BIOLOGY

Worksheet-13

STEP

A PROJECT BY PUNJAB GROUP

Worksheet-13(i)

(Bioenergetics)

Q.1 Inside the stroma of chloroplast there is a suspended:

A) Membrane system
B) Set of enzymes
C) Membrane system and set of enzymes
D) Chlorophyll

Q.2 Chlorophyll molecules are found embedded in:

A) Thylakoid membranes
B) Outer chloroplast membrane
C) Lamellar membranes
D) Inner chloroplast membrane

Q.3 Electron acceptors of photosynthetic electron transport chain are parts of:

A) Thylakoid membranes
B) Outer chloroplast membrane
C) Lamellar membranes
D) Inner chloroplast membrane

Q.4 Chlorophyll and other pigments absorb light energy which is converted into chemical energy of:

A) NADH and NADPH
B) ATP and NADPH
C) ATP and NADH
D) FADH and NADPH

Q.5 The substances that absorb visible light are called:

A) Radioactive substances
B) Bioluminescent substances
C) Pigments
D) Fluorescent substances

Q.6 Different pigments absorb light of:

A) Same wavelength
B) 380 – 750 nm wavelengths
C) Different wavelengths
D) 280 – 750 nm wavelengths

Q.7 An instrument used to measure relative abilities of different pigments to absorb different wavelengths of light is called:

A) Photometer
B) Light meter
C) Spectrometer
D) Spectrophotometer

Q.8 Thylakoid membranes contain:

A) Several kinds of pigments
B) Only chlorophylls
C) Only carotenoids
D) Only xanthophylls

Q.9 Carotenes are mostly:

A) Red to orange
B) Yellow and red to orange
C) Yellow to orange
D) Orange and red to yellow

Q.10 These broaden the absorption and utilization of light:

A) Yellow pigments
B) Orange pigments
C) Red pigments
D) Yellow and red to orange pigments

Q.11 Chlorophylls found in photosynthetic bacteria are called:

A) Chlorophyll a and b
B) Chlorophy c and d
C) Chlorophyll b and c
D) Bacteriochlorophylls

Q.12 Green, yellow and indigo wavelengths of light are least absorbed by:

A) Carotenes C) Chlorophylls
B) Xanthophylls D) Carotenoids

Q.13 Plants appear green, because:

A) Green wavelength is reflected

B) Green wavelength is transmitted

C) Darker green color masks over the yellow color

D) Green wavelength is reflected and transmitted

Q.14 The light absorbing hydrophilic part of chlorophyll is:

A) Flat

B) Long and anchoring

C) Square shaped

D) Flat and square shaped

Q.15 Porphyrin ring represents the:

A) Hydrophobic head of chlorophyll

B) Hydrophilic tail of chlorophyll

C) Hydrophobic tail of chlorophyll

D) Hydrophilic head of chlorophyll

Q.16 Chlorophyll head is made up of:

A) Four joined porphyrin rings

B) Four Joined tetrapyrrole rings

C) Four joined pyrrole rings

D) Two joined pyrrole rings

Q.17 In chlorophyll head an atom of magnesium is coordinated with the:

A) Carbon of each pyrrole ring

B) Hydrogen of each pyrrole ring

C) Nitrogen of each pyrrole ring

D) Methyl of each pyrrole ring

Q.18 _____ of haemoglobin is also a porphyrin ring.

A) α – chain C) Haem group

B) β – chain D) Protein

Q.19 Haem group of hemoglobin differs from porphyrin of chlorophyll in having:

A) Iron as central atom

B) Magnesium as central atom

C) Four pyrrole rings

D) Central atom coordinated with nitrogen of each pyrrole ring

Q.20 Long tail of chlorophyll which is attached to one of the pyrrole is:

A) Hydrocarbon tail

B) Phytol

C) Phytol or hydrocarbon tail

D) Hydrophilic tail

Q.21 The chlorophyll molecule is embedded in the hydrophobic core of:

A) Thylakoid membrane by its head

B) Lamellar membrane by its head

C) Thylakoid membrane by its tail

D) Lamellar membrane by its tail

Q.22 Chlorophyll a and Chlorophyll b differ from each other in only one of the:

A) Atoms C) Functional groups

B) Elements D) Carbon atoms

Q.23 Chlorophyll a and chlorophyll b differ from each other with respect to the number of:

A) Carbon atoms

B) Oxygen atoms

C) Hydrogen atoms

D) Hydrogen and oxygen atoms

Q.24 As compared to chlorophyll a, chlorophyll b have:

A) Two more hydrogen atoms

B) One less oxygen atom

C) Two less hydrogen atoms and one more oxygen atom

D) Two more hydrogen atom and one less oxygen atom

Q.25 As compared to chlorophyll b, chlorophyll a have:

A) Two more hydrogen atoms

B) One less oxygen atom

C) Two less hydrogen atoms

D) Two more hydrogen atom and one less oxygen atom

Q.26 Chlorophyll a can be converted into chlorophyll b by replacing:

A) Carbonyl group with methyl group

B) Magnesium with ferrous

C) Methyl group with carbonyl group

D) Ferrous with magnesium

Q.27 Chlorophyll b can be converted into chlorophyll a by replacing:

A) Carbonyl group with methyl group

B) Magnesium with ferrous

C) Methyl group with carbonyl group

D) Ferrous with magnesium

Q.28 Some wavelengths _____ by chlorophyll a are _____ by chlorophyll b.

A) Absorbed, absorbed

B) Not absorbed, weakly absorbed

C) Not absorbed, not absorbed

D) Not absorbed, very effectively absorbed

Q.29 Due to slight difference in their _____, the chlorophyll a and chlorophyll b show slightly different _____.

A) Structure, absorption spectra

B) Structure, molecular formula

C) Absorption spectra, structure

D) Absorption spectra, molecular formula

Q.30 Difference in structure of different pigments:

A) Increase the range of light wavelengths being absorbed

B) Decrease the range of light wavelengths being absorbed

C) Have no effect on range of light wavelengths being absorbed

D) Have no effects on the color of pigment

Q.31 Chlorophyll a is:

A) Yellow – Green C) Blue – Yellow

B) Blue – Green D) Yellow – Blue

Q.32 Chlorophyll b is:

A) Yellow – Green C) Blue – Yellow

B) Blue – Green D) Yellow – Blue

Q.33 The most important photosynthetic pigment is:

A) Chlorophyll – b

B) Chlorophyll - a

C) Bacteriochlorophyll

D) Carotenoids

Q.34 It takes part directly in the light dependent reactions:

A) Chlorophyll – b

B) Chlorophyll – a

C) Bacteriochlorophyll

D) Carotenoids

Q.35 The conversion of solar energy into chemical energy is carried out directly in:

A) Chlorophyll – b

B) Chlorophyll – a

C) Bacteriochlorophyll

D) Carotenoids

Q.36 Chlorophyll a itself exists in:

A) Two forms C) Several forms

B) One forms D) Three forms

Q.37 Chlorophyll b is found along with chlorophyll a in:

A) Few green plants and all algae

B) All green plants and all algae

C) All green plants and few algae

D) Few green plants and green algae

Q.38 Chlorophylls are soluble in:

A) Carbon tetrachloride

B) Alcohol

C) Carbon tetrachloride and alcohol

D) Water

Q.39 Pick up the one(s) called as accessory pigments:

A) Carotenes

B) Chlorophylls

C) Xanthophylls

D) Carotenoids and xanthophylls

Q.40 They absorb light and transfer the energy to chlorophyll a via chlorophyll b:

A) Chlorophylls – a C) Carotenoids

B) Chlorophylls – b D) Xanthophylls

Q.41 The order of transfer of energy is:

A) Carotenoids → chlorophyll a → chlorophyll b

B) Chlorophyll b → chlorophyll a → carotenoids

C) Carotenoids → Chlorophyll b → Chlorophyll a

D) Chlorophyll a → Chlorophyll b → Carotenoids

Q.42 Some carotenoids protect chlorophyll from intense light by:

A) Absorbing excessive light energy

B) Dissipating excessive light energy

C) Transferring excessive light energy to chlorophyll a

D) Absorbing and dissipating excessive light energy

Q.43 Protection against intense light is provided by carotenoids to:

A) Chlorophyll – a

B) Human eyes

C) Chlorophyll – b

D) Chlorophyll a and human eyes

Q.44 Absorption spectrum for chlorophyll indicates that absorption is maximum in:

A) Blue part of spectrum

B) Blue and Red parts of spectrum

C) Red part of spectrum

D) Violet – blue and orange – red part of spectrum

Q.45 An absorption spectrum of chlorophylls have:

A) Two peaks

B) Two peaks, one valley

C) Two valleys

D) One peaks, two valleys

Q.46 Pick up the one having broadest valley:

A) Absorption spectrum of chlorophyll a

B) Absorption spectrum of carotenoids

C) Absorption spectrum of chlorophyll b

D) Action spectrum of chlorophyll a

Q.47 The absorptive peaks in the absorption spectrum of chlorophyll b are at the wave length of:

A) 430 – 670 nm C) 440 – 480 nm

B) 460 – 640 nm D) 420 – 610 nm

Q.48 Photosynthesis is a process in which:

A) Oxidation of CO_2 occurs

B) Oxidation of H_2O occurs

C) Reduction of CO_2 occurs

D) Reduction of CO_2 and oxidation of H_2O occurs

Q.49 The reactions of photosynthesis consists of:

A) Two phases C) Four phases

B) Three phases D) Many phases

Q.50 In photosynthesis reducing power and assimilatory power is synthesized during:

A) Dark reaction

B) Light reaction

C) Calvin cycle

D) Oxidation phosphorylation

Q.51 For synthesis of sugar by reducing CO_2, $NADPH_2$ provides:

A) Chemical energy

B) Co-enzymes

C) Energized electrons

D) Enzymes

Q.52 The phase of photosynthesis in which sugar is synthesized by reducing CO_2 is also called as dark reaction because:

A) It requires darkness

B) It does not require light

C) It requires night period

D) It cannot proceed in light

Q.53 Photosynthetic pigments are organized into clusters called:

A) Antenna pigments

B) Reaction centre

C) Photosynthetic system

D) Photosystems

Q.54 Each photosystem consists of a light gathering:

A) Antenna complex

B) Reaction complex

C) Antenna complex and a reaction centre

D) Primary electron acceptor

Q.55 The reaction centre of photosystem have:

A) One molecule of chlorophyll a and primary electron acceptor

B) Many molecule of chlorophyll a and primary electron acceptor

C) One or more molecules of chlorophyll a and primary electron acceptor

D) Chlorophyll a, chlorophyll b and primary electron acceptor

Q.56 There are two photosystems associated with photosynthesis which have been named in order of their discovery as:

A) P680 and P700 C) PS-I and PS-II

B) PS-II and PS-I D) P700 and P680

Q.57 Photosystem – I has a form of chlorophyll a which absorbs best the light of:

A) 700 nm C) 730 nm

B) 680 nm D) 660 nm

Q.58 Associated nearby each reaction centre of a photosystem, there is a specialized molecule called:

A) Primary electron acceptor

B) Chlorophyll b

C) Accessory pigments

D) Carotenoids

Q.59 Pick up the photosynthetic electron transport which is predominant:

A) Non – cyclic electron flow

B) Z – scheme

C) Cyclic electron flow

D) Non-cyclic electron flow or Z – scheme

Q.60 The photosynthetic electron transport which involved only photosystem – I is called:

A) Non-cyclic electron flow

B) Z – scheme

C) Cyclic electron flow

D) Non-cyclic electron flow or Z – scheme

Q.61 The formation of ATP during non-cyclic electron flow is called:

A) Z – scheme

B) Light reaction

C) Non-cyclic phosphorylation

D) Synthesis of ATP and $NADPH_2$

Q.62 Formation of ATP during cyclic electron flow is called:

A) Cyclic phosphorylation
B) Photophosphorylation
C) Oxidative phosphorylation
D) Z – scheme

Q.63 The splitting up of water molecule into two hydrogen ions and an oxygen atom, by light is called:

A) Electrolysis of water
B) Ionization of water
C) Photolysis of water
D) Autolysis of water

Q.64 The correct sequence of electron carriers which receive the electrons from primary electron acceptor of PS-II and pass it to PS-I:

A) PS → Cytochrome complex → PQ
B) PQ → PC → Cytochrome complex
C) Cytochrome complex → PQ → PC
D) PQ → Cytochrome complex → PC

Q.65 Pick up the one not involved in cyclic electron flow of light reaction of photosynthesis:

A) PQ
B) PC
C) Cytochrome complex
D) Fd

Q.66 As electrons move down the photosynthetic electron transport chain their energy goes on decreasing and is used by thylakoid membrane to produce:

A) ATP
B) Oxygen
C) Water
D) $NADH_2$

Q.67 The chemical energy for the synthesis of sugar during the Calvin cycle, is provided by the:

A) ATPs generated by light reactions
B) $NADH_2$ generated by light reactions
C) $FADH_2$ generated by light reactions
D) Oxygen generated by light reactions

Q.68 Pick up the correct flow of electrons in second electron transport chain of non-cyclic photophosphorylation:

A) NADP → Primary electron acceptor of PS-I → NADP → PS-I
B) PS-I → Fd → Primary acceptor of PS-I → NADP
C) PS-I → Primary acceptor of PS-I → NADP → Fd
D) PS-I → Primary acceptor of PS-I → Fd → NADP

Q.69 This pathway uses the photosystem-I, but not photosystem-II:

A) Non-cyclic photophosphorylation
B) Cyclic electron flow
C) Z-scheme
D) Non-cyclic electron flow

Q.70 During cyclic photophosphorylation ATP is generated by the:

A) Coupling of ETC by chemiosmosis
B) Involvement of chemiosmosis
C) Involvement of ETC
D) Oxidative phosphorylation

Q.71 The mechanism for ATP synthesis is chemiosmosis in:

A) Cyclic photophosphorylation
B) Non-cyclic photophosphorylation
C) Both cyclic and non-cyclic photophosphorylation
D) Z-scheme

Q.72 The details of path of carbon in dark reaction of photosynthesis were discovered by Melvin, Calvin and his colleagues at:

A) Oxford university

B) University of California

C) Cambridge university

D) Tubingen university

Q.73 The cyclic series of reactions, by which the carbon is fixed and reduced resulting in the synthesis of sugar is called:

A) Cyclic phosphorylation

B) Calvin cycle

C) Non-cyclic phosphorylation

D) Z-scheme

Q.74 First phase of Calvin cycle is:

A) Reduction of CO_2

B) Regeneration of CO_2 acceptor

C) Fixation of CO_2

D) Regeneration of RuBP

Q.75 The Calvin cycle begins when a molecule of CO_2 reacts with a highly reactive phosphorylated five carbon sugar named:

A) Ribulose bisphosphate

B) Ribulose diphosphate

C) Ribulose biphosphate

D) Ribose biphosphate

Q.76 During the first step of reduction phase of Calvin cycle following change occurs:

A) 3PGA $\xrightarrow{ATP \rightarrow ADP}$ 1, 3 BPGA

B) G.3.P $\longrightarrow$ RuBP

C) 1, 3 BPGA $\xrightarrow{NAD \longrightarrow NADH}$ G.3.P

D) G.3.P $\longrightarrow$ Starch

Q.77 The assimilatory and reducing powers synthesized in light reaction of photosynthesis are utilized in:

A) Fixation phase of Calvin cycle

B) Regeneration phase of Calvin cycle

C) Reduction phase of Calvin cycle

D) Condensation phase of Calvin cycle

Q.78 The phase of Calvin cycle in which less ATPs of light reaction are used is:

A) Fixation

B) Regeneration

C) Reduction

D) Reduction and Regeneration

Q.79 The number of CO_2, NADPH and ATP molecules respectively required for one Calvin cycle are:

A) 3, 6, 9 C) 12, 24, 36

B) 6, 12, 18 D) 24, 48, 72

Q.80 The number of CO_2, $NADPH_2$ and ATP molecules required to synthesize one maltose molecule from the output of Calvin cycle is respectively:

A) 3, 6, 9 C) 12, 24, 36

B) 6, 12, 18 D) 24, 48, 72

Q.81 The ratio of CO_2, $NADPH_2$ and ATP molecules required to synthesize one glucose molecule from the output of C_3 pathway is respectively:

A) 1, 2, 3 C) 6, 12, 18

B) 3, 6, 9 D) 12, 24, 36

Q.82 The ratio of CO_2, $NADPH_2$ and ATP molecules required for one calvin cycle is:

A) 1, 2, 3 C) 6, 12, 18

B) 3, 6, 9 D) 12, 24, 36

Q.83 The ratio of CO_2, $NADPH_2$ and ATP molecules required to synthesize starch from the output of Calvin cycle is:

A) 1, 2, 3 C) 6, 12, 18

B) 3, 6, 9 D) 12, 24, 36

Q.84 $3CO_2 + 6NADPH + 9ATP \longrightarrow (CH_2O)_3 + 6NADP + 9ADP + 9Pi + 3H_2O$

It is summary equation of:

A) Light reactions of photosynthesis

B) Photosynthesis

C) Dark reactions of photosynthesis

D) Respiration

ANSWER KEY (Worksheet-13(i))							
1	C	23	D	45	B	67	A
2	A	24	C	46	A	68	D
3	A	25	D	47	B	69	B
4	B	26	C	48	D	70	A
5	C	27	A	49	A	71	C
6	C	28	D	50	B	72	B
7	D	29	A	51	C	73	B
8	A	30	A	52	B	74	C
9	A	31	B	53	D	75	A
10	D	32	A	54	C	76	A
11	D	33	B	55	C	77	C
12	C	34	B	56	C	78	B
13	C	35	B	57	A	79	A
14	D	36	C	58	A	80	C
15	D	37	C	59	D	81	A
16	C	38	C	60	C	82	A
17	C	39	D	61	C	83	A
18	C	40	C	62	A	84	C
19	A	41	C	63	C		
20	C	42	D	64	D		
21	C	43	D	65	A		
22	C	44	B	66	A		

EXPLANATION

Q.1 Answer is "Membrane system and set of enzymes"

Explanation: Thylakoid membranes making grana and enzymes associated with photosynthesis, attached to these membranes, are suspended in stroma of chloroplast.

Q.2 Answer is "Thylakoid membranes"

Explanation: Each chlorophyll molecule is anchored in thylakoid membrane by means of its tail and head lies inside the lumen of thylakoids.

Q.3 Answer is "Thylakoid membranes"

Explanation: Thylakoid membranes sites for cyclic and non-cyclic photophosphorylation.

Q.4 Answer is "ATP and NADPH"

Explanation: It is assimilatory power (ATP) and reducing power (NADPH) respectively required for dark reaction.

Q.5 Answer is "Pigments"

Explanation: Pigments are such colored substances which absorb light.

Q.6 Answer is "Different wavelengths"

Explanation: As absorption spectra of pigments vary, they absorb light of different wavelengths.

Q.7 Answer is "Spectrophotometer"

Explanation: A spectrophotometer is used to measure relative abilities of different pigments to absorb different wavelengths of light.

Q.8 Answer is "Several kinds of pigments"

Explanation: Chlorophyll and other photosynthetic pigments like carotenes, xanthophylls, phycobilins are found embedded in the thylakoid membranes.

Q.9 Answer is "Red to orange"

Explanation: According to their absorption spectra carotenes are red to orange pigments.

Q.10 Answer is "Yellow and red to orange pigments"

Explanation: These are carotenoids i.e. carotenes and xanthophylls and they work as accessory pigments or antenna pigments to broaden the absorption and utilization of light by plants.

Q.11 Answer is "Bacteriochlorophyll"

Explanation: It is different from that of eukaryotic and even cyanobacterial chlorophyll.

Q.12 Answer is "Chlorophylls"

Explanation: Chlorophyll absorb blue and red wave lengths of light only.

Q.13 Answer is "Darker green color masks over the yellow color"

Explanation: Carotenoids are yellow and red to orange pigments which are masked over by green colored chlorophylls.

Q.14 Answer is "Flat and square shaped"

Explanation: It is porphyrin head made up of tetrapyrole rings.

Q.15 Answer is "Hydrophilic head of chlorophyll"

Explanation: The head of chlorophyll is hydrophilic but tail of chlorophyll is hydrophobic. Head consists of four pyrrole rings.

Q.16 Answer is "Four joined pyrrole rings"

Explanation: It is tetrapyrrole means four pyrrole rings, however collectively four pyrrole rings constitute a porphyrin.

Q.17 Answer is "Nitrogen of each pyrrole ring"

Explanation: An atom of magnesium is present in the centre of porphyrin ring and is coordinated with the nitrogen of each pyrrole ring.

Q.18 Answer is "Haem group"

Explanation: This is homology between hemoglobin and chlorophyll.

Q.19 Answer is "Iron as central atom"

Explanation: Haem have iron as central atom whereas porphyrin of chlorophyll have magnesium as central atom.

Q.20 Answer is "Phytol or hydrocarbon tail"

Explanation: It is a hydrocarbon tail also called phytol.

Q.21 Answer is "Thylakoid membrane by its tail"

Explanation: The chlorophyll molecule is embedded in hydrophobic core of thylakoid membrane, by its tail.

Q.22 Answer is "Functional group"

Explanation: It is methyl (CH_3) for chl. a and carbonyl (CHO) for Chl. b.

Q.23 Answer is "Hydrogen and oxygen atoms"

Explanation: Chl. a have two additional hydrogen atoms but one oxygen less, whereas Chl. b have one additional oxygen atom but two hydrogen atoms less.

Q.24 Answer is "Two less hydrogen atoms and one more O_2 atom"

Explanation: Chlorophyll a and chlorophyll b differ from each other in only one of the functional groups bonded to the porphyrin; the methyl group ($-CH_3$) in chlorophyll a is replaced by a terminal carbonyl group (-CHO) in chlorophyll b.

Q.25 Answer is "Two more hydrogen atoms and one less oxygen atom"

Explanation: Chlorophyll a have methyl group ($-CH_3$) whereas chlorophyll b have carbonyl group (-CHO). Thus, chlorophyll a have two more hydrogen atoms and one less oxygen atom.

Q.26 Answer is "Methyl group with carbonyl group"

Explanation: Chlorophyll a have methyl group ($-CH_3$) whereas chlorophyll b have carbonyl group (-CHO). Thus chlorophyll a have two more hydrogen atoms and one less oxygen atom.

Q.27 Answer is "Carbonyl group with methyl group"

Explanation: Chlorophyll a have methyl group ($-CH_3$) whereas chlorophyll b have carbonyl group (-CHO). Thus both can be converted into each other by changing functional groups.

Q.28 Answer is "Not absorbed, very effectively absorbed"

Explanation: Due to slight difference in their structure, the two chlorophylls shows slightly different colors. Some wavelengths not absorbed by chlorophyll a are very effectively absorbed by chlorophyll b and vice versa.

Q.29 Answer is "Structure, absorption spectra"

Explanation: Due to slight difference in their structure, the two chlorophylls show slightly different colors. Some wavelengths not absorbed by chlorophyll a are very effectively absorbed by chlorophyll b and vice versa.

Q.30 Answer is "Increase the range of wavelength being absorbed"

Explanation: Structural change changes the absorption spectrum.

Q.31 Answer is "Blue green"

Explanation: It is dark green.

Q.32 Answer is "Yellow – green"

Explanation: It is light green.

Q.33 Answer is "Chlorophyll – a"

Explanation: As reaction centre for light reaction of photosynthesis lies in it.

Q.34 Answer is "Chlorophyll – a"

Explanation: Chlorophyll a having primary reaction centre of light reaction of photosynthesis is directly involved in light reaction.

Q.35 Answer is "Chlorophyll – a"

Explanation: As the reaction centre of light reaction lies in chlorophyll a, so it is involved in conversion of solar energy into chemical energy.

Q.36 Answer is "Several forms"

Explanation: With respect to red absorbing peaks it may be at 670,680,690 and 700 nm.

Q.37 Answer is "All green plants and few algae"

Explanation: Chlorophyll b occurs in all green plants right from bryophytes to angiosperms but it is found only in euglenoids and chlorophyta as far as algae is concerned, however chlorophyll a is present in all photoautotrophs except bacteria.

Q.38 Answer is "Carbon tetrachloride and alcohol"

Explanation: As they are soluble in organic solvents.

Q.39 Answer is "Carotenoids & xanthophyll"

Explanation: As they absorb lights of different wavelengths other than that absorbed by chlorophyll – a and finally transfer it to chlorophyll a by bringing that into its absorptive range.

Q.40 Answer is "Carotenoids"

Explanation: It is as under;

Carotenoids → Chl. b → Chl. a

Q.41 Answer is "Carotenoids → Chlorophyll-b → Chlorophyll – a"

Explanation: Carotenoids and chlorophyll-b being antenna pigments transfer the light energy to chlorophyll-a where reaction centre lies.

Q.42 Answer is "Absorbing and dissipating excessive light energy"

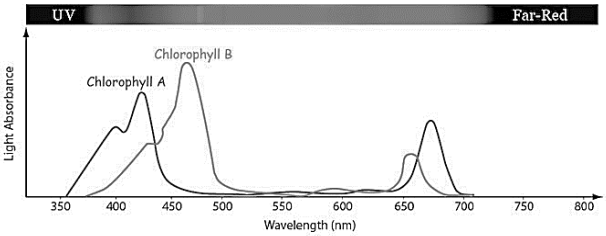
Explanation: This protection is provided to human eyes as well.

Q.43 Answer is "Chlorophyll a and human eyes"

Explanation: Carotenoids provide protection against intense light to chlorophyll-a and human eyes.

Q.44 Answer is "Blue and red parts of spectrum"

Explanation: Chlorophyll absorbs in these ranges maximum.



Q.45 Answer is "Two peaks one valley"

Explanation: One peak at blue and other at red wavelengths.

Q.46 Answer is "Absorption spectrum of chlorophyll a"

Explanation: One peak is near 430nm whereas other peak is near 670nm.

Q.47 Answer is "460-640"

Explanation: It is visible in the absorption spectrum of chlorophyll given in textbook of biology at page 212.

Q.48 Answer is "reduction of CO_2 and oxidation of water occurs"

Explanation: CO_2 is reduced to synthesize carbohydrate and hydrogen is removed from water which is used in reduction of CO_2.

Q.49 Answer is "Two phases"

Explanation: Light reaction and dark reaction.

Q.50 Answer is "Light reaction"

Explanation: It is ATP and NADPH respectively. ATP is assimilatory power and NADPH is reducing power.

Q.51 Answer is "Energized electrons"

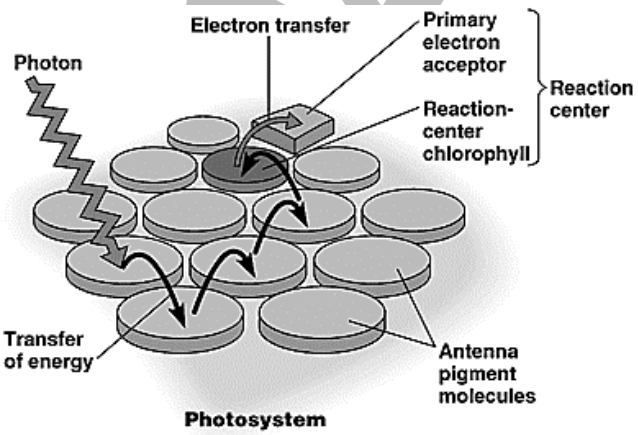
Explanation: These energized electrons are used as a source of energy in synthesis of sugar.

Q.52 Answer is "It does not requires light"

Explanation: It is dark reaction which uses the assimilatory power and reducing power synthesized in light reaction in reducing CO_2 to synthesize carbohydrates. It may occur in light as well as in dark.

Q.53 Answer is "Photosystems"

Explanation: Photosynthetic pigments are organized into clusters, called photosystems, for efficient absorption and utilization of solar energy in thylakoid membranes.



Q.54 Answer is "Antenna complex and a reaction centre"

Explanation: Each photosystem consists of a light gathering antenna complex and a reaction center. The antenna complex has many molecules of chlorophyll-a, chlorophyll-b and carotenoids, most of them channeling the energy to reaction center.

Q.55 Answer is "One or more molecules of chlorophyll a and primary electron acceptor"

Explanation: Reaction center of photosynthesis lies in chlorophyll a. It consists of one or more molecules of chlorophyll a along with a primary electron acceptor and associated electron carrier of electron transport system. Chlorophyll a molecules of reaction center and associated proteins are closely linked to the nearby electron transport system.

Q.56 Answer is "Answer PS-I and PS-II"

Explanation: PS-I was discovered earlier than PS-II.

Q.57 Answer is "700nm"

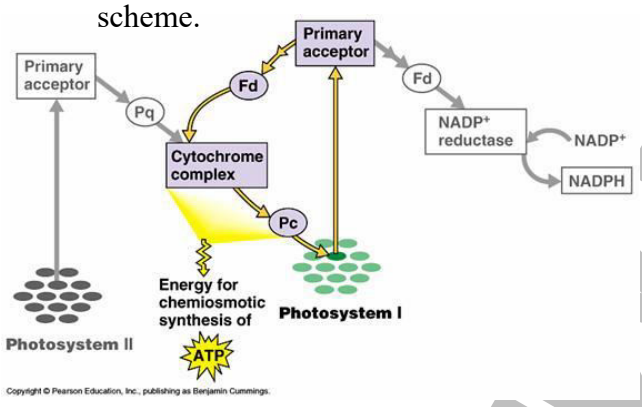
Explanation: This is absorptive range photosystem-I.

Q.58 Answer is "Primary electron acceptor"

Explanation: Chlorophyll a molecules of reaction center and associated proteins are closely linked to the nearby electron transport system.

Q.59 Answer is "Non-cyclic electron flow or Z-scheme"

Explanation: It is non-cyclic photophosphorylation also called Z-scheme.



Q.60 Answer is "Cyclic electron flow"

Explanation: It yields only ATPs

Q.61 Answer is "Non-cyclic phosphorylation"

Explanation: As same electrons are not cycled back again and again.

Q.62 Answer is "Cyclic phosphorylation"

Explanation: Same electrons are again and again cycled back and each time yield one ATP.

Q.63 Answer is "Photolysis of water"

Explanation: Photo means light and lysis means splitting up. So splitting up of water by light is called photolysis of water.

Q.64 Answer is "PQ → Cytochrome complex → PC"

Explanation: It is photosynthetic electron transport chain involved in non-cyclic phosphorylation.

Q.65 Answer is "PQ"

Explanation: Cyclic phosphorylation involves PS-I, primary electron acceptor of PS-I, Fd, cytochrome comple and PC.

Q.66 Answer is "ATP"

Explanation: It occurs through chemiosmosis in cytochrome complex.

Q.67 Answer is "ATPs generated by light reactions"

Explanation: ATP (assimilatory power) is synthesized in light reaction which is used later on in dark reaction to synthesize sugar.

Q.68 Answer is "PS-I → Primary acceptor of PS-I → Fd → NADP"

Explanation: It starts from PS-I and ends at formation of reducing power.

Q.69 Answer is "Cyclic electron flow"

Explanation: In cyclic phosphorylation only PS-I is involved.

Q.70 Answer is "Coupling of ETC by chemiosmosis"

Explanation: In both cyclic and non-cyclic photophosphorylation, the mechanism for ATP synthesis is chemiosmosis, the process that uses membranes to couple redox reactions to ATP production.

Q.71 Answer is "Both cyclic and non-cyclic photophosphorylation"

Explanation: Chemiosmosis is involved in both types of photophosphorylation.

Q.72 Answer is "University of California"

Explanation: Melvin Calvin and his colleagues at The University of California discovered the details of path of carbon in these reactions. He was awarded Nobel prize in 1961.

Q.73 Answer is "Calvin cycle"

Explanation: As discovered by Melvin Calvin. So it is called Calvin cycle

Q.74 Answer is "Fixation of CO_2"

Explanation: In first phase CO_2 is condensed with RuBP in presence of Rubisco. It is called fixation of CO_2.

Q.75 Answer is "Ribulose Bisphosphate"

Explanation: It is Ribulose 1, 5 bisphosphate.

Q.76 Answer is $\text{3PGA} \xrightarrow[\text{ATP ADP}]{} \text{1, 3 BPGA}$"

Explanation: In first stage of reduction phase assimilatory power is utilized and 3PGA is converted into 1,3 BPGA.

Q.77 Answer is "Reduction phase of Calvin cycle"

Explanation: However additional assimilatory power (ATPs) are also used in regeneration phase.

Q.78 Answer is "Regeneration"

Explanation: Only 3ATPs are used to regenerate 3RuBP from 5 G.3.P.

Q.79 Answer is "3,6,9"

Explanation: Observe the Calvin cycle.

Q.80 Answer is "12,24,36"

Explanation: As synthesis of glucose requires 6, 12, 18 molecules of CO_2, NADPH and ATPs respectively, maltose consists of two glucose molecules.

Q.81 Answer is "1,2,3"

Explanation: Ratio remains same.

Q.82 Answer is "1,2,3"

Explanation: It is 3:6:9 actually.

Q.83 Answer is "1,2,3"

Explanation: Ratio of input of Calvin Cycle will remain same.

Q.84 Answer is "Dark reaction of photosynthesis"

Explanation: Evident from inputs and outputs.

Worksheet-13(ii)

(Bioenergetics)

Q.1 **$C_6H_{12}O_6 \longrightarrow 2C_3H_4O_3$ + Energy. The given equation represents the:**

A) Oxidation of pyruvate

B) Glycolysis

C) Kreb's cycle

D) TCA cycle

Q.2 **Biologists believe that in the first cell that was organized on earth, a reaction may have occurred which was identical to:**

A) Oxidation of pyruvate

B) Glycolysis

C) Kreb's cycle

D) TCA cycle

Q.3 **Cellular respiration depending upon the type of the cell and prevailing conditions varies from the step after:**

A) Oxidation of pyruvate

B) Citric acid cycle

C) Glycolysis

D) Oxidative phosphorylation

Q.4 **Pyruvate, the end product of glycolysis, follows different catabolic pathways depending on the:**

A) Organism

B) Metabolic conditions

C) Size of organism

D) Organism and metabolic conditions

Q.5 **Alcoholic fermentation, lactic acid fermentation and aerobic respiration are the three ways for the processing of:**

A) Pyruvate in the cell

B) Glucose in the cell

C) Acetate in the cell

D) Organic food in cell

Q.6 **What occurs in the absence of oxygen:**

A) Alcoholic fermentation

B) Respiratory electron transport chain

C) Lactic acid fermentation

D) Alcoholic and lactic acid fermentation

Q.7 **Pick up the one which is anaerobic:**

A) Fermentation

B) Oxidative phosphorylation

C) Respiratory chain

D) Krebs cycle

Q.8 **Glucose is completely broken down only in the:**

A) Aerobic respiration

B) Cellular respiration

C) Internal respiration

D) External respiration

Q.9 **During aerobic respiration glucose is oxidized to:**

A) CO_2 C) CO_2 and water

B) H_2O D) CO_2 and energy

Q.10 **During aerobic respiration glucose is oxidized to carbon dioxide and water and:**

A) Energy is consumed

B) Light is consumed

C) Energy is released

D) Light is produced

Q.11 **This form of anaerobic respiration occurs in muscle cells of humans and other animals during extreme physical activities, such as sprinting:**

A) Alcoholic fermentation

B) Aerobic respiration

C) Anaerobic respiration

D) Lactic acid fermentation

Q.12 Cristae are part of:

A) Chloroplast

B) Endoplasmic reticulum

C) Mitochondrion

D) Golgi apparatus

Q.13 A large "battery" of _____ slowly release energy from the glucose molecules.

A) Organelles

B) Coenzymes

C) Enzymes

D) Enzyme and coenzymes

Q.14 A compound found in every living cell and is one of the essential chemicals of life. It plays a key role in most biological energy transformations. It is:

A) NADH C) ATP

B) FADH D) Glucose

Q.15 Conventionally, 'P' stands for the:

A) Phosphorus atom

B) Entire phosphate group

C) Phosphorus element

D) Phosphorus acid

Q.16 A far more free energy is released when bond of _____ phosphate of ATP is broken by hydrolysis:

A) First C) Third

B) Second D) Second and third

Q.17 What enables the cell to accumulate a great quantity of energy in very small space and keeps it ready for use as soon as it is needed:

A) High energy 'P' bond

B) High energy bonds of organic food

C) High energy bonds of glucose

D) High energy bonds of lipids

Q.18 The maintenance of a living system requires a:

A) Continuous supply of free energy

B) Continual supply of free energy

C) Continuously increasing supply of free energy

D) Continuously decreasing supply of free energy

Q.19 Cellular respiration is essentially:

A) Oxidation process

B) Redox process

C) A reduction process

D) Decarboxylation process

Q.20 Cellular respiration is also called as:

A) Internal respiration

B) Biological oxidation

C) Organismic respiration

D) Internal respiration and biological oxidation

Q.21 The breakdown of glucose in cell yields pyruvate in the:

A) Presence of oxygen

B) Absence of oxygen

C) Presence or absence of oxygen

D) High Conc. of oxygen

Q.22 Following are the requirements for glycolysis to occur in the cytoplasm EXCEPT:

A) Glucose

B) ATP

C) Enzymes and Coenzymes

D) FAD

Q.23 The first step of glycolysis is the transfer of a phosphate group from:

A) ATP to glucose C) G.3.P to ATP

B) ATP to fructose D) ATP to G.3.P

Q.24 The product of second step of glycolysis:

A) Glucose 6-phosphate

B) Fructose 1, 6 Bisphosphate

C) Fructose 6-phosphate

D) Glucose

Q.25 The second ATP is consumed in _____ step of glycolysis.

A) First C) Third

B) Second D) Fourth

Q.26 The product of third step of glycolysis is:

A) Glucose

B) Fructose 6-phosphate

C) Glucose 6-phosphate

D) Fructose 1, 6-biphosphate

Q.27 The product(s) of fourth step of glycolysis is:

A) G.3.P

B) 3PGAL

C) Dihydroxyacetone phosphate

D) G.3.P/3PGAL and Dihydroxyacetone phosphate

Q.28 Pick up the energy yielding process of glycolysis:

A) Oxidation of PGAL

B) Reduction of PGAL

C) Phosphorylation of PGAL

D) Reduction of 3-PG

Q.29 The step of glycolysis in which removal of a water molecule is carried out is:

A) 3PG $\rightarrow$ 2PG C) PEP $\rightarrow$ Pyruvate

B) 2PG $\rightarrow$ PEP D) 1,3 BPG $\rightarrow$ 3PG

Q.30 What is equivalent to half glucose molecule that has been oxidized to the extent of losing two electrons as hydrogen atoms:

A) G.3.P C) 3PGAL

B) 3-PG D) Pyruvate

Q.31 During aerobic respiration, the chemical substance that enters the mitochondrion to start Krebs cycle is:

A) Pyruvic acid C) Acetic acid

B) Acetyl CO-A D) Citric acid

Q.32 Before start of Krebs cycle, following changes occur, EXCEPT:

A) Formation of acetyl-Co-A

B) Oxidation of acetate

C) Reduction of NAD

D) Decarboxylation of pyruvate

Q.33 Krebs cycle is a cyclic series of chemical reactions during which:

A) Oxidation process is completed

B) Decarboxylation process is completed

C) Reduction process is completed

D) Energy consuming process is completed

Q.34 In first step of Krebs cycle following changes occur, EXCEPT:

A) Formation of citrate

B) Condensation of oxaloacetate and acetyl Co-A

C) Hydration and decondensation of Co-A

D) Decarboxylation and condensation of Co-A

Q.35 In Kreb's cycle, for formation of α-ketogluterate, following changes occur, EXCEPT:

A) NAD – mediated oxidation

B) Formation of NADH

C) Decarboxylation

D) Hydration

Q.36 FAD is reduced to get $FADH_2$ in a step of Krebs cycle which involves conversion of:

A) Succinate to fumarate

B) Malate to oxaloacetate

C) Fumarate to malate

D) α-ketogluterate to succinate

Q.37 Succinate is converted into fumarate by removal of:

A) A hydrogen atom

B) A CO_2 atom

C) Two hydrogen atoms

D) A water molecule

Q.38 Rearrangement followed by a second ATP phosphorylation involves step no. _____ of glycolysis.

A) 1 C) 3

B) 2 D) 2, 3

Q.39 In glycolysis, the six-carbon molecule is split into G-3-P and DAP, then DAP is also converted into G-3-P in step no. _____.

A) 2 & 3 C) 4 & 5

B) 3 & 4 D) 5 & 6

Q.40 In glycolysis, oxidation followed by phosphorylation produces two NADH molecules and two molecules of BPG, in step no.

A) 4 C) 6

B) 5 D) 7

Q.41 The step of glycolysis that involves removal of high energy phosphate by two ADP molecules to get two ATP molecules and two 3PGA molecules is:

A) Step – 4 C) Step – 6

B) Step – 5 D) Step – 7

Q.42 Removal of high energy phosphate by two ADP molecules produces two ATP molecules and two pyruvate molecules in step no. ____ of glycolysis.

A) 7 C) 9

B) 8 D) 10

Q.43 The oxidation – reduction substances which take part in respiratory chain are following EXCEPT:

A) Coenzyme Q

B) Molecular oxygen

C) Cytochromes b, c, a and a_3

D) Cytochrome f

Q.44 In respiratory electron transport chain the first ATP is formed from ADP and inorganic phosphate, utilizing the free energy obtained by oxidation of :

A) NADH C) Coenzyme Q

B) FADH D) Cytochrome C

Q.45 In respiratory electron transport chain coenzyme – Q is reduced by:

A) NADH C) Cytochrome - C

B) FADH D) Cytochrome - a

Q.46 In respiratory electron transport chain cytochrome – b is reduced by:

A) NADH C) Cytochrome - C

B) FADH D) Coenzyme - Q

Q.47 In respiratory electron transport chain cytochrome – a is reduced by oxidation of:

A) NADH C) Cytochrome - C

B) FADH D) Coenzyme - Q

Q.48 In respiratory electron transport chain the third ATP is produced by the oxidation of:

A) NADH C) Cytochrome - c

B) Cytochrome - b D) Cytochrome - a_3

Q.49 Normally oxidative phosphorylation is coupled with the:

A) Photosynthetic electron transport chain

B) Non-cyclic electron transport chain

C) Respiratory electron transport chain

D) Cyclic electron transport chain

Q.50 **$NADH + H^+ + 3ADP + 3Pi + ½ O_2 \longrightarrow 3NAD^+ + H_2O + 3ATP$. The equation has summarized:**

A) Glycolysis

B) Respiratory chain

C) Kreb's cycle

D) Photosynthetic electron transport chain

Q.51 **Pumping of protons (H^+) across the inner membrane of mitochondrion folded into cristae, between matrix of mitochondrion and mitochondrion's intermembrane space occur for chemiosmosis of:**

A) Oxidative phosphorylation

B) Cyclic phosphorylation

C) Photophosphorylation

D) Non-cyclic phosphorylation

Q.52 **Accumulation of NADH inhibits the Krebs cycle by inhibiting:**

A) Phosphoglucokinase

B) Pyruvate decarboxylase

C) Phosphofructokinase

D) Pyruvate dehydrogenase

Q.53 **Glycolysis is inhibited by inhibition of phosphofructokinase through feedback mechanism by accumulation of _____ in mitochondrion.**

A) Citrate

B) Oxaloacetate

C) Succinate

D) Adenosine triphosphate

Q.54 **The final phase of cellular respiration in which the compounds NADH and $FADH_2$ are oxidized and their electrons pass along a chain of oxidation reduction steps is called:**

A) Electron transport chain

B) Non-cyclic photophosphorylation

C) Cyclic photophosphorylation

D) Z – scheme

Q.55 **The first of the two distinctive sets of reactions in photosynthesis in which light energy is required to oxidize water and O_2 is released, is called:**

A) Light independent reaction

B) Light reaction

C) Calvin cycle

D) Dark reaction

Q.56 **The second stage of photosynthesis , in which carbon dioxide is reduced to carbohydrate and which occurs whether light is present or not, is called:**

A) Light reaction

B) Light dependent reaction

C) Light independent reaction

D) Synthesis of ATP and $NADPH_2$

Q.57 **The removal of electrons from an atom or compound is called:**

A) Reduction

B) Oxidative phosphorylation

C) Oxidation

D) Oxidation-reduction reaction

Q.58 **The condition in which reduced metabolic products comprising the "dept" accumulate due to inability of oxidative metabolism to function rapidly enough. The "debt" is payed off when the metabolism that produces reduced products slows. This is called:**

A) Electron debt C) Hydrogen debt

B) Oxygen debt D) Carbon debt

Q.59 **The two basic molecular systems for converting light to chemical energy during photosynthesis are called:**

A) Photosystem I and II

B) Light systems

C) Pigment systems

D) PS 660 and PS 730

Q.60 The hydrogen ions move down their gradient from thylakoid space to outside through special complexes found in thylakoid membrane called:

A) Ferredoxine

B) ATP synthase

C) Cytochrome complex

D) Plastoquinone

Q.61 A process of CO_2 fixation in photosynthesis by which the first product is the four-carbon oxaloacetate molecule is called:

A) C_3 photosynthesis

B) C_4 photosynthesis

C) Light reaction

D) Cyclic electron flow

ANSWER KEY (Worksheet-13(ii))					
1	B	23	A	45	A
2	B	24	C	46	D
3	C	25	C	47	C
4	D	26	D	48	D
5	A	27	D	49	C
6	D	28	A	50	B
7	A	29	B	51	A
8	A	30	D	52	B
9	C	31	C	53	A
10	C	32	B	54	A
11	D	33	A	55	B
12	C	34	D	56	C
13	D	35	D	57	C
14	C	36	A	58	B
15	B	37	C	59	A
16	D	38	D	60	B
17	A	39	C	61	B
18	B	40	C		
19	A	41	D		
20	D	42	D		
21	C	43	D		
22	D	44	A		

EXPLANATION

Q.1 Answer is "Glycolysis"

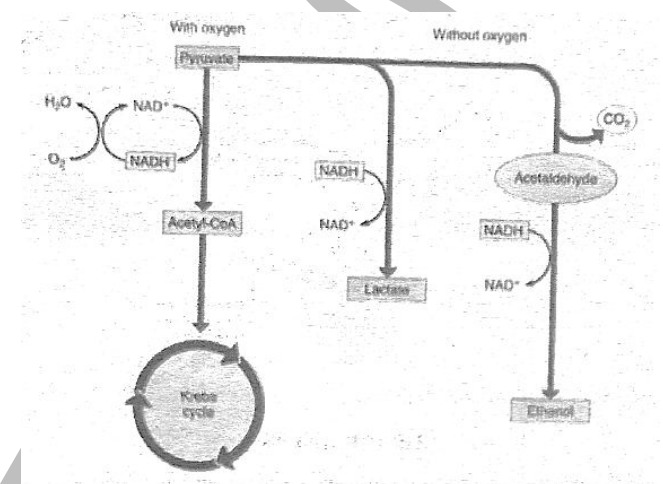
Explanation: It indicates formation of two molecules of pyruvate from one molecule of glucose.

Q.2 Answer is "Glycolysis"

Explanation: Glycolysis is such a process which is found in both prokaryotes and eukaryotes. It occurs in cytoplasm. Without glycolysis there is no other option for provision of energy to the cell.

Q.3 Answer is "Glycolysis"

Explanation: If aerobic conditions prevail after glycolysis it will follow the path of oxidation of pyruvate and Kreb's cycle otherwise it will follow the path of lactic acid fermentation or alcoholic fermentation.



Q.4 Answer is "Organism and metabolic condition"

Explanation: In prokaryotes, membranous organelles like mitochondria are absent. Thus, they follow the path of anaerobic respiration after completion of glycolysis. However, eukaryotes having membranous organelles like mitochondria carryout aerobic respiration. Similarly, in aerobic conditions aerobic respiration is possible but in anaerobic conditions, after glycolysis there is only option of anaerobic respiration.

Q.5 Answer is "Pyruvate in cell"

Explanation: After glycolysis cell gets two molecules of pyruvate. After formation of pyruvate there comes oxidation of pyruvate and Krebs cycle, if oxygen is present and fermentation (Alcoholic or lactic acid fermentation) occurs, if oxygen is absent.

Q.6 Answer is "Alcoholic and lactic acid fermentation"

Explanation: Both alcoholic fermentation and lactic acid fermentation occur in absence of oxygen. It is also called anaerobic respiration.

Q.7 Answer is "Fermentation"

Explanation: Fermentation is an anaerobic process which is also called as anaerobic respiration.

Q.8 Answer is "Aerobic respiration"

Explanation: Anaerobic respiration is a sheer wastage of resources and is opted as necessary evil. It yields only 2% of the total potential energy. However, aerobic respiration yield maximum energy.

Q.9 Answer is "CO_2 and water"

Explanation: These are the end products of aerobic respiration along with energy.

$$C_6H_{12}O_6 + 6O_2 \Rightarrow 6CO_2 + 6H_2O + ATP$$

Glucose Oxygen Carbon Dioxide Water Energy

Q.10 Answer is "Energy is released"

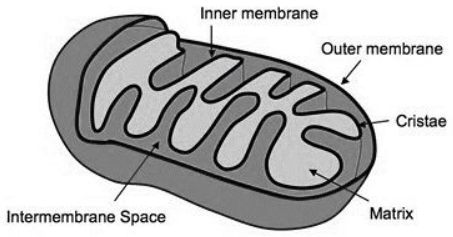
Explanation: During aerobic respiration glucose is broken down in the presence of oxygen into carbon dioxide and water and energy is produced. See the explanation of Q No. 9.

Q.11 Answer is "Lactic acid fermentation"

Explanation: As oxygen cannot be provided according to the demand in such situations and due to this deficit in demand and supply of oxygen muscles have to start anaerobic respiration to supplement the energy.

Q.12 Answer is "Mitochondria"

Explanation: Each mitochondrion is constructed of an outer enclosing membrane and an inner membrane with elaborate folds or cristae that extend into the interior of the organelle.



Q.13 Answer is "Enzymes and coenzymes"

Explanation: Aerobic respiration being a long pathway involves many enzymes and coenzymes.

Q.14 Answer is "ATP"

Explanation: That is why it is called energy currency of the cell.

Q.15 Answer is "Entire phosphate group"

Explanation: Conventionally, "P" stands for the entire phosphate group. The second and third phosphate represent the so called "high energy" bonds. If these are broken by hydrolysis far more free energy is released as compared to the other bond in the ATP molecule.

Q.16 Answer is "Second and third"

Explanation: The second and third phosphate represent the so called "high energy" bonds.

Q.17 Answer is "High energy 'p' bond"

Explanation: The energy of organic food is extracted from its bonds through aerobic respiration and is called ATP (in high energy 'p' bond).

Q.18 Answer is "Continual supply of free energy"

Explanation: Continual supply means rhythmic supply after equal time intervals but does not mean persistant supply or unabated supply.

Q.19 Answer is "Oxidation process"

Explanation: It is stepwise oxidative breakdown of organic food to get energy.

Q.20 Answer is "Internal respiration or biological oxidation"

Explanation: Cellular respiration is called internal respiration and biological oxidation of glucose to get energy.

Q.21 Answer is "Presence or absence of oxygen"

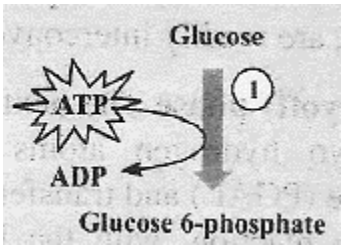
Explanation: As glycolysis does not need oxygen.

Q.22 Answer is "FAD"

Explanation: FAD (Flavin adenine dinucleotide) have nothing to do with glycolysis.

Q.23 Answer is "ATP to glucose"

Explanation: As a result Glucose 6-phosphate is formed.

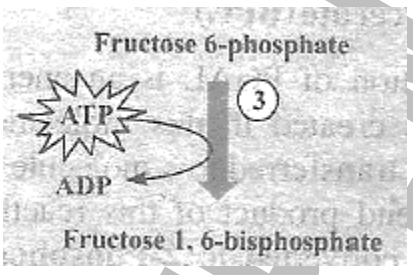


Q.24 Answer is "Fructose 6-phosphate"

Explanation: Aldohexose (glucose 6 phosphate) is transformed into ketohexose (fructose 6 phosphate).

Q.25 Answer is "Third"

Explanation: It is formation of fructose 1, 6 bisphosphate from fructose 6 phosphate.

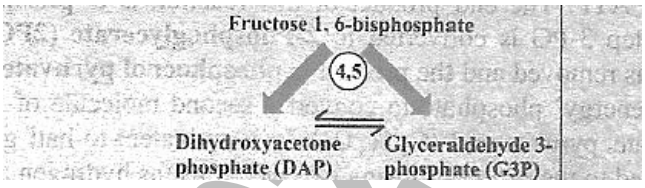


Q.26 Answer is "Fructose 1,6 bisphosphate"

Explanation: As one ATP is again consumed.

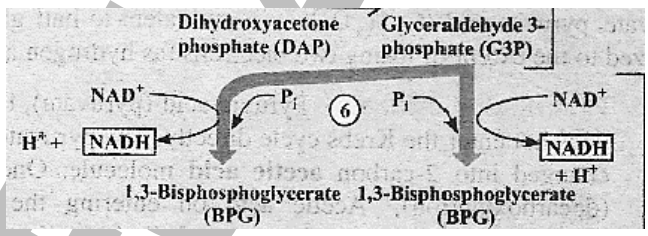
Q.27 Answer is "G.3.P/3PGAL and dihydroxyacetone phosphate"

Explanation: As fructose 1, 6 bisphosphate is cleaved to yield two trioses i.e. Glyceraldehyde 3 phosphate and dihydroxyacetone phosphate.



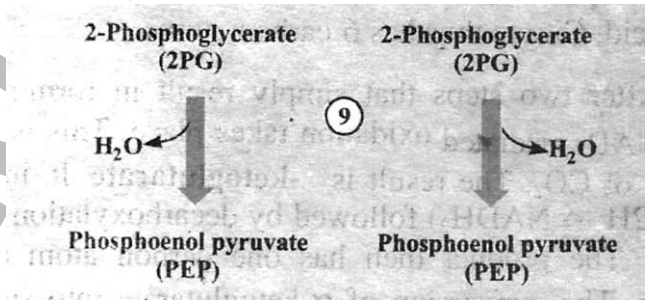
Q.28 Answer is "Oxidation of PGAL"

Explanation: NAD is reduced by oxidation of PGAL and $NADH^+$ is formed.



Q.29 Answer is "2PG → PEP"

Explanation: Dehydration occurs during the formation of phosphenol pyruvate from 2 phosphoglyceraldehyde.



Q.30 Answer is "Pyruvate"

Explanation: It occurs during oxidation of pyruvate. Pyruvic acid (pyruvate) the end product of glycolysis does not enter the Krebs cycle directly. The pyruvate (3-carbon molecule) is first changed into 2-carbon acetic acid molecule. One carbon is released as CO_2 coenzyme-A (CoA) to form acetyl CoA (Active acetate). In addition, more hydrogen atoms are transferred to NAD.

Q.31 Answer is "Acetic acid"

Explanation: Acetic acid on entering the mitochondrion unites with Coenzyme A to form acetyl Co-A.

Q.32 Answer is "Oxidation of acetate"

Explanation: Oxidation of pyruvate takes places not that of acetate.

Q.33 Answer is "Oxidation process is completed"

Explanation: Oxidative breakdown of organic food is completed.

Q.34 Answer is "Decarboxylation and condensation of Co-A"

Explanation: Other three changes given in A), B) and C) occur in first step of Krebs cycle except decarboxylation and condensation of Co-A.

Q.35 Answer is "Hydration"

Explanation: No hydration occurs in this step.

Q.36 Answer is "Succinate to fumarate"

Explanation: The succinate is oxidized to get fumarate in presence of succinic acid dehydrogenase enzyme.

Q.37 Answer is "Two hydrogen atoms"

Explanation: Succinate is converted into fumarate and two hydrogen atoms are removed. The process is catalyzed by succinic acid dehydrogenase.

Q.38 Answer is "2, 3"

Explanation: Step 2 involves rearrangement i.e. formation of Fructose 6-phosphate from glucose 6-phosphate; and 3 involves ATP phosphorylation.

Q.39 Answer is "4-5"

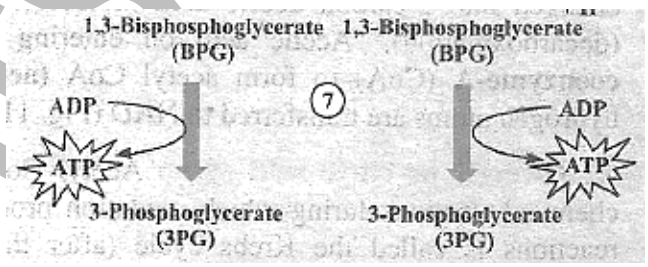
Explanation: Fructose 1, 6 bisphosphate splits up into glyceroldehyde 3.phosphate and dihydroxyacetone phosphate during step no.4 of glycolysis which is followed by step no.5 in which dihydroxyacetone phosphate is also converted into glyceraldehyde three phosphate (G.3.P). See explanation of question # 27

Q.40 Answer is "6"

Explanation: In step no. 6 of glycolysis two molecules of G3P are oxidized and two molecules of NAD are reduced (NADH) and as a result two molecules of 1, 3 bisphosphoglycerate are formed. See the explanation of question # 28.

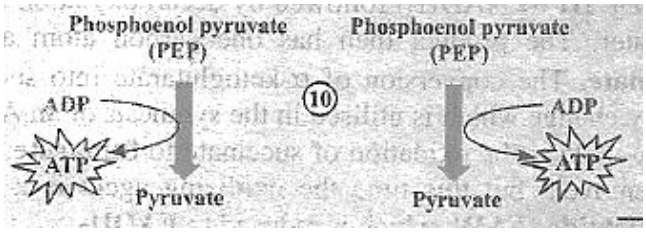
Q.41 Answer is "Step 7"

Explanation: In step no. 7 of glycolysis, two molecules of 1, 3 bisphosphoglycerate are dephosphorylated, two molecules of ADP are phosphorylated to get two ATPs and as a result two molecules of 3PGA are formed.



Q.42 Answer is "10"

Explanation: In step no. 10 of glycolysis two molecules of phosphoenol pyruvate (PEP) are converted into two molecules of pyruvate and two molecules of ATP are formed.



Q.43 Answer is "Cytochrome f"

Explanation: Cytochrome b6f, commonly called as cytochrome f is involved in photosynthesis to mediate the transfer of electron between the two photosynthetic reaction center complexes, from photosystem II to photosystem I, while transferring protons from the chloroplast stroma across the thylakoid membrane into the lumen.

Q.44 Answer is "NADH"

Explanation: It is first step of respiratory electron transport chain in which NADH is oxidized by coenzyme Q. This oxidation yields enough free energy to permit the synthesis of a molecule of ATP from ADP from ADP and inorganic phosphate.

Q.45 Answer is "NADH"

Explanation: As NADH stands at higher energy level and electron move from higher to lower energy level, thus NADH is oxidized and coenzymes Q is reduced.

Q.46 Answer is "Coenzyme – Q"

Explanation: Cytochrome-b is reduced by electrons which are released by the oxidation of coenzyme Q.

Q.47 Answer is "Cytochrome – C"

Explanation: Cytochrome-a is reduced by cytochrome c which is oxidized and electrons are used to reduced cytochrome a.

Q.48 Answer is "Cytochrome a_3"

Explanation: When cytochrome a_3 is oxidized and O_2 is reduced to form water, electrons release some free energy to come to the lower energy state and as a result ADP is phosphorylated into ATP by inorganic phosphate using that free energy.

Q.49 Answer is "Respiratory electron transport chain"

Explanation: There are three different sites where oxidative phosphorylation occurs to yield three ATP molecules during respiratory electron transport chain.

Q.50 Answer is "Respiratory chain"

Explanation: This is summary equation of respiratory electron transport chain.

Q.51 Answer is "Oxidative phosphorylation"

Explanation: The organelle (mitochondrion) clearly indicates it.

Q.52 Answer is "Pyruvate decarboxylase"

Explanation: If pyruvate decarboxylase is inhibited acetate formation and subsequently Acetyl Co. A formation will be stopped. As a result Kreb's cycle will be stopped from the beginning. It is called negative feedback or feedback inhibition.

Q.53 Answer is "Citrate"

Explanation: See Book-I page # 299 fig. 11.15.

Q.54 Answer is "Electron transport chain"

Explanation: It is respiratory electron transport chain also called oxidative phosphorylation.

Q.55 Answer is "Light reaction"

Explanation: It is light reaction or photophosphorylation which uses light energy for photolysis of water in which oxygen is released.

Q.56 Answer is "Light independent reaction"

Explanation: Light independent phase also called as dark reaction or Calvin cycle is that phase which uses the reducing power and assimilatory powers (made in light reaction) to reduce CO_2 and to synthesized glucose.

Q.57 Answer is "Oxidation"

Explanation: Removal of electrons is oxidation while addition of electrons is reduction.

Q.58 Answer is "Oxygen debt"

Explanation: It have been taken from glossary of text book of biology book-I. It is definition of oxygen debt.

Q.59 Answer is "Photosystem-I and photosystem-II"

Explanation: Photosystems convert light energy into chemical energy.

Q.60 Answer is "ATP synthase"

Explanation: ATP synthase is an important enzyme that creates the energy storage molecules adenosine triphosphate (ATP). ATP is the most commonly used "energy currency" of cells from most organisms.

Q.61 Answer is "C_4 photosynthesis"

Explanation: A photosynthetic process which proceeds in the mesophyll and bindle sheath cells of C_4 plants.

STEP

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