

Chapter: 13

Gaseous Exchange

Objective

- Only left aortic arch is present in:
☐ (A) Crow ☒ (B) Mammals ☐ (C) Cockroach ☐ (D) Birds
- The volume of air taken inside the lungs and expelled during exercise is about liters.
☒ (A) 3.5 ☐ (B) 2.5 ☐ (C) 1.5 ☐ (D) 4.5
- During breathing no state of air remains in the lungs of:
☐ (A) Birds ☒ (B) Mammals ☐ (C) Amphibian ☐ (D) Reptiles
- Which is correct order of parts of air passage ways in man:
☐ (A) Nasal cavity , Nostrils , Pharynx , Larynx ☐ (B) Nasal cavity , Pharynx , Nostrils , Larynx
☒ (C) Nostrils , Nasal cavity , Pharynx , Larynx ☐ (D) Nostrils , Pharynx , Larynx , Nasal cavity
- Blood is not involved in transport of gas in:
☐ (A) Man ☒ (B) Insects ☐ (C) Frog ☐ (D) Fish
- Tiny thin walled ducts called parabronchi are present in the lungs of:
☐ (A) Reptiles ☐ (B) Amphibians ☐ (C) Mammals ☒ (D) Birds
- Lungs of birds have thin walled ducts called:
☐ (A) Bronchi ☒ (B) Parabronchi ☐ (C) Trachea ☐ (D) Alveoli
- Syrinx is organ of voice in:
☒ (A) Birds ☐ (B) Mammals ☐ (C) Reptiles ☐ (D) Amphibian
- Parabronchii are present in:
☐ (A) Mammals ☐ (B) Reptiles ☒ (C) Birds ☐ (D) Fishes
- In earthworm exchange of gases mainly takes place through:
☐ (A) Ostia ☐ (B) Lungs ☒ (C) Skin ☐ (D) Gills
- have most efficient respiratory system.
☐ (A) Mammals ☒ (B) Birds ☐ (C) Amphibians ☐ (D) Fish
- The left systemic arch disappears in:
☐ (A) Fishes ☐ (B) Reptiles ☒ (C) Birds ☐ (D) Amphibians
- The number of air sacs in most birds are:
☐ (A) 08 ☒ (B) 09 ☐ (C) 07 ☐ (D) 06
- Respiratory organs in fish are:
☐ (A) Fins ☐ (B) Skin ☒ (C) Gills ☐ (D) Lungs
- The amount of Carbon dioxide present in air is about:
☐ (A) 0.01 to 0.02 % ☒ (B) 0.04 to 4 % ☐ (C) 0.03 to 0.04 % ☐ (D) 0.05 to 0.07 %
- Which one is an insect?
☐ (A) Hag fish ☐ (B) Cuttle fish
☒ (C) Silver fish ☐ (D) Star fish

17. Single circuit heart is present in:

- (A) Amphibians (B) Reptiles **(C) Fishes** (D) Mammals

18. Spiracles are found in:

- (A) Fish (B) Leech **(C) Cockroach** (D) Earthworm

19. The heart of fishes is:

- (A) Multi circuit **(B) Single circuit** (C) Double circuit (D) Triple circuit

20. Number of spiracles in cockroach is:

- (A) 7 **(B) 10** (C) 9 (D) 8

21. Organ of voice in birds is called as:

- (A) Pharynx (B) Tongue **(C) Syrinx** (D) Larynx

22. Most elaborate and efficient respiratory system is present in:

- (A) Reptiles (B) Fish (C) Man **(D) Birds**

23. During inspiration the space inside the chest cavity is:

- (A) Decreases **(B) Increases** (C) Both A & B (D) None of these

24. Outward and upward movement of the ribs causes increase in the chest cavity and reduces:

- (A) Pressure** (B) Space (C) Both A & B (D) None of these

25. With the expansion of the lungs vacuum is created inside the lungs in which the air rushes from the outside is called:

- (A) Digestion (B) Expiration **(C) Inspiration** (D) None of these

26. During the muscles of ribs are relaxed and the ribs move downward and inward.

- (A) Inspiration (B) Both A & C **(C) Expiration** (D) None of these

27. When lungs are the air inside lungs moves out of the lungs and this is expiration.

- (A) Relax (B) Dilation (C) None of these **(D) Contracted**

28. Respiratory distress syndrome is common in:

- (A) Premature infants** (B) Infants (C) Adults (D) None of these

29. of oxygen in and carbon dioxide out occurs because of difference in partial pressures of these gases.

- (A) Digestion (B) Effusion **(C) Diffusion** (D) None of these

30. Blood in the lungs is separated from the alveolar air by extremely thin membranes of the and alveoli.

- (A) Bronchi (B) Veins **(C) Capillaries** (D) Villi

31. Why haemoglobin is 98 % saturated, the oxygen content per 100 ml of blood is:

- (A) 18.6 ml **(B) 19.6 ml** (C) 17.6 ml (D) 16.6 ml

32. In human being the respiratory pigment is:

- (A) Haemocyanin **(B) Haemoglobin** (C) Biliverdin (D) Myoglobin

33. The maximum amount of oxygen which normal human blood absorbs and carries at the sea - level is about of blood.

- (A) 40 ml / 100 ml (B) 100 ml / 20 ml (C) None of these **(D) 200 ml / 100 ml**

34. When oxygen pressure falls below mercury , as in many cells and tissues , the oxygen saturation of haemoglobin decreases very sharply.
 (A) 20 mm **(B) 60 mm** (C) 40 mm (D) None of these
35. When carbon dioxide pressure increases , the oxygen tension:
 (A) Increase (B) Both A & C **(C) Decrease** (D) None of these
36. Increased carbon dioxide tension favours the greater liberation offrom the blood to the tissue.
 (A) Sulphur **(B) Oxygen** (C) Carbon mono oxide (D) None of these
37. Carboxyhaemoglobin is formed when carbon dioxide combines with of haemoglobin.
 (A) Easter group **(B) Amino group** (C) Oxygen (D) None of these
38. About carbon dioxide is carried as bicarbonate ion combined with sodium in the plasma.
 (A) 50 % (B) 20 % (C) 80 % **(D) 70 %**
39. The splits quickly and ionizes to produce hydrogen ions and bicarbonate ions.
 (A) Carbonylic acid **(B) Carbonic acid** (C) Hydrochloric acid (D) None of these
40. Carbon dioxide per 100 ml of venous blood is:
 (A) 99 ml (B) 98 ml **(C) 54 ml** (D) 50 ml
41. Arterial blood contains about of carbon dioxide per 100 ml of blood.
 (A) 70 ml (B) 90 ml **(C) 50 ml** (D) 80 ml
42. 4 ml of carbon dioxide per 100 ml of blood as it passes through the:
 (A) Kidney (B) Liver **(C) Lungs** (D) None of these
43. Asthma is associated with severe paroxysm of difficult:
 (A) Walking (B) Spreading **(C) Breathing** (D) Sleeping
44. Respiratory distress syndrome is common in:
 (A) Adults (B) Old age people (C) All new borns **(D) Premature infants**
45. Smoking especially in young adults is the most potential threat of:
 (A) Kidney cancer **(B) Lung cancer** (C) Throat cancer (D) None of these
46. It is now estimated that of lung cancer is caused by smoking.
 (A) 20 % (B) 80 % **(C) 90 %** (D) 10 %
47. Tuberculosis is caused by:
 (A) Smoking (B) Streptococcus (C) None **(D) Mycobacterium tuberculosis**
48. Asthma results in the release of inflammatory chemicals such asinto the circulatory System.
 (A) Trypsin **(B) Histamine** (C) Histone (D) None of these
49. How many molecules of oxygen can bind with a molecule of myoglobin:
(A) 01 (B) 02 (C) 03 (D) 04
50. Haemoglobin in man increase the oxygen carrying capacity of the blood to about:
 (A) 20 times **(B) 75 times** (C) 50 times (D) None of these

51. Air spaces between mesophyll cells of a leaf comprises of the total volume.
(A) 50 % (B) 40 % (C) 30 % (D) 20 %
52. Respiratory pigment present in muscles is called:
(A) Globin (B) Haemoglobin (C) Haemocyanins (D) Myoglobin
53. Blood contains oxygen when haemoglobin is 98% saturated per 100 ml of blood:
(A) 17.6 ml (B) 18.6 ml (C) 19.6 ml (D) 16.6 ml
54. How much air lungs can hold when they are fully inflated:
(A) 5 litres (B) 4 litres (C) 4.5 litres (D) 3.5 litres
55. Water is more viscous than air:
(A) 100 times (B) 20 times (C) 50 times (D) 10 times
56. The exchange of gases (CO_2 and O_2) between the organism and its environment is called:
(A) Cellular respiration (B) Anaerobic respiration
(C) Respiration (D) External respiration
57. A liter of H_2O contain of oxygen:
(A) 40 (B) 30 (C) 20 (D) 10
58. Oxygen contents of fresh air are:
(A) 200 ml / litre (B) 150 ml / litre (C) 10 ml / litre (D) 100 ml / litre
59. The amount of oxygen present in air about:
(A) 20 to 16 (B) 21 to 60 (C) 21 to 16 (D) 20 to 60
60. During photorespiration , glycine is converted into serine in the:
(A) Chloroplast (B) Mitochondria (C) Ribosome (D) Golgi Bodies
61. During photorespiration , glycolate diffuses into the membrane bounded organelle named as:
(A) Ribosome (B) Golgi Bodies (C) Peroxisome (D) Mitochondria
62. The main sites of exchange of gases in plants are:
(A) Epidermis (B) Cuticle (C) Lenticel (D) Stomata
63. Respiratory activity which occurs in plants during day time is called:
(A) Photorespiration (B) Cutinious respiration
(C) Transpiration (D) Respiration
64. At rest we inhale and exhale per munute.
(A) 11 - 20 times (B) 15 - 20 times (C) 10 - 15 times (D) 15 - 25 times
65. The photorespiration is a process in which ribulose biphosphate carboxylase / oxygenase (rubisco) fixes instead of carbon dioxide.
(A) Methane (B) Oxygen (C) Hydrochloric acid (D) None of these
66. In the peroxisomes the glycolate is converted into:
(A) Glycine (B) Rubisco (C) Serine (D) None of these
67. In the mitochondria where two glycine molecules are converted into:
(A) Glycolate (B) Serine (C) ATP (D) Glycine

68. Pleura is double layered thin membrane that covers:

- (A) Lungs (B) Kidney (C) Liver (D) Heart

69. All are made up of cartilage except:

- (A) Trachea (B) Bronchiole (C) Larynx (D) Bronchi

70. Lungs are covered with double membrane sacs called:

- (A) Pleura (B) Pericardium (C) Diaphragm (D) Scrotum

Fill in the blanks

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Q1: Haemoglobin is a complex molecule which contains 9512 atoms and amino acids.

Q2: There are about stomata per square centimeter of leaf surface of tobacco plant.

Q3: When the smaller bronchi attain the diameter of mm or less they are called bronchioles

Q4: The opening of larynx is called

Q5: is the most abundant protein in the world.

Answers

1. 9512

2. 12000

3. One

4. Epiglottis

5. Rubisco

Chapter : 13

Gaseous Exchange

Subjective

Q1: **How much CO₂ is present in venous and arterial blood?**

Ans: Arterial blood contains 50 ml of carbon dioxide per 100 ml of blood whereas venous blood has 54 ml of carbon dioxide per 100 ml of blood.

Q2: **How much denser is a water medium than air medium for exchange of respiratory gases?**

Ans: Water is 8000 times more dense than air.

Q3: **How aquatic plants obtain oxygen?**

Ans: Aquatic plants obtain their oxygen by diffusion from dissolved oxygen in water.

Q4: **Define photo-respiration.**

Ans: Respiratory activity which occurs in plants during daytime is called photorespiration. Photorespiration is a light dependent process during which oxygen is absorbed and carbon dioxide is released. This oxygen is derived from the early reaction of photosynthesis. The pathway in which RuBP (Ribulose Biphosphala) is converted into serine is called photorespiration.

Q5: **Describe briefly as to how gaseous exchange takes place in plants.**

Ans: Gaseous exchange in plants takes place through three methods:

Through Stomata:

- In most cells of mesophyll which are specialized for photosynthesis, there are present large spaces. These air spaces are directly involved in gaseous exchange.

Stomata are the main sites of exchange of gases in plants. Stomata are largely present in the leaves and in young stem. These stomata lead to intercellular spaces of mesophyll tissue.

Through Lenticels:

- In older stems, cork tissue is present which is formed of dead cells. The cork tissue has special pores called lenticles which are involved in gaseous exchange.

Through Roots:

- The roots of the land plants get their oxygen from the air existing in the spaces between the soil particles.

Q6: **How does breathing differ from respiration?**

Ans: **Respiration:**

- Respiration is one of the most important metabolic activities of all organisms. Cellular respiration is the process where by cell utilizes oxygen, produce carbon dioxide, extract and conserves the energy from food molecules in biologically useful form, such as ATP.

Breathing:

- Organismic respiration is also known as breathing or ventilation. During which oxygen is taken from atmosphere and carbon dioxide is released. Breathing provides the basis of cellular respiration.

Q7: **How the rate of carbon dioxide fixation is lowered?**

Ans: The photorespiration is a process in which ribulose biphosphala carboxylas/ oxygenase fixes oxygen instead of carbon dioxide which results in lowering the overall rate of carbon dioxide fixation and plant growth.

Q8: **What is Rubisco?**

Ans: Rubisco, the most abundant protein in chloroplasts and probably the most abundant protein in the world. The rubisco is carboxylase as well as oxygenase.

Q9: **How glycolate is produced?**

Ans: When RuBP react with oxygen, a two carbon compound glycolate is produced:



That glycolate thus produced diffuses into membrane bounded by organelles known as peroxisomes.

Q10: **What is glycine? How it is converted to serine?**

Ans: In the peroxisomes the glycolate is converted into glycine, through a series of reactions.



The glycine is the simplest amino acid which soon after its formation diffuses into the mitochondria where two glycine molecules are converted into serine and a molecule of carbon dioxide is formed.



Q11: **How does air always remain in the lungs of Human beings?**

Ans: Air always remain in the lungs pf human beings due to difference in the concentration gradient of carbon dioxide and oxygen in the lungs.

Q12: **What is the difference between photosynthesis and photorespiration?**

Ans: **Photorespiration:**

- During this process Rubisco acts as oxygenase and in this way rate of oxygen in atmosphere is lowered.
- It is a light dependent process during which oxygen is absorbed and carbon dioxide is released.
- Respiratory activity that occurs during daytime is called photorespiration.

Photosynthesis:

- In this process Rubisco acts as carboxylase.
- During photosynthesis carbon dioxide is absorbed and oxygen is released.
- Photosynthesis is the process by which energy is acquired by inorganic oxidized compounds of carbon and hydrogen are reduced to energy rich carbohydrates using light energy that is absorbed by chlorophyll.

Q13: **What are the properties of respiratory surfaces?**

Ans: The respiratory surfaces in most animals exhibit the following features:

Large Surface and Moisture:

- The surface area should be large and kept moist as is in lungs and gills.

Thin Epithelium:

- The distance for diffusion must be short. In animals, the epithelium is only two cells thick which separates blood and air.

Ventilation:

- There should be the difference in the gases at two points which bring about diffusion.

Capillary Network:

- The respiratory site should possess steep diffusion gradient and extensive network of capillaries through which blood should flow all the time at an adequate speed.

Q14: **Differentiate between inspiration and expiration.**

Ans: **Inspiration:**

- Inspiration is the intake of air inside the lungs.
- During inspiration the space inside the chest cavity is raised.
- Muscles of ribs contract and elevate the rib upwards and forwards.
- The muscles of diaphragm contract and become less dome-like.
- Pressure from the lungs is removed and they expand and vacuum is created due to which air rushes inside the lungs.

Expiration:

- Expiration is the expulsion of air from the lungs.
- During expiration from the sides of chest cavity the space becomes less.
- The muscles of ribs relax and ribs move downward and inward.
- The muscles of diaphragm relax becoming more dome-like.
- The lungs are pressed and the air moves outside the lungs.

Q15: **If photorespiration is inhibited chemically, the plant can still grow. Then why does photorespiration exist?**

Ans: The active site of rubisco is evolved to bind both carbon dioxide and oxygen together. Originally it was not a problem as there was little oxygen in the atmosphere and the carbon dioxide binding activity was the only one used.

The photorespiration started when the quantity of oxygen became more.

Q16: **What are respiratory surfaces?**

Ans: Respiratory surfaces in animals are the sites where gaseous exchange takes place.

Q17: **What are respiratory surfaces in hydra?**

Ans: Hydra has no specialized organs for respiration. Exchange of gases i.e., intake of oxygen and removal of carbon dioxide, occurs through entire general surface in contact with water.

Q18: **How skin is kept moist in earthworm?**

Ans: Skin is richly supplied with blood capillaries and is always kept moist by the secretion of epidermal mucous gland cells and also by coelomic fluid exuding out through the dorsal pores. Oxygen dissolved on the wet surfaces passes through the cuticle and epidermal cells into the blood.

Q19: **What are spiracles?**

Ans: The main tracheal trunk communicates with exterior by 10 pairs of apertures called spiracles.

Q20: **What are tracheoles?**

Ans: The main tracheae divide and subdivide forming very fine thin walled tubules called tracheoles.

Q21: **What are alveoli?**

Ans: Each air sac consists of several microscopic single structures called alveoli.

Q22: **What is the difference between bronchi and bronchioles?**

Ans: **Bronchi:**

- Each bronchus on entering the lung divides and subdivides progressively into smaller and smaller bronchi. Bronchi have the same cartilage rings as the trachea, but the rings are progressively replaced by irregularly distributed cartilage plates.

Bronchioles:

- When the smaller bronchi attain a diameter of one mm or less, then they are called bronchioles. Bronchioles totally lack cartilages. Bronchioles are made up of mainly circular smooth muscles.

Q23: **What is functional unit of lungs?**

Ans: Air sacs is the functional unit of lungs.

Q24: **What is the function of cartilage rings in trachea?**

Ans: In the wall of trachea there are series of C shaped cartilage rings which prevent the trachea from collapsing and keep the passage of air open.

Q25: **What is trachea?**

Ans: The trachea or wind pipe is a tubular structure lying ventral to the oesophagus and extends to the chest cavity or thorax where it is divided into right and left bronchi.

Q26: **How food is prevented from going into respiratory track?**

Ans: One of the cartilages, the epiglottis has a muscularly controlled, hinge-like action and serves as a lid which automatically covers the opening of the larynx during the act of swallowing so as to prevent the entry of food or liquids into the larynx.

Q27: **What are vocal cords? What is their purpose?**

Ans: In the glottis, the mucous membrane is stretched across into two thin edged fibrous bands called vocal cords, which help in voice production, when vibrated by air.

Q28: **What is glottis?**

Ans: The opening of larynx is called glottis is also lined with mucous membrane.

Q29: **What is larynx?**

Ans: The larynx or voice box is a complex cartilaginous structure surrounding the upper end of the trachea.

Q30: **What is pharynx?**

Ans: The pharynx is a muscular passage lined with mucous membrane. The air is channelized from the pharynx into the larynx.

Q31: **What is the function of mucous membrane?**

Ans: Air enters the nasal cavity through nostril and the larger dust particles are trapped by the hair and mucus in the nostrils. Air, while passing through the nasal cavity, becomes moist, warm and filtered of smaller foreign particles by mucous membrane.

Q32: **What air passage consist of?**

Ans: Air passage ways consist of nostrils, nasal cavities, pharynx, larynx, trachea, bronchi, bronchioles and alveolar ducts which ultimately lead into alveolar sacs.

Q33: **What are air sacs?**

Ans: The lungs have developed several extensions known as air sacs which reach all parts of the body and even penetrate some of the bones. In most birds, air sacs are nine in number which become inflated by air at atmospheric pressure when the rib articulation are rotated forward and upward. The inflated air sacs act as bellows and send air into the parabronchi for gaseous exchange.

Q34: **Why respiration in birds is specialized than any other animal?**

Ans: Respiratory system in birds is the most efficient and elaborate. The birds are very active animals with high metabolic rates, and thus need large amount of oxygen. The respiratory system in the birds is so arranged there is one way flow of air through the lungs and the air is renewed after inspiration.

Q35: **What are parabronchi?**

Ans: In the lungs of birds, tiny thin walled ducts called parabronchi are present instead of alveoli. These parabronchi are open at both ends and the air is constantly ventilated. The walls of parabronchi are chief sites of gaseous exchange.

Q36: **What is pulmonary respiration?**

Ans: The gaseous exchange through gills or lungs is called pulmonary respiration.

Q37: **What is cutaneous respiration?**

Ans: The gaseous exchange through skin is known as cutaneous respiration.

Q38: **What are gills?**

Ans: Fish respire through the gills which are paired structures present on either side of the body almost at the junction of head and trunk. Gills are most effective and highly modified for gaseous exchange in aquatic animals.

They are in four to five pairs which may open through gill slits and are visible on the surface of pharynx or are placed in bronchial cavities which are covered by operculum. Gills have great surface area for gaseous exchange. The gill surface is all the time ventilated by constant flow of water.

Q39: **What happens when abdominal muscles of cockroach contract?**

Ans: When abdomen muscles contracts, the anterior four pairs of spiracle close and posterior six pairs of spiracle open.

Q40: **What happens when abdominal muscles of cockroach expand?**

Ans: When abdomen muscles expands, the first four pairs of spiracles open, air rushes in through these spiracles into tracheoles.

Q41: **Why the amount of oxygen increase in the blood of birds during gaseous exchange?**

Ans: The direction of the blood flow in capillaries around the lungs is opposite to that of the airflow through the parabronchi. This counter current exchange increases the amount of oxygen which enters the blood.

Q42: **What is emphysema?**

Ans: Emphysema is a break down of alveoli. This respiratory problem is more common among smokers. The substances present in the smoke of tobacco weaken the alveoli wall. The irritant substances of smoke generally cause bursting of weakened of alveoli. In the result of constant coughing the absorbing surface of the lung is greatly reduced. The person suffering from emphysema cannot oxygenate his blood properly and least exertion makes him breathers and exhausted.

Emphysema produces increased airway resistance because the bronchioles are abstracted as a result and inflammation and because damaged bronchioles collapse during expiration, trapping air within alveolar sacs.

Q43: **How diving reflex is activated in mammals?**

Ans: When mammals dives to its limit the diving reflex is activated. The breathing stops, the rate of heart slows down to one tenth of the normal rate, the consumption of oxygen and energy is reduced. The blood is redistributed but most of the blood goes to the brain and heart which can least withstand anoxia.

Skin muscles and digestive organs and other internal organs receive very little blood while an animal is submerged because these areas can survive with less oxygen, Muscles shift from aerobic to anaerobic respiration.

Q44: **How diving mammals differ from the other animals?**

Ans: Diving mammals have almost twice the volume of blood in relation to their body weight as compared to non divers. Most of the diving mammals have high concentration of myoglobin in their muscles. Myoglobin binds extra oxygen and store it.

Q45: **What is the residual volume of lungs?**

Ans: Residual volumes of lungs is 1.5 liters which cannot be expelled even during exercise.

Q46: **What is the volume of air expelled from the lungs during exercise?**

Ans: The volume of air taken inside the lungs and expelled during exercise is about 3.5 liters.

Q47: **What is the total capacity of lungs?**

Ans: The total inside capacity of lungs is about 5 liters.

Q48: **Why there is an increased rate and depth of breathing during exercise?**

Ans: At rest we inhale and exhale 15 - 20 times per minute. During exercise breathing rate may rise to 30 times per minute.

The increased rate and depth of breathing during exercise allows more oxygen to dissolve in blood and be supplied to the active muscles. The extra carbon dioxide which the muscles put into the blood is removed by deep and fast breathing

Q49: **What is asthma?**

Ans: Asthma is a serious respiratory disease associated with severe paroxysm of difficult breathing, usually followed by a period of complete relief, with recurrence of attack at more or less frequent intervals.

It is an allergic reaction to pollen, spores, cold, humidity, pollution etc., which manifests itself by spasmodic contraction of small bronchiole tubes. Asthma results in the release of inflammatory chemicals such as histamines into circulatory system that cause severe contraction of the bronchiole.

Q50: **What is tuberculosis? How it is caused?**

Ans: Tuberculosis is a disorder of respiratory system, In fact, it is the general name of a group of diseases caused by Mycobacterium tuberculosis. Pulmonary tuberculosis is a diseases of lungs in which inside of the lung is damaged resulting in cough and fever.

It is more common in poor people. Malnutrition and poor living conditions facilitate Mycobacterium to grow. The disease is curable with proper medical attention. It is a contagious disease.

Q51: **What is cancer?**

Ans: Cancer or carcinoma is basically malignant tumour of potentially unlimited growth that expands locally by invasion and systematically by metastasis.

Q52: **What is malignant tumor?**

Ans: Malignant tumour is a tumour in which cancerous cells transport by means of circulatory system.

Q53: **What is metastasis?**

Ans: Metastasis is a process that involves the spread of a tumor or cancer to different parts of the body from its original site.

Q54: **How carbon dioxide is carried as bicarbonate ion?**

Ans: About 70% carbon dioxide is carried as bicarbonate ion with sodium in plasma. As carbon dioxide from tissue fluid enters the capillaries it combines to form carbonic acid.

Carbonic anhydrase



The carbonic acid splits quickly and ionized to produce hydrogen ions and bicarbonate ions.



When blood leaves the capillary bed most of the carbon dioxide is in the form of bicarbonate ions. In the lungs bicarbonate ions combine with hydrogen ions to form carbonic acid which splits into water and carbon dioxide. It is this carbon dioxide which diffuses out from the capillaries of the lungs into the space of alveolar sac.

Q55: **How much percentage of carbon dioxide is carried by plasma proteins?**

Ans: Plasma proteins carry about 5% carbon dioxide from the body fluids to the capillaries of lungs.

Q56: **How much percentage of carbon dioxide is carried as carboxyhaemoglobin?**

Ans: About 20% of the carbon dioxide is carried as carboxyhaemoglobin.

Q57: **What is carboxyhaemoglobin?**

Ans: Carboxyhaemoglobin is formed when carbon dioxide combines with amino group of haemoglobin.

Q58: **What are important factors which affect capacity of haemoglobin to combine with oxygen gas?**

Ans: There are three factors which affect the capacity of haemoglobin to combine with oxygen:

Carbon Dioxide:

- When carbon dioxide pressure increases, the oxygen tension decreases, the capacity of haemoglobin to hold oxygen becomes less. In this way increased carbon dioxide tension favors the greater liberation of oxygen from the blood to the tissue.

pH:

- As the pH of the blood declines, the amount of oxygen bound to haemoglobin also declines. This occurs because of decreased pH results from an increase in hydrogen ions, and the hydrogen ions combine with the protein part of the haemoglobin molecules, causing a decrease in the ability of haemoglobin to bind oxygen. Conversely, an increase in blood pH results in an increased ability of haemoglobin to bind oxygen.

Temperature:

- Rise in temperature also causes a decrease in the oxygen carrying capacity of blood. e.g., in the increased muscular activity.

Q59: **What adaptations a diver adopt when he descends in the sea?**

Ans: As a scuba diver descends in the sea, the pressure of the water on his body prevents normal expansion of the lungs. To compensate, the diver breaths pressurized air from air cylinders, which has a greater pressure than sea level air pressure.

Q60: **What is the maximum amount of oxygen gas which normal human blood absorbs and carries at sea level?**

Ans: Normal human blood absorbs and carries oxygen at sea level is about 20 ml / 100 ml of blood.

Q61: **How haemoglobin acts as an efficient oxygen carrier?**

Ans: In human beings the respiratory pigment is haemoglobin. It is contained in the red blood corpuscles. Haemoglobin readily combines with oxygen to form bright red oxyhaemoglobin and oxygen in the conditions of low oxygen concentration and less pressure. Carbonic anhydrase enzyme in R.B.C facilitates this activity. In this way haemoglobin acts as an efficient oxygen carrier.

Q62: **What is Myoglobin? What is its function?**

Ans: Myoglobin is hemoglobin like iron containing protein pigment occurring in muscle fibers. Myoglobin is also known as muscle hemoglobin. It serves as an intermediate compound for the transfer of oxygen from hemoglobin to aerobic metabolic processes of the muscle cells. It can also store oxygen.

Myoglobin consists of just one peptide chain associated with an iron containing ring structure which can bind with one molecule of oxygen. The affinity of myoglobins to combine with oxygen is much higher as compared to haemoglobin.

Q63: **On which factors transport of gases depend?**

Ans: R Intake of oxygen and release of carbon dioxide by blood passing through capillaries of alveoli is brought by the following factors:

- Diffusion of oxygen in and carbon dioxide out occurs because of difference in partial pressure of these gases.

- Within the rich network of capillaries surrounding the alveoli, blood is distributed in extremely thin layers and, therefore, exposed to large alveolar surface.
- Blood in the large is separated from the alveolar air by extremely thin membranes of the capillaries and alveoli.

Q64: **Explain respiratory distress syndrome in premature infant.**

Ans: In premature infant, respiratory distress syndrome is common, especially for infant with a gestation age of less than 7 months. This occurs because enough infant surfactant is not produced to reduce the tendency of the lungs to collapse.

Q65: **What are three aspects related to lungs and associated structures?**

Ans: The three aspects related to lungs and associated structures are:

- Walls of chest cavity are composed of ribs and intercostal muscles. When muscles between ribs contract, the ribs are elevated and when muscles between ribs are relaxed the ribs settle down.
- Lungs are spongy in nature. The lungs themselves neither pull air in nor can they push it out. During inspiration passive expansion of elastic lungs occurs and expiration is due to a passive contraction of lungs.
- The floor of the chest cavity is diaphragm, which is a muscular sheet. The shape of the diaphragm is more domelike when its muscles are relaxed. On the other hand when the muscles of diaphragm contract its shape becomes less domelike.

Chapter : 13

Gaseous Exchange



Imp.Long Questions

- Q1: Discuss the mechanical aspects of breathing in man.
- Q2: Write a detailed note on respiratory pigments.
- Q3: Describe the structure of alveolus in detail.