

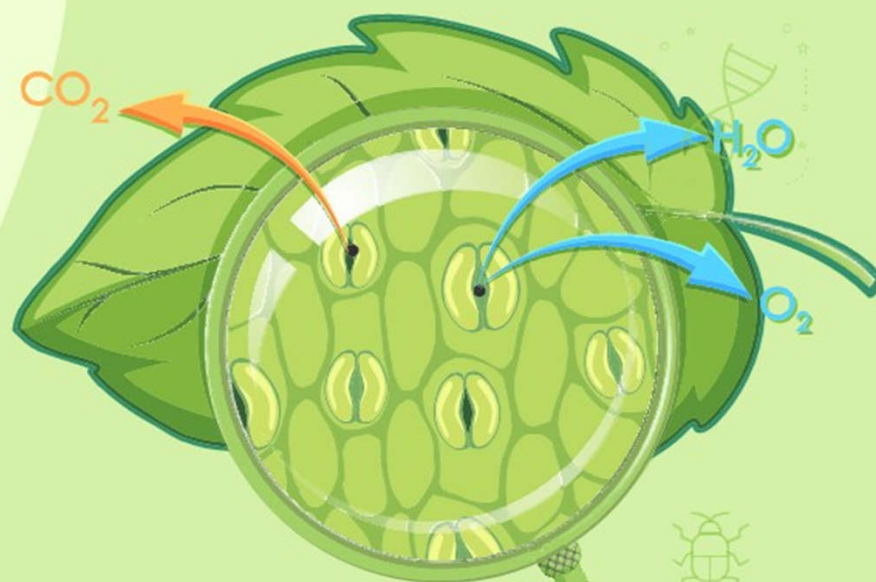


Class 9 Academic Program-2020

BIOLOGY

Lecture : B-09

Chapter 4 : Bioenergetics



উদ্ভাস

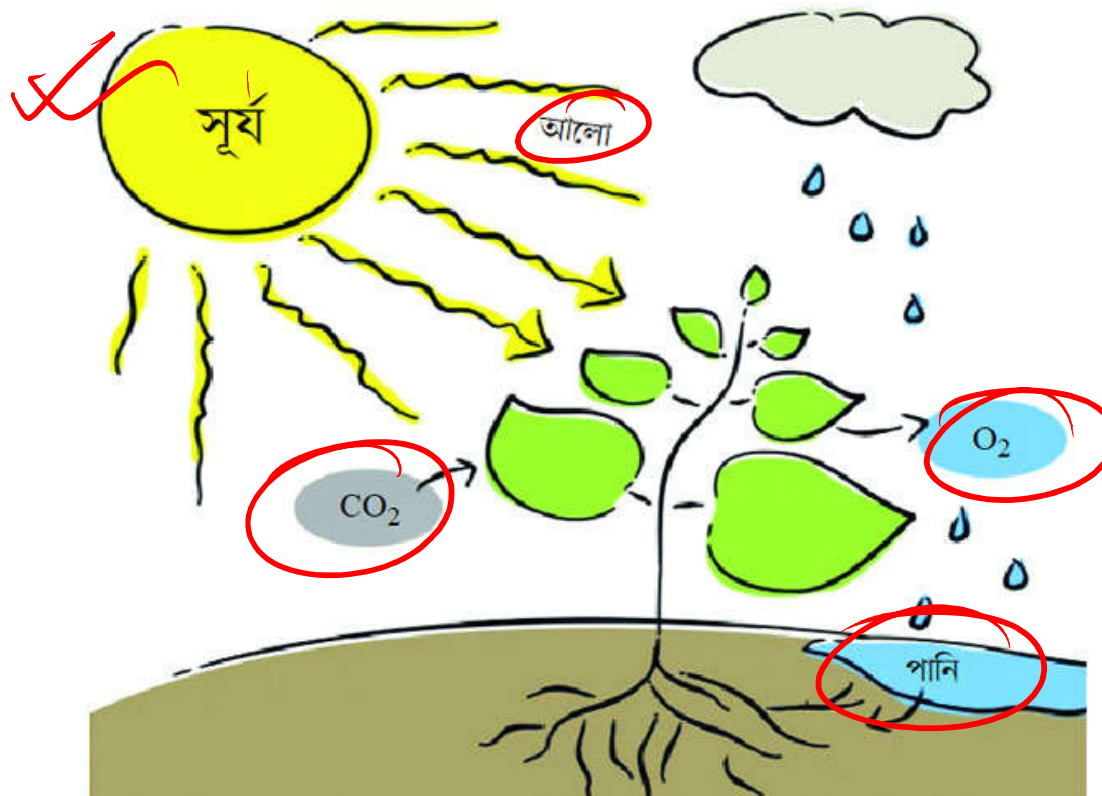
একাডেমিক এন্ড এডমিশন কোয়ার

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$C_6H_{12}O_6$

Factors effecting photosynthesis



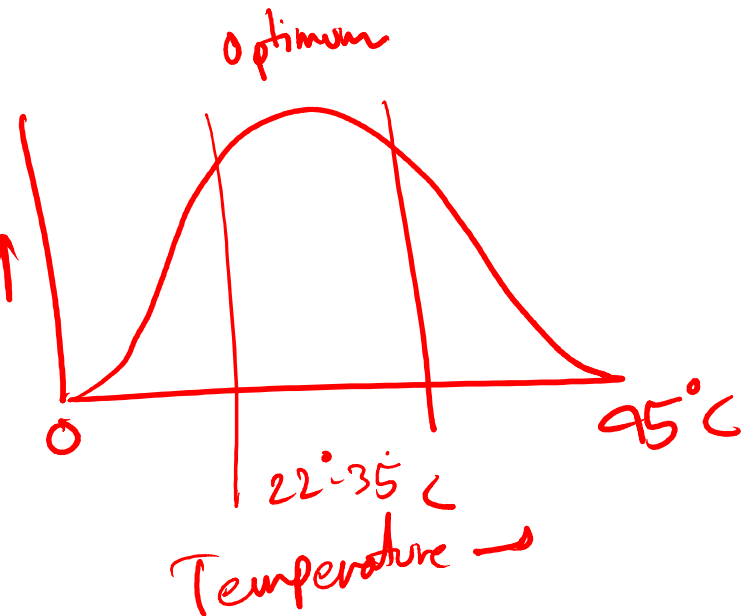
External factors

1. Light: 400-700 nm, 680 nm
2. Carbon dioxide: ↑
3. Temperature: 22°-35°C
4. Water: ↑
5. Oxygen: ↓
6. Minerals and Chemicals:

Chloroform,

K₂S, /
Methane

Photosynthesis ↑



Internal factors

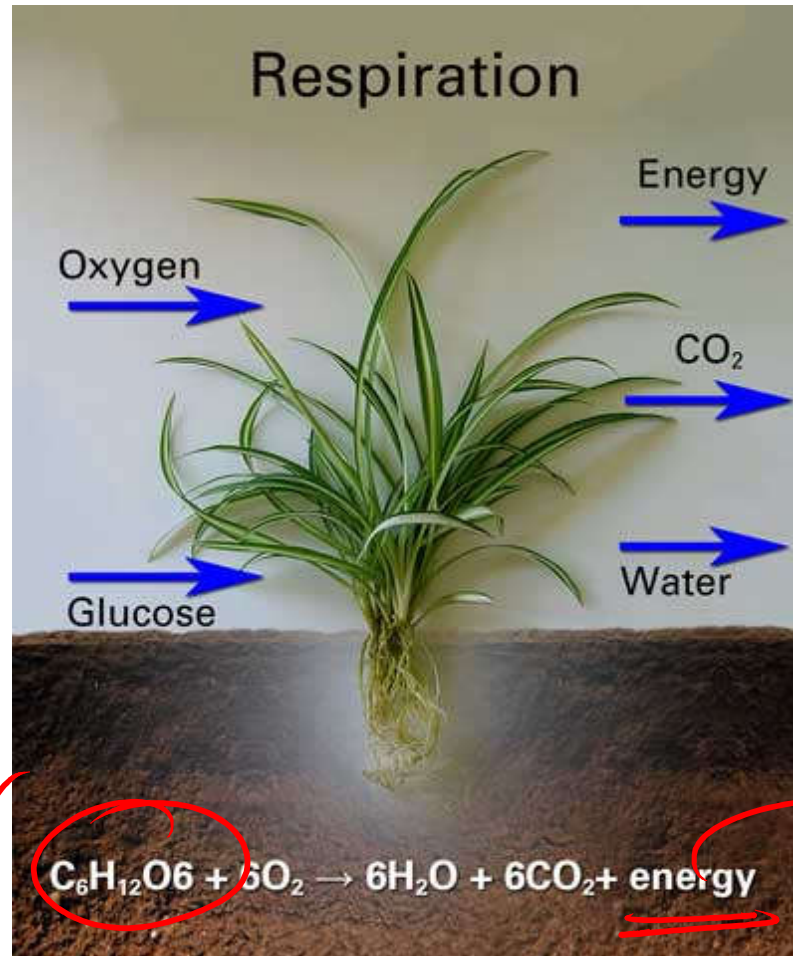
1. Chlorophyll: ✓
2. Age and section of the leaves: → Middle Age
3. Amount of Carbs: ↓
4. Potassium: ↑
- ✓ 5. Enzyme: ↑

Importance of Photosynthesis

- ✓ 1. Foods for all plants and animals in the world
- ✓ 2. Oxygen in the air retains 20.95% and carbon dioxide by 0.033%.
- ✓ 3. Keeps the atmosphere normal
- ✓ 4. Food, clothing, industrial goods, medicine, fuel etc. come from trees.
- ✓ 5. Oxygen has made our world habitable.

Respiration

Resp
Food
↓
Energy



$C_6H_{12}O_6$
↓
Energy

38 ATP

Respiratory Elements

- ☒ Carbohydrates, protein, fat etc.
- ☐ Interestingly, the process runs 24 hours. Both for plants and animals
- ☐ So the plants are also started to take oxygen to make the night's work. So that it can use all the glucose made all day by it.

i. C
ii. P
iii. F

A. i
B. i, ii
C. i, ii, iii
D. i, ii, iii, iv

Types of respiration

We can take oxygen from surrounding plants, so we can get energy in a normal way with the respiration.

However, we have a number of bacteria and fungi around us that can't survive with oxygen.

So they have a process that doesn't need oxygen.

→ Yeast

So, there are 2 types of respiration

1. Aerobic

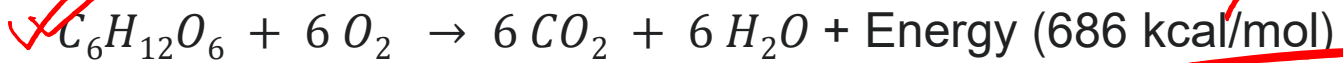
2. Anaerobic

+ with O_2

without O_2

Aerobic Respiration

- ✓ A molecule of glucose is oxidized into the process.
- ✓ 6 molecule of carbon dioxide, 6 molecule of water and 38 molecule of ATP is produced in the process.



First Things First

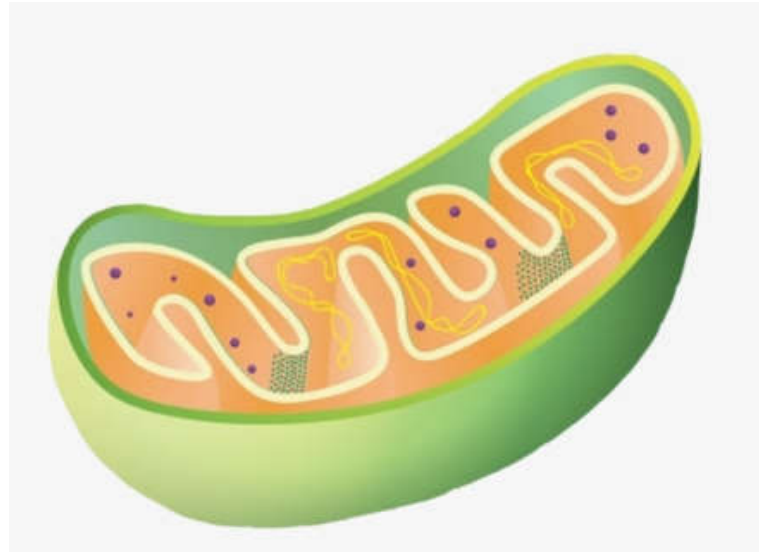
1 molecule $NADH_2$ = 3 molecule ATP

1 molecule $FADH_2$ = 2 molecule ATP

1 molecule GTP = 1 molecule ATP

Steps of Aerobic Respiration

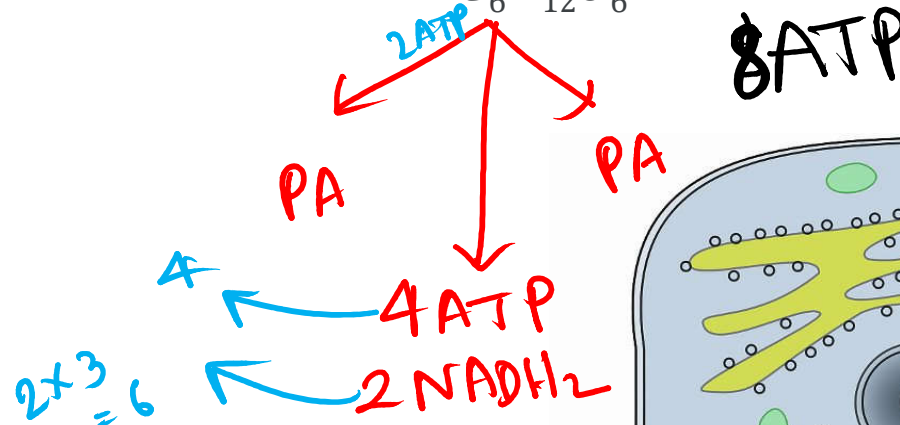
- Cytoplasm*
1. Glycolysis
 2. Formation of Acetyl CoA
 3. Krebs Cycle
 4. Electron Transport System
- Mitochondria*



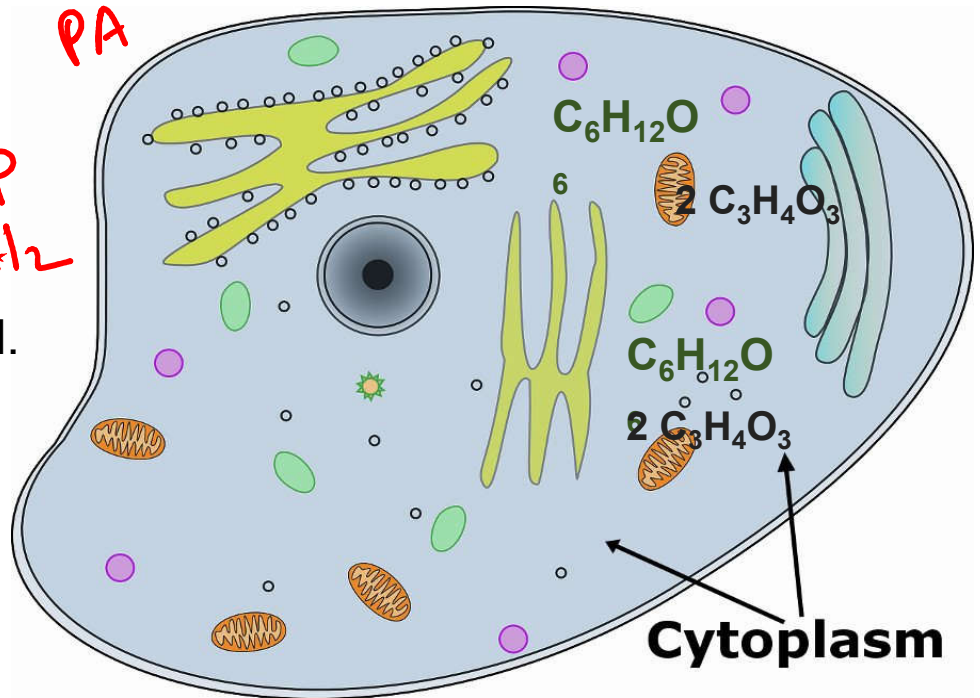
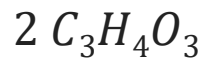
Glycolysis

One atom glucose will be broken here. $C_6H_{12}O_6$

$$\begin{array}{r} -2 \text{ ATP} \\ + 10 \text{ ATP} \\ \hline 8 \text{ ATP} \end{array}$$

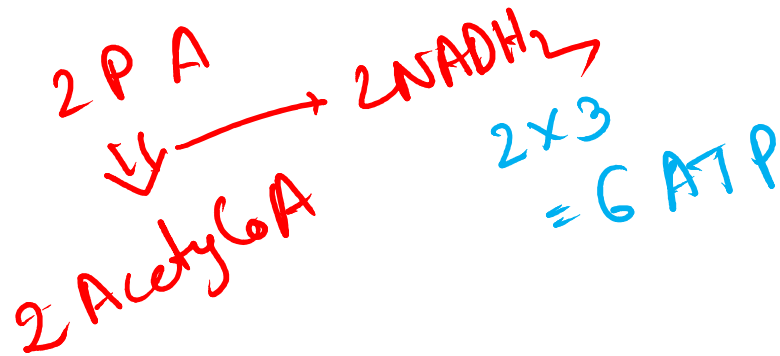


Finally, two atoms of pyruvic acid are found.

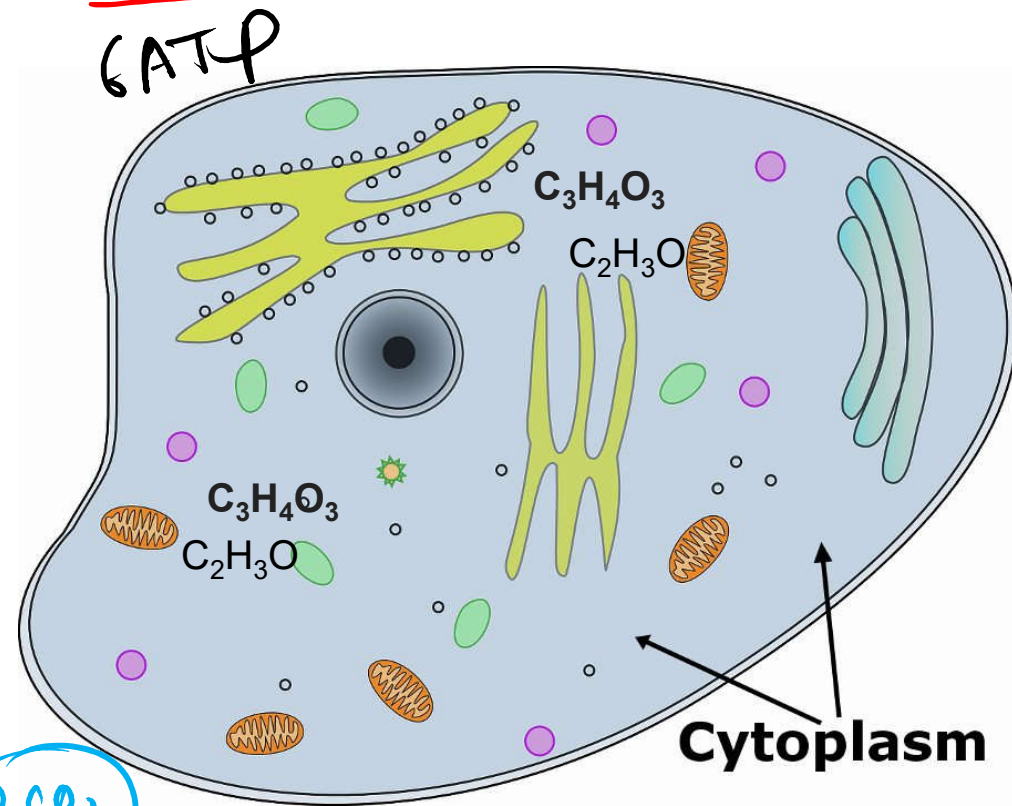
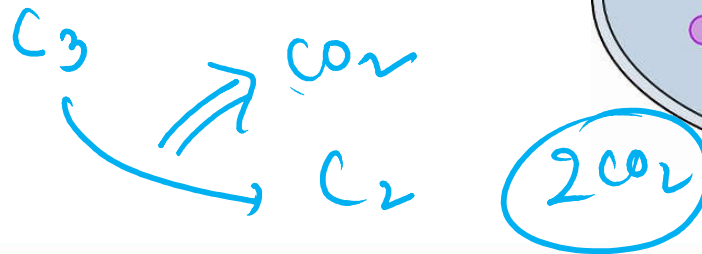


Formation of Acetyl CoA

Each Pyruvic Acid Reacts and produces acetyl CoA $C_3H_4O_3$



Finally available in two Acetyl CoA C_2H_3O

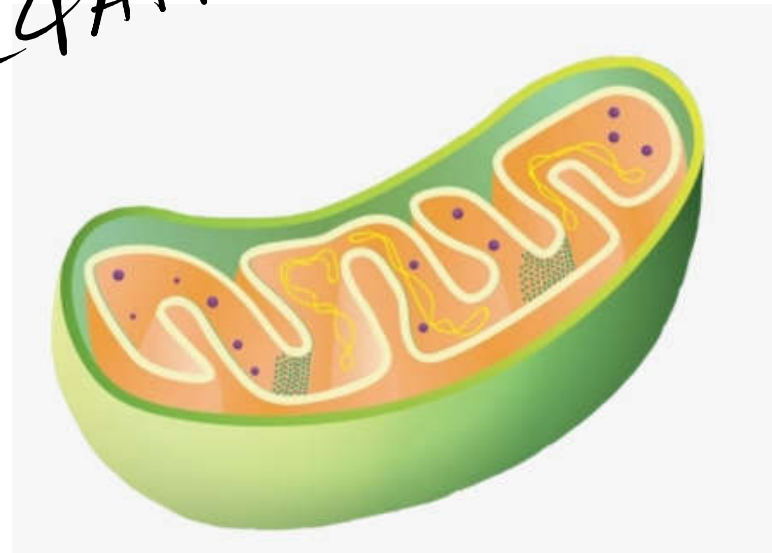


Crabs Cycle

The most powerful step is in mitochondria.

From each acetyl CoA (C_2H_3O) -
Two molecule of carbon dioxide ($2CO_2$),
3 molecule of $NADH_2$ → 3×3
1 molecule of $FADH_2$ → 1×2
1 molecule of GTP will be produced → 1×1

~~24 ATP~~



~~12 ATP~~

~~X 2~~

~~24 ATP~~

Crabs Cycle

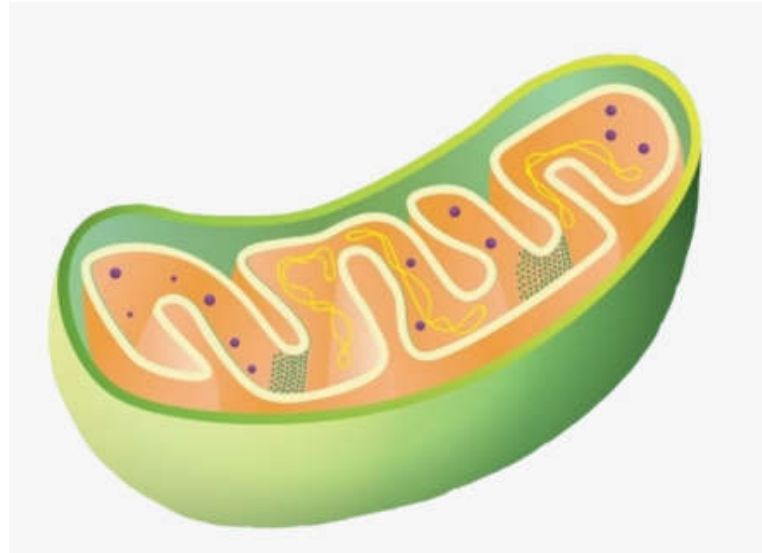
What we got at this stage

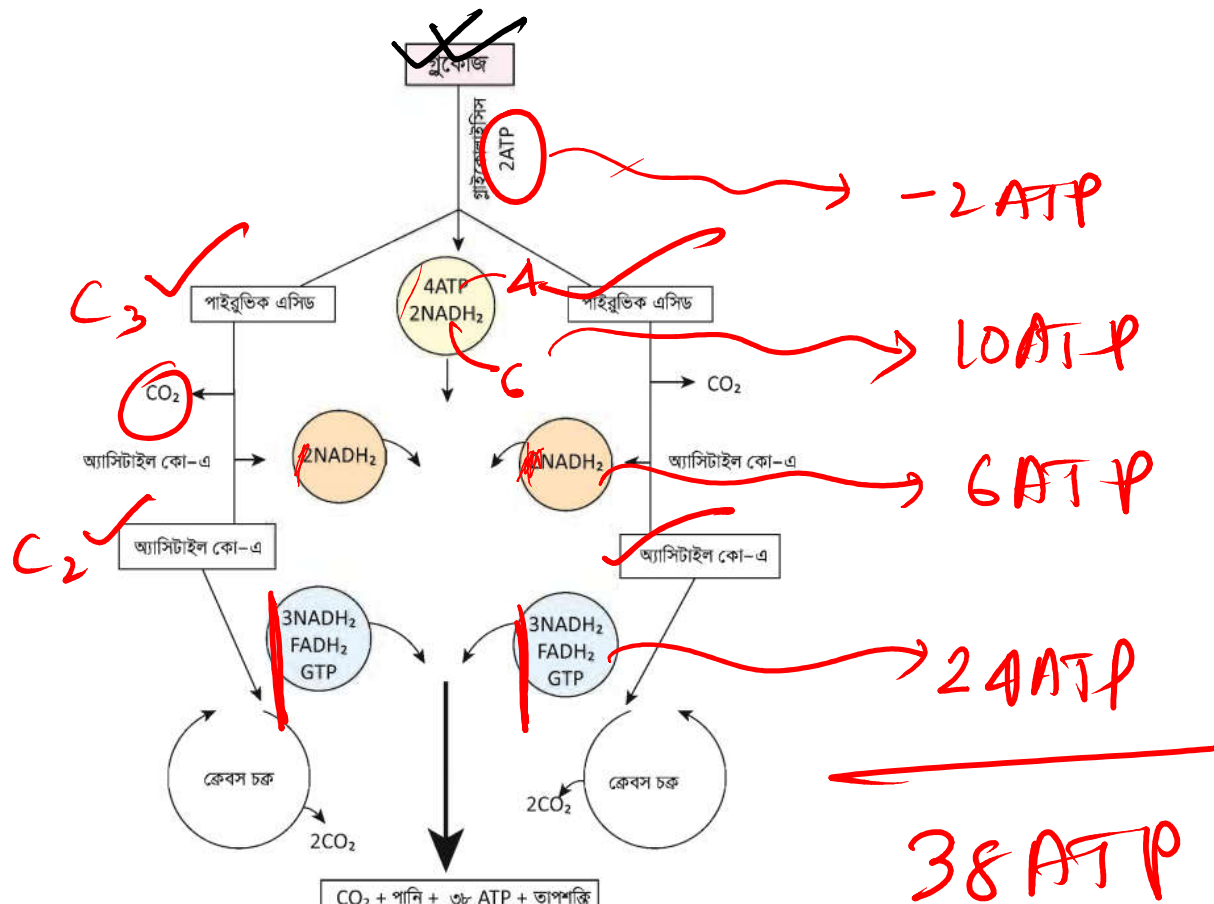
G → 8 ATP

FADH → 6 ATP

K Cycle → 24 ATP

38 ATP





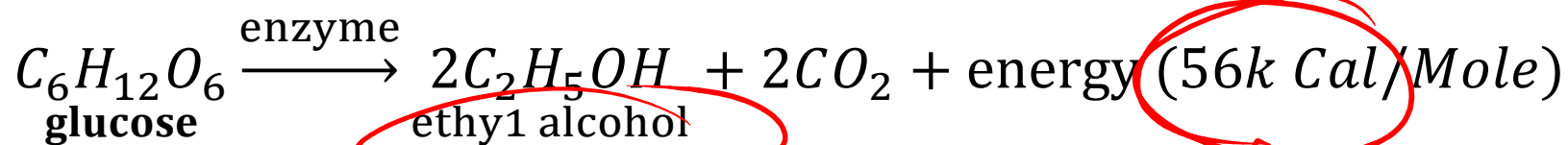
চিত্র 4.06: সবার শ্বসন প্রক্রিয়া

The calculation of Energy

Stage of espiration	Substance produced	Used substance	Neat product
C Glycolysis	2 molecules pyruvic acid 2 molecules NADH + H ⁺ 4 molecules ATP	2 molecules ATP	6 ATP 2 ATP
C Acetyl Co-A	2 molecules acetyl Co-A 2 molecules CO ₂ 2 molecules NADH + H ⁺	2 molecules pyruvic acid	2 molecules CO ₂ 6 ATP
M Krebs's Cycle	4 molecules CO ₂ 6 Molecules NADH + H ⁺ 2 molecules FADH ₂ 2 molecules GTP	2 molecules acetyl Co-A	4 molecules CO ₂ 18 ATP 4 ATP 2 ATP
			38 ATP (net total ATP) +6 molecules CO ₂

Anaerobic respiration

(2) Anaerobic respiration: Respiration, which occurs in absence of oxygen, is called anaerobic respiration. That is, in anaerobic respiration, respiratory substances are partially oxidised with the help of enzymes to produce different types of organic compounds (ethy1 alcohol, lactic acid etc.), CO_2 and a small amount of energy.

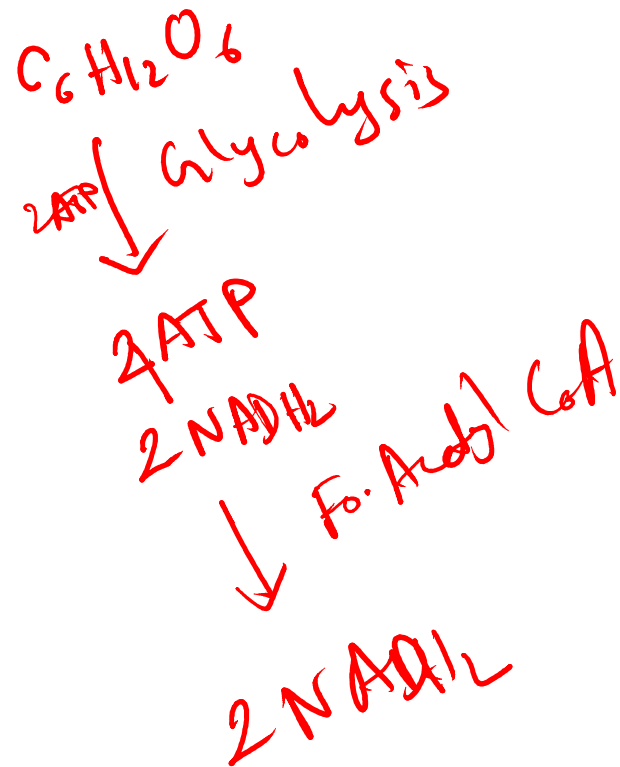


Anaerobic respiration onle occurs in some microorganisms such as in bacteria, yeast etc.

/ Lactic Acid

↓
2 ATP

Anaerobic respiration



Factors effecting Respiration

External factors:

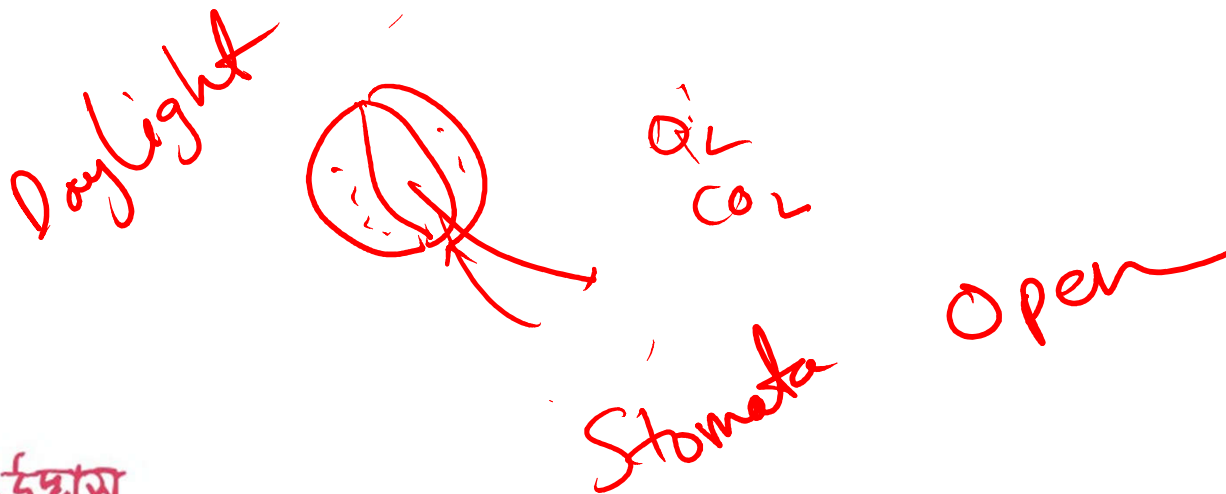
Temperature:

Oxygen: \uparrow in aerobic

Water:

Light:

Carbon dioxide: \downarrow



Factors effecting Respiration

Internal Factors:

- ✓ Food:
- ✓ Age of Cells: → Younger
- ✓ Water:
- ✓ Inorganic salt:

Importance of Respiration

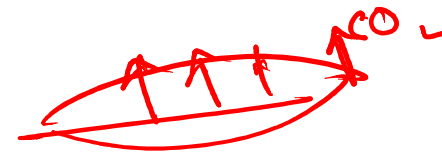
Lactic Acid

Curd

Alcohol

Yeast

Bread



Poll Question 01

Which one is the optimum temperature of Photosynthesis?

- (a) 22-35 Degree C
- (b) 20-25 Degree C
- (c) 35-40 Degree C
- (d) 22-44 Degree C

Poll Question 02

Which respiration occurs without oxygen?

- (a) Aerobic respiration
- (b) Anerobic respiration
- (c) Diffusion
- (d) Osmosis

Poll Question 03

Which one is the formula of Pyruvic Acid?

- (a) $C_3H_4O_3$
- (b) CH_4OH
- (c) $C_6H_{12}O_6$
- (d) C_2H_5OH

Poll Question 04

How many ATP produce during Krebs cycle?

- (a) 18
- (b) 20
- (c) 24
- (d) 36

Poll Question 05

Which one is not produce during Anerobic Respiration?

- (a) Carbon Di-Oxide
- (b) Ethyl alcohol
- (c) Acetyl Co-A
- (d) Lactic Acid

লেগে থাকো সৎ ভাবে,
স্বপ্ন জয় তোমারই হবে।



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