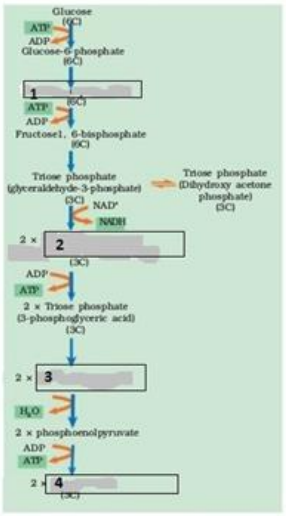
Respiration in Plants

Que.1. Observe the schematic representation of glycolysis given below. Complete the process by choosing compounds from the box given below. [Marks :(2)]



Pyruvic acid, 2-phosphoglycerate, 1,3 bisphosphoglyceric acid, Fructose 6-phosphate

Ans. 1) Fructose 6-phosphate, 2) 1,3 bisphosphoglyceric acid, 3) 2-phosphoglycerate, 4) Pyruvic acid.

Que.2. Plants can get along without respiratory organs. Give three reasons in support of this ststement. [Marks :(3)]

Ans. Each plant parts takes care of its own gas exchange needs.

Plants do not have great demands for gas exchange

The distance that gas must diffuse even in large ,bulky plants is not great.

Que.3. Following are some of the stages of Krebs' cycle. Identify the stage at which GTP is being generated [Marks :(1)]

1. Oxalo acetic acid →Citric acid.

2.Succinic acid →Malic acid.

3.Succinyl CoA →Succinic acid.

4.Citric acid → ά-keto glutaric acid.

Ans. 3.Succinyl CoA →Succinic acid

Que.4. Glycolysis is a pathway common to both aerobes and anaerobes [Marks :(2)]

a. Where does it take place ?

b.What is the end product of glycolysis?.

c. How many ATP molecules are directly synthesised in this pathway?

Ans. a. Cytoplasm

b. Pyruvic acid

c. 2 or 4

Que.5. Match the items of A with B **[Marks :(2)]**

A	**B**
1. End product of glycolysis	**a. ά -keto glutaric acid**
2.5 carbon compound	**b.ATP**
3.Mobile electron carrier in ETS	**c.Pyruvic acid**
4.Energy rich compound	**d. Malic acid**
	e. Cytochrome C

Ans. 1- c

2. a

3- e

4. b

Que.6. Fermentation and aerobic respiration are the processes for energy production in organisms. List out three differences between these two processes.

Ans.

Fermentation	Aerobic respiration
1.Partial breakdown of glucose	1. Complete breakdown of glucose
2. Net gain is 2 ATP molecules	2. Net gain is 36 molecules of ATP
3. NADH is oxidised to NAD + slowly during production of ethanol / lactic acid.	3. This oxidation is vigorous and is coupled with the phosphorylation of ADP.

Que.7. Respiratory pathway is better to consider as an amphibolic pathway than as a catabolic one. Justify with examples. **[Marks :(2)]**

Ans. The respiratory pathway is involved in both anabolism and Catabolism-

Catabolism-

1. Breakdown of respiratory substrate.

2.Amino acids after deamination enters to respiratory pathway. Anabolism -

1.Acetyl CoA formed during oxidation of pyruvic acid is used for the formation of fatty acids.

2.Respiratory intermediates like pyruvate, oxaloacetate , α-ketoglutarate etc. are precursors for amino acid synthesis.

(any two points to justify anabolism and catabolism).

Que.8. The respiratory quotient depends up on the type of respiratory substrate used during respiration. [Marks :(2)]

a. What is respiratory quotient?

b. Write the respiratory quotient of carbohydrate.

Ans. a. The ratio of the volume of CO2 evolved to the volume of O2 consumed during respiration is called respiratory quotient.

b. one .

Que.9. 6. Oxidative phosphorylation is a process of generating ATP. [Marks :(3)]

a. Name the cell organelle in which it is taking place.

b. Name the final hydrogen acceptor in this process.

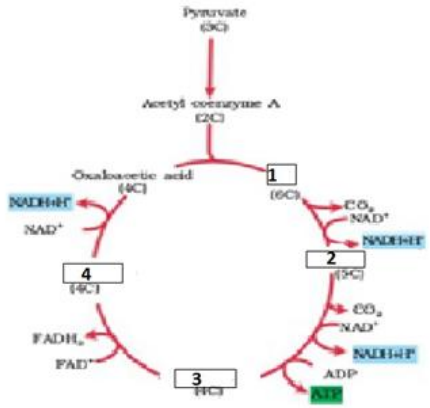
c. Why this process is called oxidative phosphorylation

Ans. a. Mitochondria.

b. Oxygen.

c. Here, ADP is phosphorylated to ATP by using the energy of oxidation -reduction reactions that creates the proton gradient

Que.10. Observe the schematic representation of a process taking place during respiration. [Marks :(3)]



a. Identify the process.

b. Name the scientist who elucidated it.

c. Fill in the box 1,2,3 and 4 with appropriate terms

Ans. a. Krebs' cycle/ TCA cycle/ Citric acid cycle

b. Hans Krebs

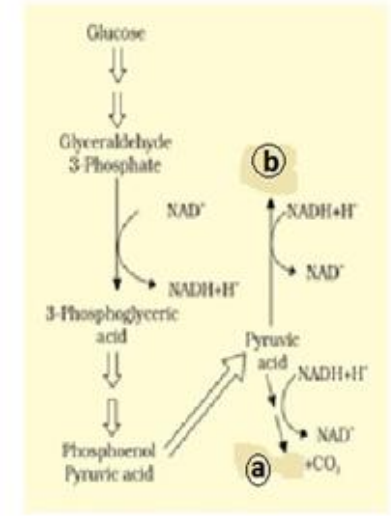
c. 1. Citric acid

2. ά-Keto glutaric acid

3. Succinic acid

4. Malic acid

Que.11. Following pathway shows anaerobic respiration in yeast .Identify the products (a) and (b) .Name the enzymes involved in it. [Marks :(2)]



Ans. (a) ethanol .

(b) lactic acid.

Enzymes:(a) Alcohol dehydrogenase and (b) Pyruvic acid decarboxylase.

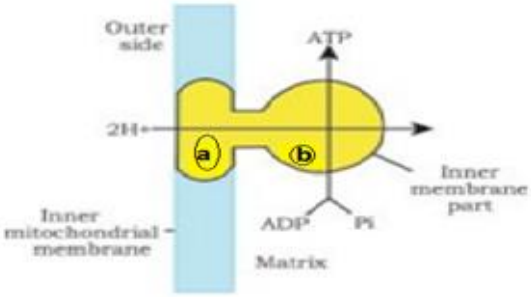
Que.12. Find out the odd one and state the feature of others.(Hint- No. of carbon atoms)

Malic acid, ά-Keto glutaric acid , Succinic acid , Oxalo acetic acid [Marks :(2)]

Ans. ά-Keto glutaric acid

others are compounds with 4 carbons

Que.13. Analyse the following diagram of ATP synthesis in mitochondria. [Marks :(3)]



Identify the parts (a) and (b) of ATP synthase and write their function

Ans. a) F0

b) F1

F0- It is an integral membrane protein complex that forms the channel though which protons cross the inner membrane.

F1 - It is a head piece and is a peripheral membrane protein complex and is the site of ATP synthesis.

Que.14. Define Glycolysis. Name the site of glycolysis [Marks :(2)]

Ans. The partial oxidation of glucose to form two molecules of pyruvic acid during cellular respiration is called glycolysis.

Cytoplasm of the cell

Que.15. Fill in the blanks. [Marks :(1)]

The compounds that are oxidized during respiration are known as……

Ans. Respiratory substrates.

Que.16. Name the scientist who first elucidated tricarboxylic acid cycle [Marks :(1)]

(Melvin Calvin,Hans Krebs, J Parnas, Otto Meyerhof)

Ans. Hans Krebs

Que.17. What happens to pyruvic acid in animal cells when oxygen is inadequate ? Name the enzyme responsible for the process. [Marks :(2)]

Ans. Pyruvic acid is reduced to lactic acid

Lactate dehydrogenase

Que.18. Name the reducing agent which is reoxidised in fermentation process.

[Marks :(1)]

Ans. NADH + H+

Que.19. There are several reasons why plants can get along without respiratory organs. Write any two reasons to justify the statement.

[Marks :(2)]

Ans. Each plant part take care of its own gas exchange needs.

Plants do not present great demands for gas exchange.

The distance that gases must diffuse even in large bulky plants is not great (any two).

Que.20. There are three major ways by which different cells handle pyruvic acid produced by glycolysis.

a) Write the three ways by which cells handle pyruvic acid.

b) Identify the pathway in which complete oxidation of pyruvic acid occurs.

[Marks :(2)]

Ans. a) Lactic acid fermentaion, Alcoholic fermentation and aerobic respiration

b) Aerobic respiration

Que.21. Choose the correct answer

[Marks :(2)]

The enzyme involved in oxidative decarboxylation is

Pyruvate dehydrogenase

Alcohol dehydrogenase

Lactate dehydrogenas

Hexokinase

Ans. a.Pyruvate dehydrogenase

Que.22. ATP synthase consists of two major components F1 and F0 . Explain the role of F1 and F0 subunits of ATP synthase in oxidative phosphorylation.

[Marks :(2)]

Ans. The F_1 contains the site for synthesis of ATP from ADP and inorganic phosphate.

F_0 is an integral membrane protein complex that forms the channel through which protons cross across the inner membrane of mitochondria.

Que.23. Though the role of oxygen is limited to the terminal stage of aerobic respiration, the presence of oxygen is vital. Why?

[Marks :(2)]

Ans. Oxygen drives the whole electron transport system of respiratory process by removing hydrogen from the system. Oxygen acts as the final hydrogen acceptor.

Que.24. The metabolic pathway through which the electron passes from one carrier to another is called the electron transport system.

a) Where is electron transport system of respiratory process situated ?

b) Explain the role of Cytochrome c in electron transport system .

[Marks :(3)]

Ans. a) Inner mitochondrial membrane.

b) Cytochrome c is a small protein attached to the outer surface of the inner membrane and acts as a mobile carrier for transfer of electrons betwen complex III and IV.

Que.25. Phosphorylation of ADP occurs by oxidative phosphorylation during cellular respiration. Explain the reason why it is known as oxidative phosphorylation.

[Marks :(2)]

Ans. Energy of oxidation-reduction is utilised for the production of proton gradient required for phosphorylation during respiration. Hence it is called oxidative phosphorylation.

Que.26. Notice the compounds given below

Malic acid, Pyruvic acid, Oxaloacetic acid, Citric acid

Choose the first stable compound formed during Kreb's cycle

Write the number of carbons in it.

[Marks :(2)]

Ans. a.Citric acid

b.Six carbons

Que.27. Respiratory Quotient for two respiratory substrates are 0.7 and 0.9 respectively. Identify the two respiratory substrates.

[Marks :(1)]

Ans. Fatty acid and Proteins.

Que.28. Name the enzyme which catalyses the following reaction

Pyruvic acid +CoA +NAD+→ Acetyl CoA+ CO_2 + NADH + H+

[Marks :(1)]

Ans. Pyruvate dehrdogenase

Que.29. How many ATP molecules are produced during the oxidation of one molecule of

a, NADH

b, $FADH_2$

[Marks :(1)]

Ans. a, 3 molecules of ATP

b, 2 molecules of ATP

Que.30. Choose the correctly matched pair.

GTP = 2 molecules of ATP

FADH2 = 1molecule of ATP

NADH =3 molecules of ATP

[Marks :(1)]

Ans. c, NADH =3 molecules of ATP