

RESPIRATION IN PLANTS

ONE MARKS QUESTIONS WITH ANSWERS

1. Define cellular respiration.

Oxidation of food materials releases cellular energy ATP is called cellular respiration

2. What is aerobic respiration?

Oxidation of food materials in presence of oxygen is called aerobic respiration.

3. What is anaerobic respiration?

Incomplete breakdown of respiratory substrate into alcohol or organic acid in the absence of oxygen is called anaerobic respiration.

4. What are respiratory substrates?

The organic substrate or food material yields cellular energy are called respiratory substrates.

5. Name the energy currency of cell.

ATP [Adenosine Tri Phosphate].

6. What is Glycolysis?

Conversion of glucose into two molecules of pyruvic acids is called glycolysis.

7. Which is the common step for both aerobic and anaerobic respiration?

Glycolysis.

8. Name the site of Glycolysis?

Cytoplasm of cell.

9. Give the equation of aerobic respiration.



10. Name the two carbon component forms during Krebs's Cycle.

Acetyl CoA.

11. Why Krebs's Cycle is called as citric acid cycle?

The first component forms during Krebs's cycle is citric acid, so it is called as citric acid cycle.

12. Which is the site of Krebs's Cycle?

Matrix of mitochondria.

13. Expand E.T.S.

Electron Transport System.

14. Which is the site of terminal oxidation?

Outer margin of cristae having Racker's particles.

15. What is terminal oxidation?

Oxidation of energy rich molecules like NADH₂ and FADH₂ into cellular energy ATP in presence of oxygen.

16. Name the final electron acceptor in terminal oxidation.

Oxygen.

17. What is oxidative phosphorylation?

Synthesis of ATP from ADP in presence of oxygen is called oxidative phosphorylation.

18. What is Fermentation?

Partial broken down of respiratory substrate glucose into alcohol or organic acid.

19. Why respiratory pathway considered as amphibolic pathway?

Respiratory pathway is both catabolic and anabolic, so it is called as amphibolic pathway.

20. Define respiratory quotient.

It is the ratio of volume of carbon dioxide releases to ratio of volume of oxygen consumed.

$$RQ = \frac{\text{Volume of CO}_2 \text{ releases}}{\text{Volume of O}_2 \text{ consumed}}$$

21. What is the RQ value of carbohydrate?

$$\frac{6\text{CO}_2}{6\text{O}_2} = 1.$$

22. One molecule of NADH₂ yields how many ATP?

One molecule of NADH₂ yields 3 ATP.

23. How many ATP releases from one molecule of FADH₂?

One molecule of FADH₂ yields 2 ATP.

24. Write the equation of alcoholic fermentation.



25. Name the most common respiratory substrate.

Carbohydrates.

26. What is Pasteur's effect?

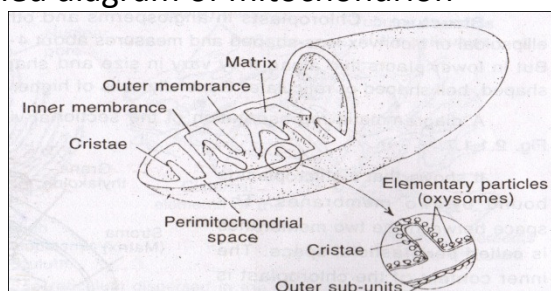
Shifting of anaerobic respiration into aerobic respiration is called Pasteur's effect.

27. Name the reducing agent involves in fermentation.

NADH₂.

TWO MARKS QUESTIONS

1. Name the products of glycolysis.
2NADH₂, 2ATP, 2 molecules of pyruvic acids.
2. Draw the labelled diagram of mitochondrion



3. Mention the products formed during Krebs's cycle.
NADH₂, FADH₂, GTP and CO₂.
4. Name the four carbon components formed during Krebs's cycle.
Succinic acid, fumaric acid, malic acid, oxaloacetic acid.
5. Write a note on Gateway of Krebs's cycle.
It is the initial step during Krebs's cycle. In which oxidative decarboxylation of pyruvic acid with CoA enzyme forms acetyl CoA and releases NADH₂.

FIVE MARKS QUESTIONS with answers

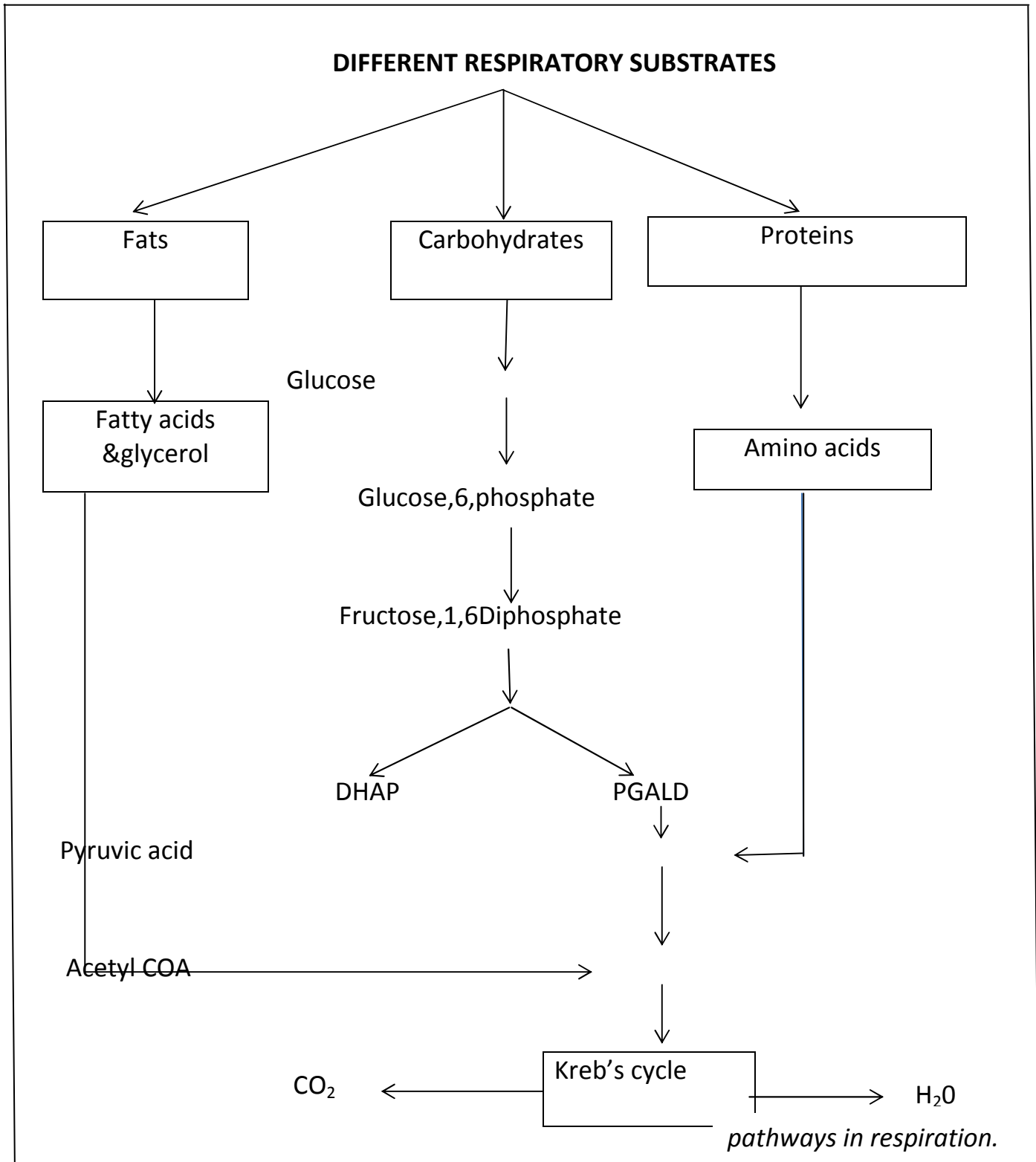
1. Mention any four differences between aerobic and anaerobic respiration.

Aerobic respiration	Anaerobic respiration
1. Takes place in presence of oxygen	1. Takes place in the absence of oxygen
2. Glucose completely broken into CO ₂ and H ₂ O	2. Glucose incompletely broken into alcohol or organic acid
3. Seen in majority of living organisms	3. Seen only in few micro organisms like yeast and bacteria
4. Krebs's cycle and ETS are takes place	4. Krebs's cycle and ETS are not takes place
5. One molecule of glucose yields 36 ATP	5. One molecule of glucose yields only 2 ATP

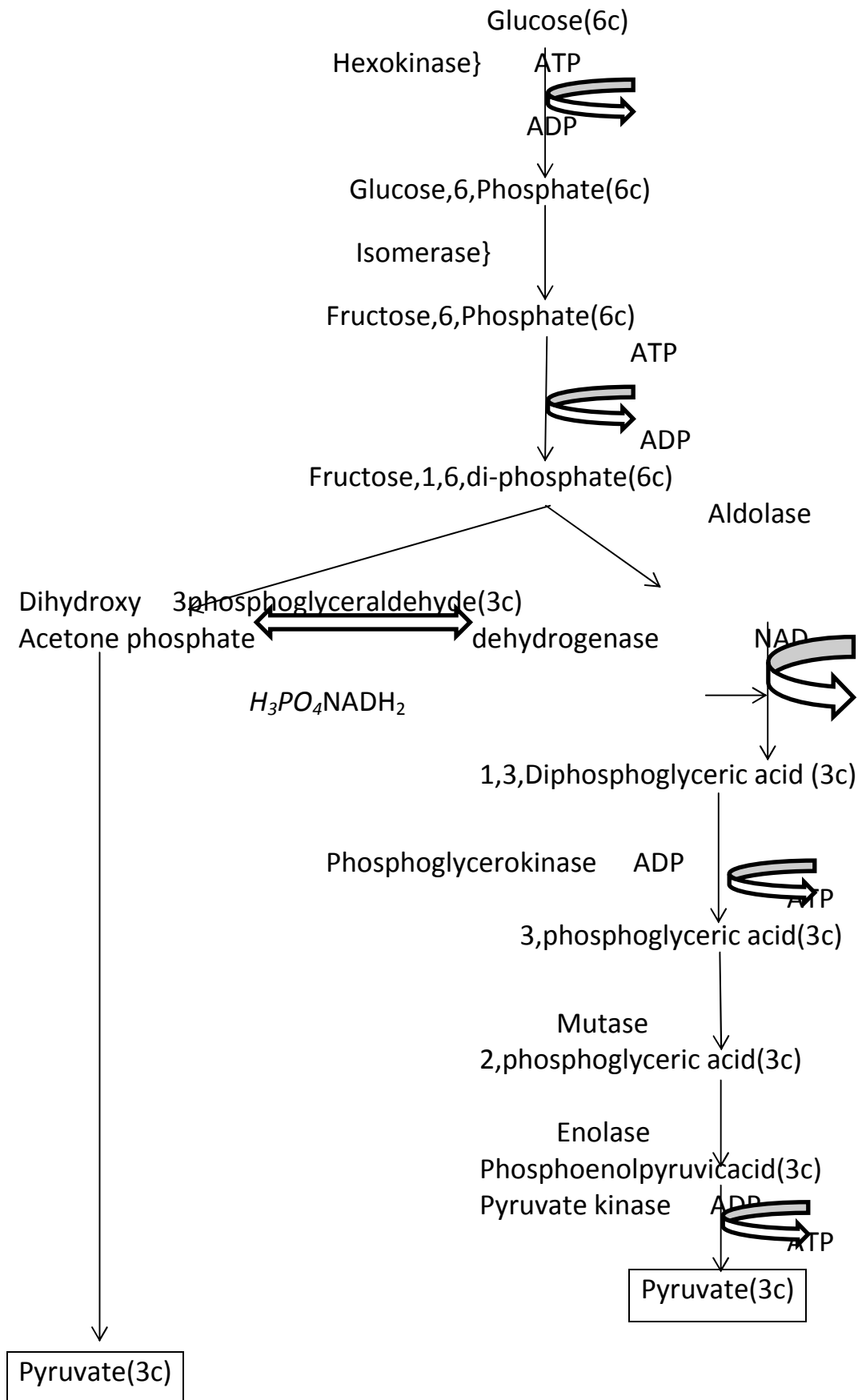
2. Discuss "The respiratory pathway is an amphibolic pathway".

Respiration is a catabolic process, during cellular oxidation. The entry of different respiratory substrates undergoes both catabolism and anabolism. So it forms an amphibolic pathway.

For eg., :- When fat is respiratory substrate it changes into fattyacid and glycerol,than fatty acid changes into acetyle COA for enters into respiratory path.Similarly proteins changes into amino acids than enters into respiratory path way.

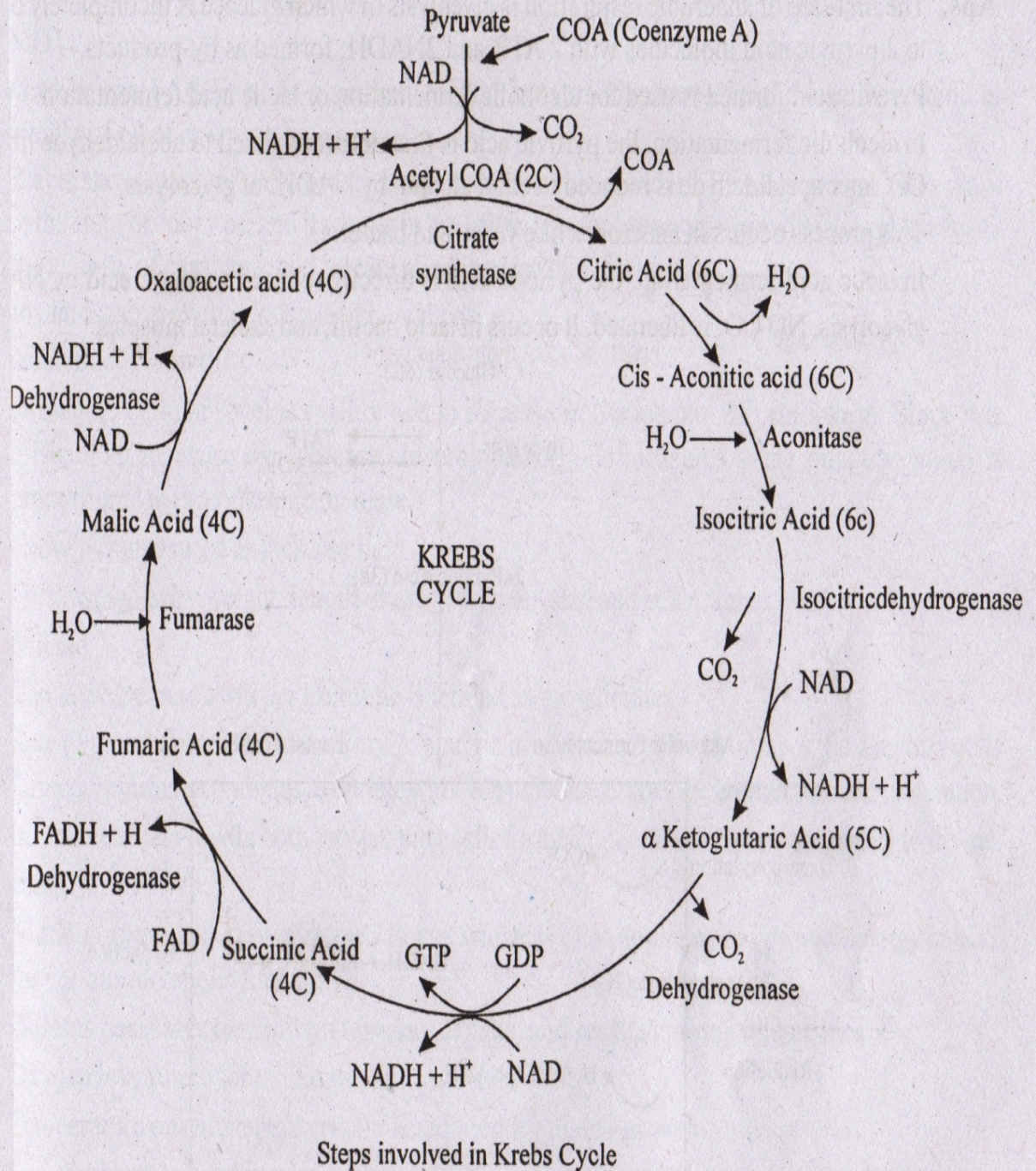


3. Give the schematic representation of glycolysis.



4 Give the schematic representation of Kreb's cycle with its preparatory reaction?

Ans.



5. Explain EMP pathway or glycolysis.

Glycolysis is conversion of Glucose into pyruvic acid in the absence of oxygen. It takes place in cytosol. The various steps of glycolysis are as follows,

- Respiratory substrates like glucose undergoes phosphorylation to form glucose-6-phosphate in the presence of enzyme glucokinase.

- b. Glucose,6, phosphate undergoes isomerisation form fructose.6phosphate by the help of enzyme Isomerase.
- c. Fructose,6, phosphate undergoes phosphorylation form fructose,1,6,diphosphate in presence of enzyme fructose kinase.
- d. Fructose,1,6,diphosphate is cleaved to form a molecule of 3-phosphoglyceraldehyde and a molecule of dihydroxy acetone phosphate by the enzyme aldolase, these are isomers.
- e. 3-phosphoglyceraldehyde is oxidised to 1,3,diphosphoglyceric acid with elimination of NADH₂ by the enzyme dehydrogenase.
- f. 1,3, diphosphoglyceric acid converted into 3,phosphoglyceric acid with formation of ATP.
- g. 3 phosphoglyceric acid changes into 2 phosphoglyceric acid by the help of enzyme mutase.
- h. 2phosphoglyceric acid converted into phosphoenol pyruvate by the elimination of H₂O in presence of an enzyme enolase.
- i. Phosphoenol pyruvate finally converted into pyruvic acid by the elimination of ATP in presence of enzyme pyruvate kinase. The product of glycolysis are 2 molecules of pyruvate,2ATP and 2 NADH₂.

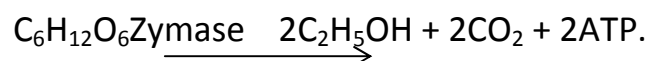
6. Explain the process of fermentation or anaerobic respiration.

Anaerobic breakdown of glucose into alcohol or organic acid with liberation of energy is called fermentation.

It includes 2 types.

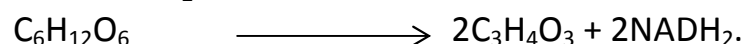
1. Alcoholic fermentation.
2. Lactic acid fermentation.

1. **Alcoholic fermentation** :It is the incomplete breakdown of respiratory substrate like glucose into ethyl alcohol and carbon dioxide in the absence of oxygen.It is seen in yeast.

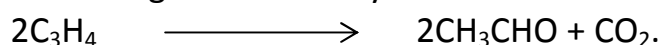


The stepwise reactions are represented as fallows.

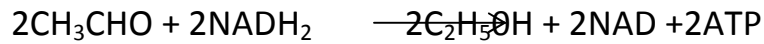
1. Glucose undergoes glycolysis forms 2 molecules of pyruvic acids with elimination of NADH₂.



2. pyruvic acid undergoes decarboxylation forms acetaldehyde.



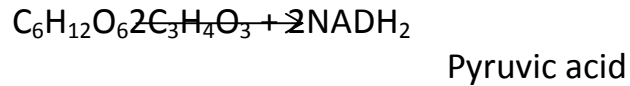
3. Acetaldehyde reduces into 2 molecules of alcohol with release of ATP.



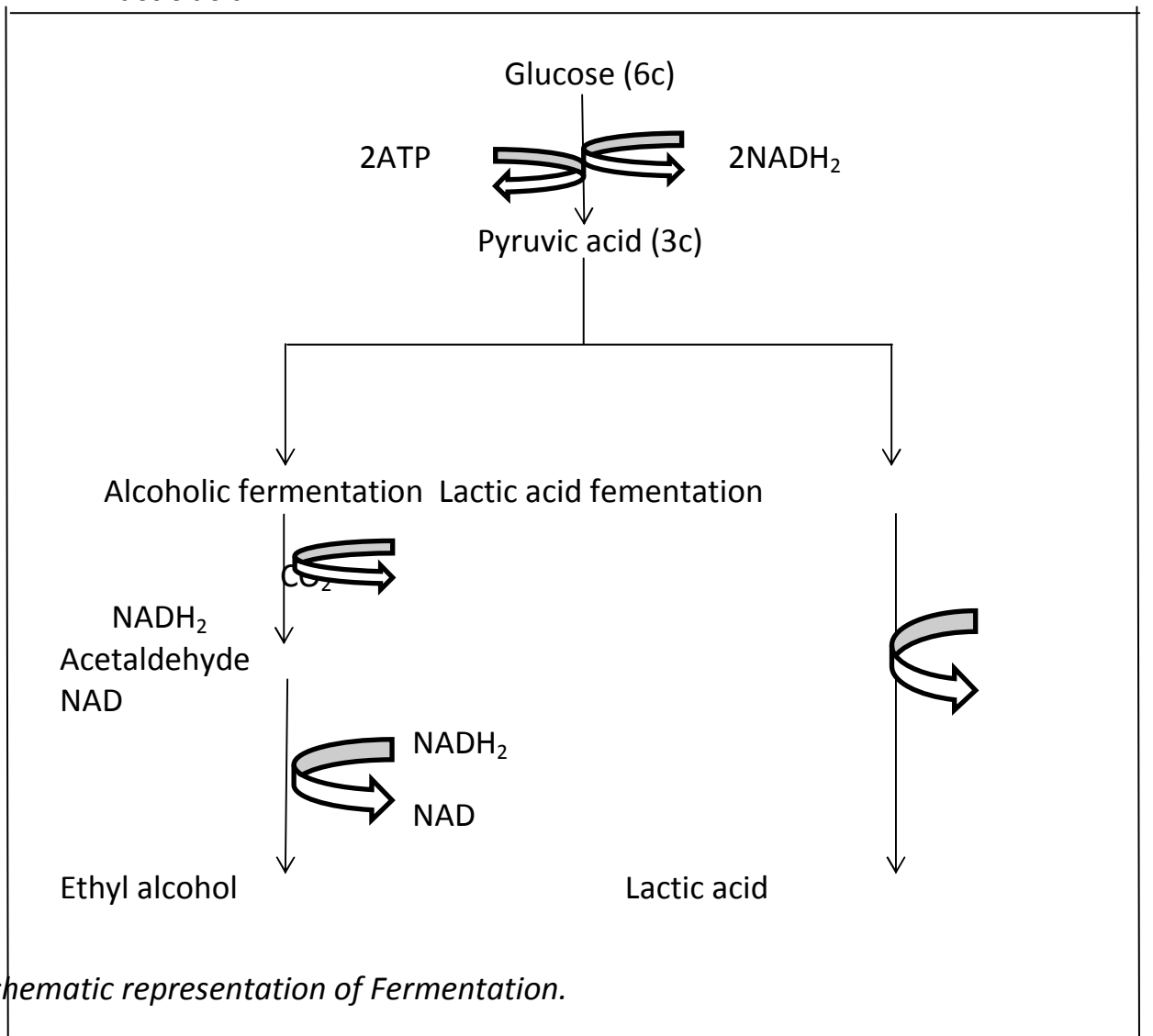
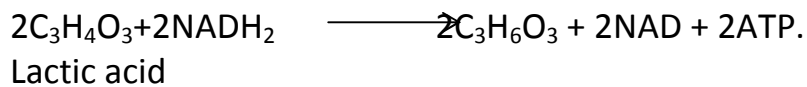
2. **Lactic acid fermentation**: It is anaerobic breakdown of glucose into lactic acid in the absence of oxygen. It is seen bacteria like lacto bacillus.

The stepwise reactions are represented as follows.

1. Glucose converted into pyruvic acid by glycolysis.



2. Pyruvic acid reduced into lactic acid by using NADH_2 .



7. TERMINAL OXIDATION [Oxidative phosphorylation]

Electron Transport System [ETS]

It is the process in which reduced co-enzyme [energy rich molecules] like NADH₂ and FADH₂ produced from glycolysis and Kreb's cycle undergoes oxidative phosphorylation by using oxygen to produce cellular energy ATP and releases water.

The process of terminal oxidation takes place on cristae having Racker's particles. In this region different electron acceptors from electron transport system [ETS] having 3 enzyme complexes.

1. FMN CO-Q complex
2. Cytochrome reductase complex like cyt b & c
3. Cytochrome oxidase complex like cytochrome a' and 'a₃'

During terminal oxidation electron (H⁺) releases from energy rich molecule NADH₂ and FADH₂ passes through the series of electron acceptor. Finally accepted by oxygen form a molecule of water. And synthesis of ATP takes place.

In terminal oxidation one molecule of NADH₂ produce 3ATP while one molecule of FADH₂ produce 2ATP.

