into 2 pyruvic acid molecules.
3. The molecule used by cells to store and transfer energy is **ATP**
4. Glycolysis happens outside the mitochondria in the **cytoplasm** of the cell.
5. **Cellular respiration** happens when oxygen is present and includes glycolysis, Krebs cycle, and Electron transport.
6. This describes a process that requires oxygen = **aerobic**
7. This atmospheric gas is required for aerobic respiration = **oxygen**
8. This describes a process that does NOT require oxygen; it means “without air”
 - a. = **anaerobic**
9. Type of fermentation used by human muscles in low oxygen conditions and microorganisms to make yogurt, cheese, pickles, sauerkraut and kimchi. = **lactic acid**
10. The **Krebs** cycle breaks down pyruvic acid into carbon dioxide and produces NADH, FADH₂, and ATP.
11. The NADH and FADH₂ produced during the Krebs cycle pass their electrons down the **electron transport** chain to produce ATP.
12. The passage of H⁺ ions through **ATP synthase** causes it to spin and produce ATP.
13. This 3 carbon molecule is produced during glycolysis when glucose splits in half
 - a. = **pyruvic acid**
14. Cell organelle which acts as the cell’s power plant to burn glucose and store energy as ATP
 - a. = **mitochondria**
15. If oxygen is NOT present, glycolysis is followed by **fermentation**.
16. Type of fermentation used to make bread dough rise and produce beer and wine.
 - a. = **alcoholic**
17. This molecule has the formula C₆H₁₂O₆ and is split in half during glycolysis
= **glucose**
18. The carbon atoms in pyruvic acid end up as **CO₂** in the atmosphere following the Krebs cycle.
19. The folded inner membranes inside a mitochondrion are called **cristae**.
20. This molecule reacts with pyruvic acid to release CO₂, produce NADH, and acetyl-CoA.
 - a. = **Coenzyme A**
21. **Acetyl CoA** forms when Coenzyme A attaches to two carbons from pyruvic acid.
22. **Glycogen** is the storage form of glucose used by animal cells which can be broken down for energy when glucose is used up.
23. The area inside the cristae where the Krebs cycle happens is the **matrix**.