Chapter = 07

Biology 9th- Detailed Question Answers

→ BIOENERGETICS

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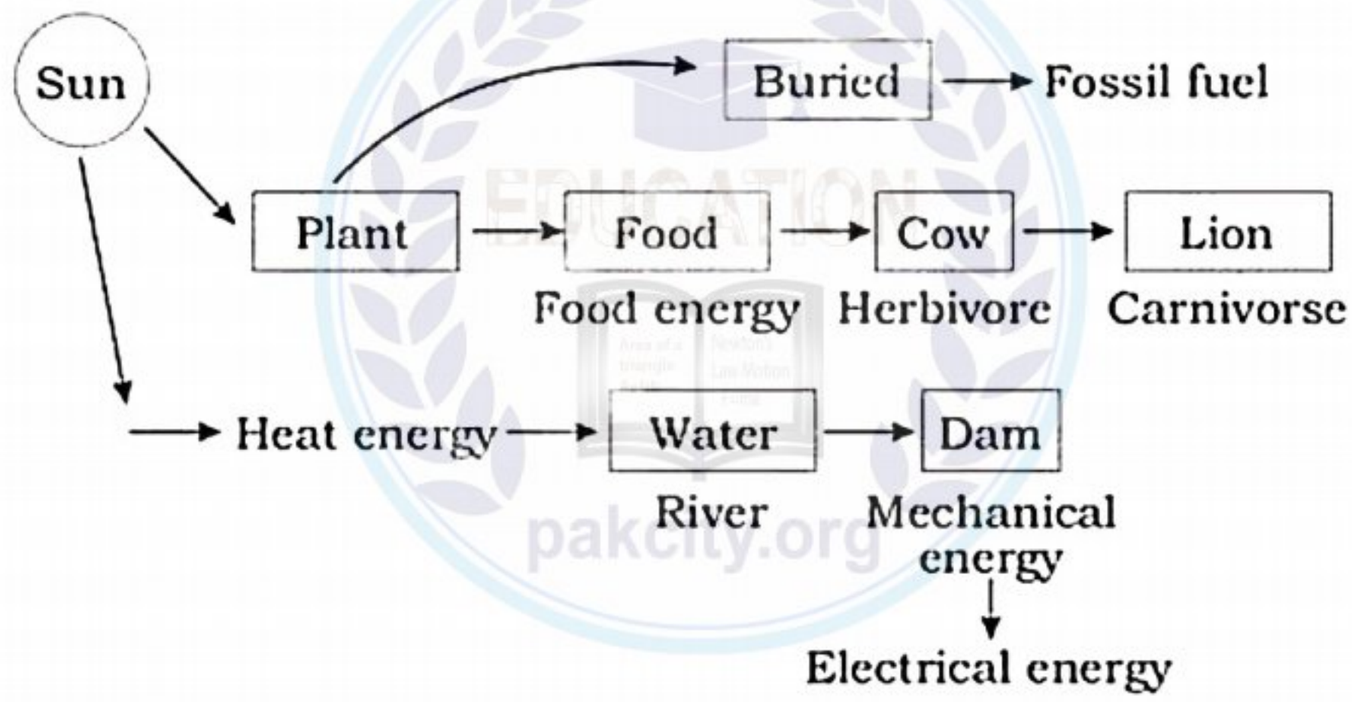
Q.1: Why do living organisms need food?

Ans: Every machine requires energy (capacity to do work) for performing its functions, like automobiles which require fuel to produced energy. Cell phones have batteries which store energy and utilize it for their working. Living organisms are also like machine which require nutrients in the form of food. The special molecules of food contain energy.

Q.2: From where does the energy come in fuel and food molecules?

Ans: The only source of energy of earth is the Sun. Energy of the Sun reaches earth in the form of light (light energy). This light energy is converted into chemical energy by living organisms or in heat energy stored by non-living things.



The above chart shows that conversion of energy from one form to another form explained by law of conservation of energy or first law of thermodynamics which states that energy can neither be created nor be destroyed but it can change from one form to another form. As we can see that the heat energy of Light converts in K.E. energy which flows water. This K.E. of water in dams is converted into mechanical energy when falls on turbine. This mechanical energy converts into light energy in bulbs and LED lights or again in mechanical energy in our fans.

On the other hands this light energy when falls on green parts of plant is captured and converted into chemical energy. This chemical energy is stored as food energy in plants. When these parts are eaten by animal this energy transferred into them where the organisms buried and remain under pressure inside earth crust for millions of years their chemical energy is converted into fossil fuel.

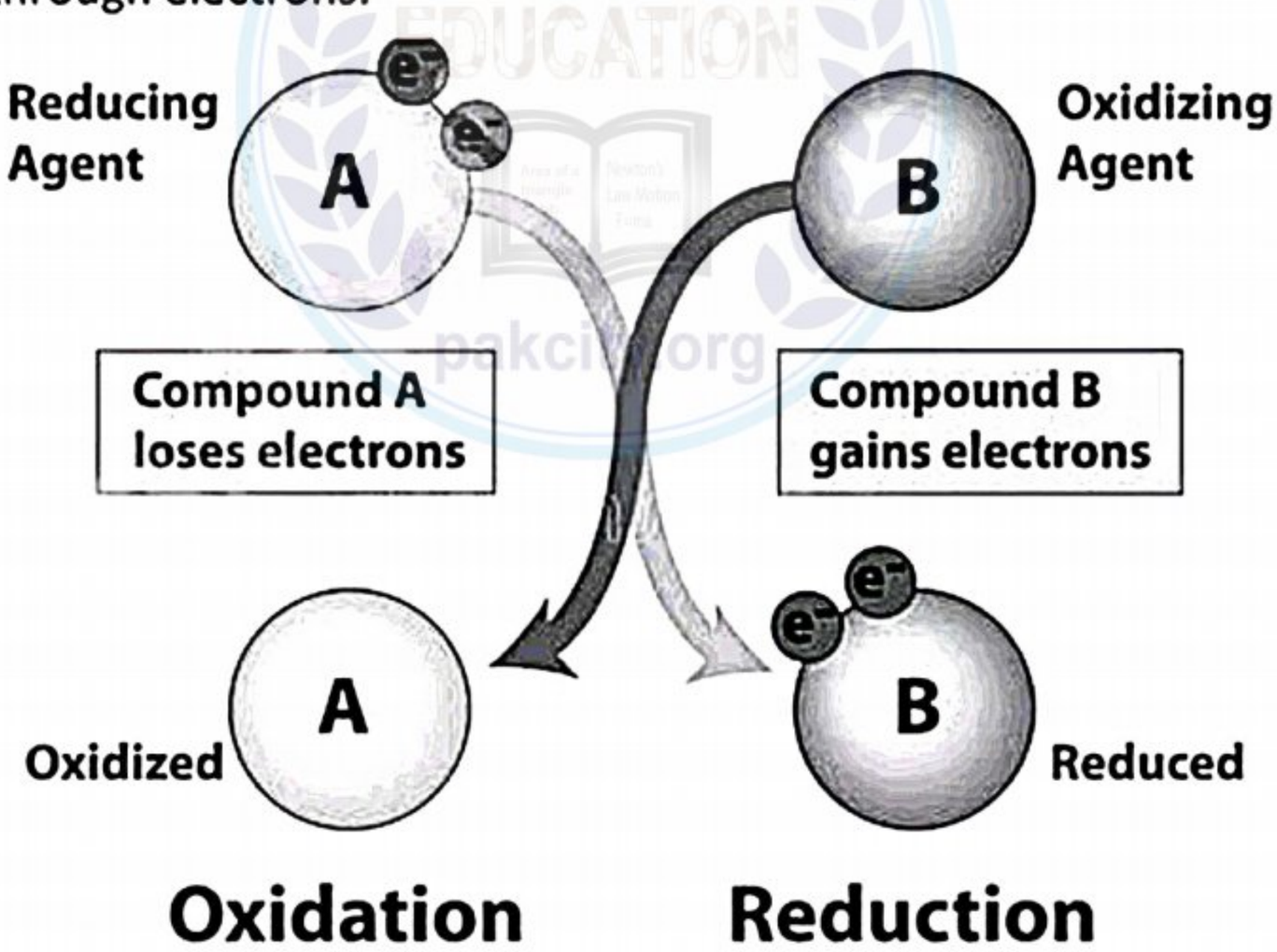
Q.3: Define Bioenergetics.

Ans: **Bioenergetics**: The study of this conversion of free energy into different forms by living organisms is Bioenergetics. It is the part of biology, Physics and chemistry concerned with the energy involved in making and breaking of chemical bonds found in the molecules of organisms. Bioenergetics can also be defined as the study of energy relationships energy transformation and transmission in living organisms.

Q.4: Describe the chemical process of energy transmission in living organisms.

Ans: **Chemical Process of Energy Transmission:** In living organisms the energy is transferred through gain or loss of electrons during formation and breaking of chemical bond. There are two chemical processes where it occurs, known with the name of oxidation and reduction.

(i) **Oxidation Reactions:** The oxidation reactions are those reactions in which loss of electrons (e-) and proton occurs. These electrons carry energy from the molecules from where they release to the molecules where they added e.g. iron reacts with oxygen to form a chemical called rust, in this reaction iron (Fe) loses some e- which transfer to oxygen. In this reaction Fe is oxidized and it transfers its energy to oxygen through electrons.

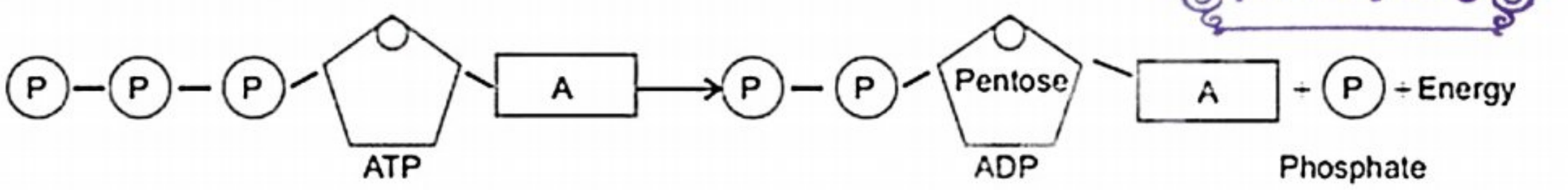


(ii) **Reduction Reactions:** On the other hand, reaction occur called reduction, where gain of e- and H+ occur. This gain of e- also brings energy which is stored in it. In living organisms these oxidation reduction (Redox) reactions occur continuously to transfer energy from one molecule to other molecule, without these reactions energy transfer becomes impossible in living system.

Q.5: Describe the formation of ATP.

Ans. **Energy Currency in Living Organism**: In our home we store energy in batteries when electricity is available from usual source or when light energy is available we capture it by solar plates. This energy of battery then is utilized at the time of power shutdown (load shedding). Living organisms also have similar type of system to store energy.

Adenosine Tn-Phosphate (ATP): In living organisms, energy is stored in a special molecule called Adenosine Tn-Phosphate (ATP). In organisms, energy is liberated during any oxidation reaction; this energy is utilized by molecules called Adenosine Di-Phosphate (ADP) to form a bond with phosphate (P). As a result the ADP become ATP, energy of oxidation is now stored in ATP.



Energy Stored in ATP: The amount of energy stored is 7.3 Kcal/mole. This stored energy in ATP will be utilized by living organism for performing any types of work e.g. transport of molecules against the concentration gradient. The energy is now become free (liberated) by breaking ATP molecule.

$$ATP \longrightarrow ADP + P + Energy\ (7.3\ kcal/mole)$$

So the formation of ATP is endergonic (energy intake) process and breakdown of ATP is exergonic (energy liberating) process.

Q.6: Define and describe the process of photosynthesis. What is its importance?

Ans. **Photosynthesis**: Photosynthesis is the fundamental process in which basic organic molecules and O_2 are produced for all bio-molecules and living organisms. This process is carried out by chlorophyll containing organisms like plants, algae, some protozons and some bacteria. Word photo means light and synthesis means to prepare. Plants utilize simple inorganic molecules carbon dioxide (CO_2) and water (H_20) which react by using light energy in the presence of pigments like chlorophyll to form glucose and oxygen.

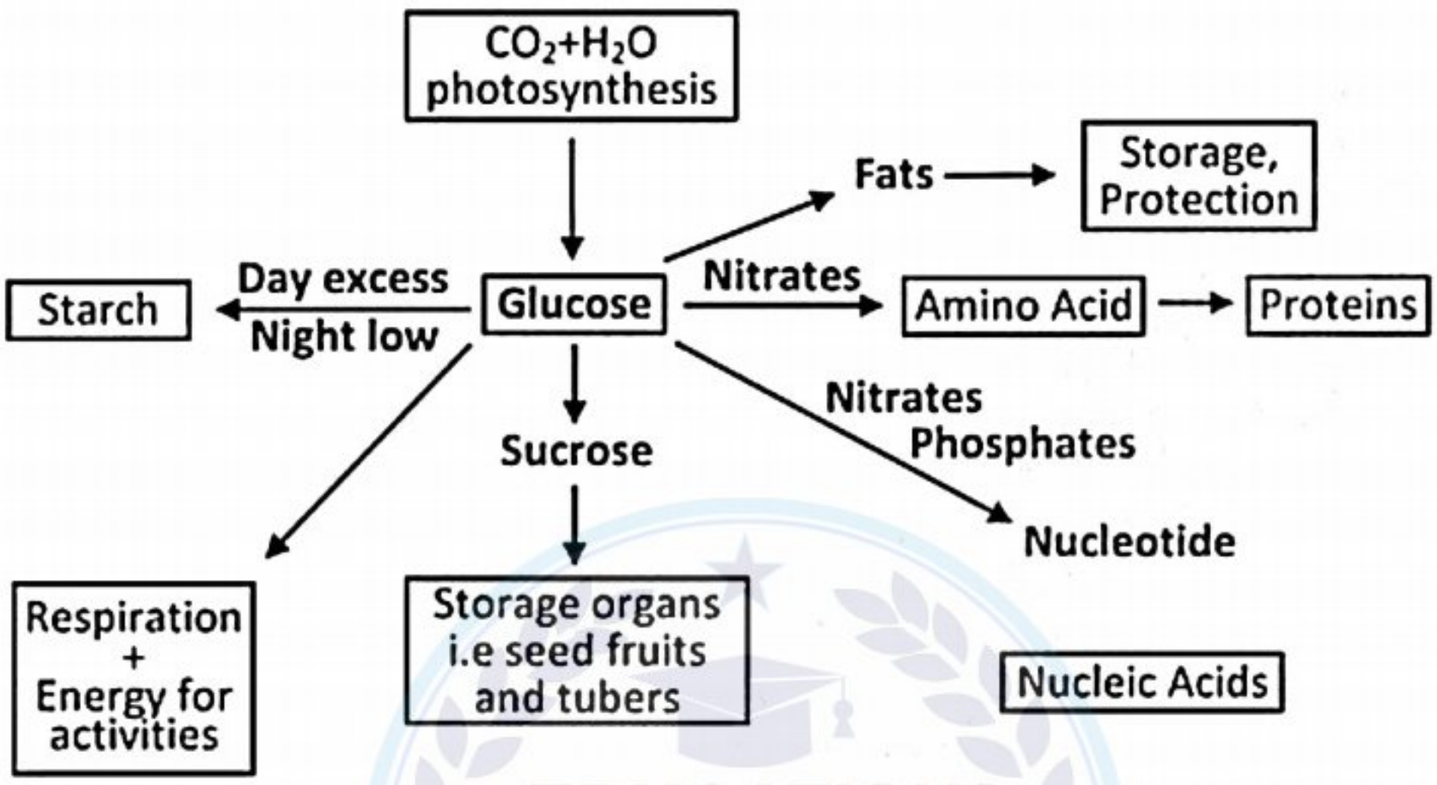
Equation:

$$\text{Carbondioxide + Water} \xrightarrow[\text{Chlorophyll}]{\text{Light}} \text{Glucose + Oxygen}$$

$$6CO_2 + 6H_2O \xrightarrow[\text{Chlorophyll}]{\text{Light}} C_6H_{12}O_6 + 6O_2$$

In other words photosynthesis converts light energy into chemical energy. The fundamental molecule produced during photosynthesis is simple sugar i.e. glucose. Glucose utilizes in most of the metabolism of plant to produce secondary products like starch and other polysaccharides. Plants also use carbohydrates to form fats, proteins and other chemical like nucleic acids.

This glucose is also used in respiration as reactant to produce energy for the metabolism of living organisms.



Different forms of life completely depends on Photosynthesis

Importance of Photosynthesis:

(i) Plants are not the only organisms which depend on photosynthesis but animals (Heterotrophs) also depend on phototrophs. These organisms utilize the molecules of phototrophs as food molecules. If an animal is herbivorous it feeds directly on plants. If an animal is carnivorous it depends on those animals which feed on plant. These feeding sequences and relationship are called Food Chains.

(ii) On the other hand photosynthesis is the only process which produces free O_2 by splitting water. This O_2 is utilized by all living organisms for respiration to produce energy for metabolism. Without O_2 living organisms cannot survive. Through photosynthesis, quantity of CO_2 and O_2 in nature is maintained by plants.

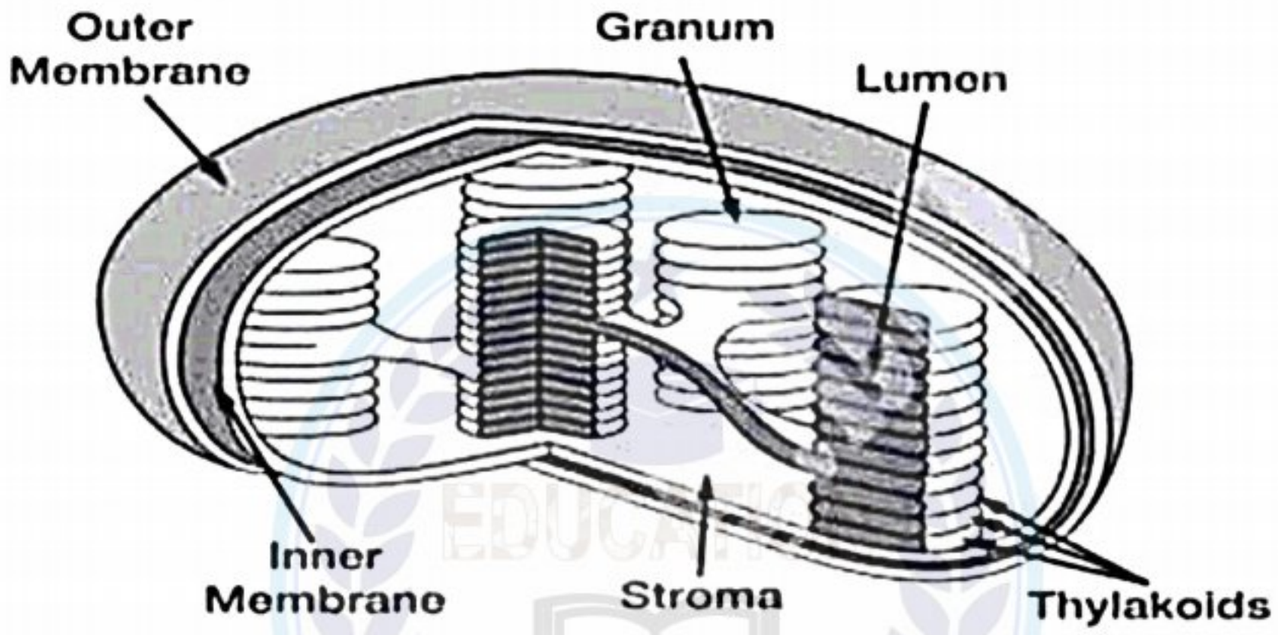
(iii) During photosynthesis plants fix CO_2 and release O_2 in environment. CO_2 has a property to absorb heat of the sun. If its quantity increases in environment, there will be increase in an environmental temperature on earth called global warming. Photosynthesis keeps the quantity of CO_2 maintained in environment i.e. indirectly keeping the concentration of CO_2 to maintain the temperature of earth.

Q.7: What is chlorophyll?

Ans: Chlorophyll is the green pigments found in the chloroplast of plant cell. It captures a specific part of visible light only, therefore it is not a reactant but absorbs energy needed to drive the reaction.

Q.8: Describe the structure of chloroplast.

Ans: **Structure of Chloroplast**: Green part of plants and algae contain special cell which contain special organelle called chloroplast. Chloroplast is double membrane bounded organelle, have semi-fluid proteins containing medium called Stroma. Another network of membrane is also embedded in it called Thylakoid membrane, somewhere this Thylakoid are piled at one another in stack called Grana (Singular-Granum).



Q.9: Briefly describe the reaction of photosynthesis.

Ans: The simple looking reaction of photosynthesis is not as simple as it looks. It involves number of chemical reactions which are catalyzed by number of enzymes, either in non-cyclic or cyclic ways. Each reaction occurs at different site in chloroplast i.e.

(i) Reaction in which light energy converted into chemical energy and stored in ATP (Adenosine Triphosphate) and $NADPH_2$ (reduced Nicotine amide Adenosine Dinucleotide Phosphate). This conversion occurs at Thylakoid membrane where solar energy is captured by pigments located in harvesting complex. This phase of photosynthesis is called light dependent reaction. It is non-cyclic process coupled with breakdown of H_2O molecules i.e. photolysis, takes place also at thylakoid membrane.

(ii) Reaction in which captured solar energy transferred to glucose from ATP and $NADPH_2$. It takes place in stroma, in cyclic manner. During this phase fixation of atmospheric CO_2 also takes place to form organic molecules.

Q.10: Describe two phases of photosynthesis in detail.

Ans: **Two phases of Photosynthesis**: Processes of Photosynthesis is mainly divided into two phases or reactions.

(i) Light Reaction or Light Dependent reaction.

(ii) Dark Reaction or Light Independent reaction.

(i) **Light Reaction or Light Dependent reaction**: The term light reaction or light dependent reaction is used due to the reason that during this phase of photosynthesis light energy is captured and converted into chemical energy.

Photolysis: Some of the light is utilized to split water into oxygen and H^+ with e^- (electron), this splitting of water is called Photolysis. Oxygen which is produced during photolysis is released in the environment where as H^+ together with CO_2 are used in building glucose.

Photosystem I & II: In chloroplast, different pigments absorb light of different wavelengths. Among them chlorophyll is the main light capturing molecules in thylakoid membrane which absorbs violet, blue and red light but reflects green therefore it appears green. In the thylakoid membrane other pigments and electron carrier molecules form highly organized assemblies in a series called photosystems. Each thylakoid contains thousands of copies of two different kind of photosystems called photosystems I and II. Each consists of two major parts, a light harvesting complex and an electron transport system.

The conversion of light energy takes places when the chlorophyll of reaction center receives energy. One of the electrons from chlorophyll "a" molecule leaves and jump over the electron transport system. This energized electron moves from one e- carrier to next. The electron releases energy, when it comes down, this energy drives reactions and produces two energy rich compounds. These are:

(a) ATP (Adenosine Triphosphate)

(b) $NADPH_2$ (Reduced Nicotinamide Adenosine Dinucleotide Phosphate)

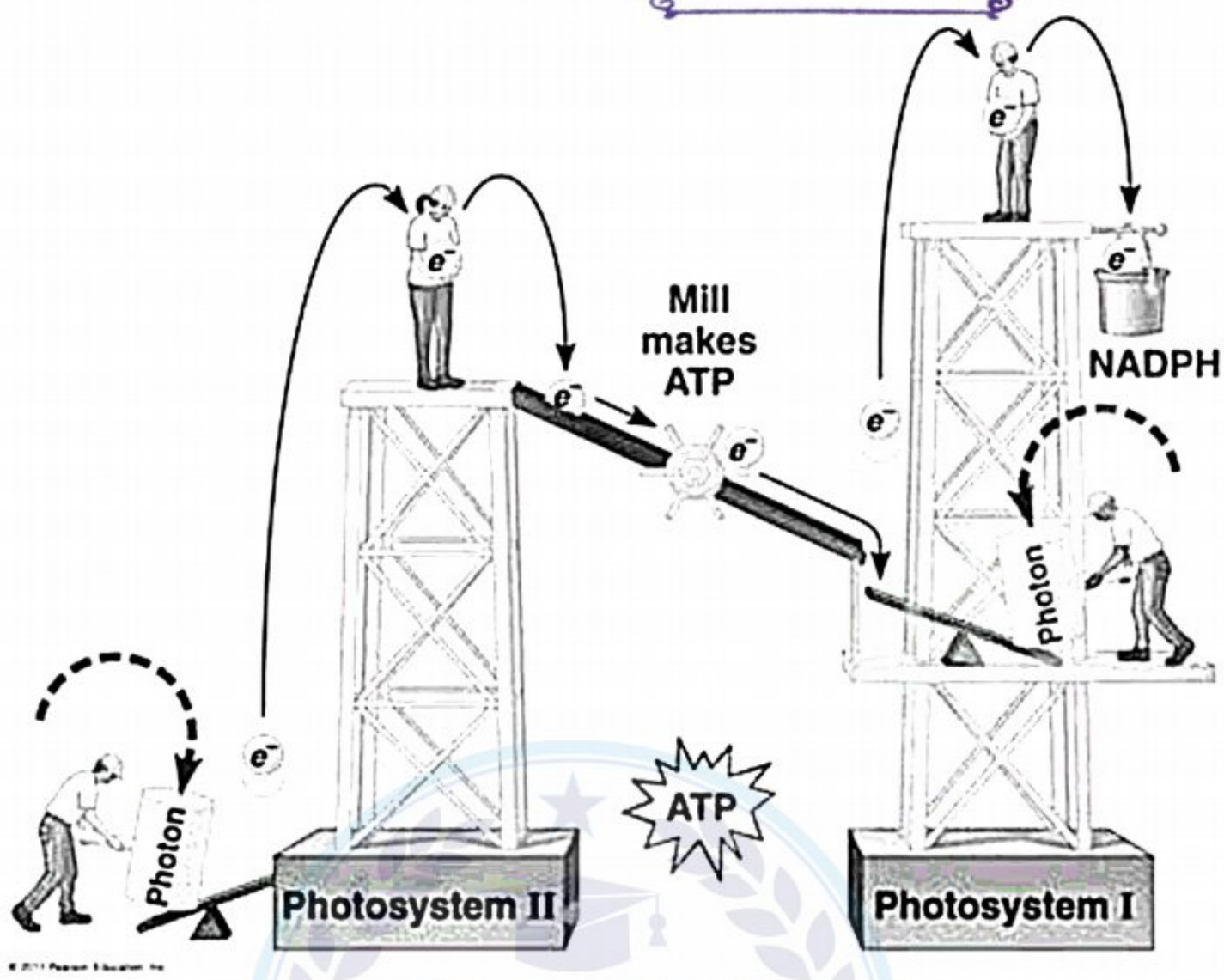
ADP is the compound which is already present in cell. It combines with phosphate by using energy of photon released from when moving through e-carriers in photosynthesis.

$$ADP + P \xrightarrow[\text{Enzyme Complex}]{\text{Light energy}} ATP$$

NADP also present in chloroplast is reduced into $NADPH_2$ by accepting Hydrogen ions (H^+) released from splitting of water.

$$\underset{\text{Cell}}{NADP} + \underbrace{2H^+ + 2e}_{\text{From Water}} \longrightarrow \underset{\text{Reduced form}}{NADPH_2}$$

ATP and $NADPH_2$ both are energy rich compounds which provide energy, Hydrogen (H^+) and e- for the conversion of atmospheric CO2 into carbohydrates in chloroplast during light independent phase of photosynthesis.



Mechanical analogy for the light reactions

(ii) **Dark Reaction or Light Independent Reaction**: This phase of photosynthesis does not require energy of photon but also takes place in day simultaneously with the light reaction.

The ATP and $NADPH_2$ synthesized during the light dependent reaction are dissolved in stroma there, they provide energy to power the synthesis of glucose from CO_2 and H_2O (i.e. H^+ and e^- of water). This phase occurs independently, without light as long as ATP and $NADPH_2$ are available.

This phase of photosynthesis is cyclic phase. It occurs in set of reactions also called Calvin Benson Cycle due to its discoverer or the C_3 (three Carbon Containing Compounds formed initially) cycle.

The C_3 cycle requires:

(a) CO_2 - normally from air; some of it also comes from respiration.

(b) CO_2 capturing sugar - a pentose sugar.

(c) Enzymes to catalyze all the reactions.

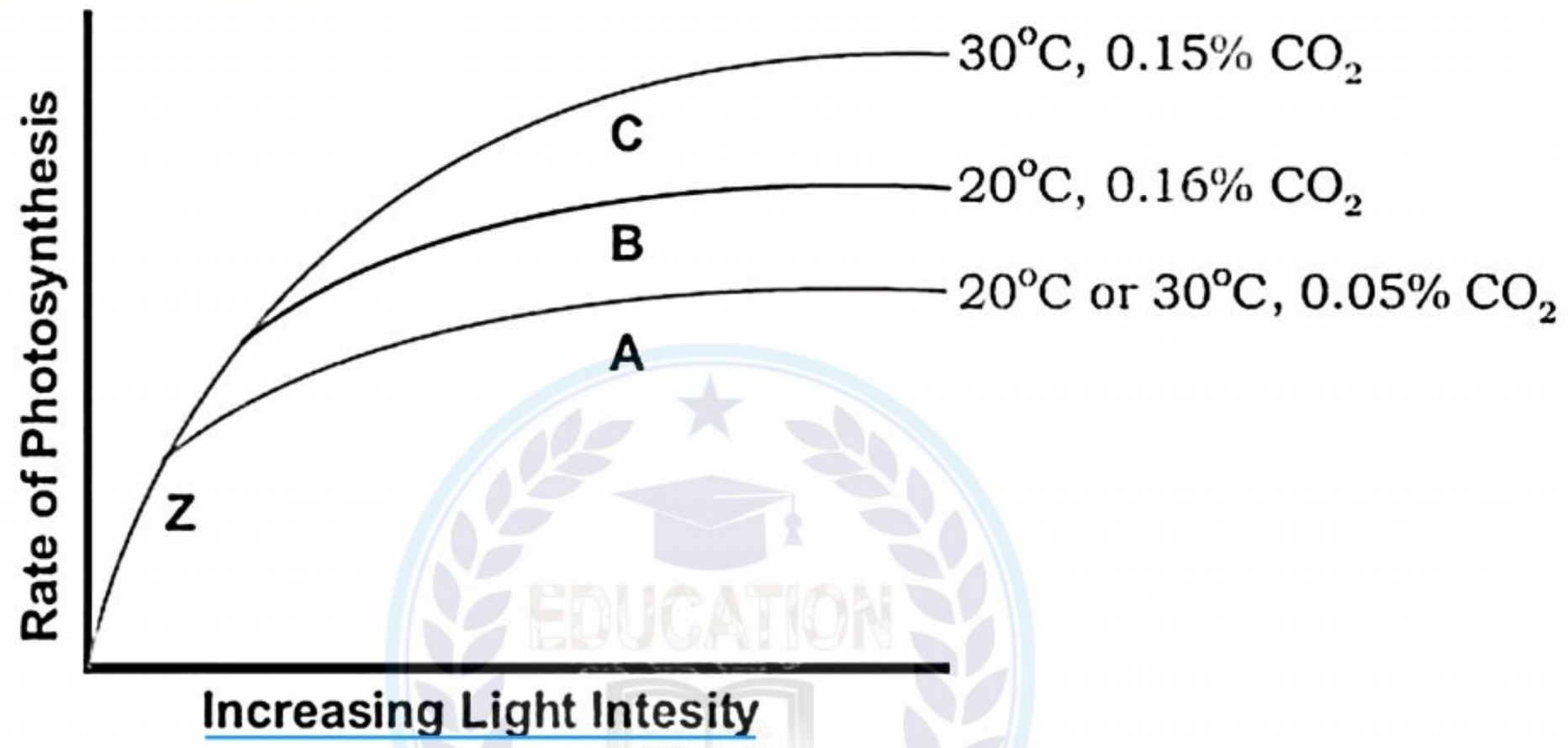
(d) Energy from ATP and $NADPH_2$ come from light dependent reaction.

Q.11: Define limiting factor.

Ans: **Limiting Factor:** Rate of biochemical reaction dependent on some factors which affect the rate are called limiting factor.

For example at low light intensity rate of photosynthesis increase continuously but at high light intensity the rate becomes constant.

Light intensity, carbon dioxide concentration and temperature can all be limiting factors for the rate of photosynthesis. Following graph shows the idea of limiting factor.



A - At point Z on graph, light intensity is limiting factor.

B - If light intensity increase to bright light and moderate temperature the concentration of CO_2, in air becomes limiting factor. It is clearly observed that the same plant if put into air containing high CO_2 then the rate of photosynthesis becomes high.

If there is high light intensity and high CO_2 concentration then the temperature becomes the limiting factor but the temperature should not be very high otherwise enzymes become denatured.

Activity: Find out the effect of light intensity on the rate of photosynthesis.

Apparatus:

Large beaker of water, boiling tube, stand and clamp, paper clip, fresh water plant hydrilla, ruler, stopwatch, thermometer, lamp etc.

Procedure:

(1) Take a healthy piece of hydrilla. Place it upside down in a boiling tube of water. It helps to sink the hydrilla.

(2) Clamp the tube to hold it upright in beaker to water. Ensure that the plant is perpendicular to source of light. The beaker of water is needed to maintain a constant temperature.

(3) Place a thermometer is water to record the temperature. Turn off the room lights to reduce back ground light and place a bench lamp close to the, beaker.

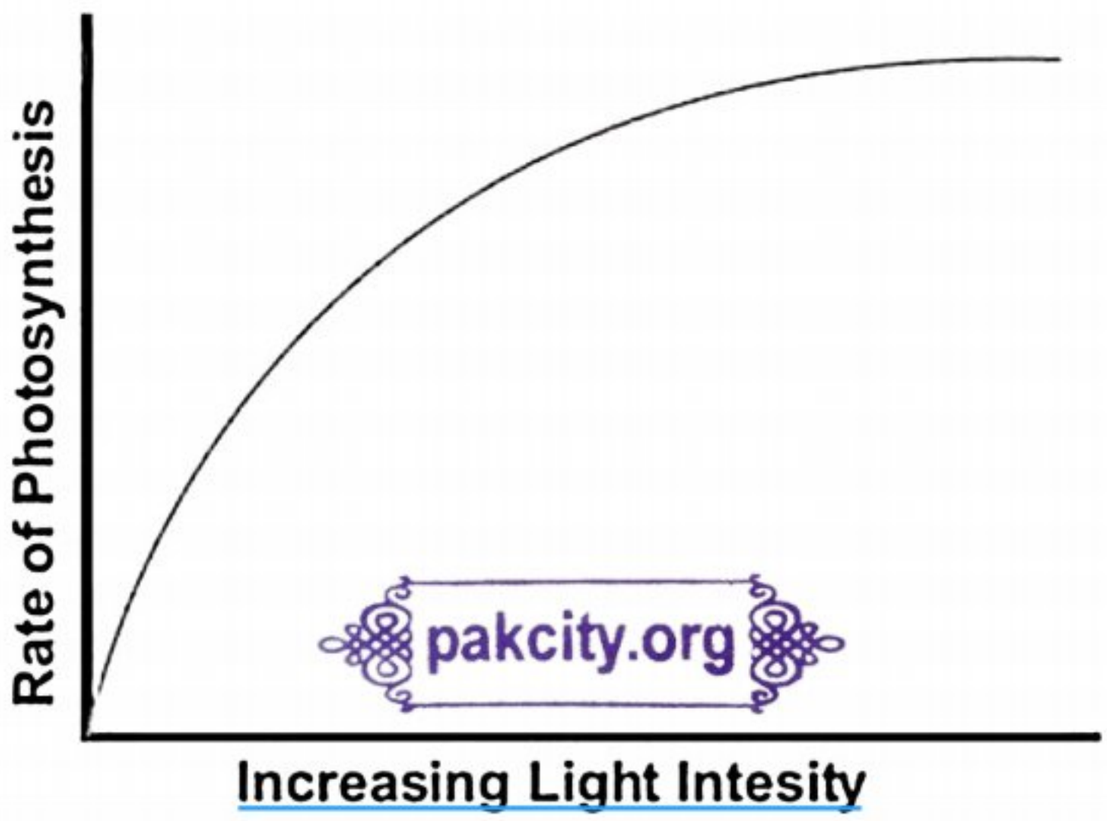
(4) Observe the plant for few minutes; you will see the bubbles of gas coming out from the cut end of plant. If no bubbles are seen repeat the experiment by using fresh piece of plant. Count the number of bubbles per minute. If the rate of bubbling is too fast to count, move the lamp away from the breaker until the rate becomes countable.

(5) Repeat the counts until you are sure that the rate is constant. Record the rate and the distance of the lamp from the plant.

(6) Change the distance of lamp from plant and take more measurement of the rate of bubbling at each distance. Take 3 values at each point.

(7) Repeat the counts at different distance from plant. Keep the temperature of water constant thought out the experiment.

Suppose that the rate of bubble production is the measure of the rate of photosynthesis. It is concluded that the rate of photosynthesis decreases at low light intensities. As the lamp is moved away from plant, the intensity of light falling on it also decreases.



Q.12: What is an ADP? How is it formed?

Ans: **ADP**: ADP is an abbreviation of Adenosine diphosphate. Each ADP compound consists of: Adenine, ribose and two phosphate groups.

Formation: When the terminal bond is broken the ATP is converted into ADP by enzyme ATP ase releasing a phosphate and liberating 30.6KJ (7.3Kcal) of energy.

An ADP is like a discharged battery. When the energy is made available by oxidation of food, ADP takes this energy to be converted to ATP that is to say that it becomes charged once again.

Q.13: Define respiration.

Ans: **Respiration**: To carry out all the life process cells requires energy. The source of this energy is food or photo assimilates (products of photosynthesis) in plants. Cells break food molecules to release their chemical energy. The breakdown of food molecules to release energy is called respiration.

Chemical Equation: Usually cells use oxygen to oxide food. It results CO_2 and water as waste products. This main food oxidized is the sugar i.e. glucose. The overall equation for this chemical reaction is:

$$\text{Glucose} + \text{Oxygen} \longrightarrow \text{Carbon dioxide} + \text{Water} + \text{Energy}$$

$$C_6H_{12}O_6 \longrightarrow 6CO_2 + 6H_2O + ATP$$

Above equation shows that one molecule of glucose reacts with six molecules of Oxygen to produce six molecules of carbon dioxide and six molecules of water. The main product is energy which is produced in the form of energy rich molecules called ATP.

Q.14: What is the difference between breathing and respiration?

Ans: It is commonly believed that breathing and respiration processes are same but factually they are different, although they are linked.

Respiration is the chemical reaction takes place in cells to release energy from food while the breathing is movement of air in and out of the organism to supply O_2 and CO_2 , We use another term for breathing called Ventilation. Breathing allows the process of gaseous exchange at surface of cells and tissues. So the terms breathing, gaseous exchange and respiration are different from one another but linked together to make possible energy production at cellular level.

Q.15: What are the steps of respiration?

Ans: **Steps of Respiration**: Respiration consists of the following two steps.

(i) Breathing (ii) Cellular Respiration

(i) **Breathing:** Breathing involves the exchange of gasses.

(ii) **Cellular Respiration**: It is defined as the process in which the oxidation of food takes place within the cell with the help of oxygen and enzymes, resulting in the release of energy.

Q.16: Explain types of respiration with the help of chemical equation.

Ans: **Type of Respiration**: There are two types of respiration found in living organisms for the production of energy.

(i) Anaerobic Respiration or Fermentation

(ii) Aerobic Respiration

(i) **Anaerobic Respiration OR Fermentation:** The primitive type of respiration which takes place in the absence of O_2 or without O_2 is called anaerobic respiration or fermentation.

There are special conditions where O_2 is not available so the organisms adapt themselves to break down their food without oxygen which is called anaerobic respiration or fermentation. It takes place in some bacteria, fungi, endoparasite and sometimes in animal. During anaerobic respiration, glucose is not broken down completely so less amount of energy (5 to 10% as compared to aerobic respiration) is released but it can sustain life even in the absence of O_2. It had evolved on earth where there was no O_2 on earth. There are two types of anaerobic respiration.

(a) Alcoholic Fermentation (b) Acidic Fermentation

(a) **Alcoholic Fermentation**: The bacteria and fungi respire aerobically but when these organisms are deprived of oxygen they stop respiration aerobically and start respiring anaerobically instead. During anaerobic respiration they produce ethyl alcohol with CO_2.

$$\text{Glucose} \longrightarrow \text{Ethanol} + CO_2 + \text{Some energy}$$

$$C_6H_{12}O_6 \longrightarrow 2C_2H_5OH + 2CO_2 + \text{Some ATP}$$

(b) **Acidic Fermentation**: In animals when aerobic respiration is not enough to produce required energy they start anaerobic respiration. During this process glucose breaks down into a substance called lactic acid.

$$\text{Glucose} \longrightarrow \text{Lactic acid} + \text{Some energy}$$

$$C_6H_{12}O_6 \longrightarrow 2C_3H_6O_3$$

A limited amount of energy is produced as compared to aerobic respiration but this is enough to power the athlete's muscles during start time of sprint. He experiences pain; this condition of pain is called muscle fatigue. The lactic acid is produced in his muscles bool stream.

(ii) **Aerobic Respiration:** In this type of respiration food breakdown occurs in the presence of oxygen to produce energy. It is a method of respiration found in majority of organisms. It takes place in the presence of free oxygen, oxidizing the food and releasing the maximum amount of energy i.e. 2827kj/mole of glucose or 36 ATP molecules/glucose.

The end products of aerobic respiration are CO_2 and H_2O

$$\text{Glucose} + \text{Oxygen} \longrightarrow \text{Carbon dioxide} + \text{Water} + \text{Energy (36 ATP)}$$

$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6HP + 36\ ATP$$

Q.17: What is the importance of anaerobic respiration?

Ans. **Importance of Anaerobic Respiration:**

(i) Anaerobic respiration is the emergency arrangement of energy which has an advantage that organisms can survive without O_2 or can work for short period with same pace for short period.

(ii) The other products of anaerobic respiration are acids. Vinegars are also organic acids that are produced commercially by acidic formulations.

(iii) Anaerobic respiration also produces ethyl alcohol. This process is commercially utilized by making alcoholic products like beer, wines and other beverages.

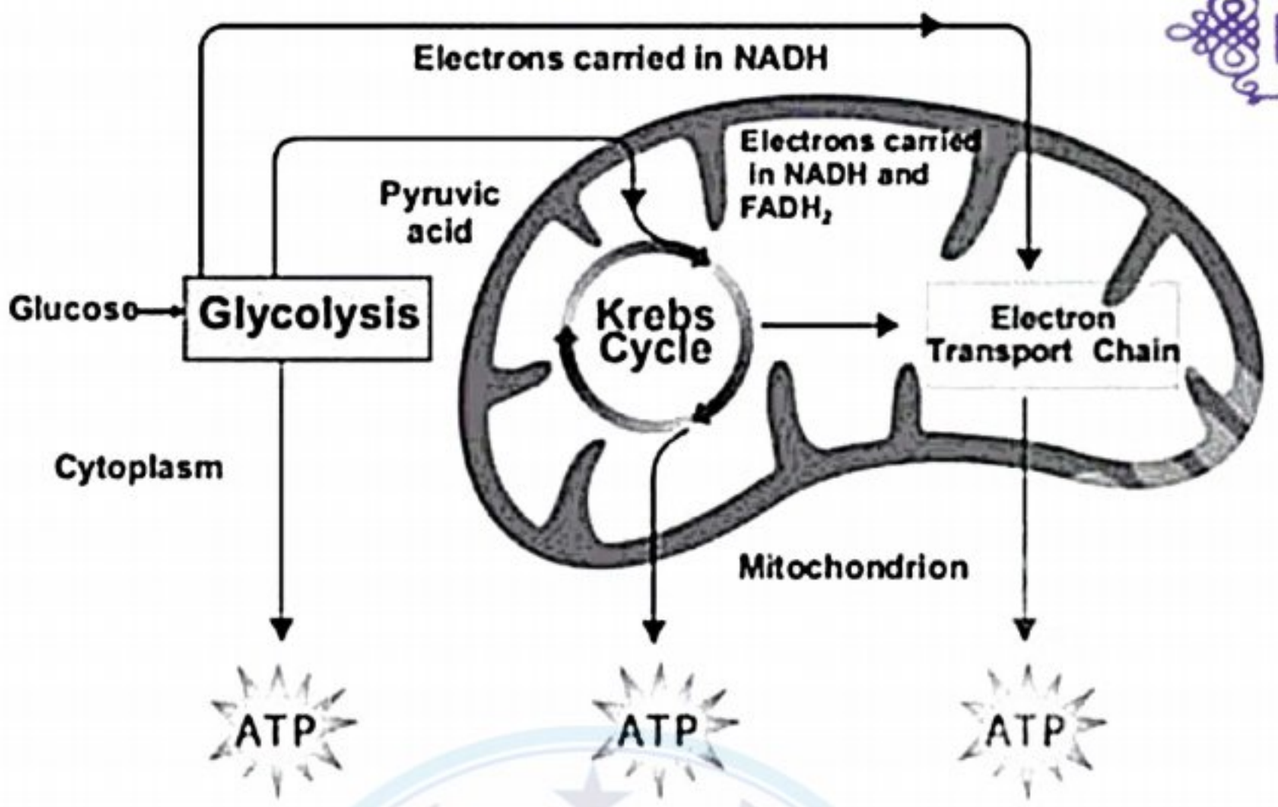
(iv) Baking industry is also based on it because anaerobic respiration also produces CO_2 which gives fluffy and soft shapes to cakes and breads also break down of starch into complex sugar to form bread and pizza.

Q.18: Describe the mechanism of aerobic respiration.

Ans. **Mechanism of Aerobic Respiration:** Aerobic Respiration takes place in 3 steps at different places in the cell.

(i) **Glycolysis:** First stage is that stage where a molecule of glucose (six carbon sugar) is broken down into two molecules of pyruvic acid (three carbon acid). It does not require oxygen. It takes place in both aerobic and anaerobic respiration. This splitting of glucose releases small amount of energy of glucose which is enough to generate 2 molecules of ATP. Glycolysis is a complex sequence of reaction all occur in cytosol.

(ii) **Kreb's or Citric acid Cycle**: The second stage of aerobic respiration in which pyruvic acid produced during glycolysis enters the mitochondria where O_2 available. Cellular respiration uses this O_2 to break pyruvic acid completely into CO_2 and H_2O in a cyclic manner. During Kreb's Cycle some ATP produce and some co-enzymes like NAD and FAD are reduced to $NADH_2$ and $FADH_2$. It takes place in matrix of mitochondria.



(iii) **Electron Transport Chain:** The last stage of aerobic respiration in which $NADH_2$ (Nicotinamide Adenosine Di-nucleotide) and $FADH_2$ (Flavinamide Adenosine Di-nucleotide) are oxidized to produce ATP and H_2O. It takes place at the cristae of mitochondria.

Q.19: Describe the usage of respiration energy in the body of organisms.

Ans: **Usage of Respiration Energy in the Body of Organisms**: Number of processes requires energy in the body of an organism. Body provides it from respiratory energy. Following are some processes which utilize respiratory energy.

(i) Synthesis of molecules - Formation of different molecules as well as large molecules from small molecules requires energy.

(ii) Cell division - During cell division formation of large molecules like DNA and protein takes place which require energy as well as movement of chromosome also require energy.

(iii) Growth without cell division - enlargement growth is not possible and both require formation of molecules which require energy.

(iv) Active transport - movement of ions and molecules from low concentration to high concentration requires energy.

(v) Muscle Contraction - Movement of muscle requires energy which is produced from chemical energy, chemical energy converted into kinetic energy.

(vi) Passage of Nerve impulse - Nerve Impulse (message of Neuron) is basically electrical signals moving long nerve fiber by active transport requires energy.

(vii) Maintenance of body temperature - In higher animal's body temperature is maintained at constant level, this temperature maintenance requires energy of respiration.

Q.20: Distinguish between the following in tabulated form:

(i) Respiration and photosynthesis

(ii) Light reaction and Dark reaction

(iii) Aerobic respiration and anaerobic respiration

(iv) Breathing and respiration

Ans: **(i) Difference Between Respiration and Photosynthesis**

	Respiration	Photosynthesis
1.	It is a catabolic process i.e. compounds are broken down.	It is an anabolic process i.e. compounds are formed in this process.
2.	It occurs during day and night a like	It occurs during day time only.
3.	It takes place inside mitochondria.	It takes place within chloroplast.
4.	In respiration energy is released from food materials.	Energy is used in this process, but energy is stored in the form of food materials.
5.	During this process O_2 enters the body and CO_2 is released.	In photosynthesis CO_2 enters the plant and O_2 is given out.
6.	It takes place in all the living cells of plants and animals.	It takes place in the green parts of the plant body.
7.	The end products of this process are CO_2 and H_2O	The end products of this process are simple carbohydrates and oxygen.
8.	The chemical equation for this process is: $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + Energy$	The chemical equation for this process is: $6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$
9.	During the breakdown of one glucose molecule, 38 ATP molecules are formed	During the formation of one glucose molecule, 18 ATP molecules are utilized.

(ii) Difference Between Light reaction and Dark reaction

	Light reaction	Dark reaction
1.	It takes place only in the presence of light.	It can take place in the presence or absenceof sunlight.
2.	It is a photochemical phase	It is a biochemical phase.
3.	It takes place in the grana of the chloroplast.	It takes place in the stroma of the chloroplast.
4.	NADP utilizes H+ ions to form NADPH.	The hydrogen of NADPH combines with CO_2
5.	The end products are ATP and NADPH.	Glucose is the end product. ATP and NADPH help in the formation of glucose.
6.	The water molecules split into hydrogen and oxygen.	Glucose is produced. CO2 is utilized in the dark reaction.
7.	Photolysis occurs in PS-II.	Photolysis does not occur.

(iii) Difference Between Aerobic respiration and anaerobic respiration

	Aerobic Respiration	Anaerobic Respiration
1.	It is that type of respiration in which oxygen is necessary.	It takes place in the absence of oxygen.
2.	It oxidizes the food completely.	It oxidizes the food partially
3.	During this process large amount of energy is released i.e. 2827KJ.	In this process, small amount of energy is released i.e. 210KJ (in bacteria & fungi) and 150 KJ (in animals).
4.	Carbon dioxide and water are the end products of this process.	The end products are lactic acid (in animals). Ethanol and carbon dioxide (in bacteria and fungi).

(iv) Difference Between Breathing and Cellular respiration

	Breathing	Cellular Respiration
1.	Breathing is a physical process in which O_2 is taken in and CO_2 is given out.	It is a biochemical process in which organic food is oxidized into CO_2 and H_2O.
2.	It occurs outside the cells.	It occurs inside the cells.
3.	There is no release of energy.	There is a gradual and stepwise release of energy.
4.	Enzymes are not involved.	Enzymes are involved.
5.	Oxygen is necessary in this process.	In anaerobic respiration oxygen is not necessary in this process.

Q.21: How CO_2 maintain the temperature of earth?

Ans: Carbon dioxide controls temperature because it has a property to absorb infrared radiation of the sun. When the carbon dioxide concentration goes up, temperature goes up. When the carbon dioxide concentration goes down, temperature goes down.

Q.22: Why the second phase of photosynthesis is called dark reaction?

Ans: Dark reactions do not need light. Instead, dark reaction uses ATP and $NADPH_2$ to produce energy molecules. No photosystem is required. Photolysis of water does not occur. The dark reaction in photosynthesis is called so because it does not require light energy.

Q.23: Why acidic fermentation is harmful?

Ans: Acidic fermentation is harmful because the lactic acid which accumulates in human may cause fatigue and pain during anaerobic respiration.

Chapter = 07

Biology 9th- Short Question Answers

➔ BIOENERGETICS

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Q.3: How respiration is different from breathing?

Ans. Respiration is the chemical reaction takes place in cells to release energy from food while the breathing is movement of air in and out of the organism to supply O_2 and CO_2 , We use another term for breathing called Ventilation. Breathing allows the process of gaseous exchange at surface of cells and tissues. So the terms breathing, gaseous exchange and respiration are different from one another but linked together to make possible energy production at cellular level.

Q.4: Why acidic fermentation is harmful?

Ans. Acidic fermentation is harmful because the lactic acid which accumulates in human may cause fatigue and pain during anaerobic respiration.

Q.5: How glucose form secondary products in plants?

Ans. To carry out all the life process cells requires energy. The source of this energy is food or photo assimilates (products of photosynthesis) in plants. Cells break food molecules to release their chemical energy. The breakdown of food molecules to release energy is called respiration. Usually cells use oxygen to oxide food. It results CO_2 and water as waste products. This main food oxidized is the sugar i.e. glucose.

In this type of respiration food breakdown occurs in the presence of oxygen to produce energy. It is a method of respiration found in majority of organisms. It takes place in the presence of free oxygen, oxidizing the food and releasing the maximum amount of energy i.e. 2827kj/mole of glucose or 36 ATP molecules/glucose.

Q.6: Describe the three usage of respiration energy in the body of organisms.

Ans: **Usage of Respiration Energy in the Body of Organisms**: Number of processes requires energy in the body of an organism. Body provides it from respiratory energy. Following are some processes which utilize respiratory energy.

(i) Synthesis of molecules - Formation of different molecules as well as large molecules from small molecules requires energy.

(ii) Cell division - During cell division formation of large molecules like DNA and protein takes place which require energy as well as movement of chromosome also require energy.

(iii) Growth without cell division - enlargement growth is not possible and both require formation of molecules which require energy.

Q.7: Define respiration.

Ans: **Respiration**: To carry out all the life process cells requires energy. The source of this energy is food or photo assimilates (products of photosynthesis) in plants. Cells break food molecules to release their chemical energy. The breakdown of food molecules to release energy is called respiration.

Q.8: What is chlorophyll?

Ans: Chlorophyll is the green pigments found in the chloroplast of plant cell. It captures a specific part of visible light only, therefore it is not a reactant but absorbs energy needed to drive the reaction.

Q.9: Describe the structure of chloroplast.

Ans: **Structure of Chloroplast**: Green part of plants and algae contain special cell which contain special organelle called chloroplast. Chloroplast is double membrane bounded organelle, have semi-fluid proteins containing medium called Stroma. Another network of membrane is also embedded in it called Thylakoid membrane, somewhere this Thylakoid are piled at one another in stack called Grana (Singular-Granum).