

Chapter - 7

Control and Coordination

Multiple Choice Questions

- 1. Which of the following statements is correct about receptors?**
- (a) Gustatory receptors detect taste while olfactory receptors detect smell
 - (b) Both gustatory and olfactory receptors detect smell
 - (c) Auditory receptors detect smell and olfactory receptors detect taste
 - (d) Olfactory receptors detect taste and gustatory receptors smell

Soln:

Answer is (a) Gustatory receptors detect taste while olfactory receptors detect smell

Explanation:

A receptor is a cell which is sensitive for the external stimulus such as light,taste, smell. Ex: Photoreceptors detect light.Gustatory receptors detect taste. Olfactory receptors detects smell.

- 2. Electrical impulse travels in a neuron from**
- (a) Dendrite → axon → axonal end → cell body
 - (b) Cell body → dendrite → axon → axonal end
 - (c) Dendrite → cell body → axon → axonal end
 - (d) Axonal end → axon → cell body → dendrite

Soln:

Answer is (c) Dendrite → cell body → axon → axonal end

Explanation:

Stimulus is received by dendrites which are transmitted to cyton through axon . Stimulus reaches the terminal branches called as axonal end from where they are transmitted to another neuron.

- 3. In a synapse, chemical signal is transmitted from**
- (a) dendritic end of one neuron to axonal end of another neuron
 - (b) axon to cell body of the same neuron
 - (c) cell body to axonal end of the same neuron
 - (d) axonal end of one neuron to dendritic end of another neuron

Soln:

Answer is (d) axonal end of one neuron to dendritic end of another neuron

Explanation:

Electric impulse travel from the axon to the dendrite of another neuron through a synaptic gap which consist of SYNAPSE.

4. In a neuron, conversion of electrical signal to a chemical signal occurs at/in

- (a) cell body
- (b) axonal end
- (c) dendritic end
- (d) axon

Soln:

Answer is (b) axonal end

Explanation:

At axonal end electric impulse triggers the release of neurotransmitter. These chemicals enter dendrite of another neuron to transmit the signal.

5. Which is the correct sequence of the components of a reflex arc?

- (a) Receptors → Muscles → Sensory neuron → Motor neuron → Spinal cord
- (b) Receptors → Motor neuron → Spinal cord → Sensory neuron → Muscle
- (c) Receptors → Spinal cord → Sensory neuron → Motor neuron → Muscle
- (d) Receptors → Sensory neuron → Spinal cord → Motor neuron → Muscle

Soln:

Answer is (d) Receptors → Sensory neuron → Spinal cord → Motor neuron → Muscle

Explanation:

Sensory neurons receive signals from receptors. These signals are sent to spinal cord which reaches Muscles through motor neuron.

6. Which of the following statements are true?

- (i) Sudden action in response to something in the environment is called reflex action
 - (ii) Sensory neurons carry signals from spinal cord to muscles
 - (iii) Motor neurons carry signals from receptors to spinal cord
 - (iv) The path through which signals are transmitted from a receptor to a muscle or a gland is called reflex arc
- (a) (i) and (ii)
 - (b) (i) and (iii)
 - (c) (i) and (iv)
 - (d) (i), (ii) and (iii)

Soln:

Answer is (c) (i) and (iv)

Explanation:

Sensory neurons carry signals from muscles to spinal cord hence statement ii) and iv) are wrong statements.

7. Which of the following statements are true about the brain?

- (i) The main thinking part of brain is hind brain
 - (ii) Centres of hearing, smell, memory, sight etc are located in fore brain.
 - (iii) Involuntary actions like salivation, vomiting, blood pressure are controlled by the medulla in the hind brain
 - (iv) Cerebellum does not control posture and balance of the body
- (a) (i) and (ii)
 - (b) (i), (ii) and (iii)
 - (c) (ii) and (iii)
 - (d) (iii) and (iv)

Soln:

Answer is (c) (ii) and (iii)

Explanation:

Forebrain is the thinking part of brain hence statement i) is wrong. Cerebellum control posture and balance of the body hence statement iv) is wrong

8. Posture and balance of the body is controlled by

- (a) cerebrum
- (b) cerebellum
- (c) medulla
- (d) pons

Soln:

Answer is (b) cerebellum

Explanation:

Cerebrum is responsible for sensory processing. Medulla controls involuntary functions. Pons regulates respiration and controls involuntary actions sensations such as touch and pain.

9. Spinal cord originates from

- (a) cerebrum
- (b) medulla
- (c) pons
- (d) cerebellum

Soln:

Answer is (b) medulla

10. The movement of shoot towards light is

- (a) geotropism
- (b) hydrotropism
- (c) chemotropism
- (d) phototropism

Soln:

Answer is (d) phototropism

Explanation:

Growth of plant roots towards or away from moisture is called hydrotropism. Plant growth in response to gravitational force is called as geotropism. Growth of plant in response to chemical stimulus is called chemotropism.

11. The main function of abscisic acid in plants is to

- (a) increase the length of cells
- (b) promote cell division
- (c) inhibit growth
- (d) promote growth of stem

Soln:

Answer is (c) inhibit growth

Explanation:

Auxins increase the length of cells. Cytokinins promote cell division. Gibberellins promote growth of stem.

12. Which of the following is not associated with growth of plant?

- (a) Auxin
- (b) Gibberellins
- (c) Cytokinins
- (d) Abscisic acid

Soln:

Answer is (d) Abscisic acid

Explanation:

Abscisic acid inhibit the growth of plant hence it is not associated with growth of plant.

13. Iodine is necessary for the synthesis of which hormone?

- (a) Adrenaline
- (b) Thyroxin
- (c) Auxin
- (d) Insulin

Soln:

Answer is (b) Thyroxin

14. Choose the incorrect statement about insulin

- (a) It is produced from pancreas
- (b) It regulates growth and development of the body
- (c) It regulates blood sugar level
- (d) Insufficient secretion of insulin will cause diabetes

Soln:

Answer is (b) It regulates growth and development of the body

15. Select the mis-matched pair

- (a) Adrenaline : Pituitary gland
- (b) Testosterone: Testes
- (c) Estrogen : Ovary
- (d) Thyroxin : Thyroid gland

Soln:

Answer is (a) Adrenaline : Pituitary gland

Explanation:

Adrenaline is secreted by Adrenal gland and Pituitary gland produces TSH, FSH and GSH hormones.

16. The shape of guard cells changes due to change in the

- (a) protein composition of cells
- (b) temperature of cells
- (c) amount of water in cells
- (d) position of nucleus in the cells

Soln:

Answer is (c) amount of water in cells

Explanation:

Excess of water will turn guard cells turgid and loss of water turn guard cells flaccid.

17. The growth of tendril in pea plants is due to

- (a) effect of light
- (b) effect of gravity
- (c) rapid cell divisions in tendrillar cells that are away from the support
- (d) rapid cell divisions in tendrillar cells in contact with the support

Soln:

Answer is (c) rapid cell divisions in tendrillar cells that are away from the support

18. The growth of pollen tubes towards ovules is due to

- (a) hydrotropism
- (b) chemotropism
- (c) geotropism
- (d) phototropism

Soln:

Answer is (b) chemotropism

Explanation:

Chemicals released by ovules stimulate the growth of pollen tubes towards ovules.

19. The movement of sunflower in accordance with the path of sun is due to

- (a) phototropism
- (b) geotropism
- (c) chemotropism
- (d) hydrotropism

Soln:

Answer is (a) phototropism

Explanation:

The movement of shoot towards light is called phototropism.

Plant growth in response to gravitational force is called as geotropism .

Growth of plant in response to chemical stimulus is called chemotropism.

Growth of plant roots towards or away from moisture is called hydrotropism.

20. The substance that triggers the fall of mature leaves and fruits from plants is due to

- (a) auxin
- (b) gibberellin
- (c) abscisic acid
- (d) cytokinin

Soln:

Answer is (c) abscisic acid

Explanation:

abscisic acid forms a layer of abscission. This layer disconnects the living tissue of leaf from the other parts.

21. Which of the following statements about transmission of nerve impulse is incorrect?

- (a) Nerve impulse travels from dendritic end towards axonal end
- (b) At the dendritic end electrical impulses bring about the release of some chemicals which generate an electrical impulse at the axonal end of another neuron
- (c) The chemicals released from the axonal end of one neuron cross the synapse and generate a similar electrical impulse in a dendrite of another neuron
- (d) A neuron transmits electrical impulses not only to another neuron but also to muscle and gland cells

Soln:

Answer is (b) At the dendritic end electrical impulses bring about the release of some chemicals which generate an electrical impulse at the axonal end of another neuron

Explanation:

Chemicals or neurotransmitters are released at axonal end not on dendritic end. Hence statement b) is incorrect

22. Involuntary actions in the body are controlled by

- (a) medulla in fore brain
- (b) medulla in mid brain
- (c) medulla in hind brain
- (d) medulla in spinal cord

Soln:

Answer is (c) medulla in hind brain

Explanation:

Medulla is present only in hind brain

23. Which of the following is not an involuntary action?

- (a) Vomiting
- (b) Salivation
- (c) Heart beat
- (d) Chewing

Explanation:

Answer is (d) Chewing

24. When a person is suffering from severe cold, he or she cannot

- (a) differentiate the taste of an apple from that of an ice cream
- (b) differentiate the smell of a perfume from that of an agarbatti
- (c) differentiate red light from green light
- (d) differentiate a hot object from a cold object

Soln:

Answer is (b) differentiate the smell of a perfume from that of an agarbatti

Explanation:

During cold olfactory receptors gets blocked hence we cannot differentiate smell.

25. What is the correct direction of flow of electrical impulses?

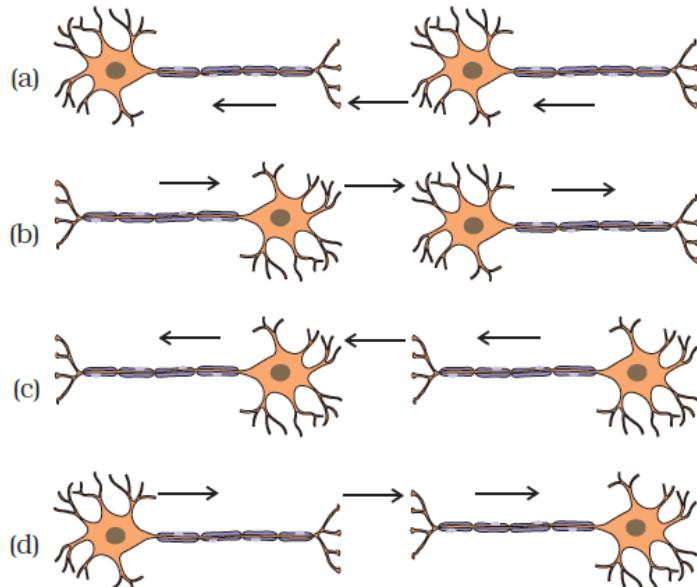


Fig. 7.1

Soln:

Answer is c)

Explanation:

Dendrites of a neuron receive electrical impulse from axonal end of another neuron. After that, electrical impulse travels through cell body, axon; to the axonal end.

26. Which statement is not true about thyroxin?

- (a) Iron is essential for the synthesis of thyroxin
- (b) It regulates carbohydrates, protein and fat metabolism in the body
- (c) Thyroid gland requires iodine to synthesise thyroxin
- (d) Thyroxin is also called thyroid hormone

Soln:

Answer is (a) Iron is essential for the synthesis of thyroxin

Explanation:

Iodine is essential for the synthesis of thyroxin but not iron hence statement a) is wrong

27. Dwarfism results due to

- (a) Excess secretion of thyroxin
- (b) Less secretion of growth hormone
- (c) Less secretion of adrenaline
- (d) Excess secretion of growth hormone

Soln:

Answer is (b) Less secretion of growth hormone

Explanation:

Growth hormones are responsible for the overall growth of an organism. When there will be no secretion of growth hormones it leads to dwarfism.

28. Dramatic changes of body features associated with puberty are mainly because of secretion of

- (a) oestrogen from testes and testosterone from ovary
- (b) estrogen from adrenal gland and testosterone from pituitary gland
- (c) testosterone from testes and estrogen from ovary
- (d) testosterone from thyroid gland and estrogen from pituitary gland

Soln:

Answer is (c) testosterone from testes and estrogen from ovary

Explanation:

These are the sex hormones responsible for the secondary character that appear after puberty. Males secrete testosterone and females secrete estrogen.

29. A doctor advised a person to take an injection of insulin because

- (a) his blood pressure was low
- (b) his heart was beating slowly
- (c) he was suffering from goitre
- (d) his sugar level in blood was high

Soln:

Answer is (d) his sugar level in blood was high

Explanation:

Patient suffering from diabetes will have high blood glucose due to non-functioning or lack of insulin hormone. Such patients are administered with insulin injection to regulate blood glucose.

30. The hormone which increases the fertility in males is called

- (a) oestrogen
- (b) testosterone
- (c) insulin
- (d) growth hormone

Soln:

Answer is (b) testosterone

31. Which of the following endocrine glands is unpaired?

- (a) Adrenal
- (b) Testes
- (c) Pituitary
- (d) Ovary

Soln:

Answer is (c) Pituitary

Explanation:

Adrenal glands are two which are present on top of each kidney. Testes is a paired gland in males which produces male sex hormones. Ovary is a paired gland in females which produces female sex hormones. Pituitary gland is an independent gland present below the brain. It is called as master gland as it secretes major of the hormones.

32. Junction between two neurons is called

- (a) cell junction
- (b) neuro muscular junction
- (c) neural joint
- (d) synapse

Soln:

Answer is (d) synapse

Explanation:

A synapse is a structure that allows a neuron to pass an electric signal to the next neuron or effector cell. Hence it is a junction between two neurons.

33. In humans, the life processes are controlled and regulated by

- (a) reproductive and endocrine systems
- (b) respiratory and nervous systems
- (c) endocrine and digestive systems
- (d) nervous and endocrine systems

Soln:

Answer is (d) nervous and endocrine systems

Explanation :

Reproductive, respiratory and digestive systems have no role to play in control and regulation of life processes. It is the nervous system and the endocrine system that control and regulates all the processes including Reproductive, respiratory and digestive systems.

Short Answer Questions

34. Label the parts (a), (b), (c) and (d) and show the direction of flow of electrical signals in Figure 7.2.

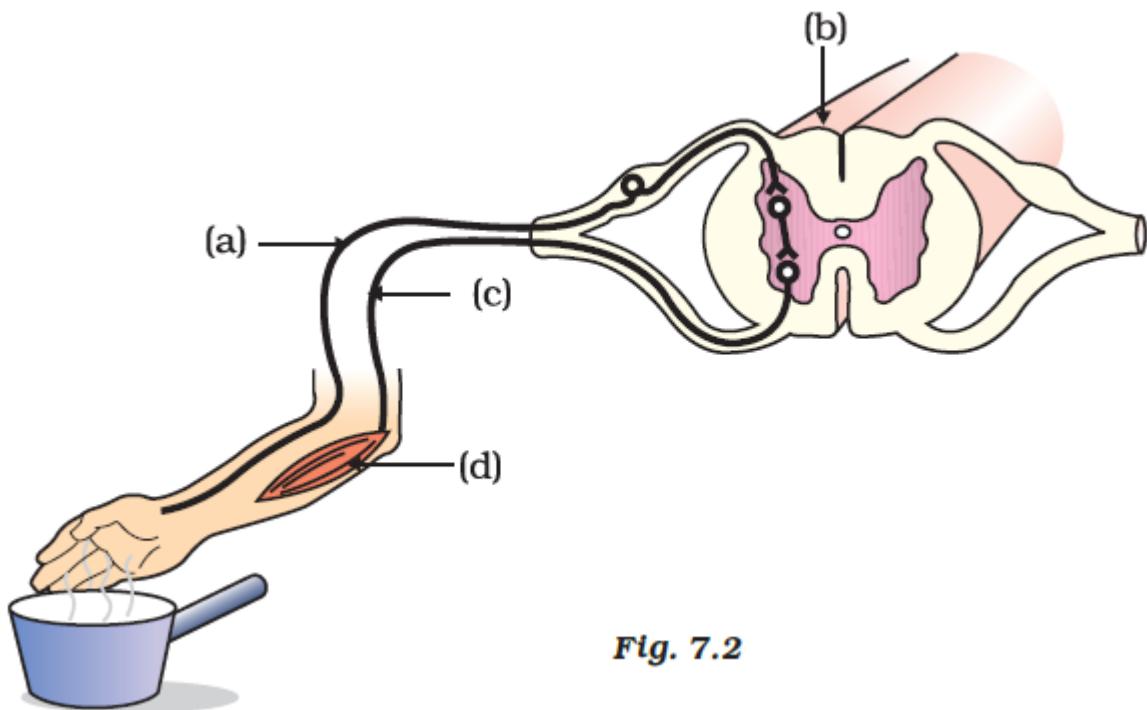


Fig. 7.2

Soln:

- a) Sensory neuron
- b) Spinal cord
- c) Motor neuron
- d) Muscle

35. Name the plant hormones responsible for the following

- (a) elongation of cells
- (b) growth of stem
- (c) promotion of cell division
- (d) falling of senescent leaves.

Soln:

- a) Auxin
- b) Gibberelin
- c) Cytokinin
- d) Abscisic acid

36. Label the endocrine glands in Figure 7.3.

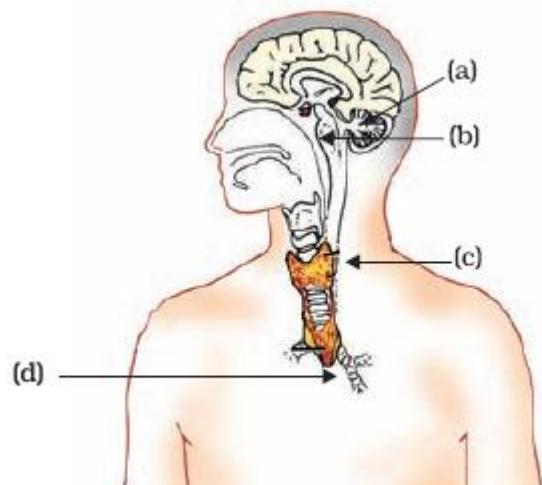


Fig. 7.3

Soln:

- a) Pineal Gland
- b) Pituitary gland
- c) Thyroid gland
- d) Thymus

37. In Figure 7.4 (a), (b) and (c), which appears more accurate and why?

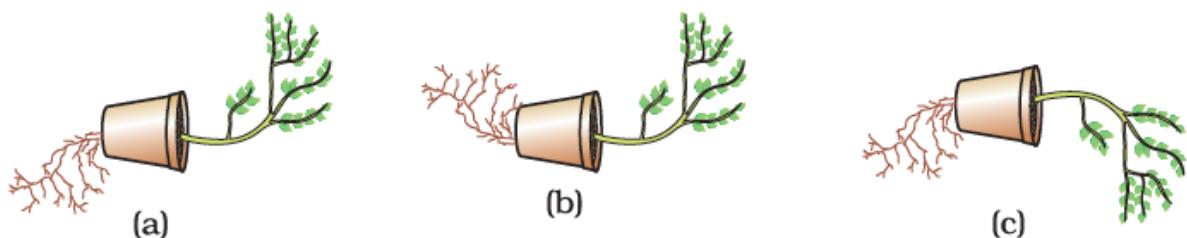
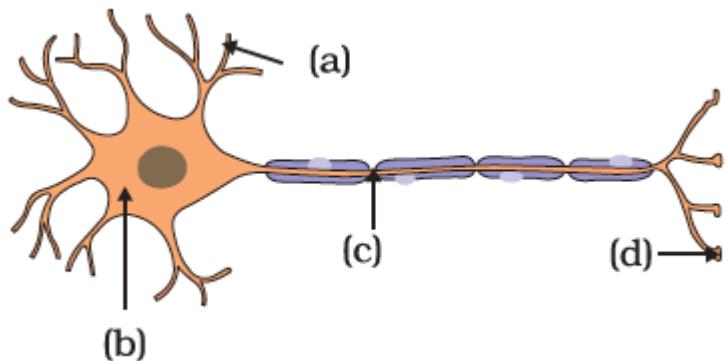


Fig. 7.4

Soln:

Figure a) is more accurate because in figure a plant root shows positive geotropism and shoot shows positive phototropism.

38. Label the parts of a neuron in Figure 7.5.



Soln:

- a) Dendrite
- b) Cellbody
- c) Axon
- d) Axon terminal

39. Match the terms of Column (A) with those of Column (B)

Column A	Column B
(a) Olfactory receptors	(i) Tongue
(b) Thermo receptors (temperature receptors)	(ii) Eye
(c) Gustatoreceptors	(iii) Nose
(d) Photoreceptors	(iv) Skin

Soln:

Column A	Column B
(a) Olfactory receptors	(iii) Nose
(b) Thermo receptors (temperature receptors)	(iv) Skin
(c) Gustatoreceptors	(i) Tongue
(d) Photoreceptors	(ii) Eye

40. What is a tropic movement? Explain with an example.

Soln:

Directional growth movement of a plant due to external stimulus is called as tropic movement. Movement can be either toward the stimulus or away from stimulus. Ex: Roots shows positive geotropic movement and they grow with direction of gravity whereas shoots shows negative geotropic movement.

41. What will happen if intake of iodine in our diet is low?

Iodine is essential for the synthesis of hormone thyroxin. If we take low iodine diet it leads to hypo thyroidism which results in a disease called as goiter.

42. What happens at the synapse between two neurons?

Soln:

At Synapse nerve impulse of a nerve cell gets converted to neurotransmitters which travels towards dendrites of next neuron leading to electric impulse.

43. Answer the following :

- (a) Which hormone is responsible for the changes noticed in females at puberty?
- (b) Dwarfism results due to deficiency of which hormone?
- (c) Blood sugar level rises due to deficiency of which hormone?
- (d) Iodine is necessary for the synthesis of which hormone?

Soln:

- a) **Oestrogen** hormone is responsible for the changes noticed in females at puberty
- b) Dwarfism results due to deficiency of **Growth Hormones**.
- c) Blood sugar level rises due to deficiency of **Insulin** Hormone
- d) Iodine is necessary for the synthesis of **Thyroxine** Hormone

44. Answer the following :

- (a) Name the endocrine gland associated with brain?
- (b) Which gland secretes digestive enzymes as well as hormones?
- (c) Name the endocrine gland associated with kidneys?
- (d) Which endocrine gland is present in males but not in females?

Soln:

- a) **Pituitary gland** is associated with brain
- b) **Pancreas** secretes digestive enzymes as well as hormones
- c) **Adrenal gland** is associated with kidneys
- d) **Testis** is present in males but not in females

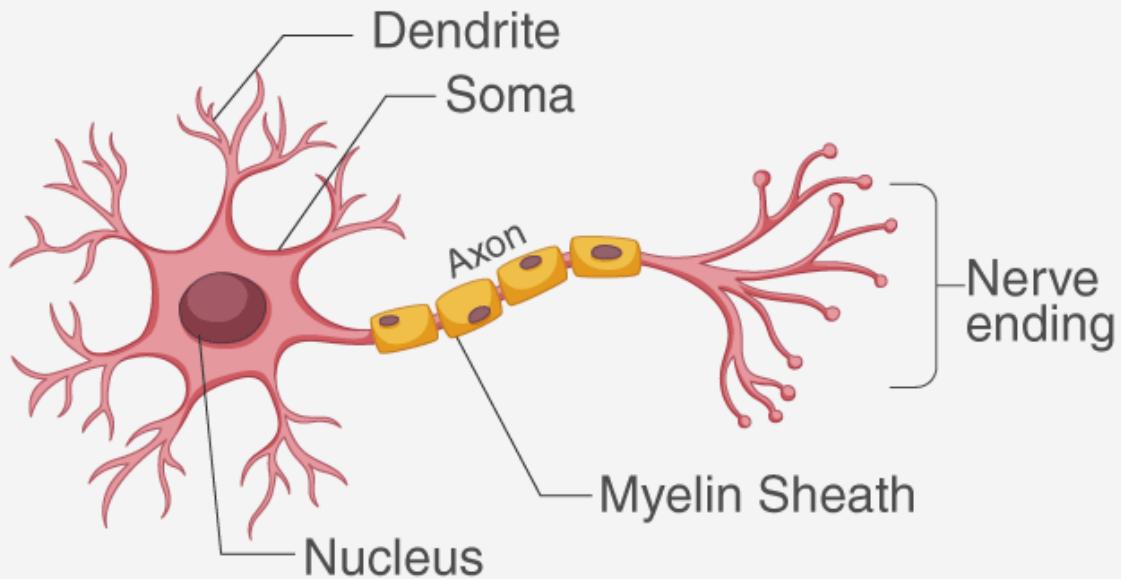
Long Answer Questions

45. Draw the structure of a neuron and explain its function.

Soln:

Neuron is highly specialized cell responsible for the transmission of nerve impulse.

STRUCTURE OF NEURON



Soma or cellbody is a star shaped hair like structure Hair like structures are called as dendrites. Dendrites receives nerve impulses.

Axon is the tail of the nucleus it ends in hair like structures which makes nerve endings. Nerve endings relay nerve impulses.

Myelin sheath acts as an insulator around the axon. It insulates axons from the electrical impulses from the surroundings.

Function of neuron is to process and transmit information from brain to all parts of the body.

46. What are the major parts of the brain? Mention the functions of different parts.

Soln:

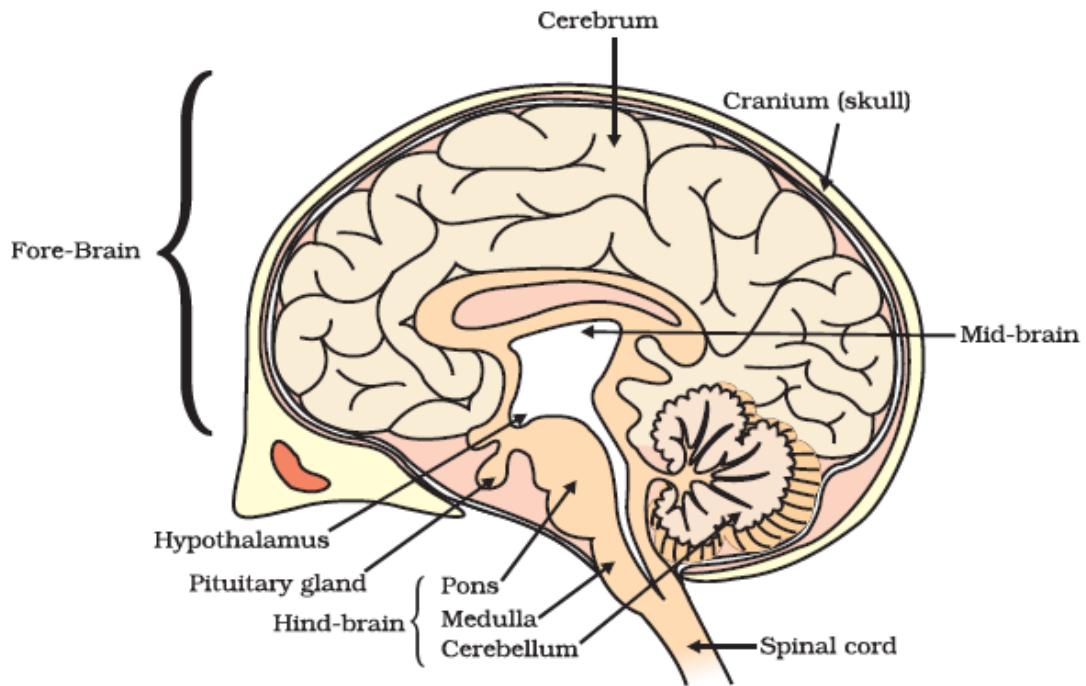


Figure 7.3 Human brain

Functions of brain Parts

Forebrain:

The fore-brain is the main thinking part of the brain. It has regions which receive sensory impulses from various receptors. Separate areas of the fore-brain are specialised for hearing, smell, sight and so on.

Mid brain and Hind brain:

Involuntary actions are controlled by the mid-brain and hind-brain.

Cerebellum:

Responsible for voluntary actions and maintaining the posture and balance of the body.

Cerebrum:

Cerebrum is responsible for sensory processing.

Medulla:

Medulla controls involuntary functions.

Pons:

Pons regulates respiration and controls involuntary actions sensations such as touch and pain.

Hypothalamus:

Hypothalamus control sleep and wake cycle

47. What constitutes the central and peripheral nervous systems? How are the components of central nervous system protected?**Soln:**

Central nervous system comprises of brain and spinal cord. Peripheral nervous system is composed of nerves which are outside the spinal cord.

Central nervous system has a well-developed system for its protection. Brain is enclosed in a hard shell known as skull. Spinal cord is enclosed in vertebral column for its protection. Along with these there is cerebrospinal fluid which protects the brain from mechanical shocks.

48. Mention one function for each of these hormones :

- (a) Thyroxin
- (b) Insulin
- (c) Adrenaline
- (d) Growth hormone
- (e) Testosterone.

Soln:**Thyroxin:**

Thyroxin regulates carbohydrate, protein and fat metabolism in the body so as to provide the best balance for growth.

Insulin:

Insulin regulates blood glucose levels. If insulin is not secreted in an appropriate level it leads to a rise in blood glucose level which results in many adverse effects on life processes.

Adrenaline:

Adrenaline prepares our body for emergency situations. Adrenaline is also called as fight and flight hormone.

Growth Hormone:

Growth hormone is responsible for the growth and regulation of growth.

Testosterone:

Testosterone is responsible for the expression of secondary sexual characters in the body.

49. Name various plant hormones. Also give their physiological effects on plant growth and development.**Soln:**

- a) Auxin- responsible for elongation of cells
- b) Gibberelin- responsible for growth of stem and thereby increases girth of stem
- c) Cytokinin promotes cell division in plants
- d) Abscisic acid stops growth of the plant and it makes leaves and fruits fall from plant.

50. What are reflex actions? Give two examples. Explain a reflex arc.

The sudden involuntary movement in a voluntary organ; in response to a stimulus; is called reflex action.

Examples of reflex action:

- (a) Moving your hand away from a hot iron plate
- (b) Blinking of eyes

Reflex Arc.

Reflex arc is a path of electrical impulse during a reflex action. It is composed of sensory neuron, spinal cord, motor neuron and muscle.

Steps of reflex arc

- The sensory neuron picks signals from the stimulus and carries the signals to the spinal cord.
- Spinal cord process the signals and sends message through the motor neuron.
- Motor neuron transmits the signals to the effector muscle so that the muscle can take immediate action.

51. “Nervous and hormonal systems together perform the function of control and coordination in human beings.” Justify the statement.

Control and coordination in human beings is under the influence of nervous system . Brain control all the organelles and organ system. The control is obtained by network of neurons which carry signals through neurotransmitters in the form of electric impulses to the brain and from the brain.

Hormonal system consist of varieties of hormones secreted by various glands in our body. Hormonal system coordinates the function of nervous system. Hormones indirectly control the life processes by feedback mechanism. They can produce hormones when required and can stop production when not required.

52. How does chemical coordination take place in animals?

Soln:

Chemical coordination takes place in animals through hormones produced by glands present in animals. Hormones are directly released into blood stream to reach the target site. Hormones control the behavior of the target tissue.

Example:

Adrenal gland secretes Adrenalin which reaches the heart, lungs and Gastro intestinal tract. Heart speeds up its pumping action so that more blood could be supplied to the limbs and facial muscles. But activity of the GI tract is slowed down to ensure better blood supply in limbs. Thus, adrenalin prepares the body for a fight or flight situation.

53. Why is the flow of signals in a synapse from axonal end of one neuron to dendritic end of another neuron but not the reverse?

Soln:

Electrical impulse travels through a neuron. But to be transmitted to another neuron, it need to be passed in the form of neurotransmitters. Neurotransmitters are specialized chemicals. They can enter a neuron only through specialized channels. Such channels are present in dendrites but not in axon. On the other hand, a neurotransmitter can enter a dendrite. Due to this, the flow of signals in a synapse is from axonal end of one neuron to dendritic end of another neuron but not the reverse.

Chapter - 6

Life Processes

Multiple Choice Questions

1. Which of the following statements about the autotrophs is incorrect?

- (a) They synthesise carbohydrates from carbon dioxide and water in the presence of sunlight and chlorophyll
- (b) They store carbohydrates in the form of starch
- (c) They convert carbon dioxide and water into carbohydrates in the absence of sunlight
- (d) They constitute the first trophic level in food chains

Soln:

They convert carbon dioxide and water into carbohydrates in the absence of sunlight

Explanation:

They need sunlight to convert carbon dioxide and water into carbohydrates.

2. In which of the following groups of organisms, food material is broken down outside the body and absorbed? (a) Mushroom, green plants, Amoeba

- (b) Yeast, mushroom, bread mould
- (c) Paramecium, Amoeba, Cuscuta
- (d) Cuscuta, lice, tapeworm

Soln:

Answer is (b) Yeast, mushroom, bread mould

Explanation:

Yeast , mushroom and bread mould are saprophytes and Saprophytes break the food material outside their body and absorbed.

3. Select the correct statement

- (a) Heterotrophs do not synthesise their own food
- (b) Heterotrophs utilise solar energy for photosynthesis
- (c) Heterotrophs synthesise their own food
- (d) Heterotrophs are capable of converting carbon dioxide and water into carbohydrates

Soln:

Answer is (a) Heterotrophs do not synthesise their own food

Explanation:

Heterotrophs either dependent on Phototrophs or other organisms for their food.

4. Which is the correct sequence of parts in human alimentary canal?

- (a) Mouth → stomach → small intestine → oesophagus → large intestine
- (b) Mouth → oesophagus → stomach → large intestine → small intestine
- (c) Mouth → stomach → oesophagus → small intestine → large intestine
- (d) Mouth → oesophagus → stomach → small intestine → large intestine

Soln:

Answer is (d) Mouth → oesophagus → stomach → small intestine → large intestine

5. If salivary amylase is lacking in the saliva, which of the following events in the mouth cavity will be affected?

- (a) Proteins breaking down into amino acids
- (b) Starch breaking down into sugars
- (c) Fats breaking down into fatty acids and glycerol
- (d) Absorption of vitamins

Soln:

Answer is (b) Starch breaking down into sugars

Explanation:

Salivary Amylase enzyme present in the saliva breaks down Starch into simpler sugar and helps in digesting them. Hence the breakdown of starch will be affected if salivary amylase is lacking in the saliva.

6. The inner lining of stomach is protected by one of the following from hydrochloric acid. Choose the correct one (a) Pepsin

- (b) Mucus
- (c) Salivary amylase
- (d) Bile

Soln:

Answer is (b) Mucus

7. Which part of alimentary canal receives bile from the liver?

- (a) Stomach
- (b) Small intestine
- (c) Large intestine
- (d) Oesophagus

Soln:

Answer is (b) Small intestine

Explanation:

Bile goes to small intestine from gall bladder through hepta pancreatic duct.

8. A few drops of iodine solution were added to rice water. The solution turned blue-black in colour. This indicates that rice water contains

- (a) complex proteins
- (b) simple proteins
- (c) fats
- (d) starch

Soln:

Answer is (d) starch

Explanation

Starch is made up of two components Amylose and Amylo pectin. When we add iodine to starch containing water Amylose reacts with iodine to form a blue colour complex. Here solution gives blue-black colour on adding Iodine which confirms the presence of starch in the rice water.

9. In which part of the alimentary canal food is finally digested?

- (a) Stomach
- (b) Mouth cavity
- (c) Large intestine
- (d) Small intestine

Soln:

Answer is (d) Small intestine

Explanation:

Although primary digestion process is conducted in mouth and stomach most of the digestion process occur in small intestine and in large intestine digestion process will not take place.

10. Choose the function of the pancreatic juice from the following

- (a) trypsin digests proteins and lipase carbohydrates
- (b) trypsin digests emulsified fats and lipase proteins
- (c) trypsin and lipase digest fats
- (d) trypsin digests proteins and lipase emulsified fats

Soln:

Answer is (d) trypsin digests proteins and lipase emulsified fats

Explanation:

Trypsin breaks down proteins into polypeptides and Lipase digest emulsified fat molecules into fatty acids and glycerol.

11. When air is blown from mouth into a test-tube containing lime water, the lime water turned milky due to the presence of

- (a) oxygen
- (b) carbon dioxide
- (c) nitrogen
- (d) water vapour

Soln:

Answer is (b) carbon dioxide

Explanation:

Carbon dioxide reacts with lime water to convert it to milky.

12. The correct sequence of anaerobic reactions in yeast is

- (a) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{mitochondria}}$ Ethanol
+ Carbon dioxide
- (b) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{cytoplasm}}$ Lactic acid
- (c) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{mitochondria}}$ Lactic acid
- (d) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{cytoplasm}}$ Ethanol
+ Carbon dioxide

Soln:

Answer is d) Glucose $\xrightarrow{\text{Cytoplasm}}$ Pyruvate $\xrightarrow{\text{Cytoplasm}}$ Ethanol + Carbon-di-oxide

Explanation:

In Yeast cytoplasm Glucose is breakdown in anaerobic condition to produce Pyruvate which is further breakdown to Ethanol and carbon-di-oxide

13. Which of the following is most appropriate for aerobic respiration?

- (a) Glucose $\xrightarrow{\text{mitochondria}}$ Pyruvate $\xrightarrow{\text{cytoplasm}}$ $\text{CO}_2 + \text{H}_2\text{O} + \text{Energy}$
- (b) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{mitochondria}}$ $\text{CO}_2 + \text{H}_2\text{O} + \text{Energy}$
- (c) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate + Energy $\xrightarrow{\text{mitochondria}}$ $\text{CO}_2 + \text{H}_2\text{O}$
- (d) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate + Energy $\xrightarrow{\text{mitochondria}}$ $\text{CO}_2 + \text{H}_2\text{O} + \text{Energy}$

Soln:

Answer is d) Glucose $\xrightarrow{\text{Cytoplasm}}$ Pyruvate+Energy $\xrightarrow{\text{Mitochondria}}$ $\text{CO}_2 + \text{H}_2\text{O} + \text{Energy}$

Explanation:

In aerobic respiration breakdown of pyruvate takes place in mitochondria. CO_2 , H_2O and energy are released in the reaction.

14. Which of the following statement(s) is (are) true about respiration?

- (i) During inhalation, ribs move inward and diaphragm is raised
 - (ii) In the alveoli, exchange of gases takes place i.e., oxygen from alveolar air diffuses into blood and carbon dioxide from blood into alveolar air
 - (iii) Haemoglobin has greater affinity for carbon dioxide than oxygen
 - (iv) Alveoli increase surface area for exchange of gases
- (a) (i) and (iv)
 - (b) (ii) and (iii)
 - (c) (i) and (iii)
 - (d) (ii) and (iv)

Soln:

Answer is (d) (ii) and (iv)

Explanation:

Statement i) is wrong because ribs move outward and diaphragm is lowered during inhalation. Similarly Option iii) is wrong because Hemoglobin has greater affinity for Oxygen than CO_2 .

15. Which is the correct sequence of air passage during inhalation?

- (a) Nostrils → larynx → pharynx → trachea → lungs
- (b) Nasal passage → trachea → pharynx → larynx → alveoli
- (c) larynx → nostrils → pharynx → lungs
- (d) Nostrils → pharynx → larynx → trachea → alveoli

Soln:

Answer is (d) Nostrils → pharynx → larynx → trachea → alveoli

Explanation:

Air enters respiratory system through nostrils through nostrils, passes to pharynx, larynx, trachea and then to alveoli. After inhalation diaphragm and intercostal muscles contract along with expansion of thoracic muscles which creates enough space for the air to enter into the lungs.

16. During respiration exchange of gases take place in

- (a) trachea and larynx
- (b) alveoli of lungs
- (c) alveoli and throat
- (d) throat and larynx

Soln:

Answer is (b) alveoli of lungs

Explanation:

Trachea, Larynx provide a passage for the movement of air. Gas exchange takes place in Alveoli of lungs. From alveoli oxygen diffuses into blood and Carbon-di-oxide is exhaled out of blood.

17. Which of the following statement (s) is (are) true about heart?

- (i) Left atrium receives oxygenated blood from different parts of body while right atrium receives deoxygenated blood from lungs
- (ii) Left ventricle pumps oxygenated blood to different body parts while right ventricle pumps deoxygenated blood to lungs
- (iii) Left atrium transfers oxygenated blood to right ventricle which sends it to different body parts
- (iv) Right atrium receives deoxygenated blood from different parts of the body while left ventricle pumps oxygenated blood to different parts of the body

- (a) (i)
- (b) (ii)
- (c) (ii) and (iv)
- (d) (i) and (iii)

Soln:

Answer is (c) (ii) and (iv)

Explanation:

Oxygenated blood circulates through left part of the heart whereas deoxygenated blood circulates through right part of the heart. Atrium receives blood and ventricle pumps the blood out of the heart.

18. What prevents backflow of blood inside the heart during contraction?

- (a) Valves in heart
- (b) Thick muscular walls of ventricles
- (c) Thin walls of atria
- (d) All of the above

Soln:

Answer is (a) Valves in heart

Explanation:

Walls in the heart are responsible for only pumping of the blood and they are not responsible in blocking backflow of blood inside the heart during contraction.

19. Single circulation i.e., blood flows through the heart only once during one cycle of passage through the body, is exhibited by

- (a) Labeo, Chameleon, Salamander
- (b) Hippocampus, Exocoetus, Anabas
- (c) Hyla, Rana, Draco
- (d) Whale, Dolphin, Turtle

Soln:

Answer is (b) Hippocampus, Exocoetus, Anabas

Explanation:

In Option a) Chameleon is a reptile and Salamander is an amphibian which are having 3 chambered hearts and show partial double circulation. In Option c) all are Amphibians and they show partial double circulation. In option d) Whale is a mammal but turtle is a reptile hence option d) is wrong.

20. In which of the following vertebrate group/groups, heart does not pump oxygenated blood to different parts of the body?

- (a) Pisces and amphibians
- (b) Amphibians and reptiles
- (c) Amphibians only
- (d) Pisces only

Soln:

Answer is (d) Pisces only

Explanation:

This is because of single circulation where deoxygenated blood from all part of the body is pumped into heart. From heart it is pumped to gills where it gets oxygenated and gets transferred to all parts of the body. Hence it proves pisces will not receive oxygenated blood.

21. Choose the correct statement that describes arteries.

- (a) They have thick elastic walls, blood flows under high pressure; collect blood from different organs and bring it back to the heart
- (b) They have thin walls with valves inside, blood flows under low pressure and carry blood away from the heart to various organs of the body
- (c) They have thick elastic walls, blood flows under low pressure; carry blood from the heart to various organs of the body
- (d) They have thick elastic walls without valves inside, blood flows under high pressure and carry blood away from the heart to different parts of the body.

Soln:

Answer is (d) They have thick elastic walls without valves inside, blood flows under high pressure and carry blood away from the heart to different parts of the body.

22. The filtration units of kidneys are called

- (a) ureter
- (b) urethra
- (c) neurons
- (d) nephrons

Soln:

Answer is (d) nephrons

Explanation:

Nephron is called as the functional unit of kidney. It helps in removing the waste products and excess substances from our body.

23. Oxygen liberated during photosynthesis comes from

- (a) water
- (b) chlorophyll
- (c) carbon dioxide
- (d) glucose

Soln:

Answer is (a) water

Explanation:

During photosynthesis water molecule splits to produce Oxygen and Hydrogen Ions. Oxygen is expelled out of plants and Hydrogen is used to reduce Carbon-di-oxide to produce carbohydrates.

24. The blood leaving the tissues becomes richer in

- (a) carbon dioxide
- (b) water
- (c) haemoglobin
- (d) oxygen

Soln:

Answer is (a) carbon dioxide

Explanation:

Because of respiration Carbon-di-oxide gets accumulated in tissues. Hence blood leaving the tissues becomes richer in Carbon-di-oxide.

25. Which of the following is an incorrect statement?

- (a) Organisms grow with time
- (b) Organisms must repair and maintain their structure
- (c) Movement of molecules does not take place among cells
- (d) Energy is essential for life processes

Soln:

Answer is (c) Movement of molecules does not take place among cells

Explanation:

Movement of molecule is a vital process. Movement of molecules in cells take place in active and passive modes such as Diffusion, osmosis, facilitated diffusion etc.

26. The internal (cellular) energy reserve in autotrophs is

- (a) glycogen
- (b) protein
- (c) starch
- (d) fatty acid

Soln:

Answer is (c) starch

Explanation:

Glycogen is the stored energy in animals, Plants stores energy in the form of Starch.

27. Which of the following equations is the summary of photosynthesis?

- (a) $6\text{CO}_2 + 12\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$
- (b) $6\text{CO}_2 + \text{H}_2\text{O} + \text{Sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 + 6\text{H}_2\text{O}$
- (c) $6\text{CO}_2 + 12\text{H}_2\text{O} + \text{Chlorophyll} + \text{Sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$
- (d) $6\text{CO}_2 + 12\text{H}_2\text{O} + \text{Chlorophyll} + \text{Sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{CO}_2 + 6\text{H}_2\text{O}$

Soln:

Answer is (c) $6\text{CO}_2 + 12\text{H}_2\text{O} + \text{Chlorophyll} + \text{Sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$

Explanation:

Option a does not show the factors responsible for photosynthesis . Option b) is not a balanced equation. Option d) is wrong as it has CO₂ in the products.

28. Choose the event that does not occur in photosynthesis

- (a) Absorption of light energy by chlorophyll
- (b) Reduction of carbon dioxide to carbohydrates
- (c) Oxidation of carbon to carbon dioxide
- (d) Conversion of light energy to chemical energy

Soln:

Answer is (c) Oxidation of carbon to carbon dioxide

29. The opening and closing of the stomatal pore depends upon

- (a) oxygen
- (b) temperature
- (c) water in guard cells
- (d) concentration of CO₂ in stomata

Soln:

Answer is (c) water in guard cells

Explanation:

Opening of guard cells is facilitated by the entry of water inside guard cells. This make the guard cell become turgid. Closing of guard cells is facilitated by water coming out of guard cells. This will make the guard cells flaccid.

30. Choose the forms in which most plants absorb nitrogen

- (i) Proteins
 - (ii) Nitrates and Nitrites
 - (iii) Urea
 - (iv) Atmospheric nitrogen
- (a) (i) and (ii)
 - (b) (ii) and (iii)
 - (c) (iii) and (iv)
 - (d) (i) and (iv)

Soln:

Answer is (b) (ii) and (iii)

Explanation:

Plants cannot absorb atmospheric Nitrogen. They can absorb the Nitrogen in the form of Nitrates, Nitrites and Urea present in the soil.

31. Which is the first enzyme to mix with food in the digestive tract?

- (a) Pepsin
- (b) Cellulase
- (c) Amylase
- (d) Trypsin

Soln:

Answer is (c) Amylase

Explanation:

Amylase is secreted in mouth and acts on the starch to convert into simpler molecules. Hence Amylase is the first enzyme to mix with food in the digestive tract.

32. Which of the following statement(s) is (are) correct?

- (i) Pyruvate can be converted into ethanol and carbon dioxide by yeast
 - (ii) Fermentation takes place in aerobic bacteria
 - (iii) Fermentation takes place in mitochondria
 - (iv) Fermentation is a form of anaerobic respiration
- (a) (i) and (iii)
 - (b) (ii) and (iv)
 - (c) (i) and (iv)
 - (d) (ii) and (iii)

Soln:

Answer is(c) (i) and (iv)

Explanation:

Fermentation is carried out by anaerobes in the cytoplasm. Hence option ii) and iii) are wrong.

33. Lack of oxygen in muscles often leads to cramps among cricketers. This results due to

- (a) conversion of pyruvate to ethanol
- (b) conversion of pyruvate to glucose
- (c) non conversion of glucose to pyruvate
- (d) conversion of pyruvate to lactic acid

Soln:

Answer is (d) conversion of pyruvate to lactic acid

Explanation:

Breakdown of Pyruvate in presence of oxygen takes place in mitochondria leading to the formation of Lactic acid. Due to workout oxygen is used for the production of energy leading to the lack of oxygen and production of lactic acid.

34. Choose the correct path of urine in our body

- (a) kidney → ureter → urethra → urinary bladder
- (b) kidney → urinary bladder → urethra → ureter
- (c) kidney → ureters → urinary bladder → urethra
- (d) urinary bladder → kidney → ureter → urethra

Soln:

Answer is (c) kidney → ureters → urinary bladder → urethra

Explanation:

Urine from nephron is brought to the collecting duct of kidneys where the urine enters the ureters. There are 2 ureters, each opening from one kidney into the urinary bladder. The urinary bladder stores urine and its size increases as the amount of urine collected increases. When the CNS gives a voluntary message the muscles of bladder contract and the bladder sphincter relaxes thus excreting urine out through the urethra.

35. During deficiency of oxygen in tissues of human beings, pyruvic acid is converted into lactic acid in the

- (a) cytoplasm
- (b) chloroplast
- (c) mitochondria
- (d) golgi body

Soln:

Answer is (a) cytoplasm

Explanation:

When there is lack of oxygen Breakdown of Pyruvate takes place in cytoplasm of muscle cells leading to the formation of Lactic acid.

Short Answer Questions

36. Name the following

- (a) The process in plants that links light energy with chemical energy
- (b) Organisms that can prepare their own food
- (c) The cell organelle where photosynthesis occurs
- (d) Cells that surround a stomatal pore
- (e) Organisms that cannot prepare their own food
- (f) An enzyme secreted from gastric glands in stomach that acts on proteins.

Soln:

- a) Photosynthesis
- b) Autotrophs
- c) Chloroplasts
- d) Guard cells
- e) Heterotrophs
- f) Pepsin

37. "All plants give out oxygen during day and carbon dioxide during night". Do you agree with this statement? Give reason.

Soln:

The statement is wrong because plants respire every time and expel out Carbon-di-oxide every time but they give out oxygen only in the day time as photosynthesis process can take place only in the presence of sunlight.

38. How do the guard cells regulate opening and closing of stomatal pores?**Soln:**

Opening of guard cells is facilitated by the entry of water inside guard cells. This make the guard cell become turgid. Closing of guard cells is facilitated by water coming out of guard cells. This will make the guard cells flaccid.

Entry of water inside guard cells will make the cell turgid leading to the opening of stomata. Similarly cell become flaccid when water come out of guard cells, this leads to closing of the stomata.

39. Two green plants are kept separately in oxygen free containers, one in the dark and the other in continuous light. Which one will live longer? Give reasons.**Soln:**

Plant kept in continuous light live longer because plants release CO₂ during respiration. In case of plant kept in dark CO₂ resulting in lack of oxygen and the plant will die earlier.

40. If a plant is releasing carbon dioxide and taking in oxygen during the day, does it mean that there is no photosynthesis occurring? Justify your answer.**Soln:**

If a plant is releasing carbon dioxide and taking in oxygen during the day means plant is respiring; it does not mean that there is no photosynthesis occurring in the plant. This is because Photosynthesis and respiration are two independent processes.

41. Why do fishes die when taken out of water?**Soln:**

Fishes can respire only by using dissolved oxygen. When we take fish out of water it cannot respire due to lack of dissolved oxygen and they die.

42. Differentiate between an autotroph and a heterotroph**Soln:**

Autotrophs	Heterotrophs
They can make their own food	They cannot make their own food
Ex: Plants and certain bacteria	Ex: Animals, Fungi and protozoans

43. Is ‘nutrition’ a necessity for an organism? Discuss.

Soln:

Nutrition is an absolute necessity for the organisms because nutrition provides energy for carrying out metabolic activities.

44. What would happen if green plants disappear from earth?

Soln:

Green plants are the sources of energy for all the heterotrophs on earth. Plants convert solar and chemical energy into viable food sources. If plants get disappeared from the earth it lead to imbalance in the ecosystem and heterotrophs may die without food.

45. Leaves of a healthy potted plant were coated with vaseline. Will this plant remain healthy for long? Give reasons for your answer.

Soln:

Coating Vaseline to the leaves of a healthy plants will clog its stomata pores and stops the respiration of plants and the plants dies.

46. How does aerobic respiration differ from anaerobic respiration?

Soln:

Aerobic Respiration	Anaerobic respiration
Takes place in the presence of Oxygen	Takes place in the absence of Oxygen
Carbon-di-oxide and water are the end products	Carbon-di-oxide and Lactic acid/ethanol are the end products
More efficient in energy production	Less efficient in energy production
Takes Place in animals and plants	Takes place in unicellular organisms

47. Match the words of Column (A) with that of Column (B)

Column A	Column B
Phloem	(i) Excretion
Nephron	(ii) Translocation of food
Veins	(iii) Clotting of blood
Platelets	(iv) Deoxygenated blood

Soln:

Column A	Column B
Phloem	(ii) Translocation of food
Nephron	(i) Excretion
Veins	(iv) Deoxygenated blood
Platelets	(iii) Clotting of blood

48. Differentiate between an artery and a vein.

Soln:

Artery has thick walls whereas Veins has thin walls.

Arteries carries blood away from the heart but veins carry blood to the heart.

In arteries valves are absent and in veins they are present

In arteries blood flows under pressure but in veins there will be no pressure.

49. What are the adaptations of leaf for photosynthesis?

Soln:

Adaptation of leaf for photosynthesis are as follows

- a) Surface of leaf is flat to allow greater exposure of light.
- b) Presence of chlorophyll to trap sunlight
- c) Presence of stomata on the lower surface for easy transpiration

50. Why is small intestine in herbivores longer than in carnivores?

Soln:

Food of herbivores contains mostly cellulose. To digest cellulose herbivores need help of certain bacteria. In order to accommodate the microbes and to facilitate digestion of food herbivores has longer small intestine than carnivores.

51. What will happen if mucus is not secreted by the gastric glands?

Soln:

Mucus prevent inner lining of stomach from HCL. Mucus prevents drying of inner lining of the stomach. Mucus helps in easy movement of food particles through digestive system. If mucus is not secreted food will not easily move through digestive system. HCL will damage the stomach lining and the digestion process will not take place.

52. What is the significance of emulsification of fats?**Soln:**

Emulsification is a process of breakage of larger fats molecules into digestible fat globules. Emulsification aids action enzymes on fats by breaking larger fat molecules.

53. What causes movement of food inside the alimentary canal?**Soln:**

Peristalsis is the process that cause movement of food inside the alimentary canal.

54. Why does absorption of digested food occur mainly in the small intestine?**Soln:**

Small intestine has specialized structures that facilitate absorption of digested food. Small intestine has number of folds that increase the area of absorption. Small intestine also has fingerlike projection called microvilli which are richly supplied by blood vessels.

55. Match Group (A) with Group (B)

Group A	Group B
(a) Autotrophic nutrition	(i) Leech
(b) Heterotrophic nutrition	(ii) Paramecium
(c) Parasitic nutrition	(iii) Deer
(d) Digestion in food vacuoles	(iv) Green plant

Soln:

Group A	Group B
(a) Autotrophic nutrition	(iv) Green plant
(b) Heterotrophic nutrition	(iii) Deer
(c) Parasitic nutrition	(i) Leech
(d) Digestion in food vacuoles	(ii) Paramecium

56. Why is the rate of breathing in aquatic organisms much faster than in terrestrial organisms?**Soln:**

Rate of breathing in aquatic organisms much faster than in terrestrial organisms because availability of oxygen is less in water than on land, hence in order to obtain required oxygen aquatic organisms has to work hard.

57. Why is blood circulation in human heart called double circulation?

Soln:

In Humans blood flow in two direction simultaneously in one cardiac cycle. Oxygenated blood comes to heart from lungs and at the same time de-oxygenated blood goes from Heart towards lungs. Because of this double movement is blood circulation in human heart called double circulation.

58. What is the advantage of having four chambered heart?

Soln:

Four chambered heart has the following advantages

- Clear cut division of labors among different chambers
- Segregation of oxygenated and deoxygenated blood in the heart.
- Efficiency of the heart will increase.

59. Mention the major events during photosynthesis

Soln:

Major events of Photosynthesis are

- a) Absorption of light energy by chlorophyll
- b) Conversion of light energy into chemical energy
- c) Splitting of water molecules into Hydrogen and Oxygen
- d) Reduction of CO₂ to from carbohydrates.

60. In each of the following situations what happens to the rate of photosynthesis?

- (a) Cloudy days
- (b) No rainfall in the area
- (c) Good manuring in the area
- (d) Stomata get blocked due to dust

Soln:

- a) Rate of photosynthesis will reduce due to availability of sunlight.
- b) Rainfall will not affect rate of Photosynthesis
- c) Manuring will not affect rate of Photosynthesis
- d) Blockage of stomata will reduce the rate of photosynthesis because blockage will affect availability pf Carbon-di-oxide.

61. Name the energy currency in the living organisms. When and where is it produced?

Soln:

Adenosine tri Phosphate (ATP) is the energy currency in the living organisms. It is produced in Mitochondria during respiration.

62. What is common for cuscuta, ticks and leeches?

Soln:

These all are parasite. They live on or inside another body to obtain food from the host. In obtaining food parasites always harm their host.

63. Explain the role of mouth in digestion of food.

Soln:

Role of mouth in digestion of food.

- a) Ingestion of food
- b) Breakage of food by Mastication
- c) Saliva aids easy swallowing of food
- d) Salivary amylase breaks starch into simpler carbohydrates.

64. What are the functions of gastric glands present in the wall of the stomach?

Soln:

Hydrochloric acid, pepsin and mucus are secreted by gastric gland present in the stomach. They have following functions.

HCL Kills germs present in the food and it decreases P^H of the stomach which is essential for the working of digestive enzymes.

Pepsin digests protein.

Mucus protects stomach's innerline from HCL.

65. Match the terms in Column (A) with those in Column (B)

Column (A)	Column (B)
(a) Trypsin	(i) Pancreas
(b) Amylase	(ii) Liver
(c) Bile	(iii) Gastric glands
(d) Pepsin	(iv) Saliva

Soln:

Column (A)	Column (B)
(a) Trypsin	(i) Pancreas
(b) Amylase	(iv) Saliva
(c) Bile	(ii) Liver
(d) Pepsin	(iii) Gastric glands

66. Name the correct substrates for the following enzymes

- (a) Trypsin
- (b) Amylase
- (c) Pepsin
- (d) Lipase

Soln:

- a) Protein
- b) Starch
- c) Protein
- d) Lipid

67. Why do veins have thin walls as compared to arteries?

Soln:

Blood flow through veins does not exert pressure on walls of veins hence they have thin walls. Blood flow in arteries exerts high pressure on arterial walls hence they need thick walls.

68. What will happen if platelets were absent in the blood?

Soln:

Platelets are responsible for the clotting of the blood. If platelets are absent blood will not clot. In case of injuries blood flow cannot be stopped without clotting and this may prove fatal for the person.

69. Plants have low energy needs as compared to animals. Explain.

Soln:

Most of the transport in plants occur through passive transport which does not require energy and plants stand still at one place and they will not travel in search of food. Hence Plants require low energy compared to animals.

70. Why and how does water enter continuously into the root xylem?

Soln:

Water should enter the root xylem continuously to assist the various process such as photosynthesis. Continuous flow of water into root xylem is due to transpiration pull.

71. Why is transpiration important for plants?

Soln:

Transpiration is important for plants because of the following reasons.

- (a) It creates transpiration pull to facilitate ascent of sap.
- (b) Ascent of sap is necessary to make water available for photosynthesis.
- (c) It helps a plant to get rid of excess water.

72. How do leaves of plants help in excretion?

Soln:

Leaves play an important role in excretion in plants because CO_2 is expelled out through pores of stomata present in the leaf. Plants shed leaves to get rid of excretory products deposited on them.

Long Answer Questions

73. Explain the process of nutrition in Amoeba.

Soln:

Amoeba shows holozoic nutrition which is comprised of Ingestion, Digestion, Absorption, Assimilation and Egestion.

Ingestion:

Ameoba traps food particles through fingerlike projections called as pseudopodia. Pseudopodia present outside its body and helps in taking food along with water

Digestion:

Food vacuoles are made after ingesting the food. Enzymes are released in the food vacuole for digestion.

Absorption:

After digestion, nutrients enter the cytoplasm through osmosis.

Assimilation:

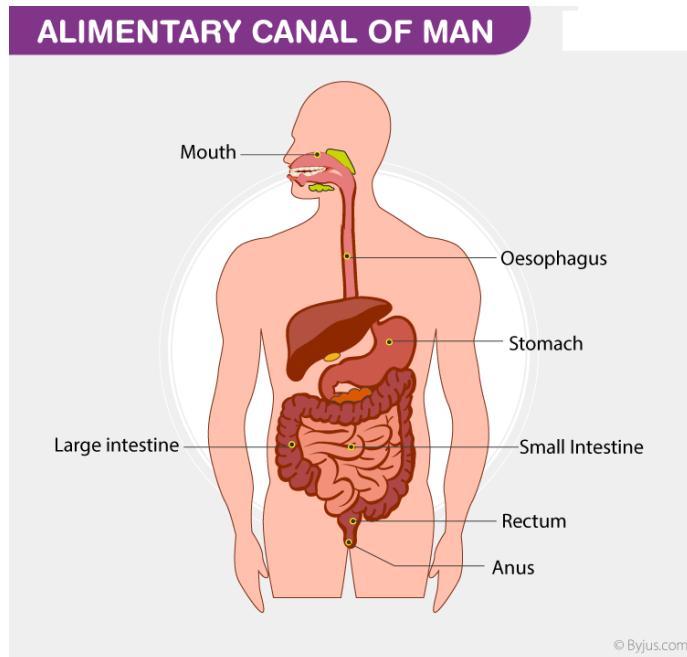
Nutrients are utilized by the cell for various purposes.

Egestion:

Food vacuole goes near the cell membrane to empty its contents outside the cell. This results in expulsion of waste materials from the cell.

74. Describe the alimentary canal of man.

Soln:



Human Alimentary canal has the following parts

Buccal Cavity:

Generally called as mouth and it consists of tongue, teeth and salivary gland. It is the entry site for the food to digestive system. Food is breakdown into simpler molecules by mastication in buccal cavity and salivary amylase breaks Starch into simpler carbohydrates in the Buccal cavity.

Oesophagus:

Buccal cavity is connected to long tube like structure called as Oesophagus. Oesophagus connects the buccal cavity to stomach and assists in flow of food towards stomach. Oesophagus has a valve to prevent backflow of food particles.

Stomach:

Stomach is a J Shaped organ which has gastric glands in it. Gastric glands secrets Hydrochloric acid, Pepsin and Mucus that helps in the digestion of food.

Small Intestine:

Small intestine is highly coiled long structure. Small intestine performs major of the food absorption. Small intestine has specialized structures that facilitate absorption of digested food. Small intestine has number of folds that increase the area of absorption. Small intestine also has fingerlike projection called microvilli which are richly supplied by blood vessels.

Large Intestine :

This is shorter than small intestine and its lumen is larger than that of Small intestine. The major function of the large intestine is to absorb water from the remaining indigestible food matter and transmit the useless waste material from the body.

Rectum:

Large Intestine open into rectum. Waste materials and undigested food are stored in rectum.

Anus:

It is the opening at the end of alimentary canal. Solid waste materials leave the body through Anus.

75. Explain the process of breathing in man**Soln:**

Breathing in Humans has two processes 1) Inhalation 2) Exhalation

Inhalation:

Inhalation is the process of taking oxygen. During this process, ribs come out and diaphragm moves down. This increases the volume of the lungs and decreases the pressure. This will make the air move towards the lungs.

Exhalation:

Exhalation is a process of throwing out carbon-dioxide. During this process, ribs go down and diaphragm moves up. This decreases the volume of the lungs and increases the pressure. As a result air moves out of the lungs.

76. Explain the importance of soil for plant growth.**Soln:**

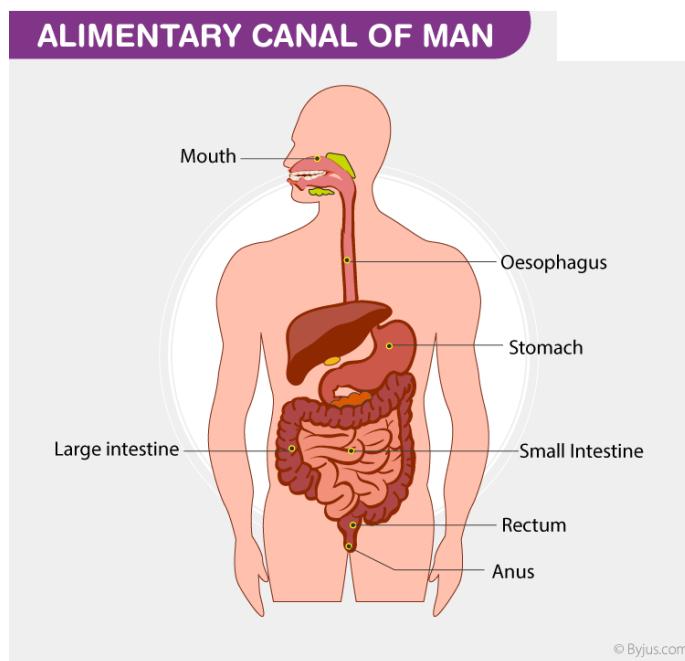
Soil is very important for the growth of the plant for the following reasons.

- 1) Soil provides the base for the growth of the plants and provides a platform for the penetration of roots.
- 2) It acts as a reservoir of the water.

- 3) Soil has different minerals essential for the growth of the plant. Soil is the only medium from which soil obtain nutrients.
- 4) Soil has organic materials essential for the growth of the plants.
- 5) Soil has microorganisms that has symbiotic relationship with the plant and these microbes assist plant in their growth and life processes.

77. Draw the diagram of alimentary canal of man and label the following parts. Mouth, Oesophagus, Stomach, Intestine

Soln:



78. How do carbohydrates, proteins and fats get digested in human beings?

Soln:

Carbohydrate Digestion

Digestion of carbohydrates starts with buccal cavity where salivary enzymes breaks down the starch into simple sugar molecules. Other sugar molecules are breakdown to glucose in small intestine.

Protein digestion

Proteins are partially digested by pepsin secreted by gastric glands present in the stomach. Then Pancreatic juice secrets trypsin and chymotrypsin enzymes in small intestine where complete digestion of proteins takes place.

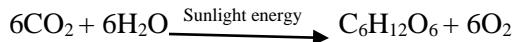
Fat Digestion

Fats are digested in small intestine. Bile juice present in the liver emulsifies the fat which breaks fats into small globules. These small fat globules are converted into glycerol and fatty acids by Lipase enzyme.

79. Explain the mechanism of photosynthesis

Soln:

Photosynthesis is a process by which plants produce their own food by utilizing sunlight, CO₂ and water. CO₂ and water are converted to carbohydrates with the evolution of oxygen. Photosynthesis reaction can be given by following reaction.

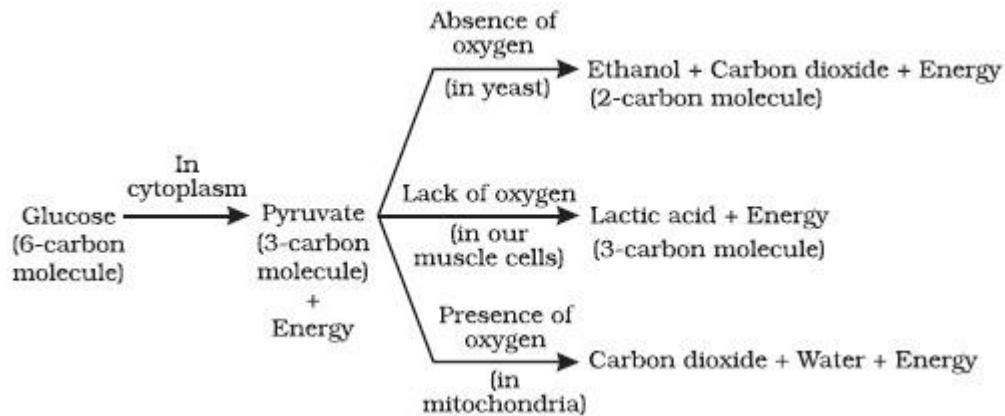


Process of Photosynthesis is divided into 4 processes

1. Absorption of light energy by chlorophyll
2. Conversion of light energy into chemical energy
3. Splitting of water molecules into Hydrogen and Oxygen
4. Reduction of CO₂ to produce carbohydrates

80. Explain the three pathways of breakdown in living organisms.

Soln:



Glucose is first broken down to 3 carbon molecule called as pyruvate. This process takes place in the cytoplasm of all organisms. Pyruvate is further broken down by the flowing steps.

In yeast:

Pyruvate is broken down in the absence of oxygen and the process is called as anaerobic respiration. In yeasts pyruvate is broken down to produce CO₂ and ethanol.

In Muscle Cells:

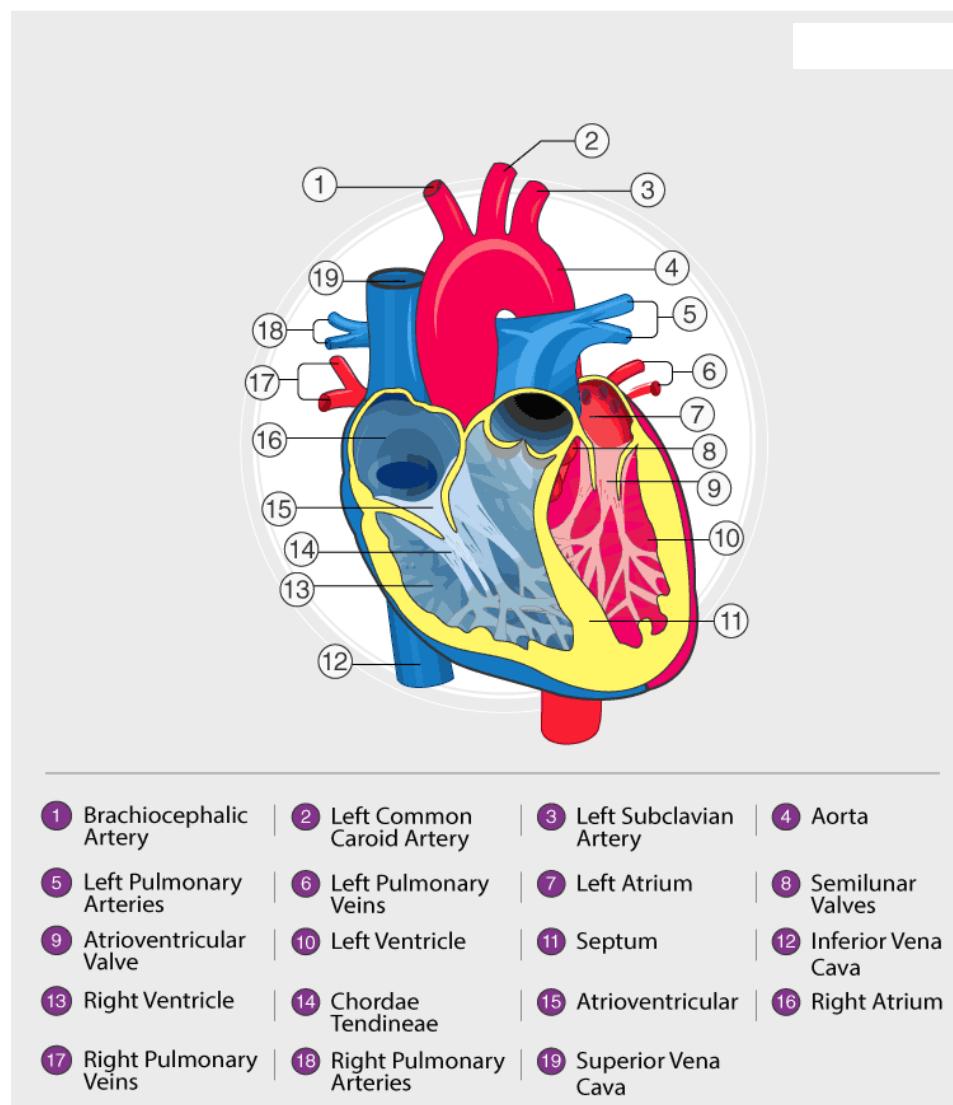
During rigorous physical activity energy demand of our muscles cells increases rapidly. This is compensated by anaerobic respiration in muscle cells. In muscle cells pyruvate is broken down into lactic acid.

In Mitochondria:

In case of aerobic respiration (in presence of oxygen) pyruvate is broken down in mitochondria. Here Pyruvate is broken down to produce H₂O and CO₂. Aerobic respiration is most common in most of the organisms.

81. Describe the flow of blood through the heart of human beings

Soln:



- Deoxygenated blood from different organs comes to the right atrium through the vena cava.
- From the right atrium, blood goes to the right ventricle. The tricuspid valve between the right atrium and right ventricle prevents the backflow of blood.
- From the right ventricle, blood goes to the lungs through pulmonary artery. Inside the lungs, carbon dioxide is removed from the blood and oxygen enters the blood.
- From the lungs, blood goes to the left atrium through pulmonary vein.
- From the left atrium, blood goes to the left ventricle.
- From the left ventricle, blood is pumped into the aorta so that it can be supplied to different organs.

82. Describe the process of urine formation in kidneys

Soln:

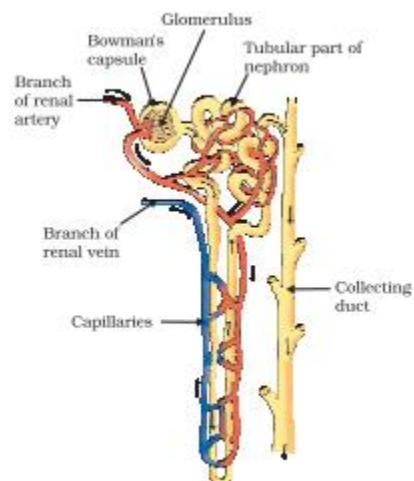


Figure 6.14
Structure of a nephron

The basic filtration unit in the kidneys is a cluster of very thin-walled blood capillaries. Each capillary cluster in the kidney is associated with the cup-shaped end of a coiled tube called Bowman's capsule that collects the filtrate (Fig. 6.14). Each kidney has large numbers of these filtration units called nephrons packed close together.

Some substances in the initial filtrate, such as glucose, amino acids, salts and a major amount of water, are selectively re-absorbed as the urine flows along the tube. The amount of water re-absorbed depends on how much excess water is there in the body, and on how much of dissolved waste there is to be excreted. The urine forming in each kidney eventually enters a long tube, the ureter, which connects the kidneys with the urinary bladder.

Urine is stored in the urinary bladder until the pressure of the expanded bladder leads to the urge to pass it out through the urethra. The bladder is muscular, so it is under nervous control.

Chapter - 5

Periodic Classification of elements

Multiple Choice Questions

1. Upto which element, the Law of Octaves was found to be applicable

- (a) Oxygen
- (b) Calcium
- (c) Cobalt
- (d) Potassium

Soln:

Answer is (b) Calcium

Explanation:

Newland's law of octaves was applicable to the elements with atomic mass up to 40 da which comes up to Calcium. After calcium every eighth element possess properties similar to that of the first.

2. According to Mendeleev's ' Periodic Law, the elements were arranged in the periodic table in the order of

- (a) increasing atomic number
- (b) decreasing atomic number
- (c) increasing atomic masses
- (d) decreasing atomic masses

Soln:

Answer is (c) increasing atomic masses

Explanation:

3. In Mendeleev 's Periodic Table, gaps were left for the elements to be discovered later. Which of the following elements found a place in the periodic table later

- (a) Germanium
- (b) Chlorine
- (c) Oxygen
- (d) Silicon

Soln:

Answer is (a) Germanium

Explanation:

Mendeleev name unnamed elements as EKA- Boron EKA- Aluminium and EKA Silicon which were later replaced as Scandium, Gallium, and germanium respectively.

4. Which of the following statement (s)

about the Modern Periodic Table are incorrect

- (i) The elements in the Modern Periodic Table are arranged on the basis of their decreasing atomic number
- (ii) The elements in the Modern Periodic Table are arranged on the basis of their increasing atomic masses
- (iii) Isotopes are placed in adjoining group (s) in the Periodic Table
- (iv) The elements in the Modern Periodic Table are arranged on the basis of their increasing atomic number

- (a) (i) only
- (b) (i), (ii) and (iii)
- (c) (i), (ii) and (iv)
- (d) (iv) only

Soln:

Answer is (b) (i), (ii) and (iii)

Explanation:

Elements in the Modern Periodic Table are arranged on the basis of their increasing atomic number hence option i) is wrong . In modern periodic table atomic mass is not a criteria hence option ii) is wrong. Isotopes are given the same position in periodic table hence option iii) is wrong.

5. Which of the following statements about the Modern Periodic Table is correct:

- (a) It has 18 horizontal rows known as Periods
- (b) It has 7 vertical columns known as Periods
- (c) It has 18 vertical columns known as Groups
- (d) It has 7 horizontal rows known as Groups

Soln:

Answer is (c) It has 18 vertical columns known as Groups

Explanation:

Modern periodic table have 18 groups and 7 periods. Columns are called groups and rows are called priods.

6. Which of the given elements A, B, C, D and E with atomic number 2, 3, 7, 10 and 30 respectively belong to the same period?

- (a) A, B, C
- (b) B, C, D
- (c) A, D, E
- (d) B, D, E

Soln:

Answer is (b) B, C, D

Explanation:

Element with atomic number belong to first period and element B, C and D belongs to second period.

7. The elements A, B, C, D and E have atomic number 9, 11, 17, 12 and 13 respectively. Which pair of elements belong to the same group?

- (a) A and B
- (b) B and D
- (c) A and C
- (d) D and E

Soln:

Answer is (c) A and C

Explanation:

A and C are fluorine and chlorine belongs to the same group.

8. Where would you locate the element with electronic configuration 2,8 in the Modern Periodic Table?

- (a) Group 8
- (b) Group 2
- (c) Group 18
- (d) Group 10

Soln:

Ans is (c) Group 18

Explanation:

Group 18 has its outermost shells completely filled hence element with electronic configuration belongs to group 18.

9. An element which is an essential constituent of all organic compounds belongs to

- (a) group 1
- (b) group 14
- (c) group 15
- (d) group 16

Soln:

Answer is b) group 14

Explanation:

Carbon is an essential constituent of all organic compounds which belongs to group 14.

10. Which of the following is the outermost shell for elements of period 2?

- (a) K shell
- (b) L shell
- (c) M shell
- (d) N shell

Soln:

Answer is (b) L shell

Explanation:

In period 18 there are two shells K and L

11. Which one of the following elements exhibit maximum number of valence electrons?

- (a) Na
- (b) Al
- (c) Si
- (d) P

Soln:

Answer is (d) P

Explanation:

Electronic configuration of Na, Al, Si and P are 2,8 1, 2,8,3,2,8,4, and 2,8,5 respectively. Valence electrons in Na, Al, Si and P are 1,3,4 and 5 Hence phosphorus has maximum number of valence electrons.

12. Which of the following gives the correct increasing order of the atomic radii of O, F and N ?

- (a) O, F, N
- (b) N, F, O
- (c) O, N, F
- (d) F, O, N

Soln:

Answer is (d) F, O, N

Explanation:

Atomic radius increase as move from left to right across a period. (N7), O(8) and F(10) are in increasing order of atomic numbers.

13. Which among the following elements has the largest atomic radii?

- (a) Na
- (b) Mg
- (c) K
- (d) Ca

Soln:

Answer is (c) K

Soln:

K has largest atomic radii because atomic radii decreases from left to right along a period. This is because of increase in nuclear charge which tends to pull the electron closer to the nucleus and reduces the size of the atom. Hence K has the largest atomic radii.

14. Which of the following elements would lose an electron easily?

- (a) Mg
- (b) Na
- (c) K
- (d) Ca

Soln:

Answer is (b) Na

Explanation:

Na and K belongs to the same group I and Magnesium and Calcium belongs to group ii. Sodium has 1 electron in its valence shell which can be lost easily.

15. Which of the following elements does not lose an electron easily?

- (a) Na
- (b) F
- (c) Mg
- (d) Al

Soln:

Sodium has 1, magnesium has 2 and Aluminium has 3 electron in its outermost shell whereas Fluorine has 7 electron in its outermost shell hence Fluorine does not lose electron easily.

16. Which of the following are the characteristics of isotopes of an element?

- (i) Isotopes of an element have same atomic masses
- (ii) Isotopes of an element have same atomic number
- (iii) Isotopes of an element show same physical properties
- (iv) Isotopes of an element show same chemical properties

- (a) (i), (iii) and (iv)
- (b) (ii), (iii) and (iv)
- (c) (ii) and (iii)
- (d) (ii) and (iv)

Soln:

Answer is (d) (ii) and (iv)

Explanation:

Elements with same atomic number but different atomic masses are known as isotopes. Isotopes show same chemical properties but differ in their physical properties.

17. Arrange the following elements in the order of their decreasing metallic character Na, Si, Cl, Mg, Al

- (a) Cl > Si > Al > Mg > Na
- (b) Na > Mg > Al > Si > Cl
- (c) Na > Al > Mg > Cl > Si
- (d) Al > Na > Si > Ca > Mg

Soln:

Answer is (b) Na > Mg > Al > Si > Cl

Explanation:

Na has 1, magnesium has 2, aluminium has 3 and Chlorine has 7 electrons in its valence shells. Hence Sodium shows maximum metallic characters followed by Magnesium, aluminium and chlorine shows non-metallic properties.

18. Arrange the following elements in the order of their increasing nonmetallic character Li, O, C, Be, F

- (a) F < O < C < Be < Li
- (b) Li < Be < C < O < F
- (c) F < O < C < Be < Li
- (d) F < O < Be < C < Li

Soln:

Li is on the left of in the 2nd period of modern periodic table followed by beryllium. Fluorine is at right next to Neon. Hence Fluorine shows maximum non-metallic characters followed by Oxygen, Beryllium, carbon and Lithium.

19. What type of oxide would Eka– aluminium form?

- (a) EO₃
- (b) E₃ O₂
- (c) E₂ O₃
- (d) EO

Soln:

Answer is (c) E₂O₃

20. Three elements B, Si and Ge are

- (a) metals
- (b) non-metals
- (c) metalloids
- (d) metal, non-metal and metalloid respectively

Soln:

Answer is (c) metalloids

21. Which of the following elements will form an acidic oxide?

- (a) An element with atomic number 7
- (b) An element with atomic number 3
- (c) An element with atomic number 12
- (d) An element with atomic number 19

Soln:

Answer is (a) An element with atomic number 7

Explanation:

Element with atomic number 7 has electron configuration 2,5 which means it can gain 3 electrons and is a electronegative element. It should be a non-metal and non-metals will form acidic oxide.

22. The element with atomic number 14 is hard and forms acidic oxide and a covalent halide. To which of the following categories does the element belong?

- (a) Metal
- (b) Metalloid
- (c) Non-metal
- (d) Left-hand side element

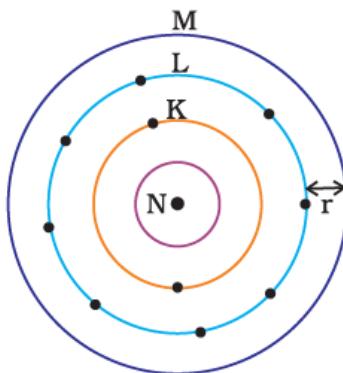
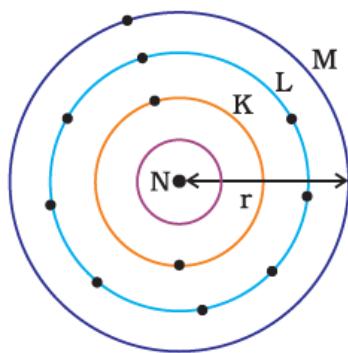
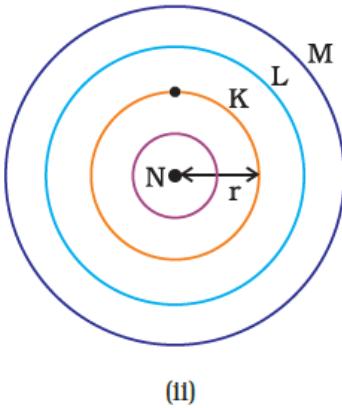
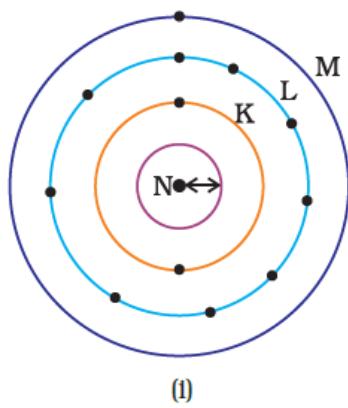
Soln:

Answer is (b) Metalloid

Explanation:

Element with atomic no. 14 is Silicon and is a metalloid. It forms acidic oxide , thus behaving as a non-metal and also forms covalent halide, thus acting as a metal.

23. Which one of the following depict the correct representation of atomic radius(r) of an atom?



Soln:

- (a) (i) and (ii)
- (b) (ii) and (iii)
- (c) (iii) and (iv)
- (d) (i) and (iv)

Soln:

Answer is (b) (ii) and (iii)

Explanation:

Atomic radius is the distance between the nucleus and outermost orbital is shown clearly in images ii) and iii) where as in image i) and iv) it is not depicted.

24. Which one of the following does not increase while moving down the group of the periodic table?

- (a) Atomic radius
- (b) Metallic character
- (c) Valence
- (d) Number of shells in an element

Soln:

Answer is (c) Valence

Explanation:

Valency remain same in a group.

25. On moving from left to right in a period in the periodic table, the size of the atom.

- (a) increases
- (b) decreases
- (c) does not change appreciably
- (d) first decreases and then increases

Soln:

Answer is (b) decreases

Explanation:

Atomic radius decreases when we move from left to right in a periods hence the size of the atom also decreases.

26. Which of the following set of elements is written in order of their increasing metallic character?

- (a) Be Mg Ca
- (b) Na Li K
- (c) Mg Al Si
- (d) C O N

Soln:

Answer is (a) Be Mg Ca

Explanation:

Metallic character increase as we move down the group. In the elements that belong to same group Berrylium is at the top and Calcium is at the bottom.

Short Answer Questions

27. The three elements A, B and C with similar properties have atomic masses X, Y and Z respectively. The mass of Y is approximately equal to the average mass of X and Z. What is such an arrangement of elements called as? Give one example of such a set of elements.

Soln:

Such an arrangement of elements are called Triads. Ex: Lithium Sodium and Potassium make a triad. Their atomic masses are 6.9, 23.0 and 39.0 respectively. An average mass of Li and K is approximately equal to the atomic mass of Na.

28. Elements have been arranged in the following sequence on the basis of their increasing atomic masses. F, Na, Mg, Al, Si, P, S, Cl, Ar, K (a) Pick two sets of elements which have similar properties. (b) The given sequence represents which law of classification of elements?

Soln:

- a) Na, Mg, Al and K are metals. F and Cl are Halogens. These make two sets of elements
- b) Given set represent Mendeleev's law of periodicity.

29. Can the following groups of elements be classified as Dobereiner's triad ?

- (a) Na, Si, Cl
- (b) Be, Mg, Ca

Atomic mass of Be 9; Na 23; Mg 24; Si 28; Cl 35; Ca 40 Explain by giving reason.

Soln:

Though atomic mass of Silicon is the average of atomic masses of Sodium and Chlorine they do not have similar properties hence they cannot be classified as Dobereiner's triad

30. In Mendeleev's Periodic Table the elements were arranged in the increasing order of their atomic masses. However, cobalt with atomic mass of 58.93 amu was placed before nickel having an atomic mass of 58.71 amu. Give reason for the same.

Soln:

In Mendeleev's Periodic Table there are instances where elements with higher atomic mass is placed before the element with lower atomic mass. This was done to ensure that elements with similar properties were included in the same group. Hence Cobalt was placed before Nickel despite of higher atomic number of Cobalt than Nickel.

31. "Hydrogen occupies a unique position in Modern Periodic Table". Justify the statement.

Soln:

Hydrogen occupies a unique position in Modern Periodic Table because of the following reasons.

1. Hydrogen and alkali metals have similar outer electronic configuration as both have one electron in their outermost shell.
2. Properties of Hydrogen are similar to properties of Halogens as electronic configurations of halogens and Hydrogen are same.

32. Write the formulae of chlorides of Eka-silicon and Eka-aluminium, the elements predicted by Mendeleev.

Soln:

Chlorides of Eka-silicon: ECl_4

Chlorides of Eka-Aluminium: ECl_3

33. Three elements A, B and C have 3, 4 and 2 electrons respectively in their outermost shell. Give the group number to which they belong in the Modern Periodic Table. Also, give their valencies.

Soln:

A Belongs to Group 13, A Belongs to Group 14 and C Belongs to Group 2. Valency of A is 3, B is 4 and C is 2.

34. If an element X is placed in group 14, what will be the formula and the nature of bonding of its chloride?

Soln:

If an element X is placed in group 14 it has 4 electron in its outermost orbit. Formula of its Chloride is ECl_4 . Here element can form compound by sharing electrons hence it will be a chemical bonding.

35. Compare the radii of two species X and Y. Give reasons for your answer.

- (a) X has 12 protons and 12 electrons
(b) Y has 12 protons and 10 electrons

Soln:

From electron arrangement

X -2.8.2

Y -2.8

Since Y has fewer energy levels it's atomic radius will be smaller than that of X.

36. Arrange the following elements in increasing order of their atomic radii.

- (a) Li, Be, F, N
(b) Cl, At, Br I

Soln:

Given elements are in the same group and are arranged from left to right. So Increasing order of their atomic radiis

- a) Li>Be>F>N
- b) Cl>Br>I>At

37. Identify and name the metals out of the following elements whose electronic configurations are given below.

- (a) 2, 8, 2
- (b) 2, 8, 1
- (c) 2, 8, 7
- (d) 2, 1

Soln:

- a) Magnesium
- b) Sodium
- c) Chlorine
- d) Lithium

38. Write the formula of the product formed when the element A (atomic number 19) combines with the element B (atomic number 17). Draw its electronic dot structure. What is the nature of the bond formed?

Soln:

Element A is K (Potassium).

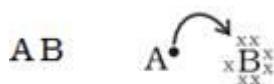
The electronic configuration of element A (atomic number 19) would be 2, 8, 8, 1. As it has only one valence electron therefore it must be a metal. Thus it is potassium.

Element B is Cl (Chlorine).

The electronic configuration of element B (atomic number 17) would be 2, 8, 7. As it has 7 valence electrons therefore it must be a non-metal. Thus it is chlorine.

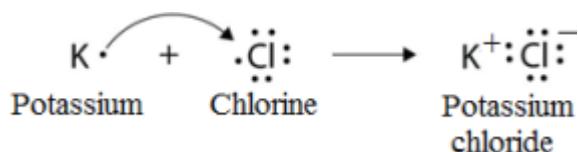
A metal and a non-metal usually combine with an ionic bond. Metals have tendency to lose electrons and form cations whereas non-metals can accept electrons to form anions.

Dot structure:



Potassium and chlorine will combine with an ionic bond to form potassium chloride (KCl).

The electron dot structure of KCl is as given below:



39. Arrange the following elements in the increasing order of their metallic character Mg, Ca, K, Ge, Ga

Soln:

Ge>Ga>Mg>Ca>K

40. Identify the elements with the following property and arrange them in increasing order of their reactivity

- (a) An element which is a soft and reactive metal
- (b) The metal which is an important constituent of limestone
- (c) The metal which exists in liquid state at room temperature

Soln:

- a) Sodium
- b) Calcium
- c) Mercury

41. Properties of the elements are given below. Where would you locate the following elements in the periodic table?

- (a) A soft metal stored under kerosene
- (b) An element with variable (more than one) valency stored under water.
- (c) An element which is tetravalent and forms the basis of organic chemistry
- (d) An element which is an inert gas with atomic number 2
- (e) An element whose thin oxide layer is used to make other elements corrosion resistant by the process of “anodising”

Soln:

- a) Sodium Group 1 Period 3
- b) Phosphorus Group 15 Period 3
- c) Carbon Group 14 Period 2
- d) Helium Group 18 Period 1

- e) Aluminium
Group 13
Period 3

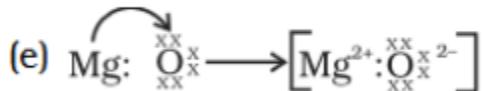
Long Answer Questions

42. An element is placed in 2nd Group and 3rd Period of the Periodic Table, burns in presence of oxygen to form a basic oxide.

- (a) Identify the element
- (b) Write the electronic configuration
- (c) Write the balanced equation when it burns in the presence of air
- (d) Write a balanced equation when this oxide is dissolved in water
- (e) Draw the electron dot structure for the formation of this oxide

Soln:

- a) Element is Magnesium
- b) Electronic Configuration-2,8,2
- c) $2\text{Mg} + \text{O}_2 \longrightarrow 2\text{MgO}$
- d) $\text{MgO} + \text{H}_2\text{O} \longrightarrow \text{Mg(OH)}_2$
- e)



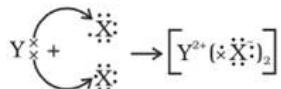
43. An element X (atomic number 17) reacts with an element Y (atomic number 20) to form a divalent halide.

- (a) Where in the periodic table are elements X and Y placed?
- (b) Classify X and Y as metal (s), non-metal (s) or metalloid (s)
- (c) What will be the nature of oxide of element Y? Identify the nature of bonding in the compound formed
- (d) Draw the electron dot structure of the divalent halide

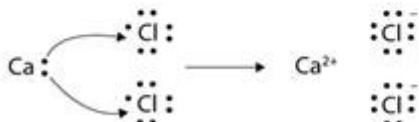
Soln:

- a) X is in Group 17, period 3 and Y is in group 2 Period 4.
- b) X is Non-metal and Y is metal
- c) Y Oxide will be basic in nature. Compound formed by ionic bond.

d)



Electron dot structure for calcium chloride



44. Atomic number of a few elements are given below 10, 20, 7, 14

- (a) Identify the elements
- (b) Identify the Group number of these elements in the Periodic Table
- (c) Identify the Periods of these elements in the Periodic Table
- (d) What would be the electronic configuration for each of these elements?
- (e) Determine the valency of these elements

Soln:

- a) Elements are Neon (10) Calcium (20) Nitrogen (7) Silicon (14)
- b) Neon belongs to group 18, Calcium belongs to group 2, Nitrogen belongs to group 7 and Silicon belongs to group 14.
- c) Nitrogen and Neon belong to period 2. Calcium and silicon belongs to Period 3.
- d) Electronic Configurations

Neon-2,8
Calcium-2,8,8,2
Nitrogen-2,5
Silicon-2,8,4

- e) Valency

Neon-0
Calcium-2
Nitrogen-3
Silicon-4

45. Complete the following cross word puzzle (Figure 5.1)

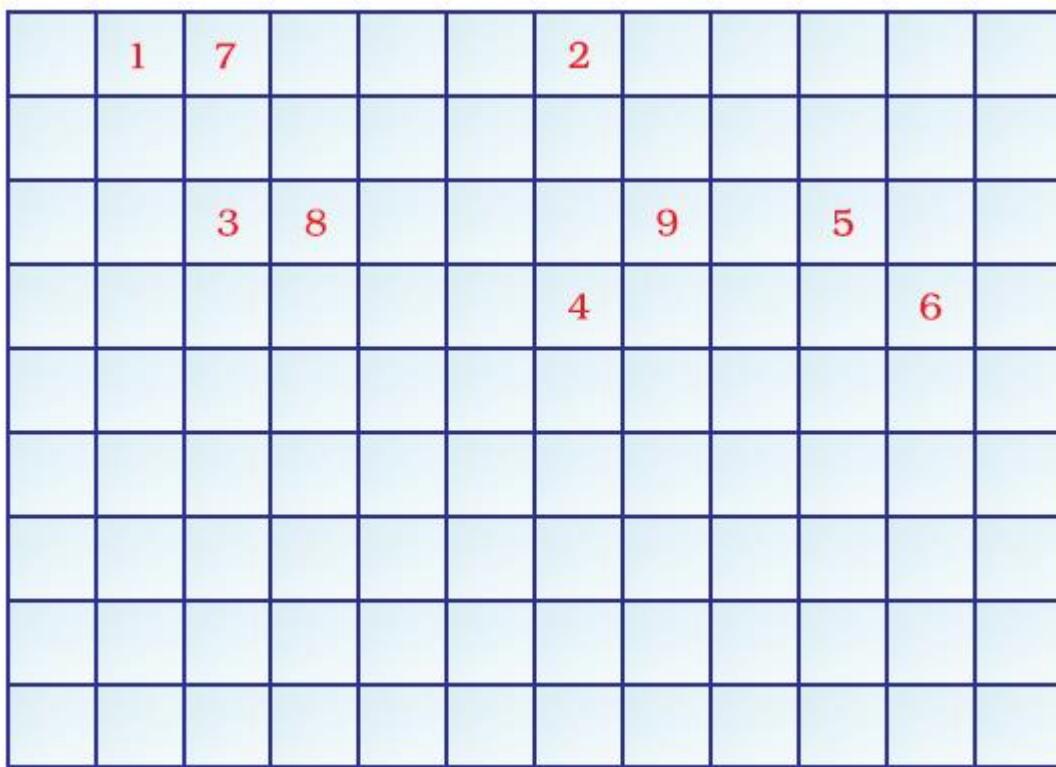


Fig. 5.1

Across:

- (1) An element with atomic number 12.
- (3) Metal used in making cans and member of Group 14.
- (4) A lustrous non-metal which has 7 electrons in its outermost shell.

Down:

- (2) Highly reactive and soft metal which imparts yellow colour when subjected to flame and is kept in kerosene.
- (5) The first element of second Period
- (6) An element which is used in making fluorescent bulbs and is second member of Group 18 in the Modern Periodic Table
- (7) A radioactive element which is the last member of halogen family.

(8) Metal which is an important constituent of steel and forms rust when exposed to moist air.

(9) The first metalloid in Modern Periodic Table whose fibres are used in making bullet-proof vests

Soln:

Across

- 1) Magnesium
- 3) Tin
- 4) Iodine

Down

- 2) Sodium
- 5) Lithium
- 6) Neon
- 7) Astatine
- 8) Iron
- 9) Boron

46. (a) In this ladder (Figure 5.2) symbols of elements are jumbled up. Rearrange these symbols of elements in the increasing order of their atomic number in the Periodic Table.

(b) Arrange them in the order of their group also.

Soln:

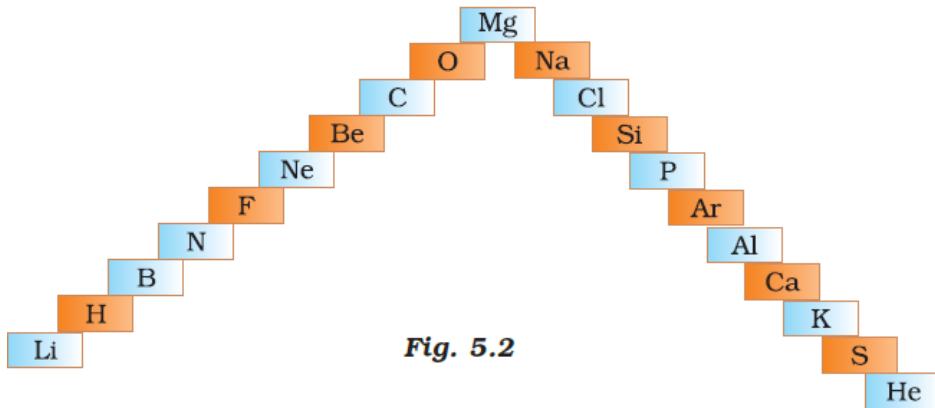


Fig. 5.2

Soln:

a) H, He, Li, Be, B, C, N, O, F, Ne, Mg, Al Si,P, S, Cl, Ar, K, Ca

b)

Group 1:H, Li, Na, K

Group 2: Be, Mg,Ca

Group 13: B, Al

Group 14: C, Si

Group 15: N, P

Group 16: O, S

Group 17: F, U

Group 18: He, Ne, Ar

47. Mendeleev ' predicted the existence of certain elements not known at that time and named two of them as Eka-silicon and Eka-aluminium.

- (a) Name the elements which have taken the place of these elements
- (b) Mention the group and the period of these elements in the Modern Periodic Table.
- (c) Classify these elements as metals, non-metals or metalloids
- (d) How many valence electrons are present in each one of them?

Soln:

- a) Eka-Silicon was replaced by germanium, Eka-aluminium was replaced by Gallium
- b) Germanium-Group 14 Period 5
Gallium-Group 13 Period 5
- c) Germanium is a metalloid and Gallium is a metal.
- d) Germanium has 4 electron, Gallium has 3 valence electrons

**48. (a) Electropositive nature of the element(s) increases down the group and decreases across the period
(b) Electronegativity of the element decreases down the group and increases across the period
(c) Atomic size increases down the group and decreases across a period (left to right)
(d) Metallic character increases down the group and decreases across a period.**

On the basis of the above trends of the Periodic Table, answer the following about the elements with atomic numbers 3 to 9.

- (a) Name the most electropositive element among them
- (b) Name the most electronegative element
- (c) Name the element with smallest atomic size
- (d) Name the element which is a metalloid
- (e) Name the element which shows maximum valency.

Soln:

- (a) Electropositive nature of the element(s) increases down the group and decreases across the period.
 - (b) Electronegativity of the element decreases down the group and increases across the period
 - (c) Atomic size increases down the group and decreases across a period (left to right)
 - (d) Metallic character increases down the group and decreases across a period.
- a) Lithium is the most electropositive element .
 - b) Fluorine is the most electronegative element
 - c)) Fluorine is the element with smallest atomic size among the given elements
 - c) Boron
 - d) Carbon is the element which shows maximum valency.

49. An element X which is a yellow solid at room temperature shows catenation and allotropy. X forms two oxides which are also formed during the thermal decomposition of ferrous sulphate crystals and are the major air pollutants.

(a) Identify the element X

(b) Write the electronic configuration of X

(c) Write the balanced chemical equation for the thermal decomposition of ferrous sulphate crystals?

(d) What would be the nature (acidic/ basic) of oxides formed?

(e) Locate the position of the element in the Modern Periodic Table

Soln:

- a) Element X is Sulphur
- b) 2,8,6
- c) $2\text{FeSO}_4 \longrightarrow \text{Fe}_2\text{O}_3 + \text{SO}_2 + \text{SO}_3$
- d) Sulphur oxides are acidic in nature
- e) Group 16 Period 3

50. An element X of group 15 exists as diatomic molecule and combines with hydrogen at 773 K in presence of the catalyst to form a compound, ammonia which has a characteristic pungent smell.

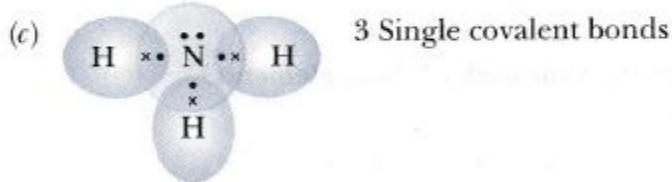
(a) Identify the element X. How many valence electrons does it have?

(b) Draw the electron dot structure of the diatomic molecule of X. What type of bond is formed in it?

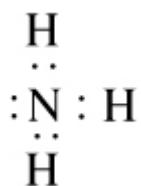
(c) Draw the electron dot structure for ammonia and what type of bond is formed in it?

Solution:

- a) Answer is Nitrogen and it has 5 electrons in its outermost shell.
- b)



- c) Ammonia forms covalent bonding



51. Which group of elements could be placed in Mendeleev's ' Periodic Table without disturbing the original order? Give reason.

Soln:

Inert gases could be placed in Mendeleev's Periodic Table without disturbing the original order.

Before Mendeleev Noble gases; like Helium, Neon and Argon had been mentioned by various scientists. But these gases could be grouped together as noble gases much later than Mendeleev's discovery.

Mendeleev used 63 elements till his periodic table because these were the only known elements till his time. However, he was bold enough to leave gaps in his periodic table. He had predicted that more elements would be discovered in times to come.

Mendeleev's Periodic Table was the first comprehensive attempt to classify elements on the basis of their chemical properties. This is the main reason that new elements could be easily placed in Mendeleev's Periodic Table without disturbing the original order.

52. Give an account of the process adopted by Mendeleev ' for the classification of elements. How did he arrive at "Periodic Law"?

Soln:

During Mendeleev's time, only 63 elements were known. Mendeleev examined the correlation between chemical properties and Atomic masses of elements. For this, he concentrated on compounds which were formed by the elements with hydrogen and oxygen. He selected hydrogen and oxygen, because these elements make compound with most of the other elements.

Mendeleev made 63 cards and wrote the name of an element on each card: along with the chemical properties of a particular element. Then, he pinned those cards on a wall. He could observe that most of the elements could be arranged in periodic table in increasing order of their atomic masses. That is how Mendeleev arrived at "Periodic law". Mendeleev's Periodic Law states that properties of elements are periodic function of their atomic masses.

Chapter - 4

Carbon and its Compounds

Multiple Choice Questions

1. Carbon exists in the atmosphere in the form of

- (a) carbon monoxide only
- (b) carbon monoxide in traces and carbon dioxide
- (c) carbon dioxide only
- (d) coal

Soln:

Answer is (c) carbon dioxide only

2. Which of the following statements are usually correct for carbon compounds? These

- (i) are good conductors of electricity
 - (ii) are poor conductors of electricity
 - (iii) have strong forces of attraction between their molecules
 - (iv) do not have strong forces of attraction between their molecules
-
- (a) (i) and (iii)
 - (b) (ii) and (iii)
 - (c) (i) and (iv)
 - (d) (ii) and (iv)

Soln:

Answer is (d) (ii) and (iv)

Explanation:

Carbon compounds form covalent bonds hence they have very weak force of attraction. Carbon compounds are poor conductors of electricity.

3. A molecule of ammonia (NH_3) has

- (a) only single bonds
- (b) only double bonds
- (c) only triple bonds
- (d) two double bonds and one single bond

Soln:

Answer is (a) only single bonds

Explanation:

Nitrogen has three electron in its outermost shell and hydrogen has 1. 3 hydrogen atoms combine with 1 nitrogen atom to make ammonia. These bonds are single bonds.

4. Buckminsterfullerene is an allotropic form of

- (a) phosphorus
- (b) sulphur
- (c) carbon
- (d) tin

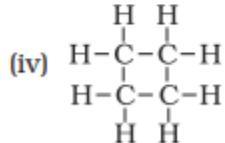
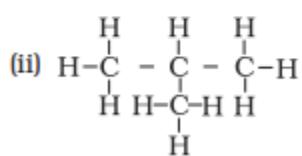
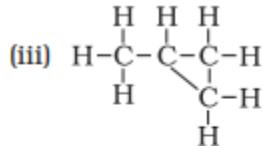
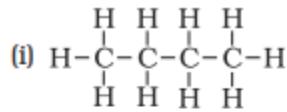
Soln:

Answer is (c) carbon

Explanation:

Diamond, Graphite, Lonsdaleite, C60 (Buckminsterfullerene or buckyball), C540, C70, Amorphouscarbon, and h single-walled carbon nanotube, or buckytube. Are the allotropes of Carbon.

5. Which of the following are correct structural isomers of butane?



- (a) (i) and (iii)
- (b) (ii) and (iv)
- (c) (i) and (ii)
- (d) (iii) and (iv)

Soln:

Answer is (c) (i) and (ii)

Explanation:

Chemical formula of Butane is C_4H_{10} , here option iii) and iv) have 8 hydrogen atoms, hence they are wrong.

6. $CH_3 - CH_2 - OH$ Alkaline $KMnO_4$ Heat $4 + \rightarrow CH_3 - COOH$

In the above given reaction, alkaline $KMnO_4$ acts as

- (a) reducing agent
- (b) oxidising agent
- (c) catalyst
- (d) dehydrating agent

Soln:

Answer is (b) oxidising agent

Explanation:

Two Hydrogen atoms are replaced by an atom of oxygen making oxidation of ethanol. Here addition of oxygen is provided by potassium.

7. Oils on treating with hydrogen in the presence of palladium or nickel catalyst form fats. This is an example of

- (a) Addition reaction
- (b) Substitution reaction
- (c) Displacement reaction
- (d) Oxidation reaction

Soln:

Answer is (a) Addition reaction

Explanation:

Here Hydrogen is added to oil, hence it is an addition reaction.

8. In which of the following compounds, — OH is the functional group?

- (a) Butanone
- (b) Butanol
- (c) Butanoic acid
- (d) Butanal

Soln:

Answer is (b) Butanol

Explanation:

Compound with OH Functional group will have a suffix ol in them hence answer is (b) Butanol.

9. The soap molecule has a

- (a) hydrophilic head and a hydrophobic tail
- (b) hydrophobic head and a hydrophilic tail
- (c) hydrophobic head and a hydrophobic tail
- (d) hydrophilic head and a hydrophilic tail

Soln:

Answer is (a) hydrophilic head and a hydrophobic tail

Explanation:

Because of hydrophobic tail Oil and grease is trapped inside a micelle. Hydrophobic head makes the outer surface of micelle. Hence micelle is easily washed by water.

10. Which of the following is the correct representation of electron dot structure of nitrogen?

- (a) $\ddot{\text{N}} : \ddot{\text{N}} :$
- (b) $\dot{\text{N}} \cdot \cdot \dot{\text{N}} \cdot$
- (c) $\ddot{\text{N}} \cdot \dot{\text{N}} \cdot$
- (d) $\text{:N} \ddot{\cdot} \ddot{\cdot} \text{N:}$

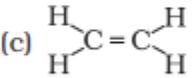
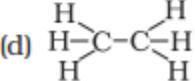
Soln:

Answer is d)

Explanation:

In this structure Nitrogen atoms gets 8 electron whereas in other options it is different.

11. Structural formula of ethyne is

- (a) $\text{H} - \text{C} \equiv \text{C} - \text{H}$
- (b) $\text{H}_3 - \text{C} \equiv \text{C} - \text{H}$
- (c) 
- (d) 

Solution:

Answer is a)

Explanation:

Chemical formula of Ethyne is C_2H_2 , Hence answer is a)

12. Identify the unsaturated compounds from the following

- (i) Propane
 - (ii) Propene
 - (iii) Propyne
 - (iv) Chloropropane
-
- (a) (i) and (ii)
 - (b) (ii) and (iv)
 - (c) (iii) and (iv)
 - (d) (ii) and (iii)

Soln:

Answer is (d) (ii) and (iii)

Explanation:

Propene has double bond and Propyne is having triple bond. Hence they are unsaturated compounds.

13. Chlorine reacts with saturated hydrocarbons at room temperature in the

- (a) absence of sunlight
- (b) presence of sunlight
- (c) presence of water
- (d) presence of hydrochloric acid

Soln:

Answer is (b) presence of sunlight

Explanation:

In presence of sunlight Chlorine reacts with Hydrocarbons and displaces Hydrogen atoms.

14. In the soap micelles

- (a) the ionic end of soap is on the surface of the cluster while the carbon chain is in the interior of the cluster.
- (b) ionic end of soap is in the interior of the cluster and the carbon chain is out of the cluster.
- (c) both ionic end and carbon chain are in the interior of the cluster
- (d) both ionic end and carbon chain are on the exterior of the cluster

Soln:

Answer is (a) the ionic end of soap is on the surface of the cluster while the carbon chain is in the interior of the cluster.

Explanation:

A micelle is a spherical aggregate soap molecules in soap solution. In the soap micelles the ionic end of soap is on the surface of the cluster while the carbon chain is in the interior of the cluster.

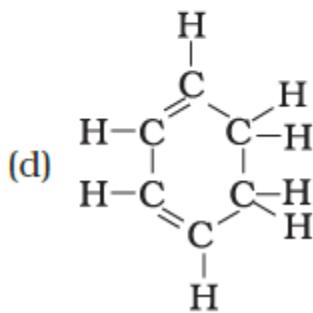
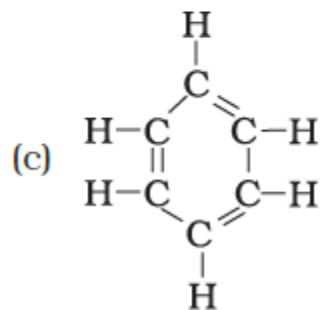
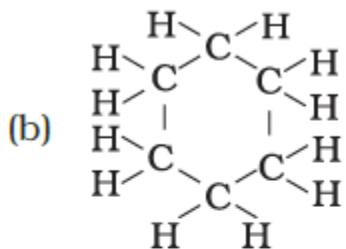
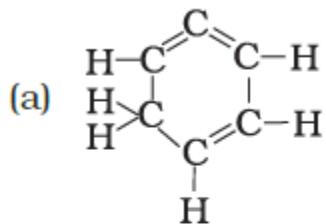
15. Pentane has the molecular formula C₅H₁₂. It has

- (a) 5 covalent bonds
- (b) 12 covalent bonds
- (c) 16 covalent bonds
- (d) 17 covalent bonds

Soln:

Answer is (c) 16 covalent bonds

16. Structural formula of benzene is



Soln:

Answer is c)

Explanation:

Chemical formula of Benzene is C₆H₆. In option all the arms of carbon atoms are occupied hence it is the right answer.

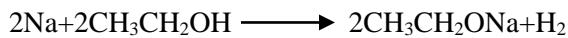
17. Ethanol reacts with sodium and forms two products. These are

- (a) sodium ethanoate and hydrogen
- (b) sodium ethanoate and oxygen
- (c) sodium ethoxide and hydrogen
- (d) sodium ethoxide and oxygen

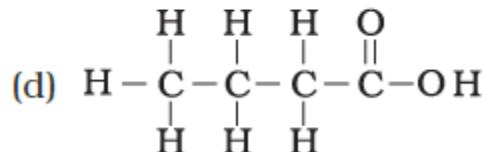
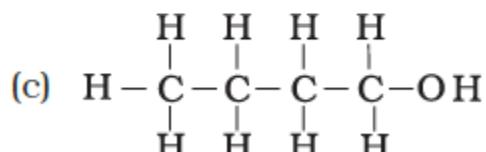
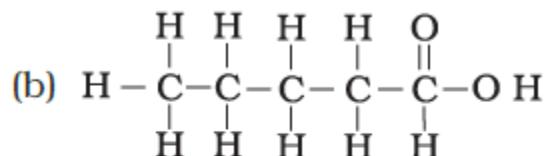
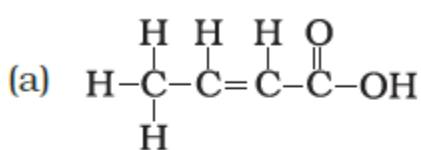
Soln:

Answer is (c) sodium ethoxide and hydrogen

Explanation:



18. The correct structural formula of butanoic acid is



Soln:

Answer is d)

19. Vinegar is a solution of

- (a) 50% – 60% acetic acid in alcohol
- (b) 5% – 8% acetic acid in alcohol
- (c) 5% – 8% acetic acid in water
- (d) 50% – 60% acetic acid in water

Soln:

Answer is (c) 5% – 8% acetic acid in water

20. Mineral acids are stronger acids than carboxylic acids because

- (i) mineral acids are completely ionised
 - (ii) carboxylic acids are completely ionised
 - (iii) mineral acids are partially ionised
 - (iv) carboxylic acids are partially ionised
- (a) (i) and (iv)
 - (b) (ii) and (iii)
 - (c) (i) and (ii)
 - (d) (iii) and (iv)

Soln:

Answer is (a) (i) and (iv)

Explanation:

Mineral acids are completely ionized whereas carboxylic acids are partially ionized. Hence mineral acids are stronger than carboxylic acids.

21. Carbon forms four covalent bonds by sharing its four valence electrons with four univalent atoms, e.g. hydrogen. After the formation of four bonds, carbon attains the electronic configuration of

- (a) helium
- (b) neon
- (c) argon
- (d) krypton

Soln:

Answer is (b) neon

Explanation:

After sharing four valence electrons with univalent atoms. Electronic configuration of Carbon becomes 2.8 which is same as electronic configuration of Neon.

22. The correct electron dot structure of a water molecule is

- (a) H $\ddot{\text{O}}\text{H}$
- (b) H : $\ddot{\text{O}}\text{:H}$
- (c) H : $\ddot{\text{O}}\text{:H}$
- (d) H :O:H

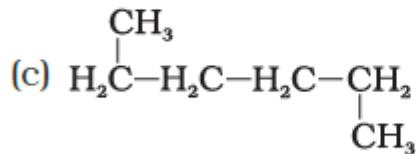
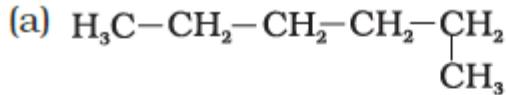
Soln:

Answer is c)

Explanation:

Option c) represents complete octet configuration . Hence it is the right answer.

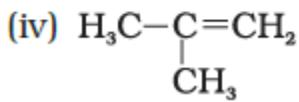
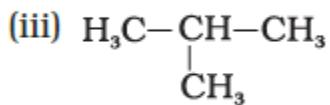
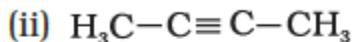
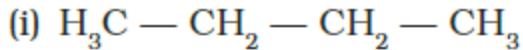
23. Which of the following is not a straight chain hydrocarbon?



Soln:

Answer is d)

24. Which among the following are unsaturated hydrocarbons?



- (a) (i) and (iii)
 - (b) (ii) and (iii)
 - (c) (ii) and (iv)
 - (d) (iii) and (iv)

Soln:

Answer is (c) (ii) and (iv)

Explanation:

Option (ii and (iv having double and triple bonds, hence they are unsaturated hydrocarbons.

25. Which of the following does not belong to the same homologous series?

- (a) CH₄
- (b) C₂H₆
- (c) C₃H₈
- (d) C₄H₈

Soln:

Answer is (d) C₄H₈

Explanation

General formula for C₄H₈ is C_nH_{2n} and for other option it is C_nH_{2n+2}

26. The name of the compound CH₃ — CH₂ — CHO is

- (a) Propanal
- (b) Propanone
- (c) Ethanol
- (d) Ethanal

Soln:

Answer is (a) Propanal

Explanation:

This compound has 3 carbon atoms and an aldehyde which add suffix al to 3 carbon compound.

27. The heteroatoms present in CH₃ — CH₂ — O — CH₂ — CH₂ Cl are

- (i) oxygen
 - (ii) carbon
 - (iii) hydrogen
 - (iv) chlorine
-
- a) (i) and (ii)
 - (b) (ii) and (iii)
 - (c) (iii) and (iv)
 - (d) (i) and (iv)

Soln:

Answer is (d) (i) and (iv)

Explanation:

Oxygen and chlorine are not among essential components of Hydrocarbon hence they are heteroatoms.

28. Which of the following represents saponification reaction?

- (a) $\text{CH}_3\text{COONa} + \text{NaOH} \rightarrow \text{CH}_4 + \text{Na}_2\text{CO}_3$
- (b) $\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \rightarrow \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$
- (c) $2\text{CH}_3\text{COOH} + 2\text{Na} \rightarrow 2\text{CH}_3\text{COONa} + \text{H}_2$
- (d) $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{C}_2\text{H}_5\text{OH}$

Soln:

Answer is (d) $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{C}_2\text{H}_5\text{OH}$

Explanation:

Saponification is a reaction in which ethanol and sodium ethanoate are produced upon treatment of ester with an alkali.

29. The first member of alkyne homologous series is

- (a) ethyne
- (b) ethene
- (c) propyne
- (d) methane

Soln:

Answer is (b) ethene

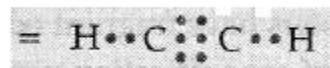
Short Answer Questions

30. Draw the electron dot structure of ethyne and also draw its structural formula

Soln:

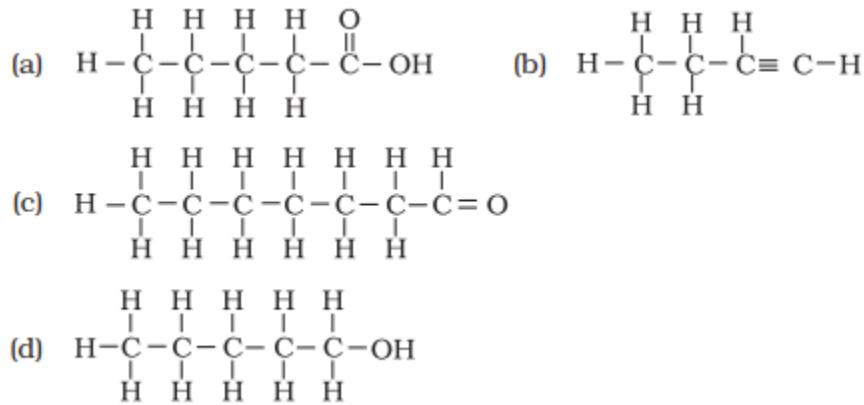
Molecular formula= C_2H_2

Electronic Formula



Structural formula= $\text{H}-\text{C}\equiv\text{C}-\text{H}$

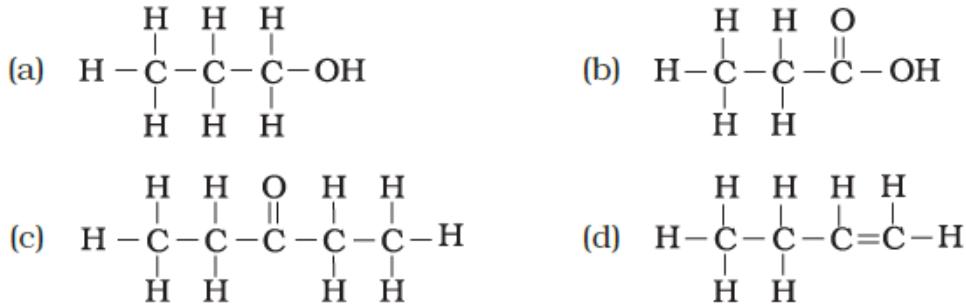
31. Write the names of the following compounds



Soln:

- a) Pentanoic acid
- b) Butyne
- c) Heptanal
- d) Pentanol

32. Identify and name the functional groups present in the following compounds.



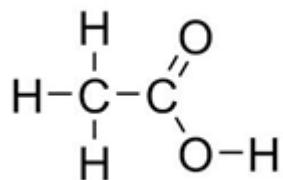
Soln:

- a) Alcohol
- b) Carboxylic acid
- c) Ketone
- d) Alkene

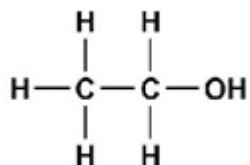
33. A compound X is formed by the reaction of a carboxylic acid C₂H₄O₂ and an alcohol in presence of a few drops of H₂SO₄. The alcohol on oxidation with alkaline KMnO₄ followed by acidification gives the same carboxylic acid as used in this reaction. Give the names and structures of (a) carboxylic acid, (b) alcohol and (c) the compound X. Also write the reaction.

Soln:

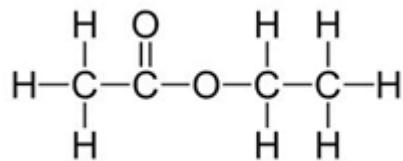
Carboxylic acid = CH₃COOH ethanoic acid



Alcohol = CH₃CH₂OH ethanol



X = CH₃COOCH₂CH₃ ethyl ethanoate



34. Why detergents are better cleansing agents than soaps? Explain.

Soln:

Detergents are better than soaps because detergents are ammonium or sulphonate salts of long chain carboxylic acids. Charged ends of these will not form precipitate with calcium and magnesium present in hard water. On the other hand soaps will form precipitate with calcium and magnesium ions present in the hard water.

35. Name the functional groups present in the following compounds

- (a) $\text{CH}_3\text{COCH}_2\text{CH}_2\text{CH}_2\text{CH}_3$
- (b) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$
- (c) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$
- (d) $\text{CH}_3\text{CH}_2\text{OH}$

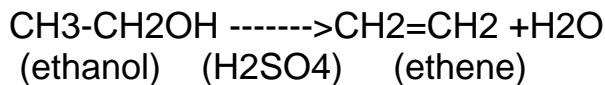
Soln:

- a) Ketone
- b) Carboxylic acid
- c) Aldehyde
- d) Alcohol

36. How is ethene prepared from ethanol? Give the reaction involved in it.

Soln:

Ethanol is heated at 443k along with excess Sulphuric acid to obtain Ethene.



37. Intake of small quantity of methanol can be lethal. Comment.

Soln:

Methanol gets converted to Methanal and liver and kills all the cells. Methanol also affect the optic nerves and causes blindness. Hence intake of small quantity of methanol can be lethal.

38. A gas is evolved when ethanol reacts with sodium. Name the gas evolved and also write the balanced chemical equation of the reaction involved.

Soln:

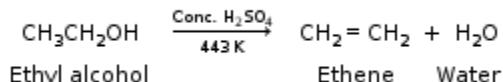
When ethanol reacts with sodium it gives Sodium ethoxide with the liberation of Hydrogen gas.



39. Ethene is formed when ethanol at 443 K is heated with excess of concentrated sulphuric acid. What is the role of sulphuric acid in this reaction? Write the balanced chemical equation of this reaction.

Soln:

Sulphuric acid acts as a catalyst and a dehydrating agent in the formation of ethene.



40. Carbon, Group (14) element in the Periodic Table, is known to form compounds with many elements.

Write an example of a compound formed with

- (a) chlorine (Group 17 of Periodic Table)
- (b) oxygen (Group 16 of Periodic Table)

Soln:

a) CCl_4 - Carbon Tetra chloride

b) Carbon-di-oxide- CO_2

41. In electron dot structure, the valence shell electrons are represented by crosses or dots.

- (a) The atomic number of chlorine is 17. Write its electronic configuration
- (b) Draw the electron dot structure of chlorine molecule

Soln:

a) KLM- 2,8,7



42. Catenation is the ability of an atom to form bonds with other atoms of the same element. It is exhibited by both carbon and silicon. Compare the ability of catenation of the two elements. Give reasons.

Soln:

Catenation is shown by both Silicon and Carbon. Silicon bonds are less stable and reactive whereas bonds formed by Carbon bonds are very strong hence carbon shows better catenation than Silicon.

43. Unsaturated hydrocarbons contain multiple bonds between the two C-atoms and show addition reactions. Give the test to distinguish ethane from ethene.

Soln:

Saturated Hydrocarbons burns with clean flame and produce no soot whereas non-saturated Hydrocarbons burns with yellow flame and produces lot of soot. Ethane is saturated hydrocarbon and it burns with clean flame with no soot. Ethene is unsaturated hence it burns with yellow flame producing lot of soot.

44. Match the reactions given in Column (A) with the names given in column (B).

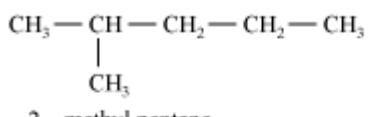
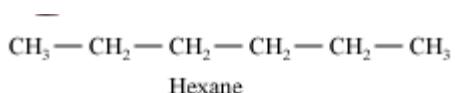
Column A	Column B
(a) $\text{CH}_3\text{OH} + \text{CH}_3\text{COOH} \rightarrow \text{CH}_3\text{COOCH}_3 + \text{H}_2\text{O}$	(i) Addition reaction
(b) $\text{CH}_2 = \text{CH}_2 + \text{H}_2 \rightarrow \text{CH}_3 - \text{CH}_3$	(ii) Substitution reaction
(c) $\text{CH}_4 + \text{Cl}_2 \xrightarrow{\text{Sunlight}} \text{CH}_3\text{Cl} + \text{HCl}$	(iii) Neutralisation reaction
(d) $\text{CH}_3\text{COOH} + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O}$	(iv) Esterification reaction

Soln:

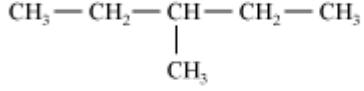
Column A	Column B
(a) $\text{CH}_3\text{OH} + \text{CH}_3\text{COOH} \rightarrow \text{CH}_3\text{COOCH}_3 + \text{H}_2\text{O}$	(iv) Esterification reaction
(b) $\text{CH}_2 = \text{CH}_2 + \text{H}_2 \rightarrow \text{CH}_3 - \text{CH}_3$	(i) Addition reaction
(c) $\text{CH}_4 + \text{Cl}_2 \xrightarrow{\text{Sunlight}} \text{CH}_3\text{Cl} + \text{HCl}$	(ii) Substitution reaction
(d) $\text{CH}_3\text{COOH} + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O}$	(iii) Neutralisation reaction

45. Write the structural formulae of all the isomers of hexane.

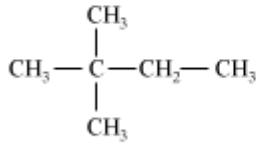
Soln:



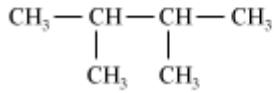
2 – methyl pentane



3 – methyl pentane



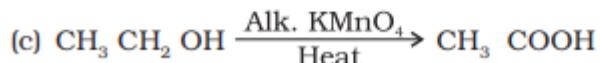
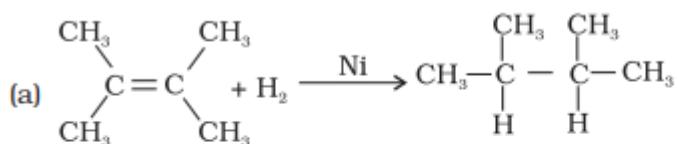
2,2 - Dimethyl butane



2,3 - Dimethyl butane

46. What is the role of metal or reagents written on arrows in the given chemical reactions?

Soln:



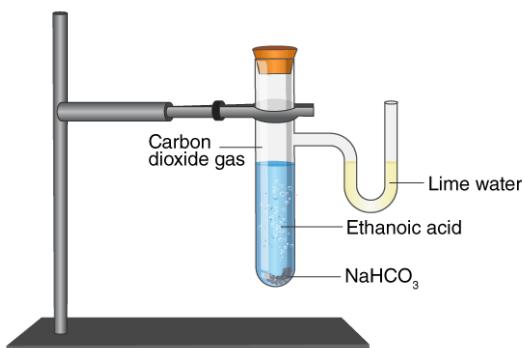
47. A salt X is formed and a gas is evolved when ethanoic acid reacts with sodium hydrogencarbonate. Name the salt X and the gas evolved. Describe an activity and draw the diagram of the apparatus to prove that the evolved gas is the one which you have named. Also, write chemical equation of the reaction involved.

Soln:

When ethanoic acid reacts with Sodium Hydrogen Carbonate with production of Sodium Ethanoate and producing Carbon-di-oxide gas.



Here salt X is Sodium Ethanoate and gas evolved is Carbon-di-oxide.



Activity

- Set up the experiment as shown in figure.
- Take a spoon full of Sodium Hydrogen Carbonate in a test-tube and add 2ml of dilute ethanoic acid.
- Brisk effervescence occur in testtube.
- Pass the produce gas into lime water
- Lime water turn milky confirming the evolution of CO_2

48. (a) What are hydrocarbons? Give examples.

(b) Give the structural differences between saturated and unsaturated hydrocarbons with two examples each. (c) What is a functional group? Give examples of four different functional groups.

Soln:

- a) Compounds of Carbon and hydrogen are called as Hydrocarbons. Ex: Ethane, Methane
- b) All the bond in saturated Hydrocarbons are single bonds whereas bonds in the unsaturated Hydrocarbons are either double or triple bonds.
Saturated Hydrocarbon Ex: Ethane, Methane
Unsaturated Hydrocarbons-Ethyne, Ethene
- c) Functional groups are set of atoms joined in a specific manner which are responsible for characteristic chemical property of the compound.Ex: CHO-Aldehyde, OH-Hydroxyl , COOH- Carboxylic acid.

49. Name the reaction which is commonly used in the conversion of vegetable oils to fats. Explain the reaction involved in detail.

Soln:

Addition reaction is involved in the conversion of oils into fats. This process is known as Hydrogenation. Here Unsaturated vegetable are converted to saturated fats which have saturated carbons.

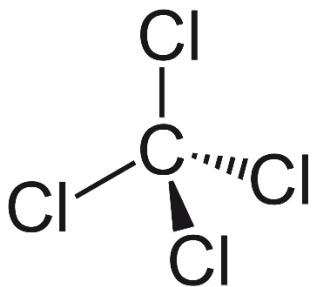
Nickel is used as a catalyst in the hydrogenation process and the reaction is given below



- 50.** (a) Write the formula and draw electron dot structure of carbon tetrachloride.
 (b) What is saponification? Write the reaction involved in this process.

Soln:

- a) Carbon tetra chloride- CCl_4



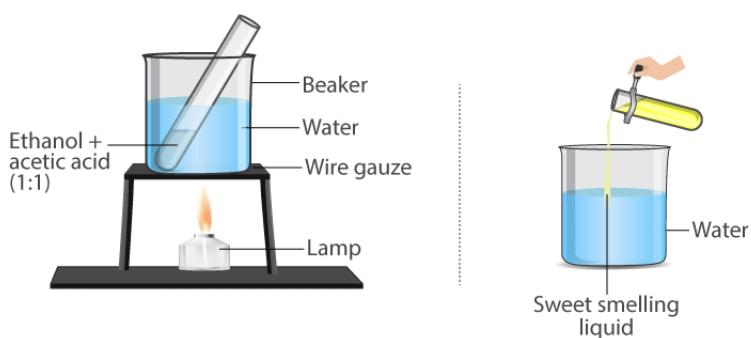
- b) The reaction of an ester in the presence of base to give sodium salt of carboxylic acid and alcohol is known as saponification and it is used in the preparation of soap.

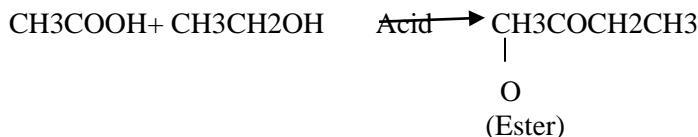


- 51.** Esters are sweet-smelling substances and are used in making perfumes. Suggest some activity and the reaction involved for the preparation of an ester with well labeled diagram.

Soln:

In a test-tube take 1ml ethanol and 1 ml glacial acetic acid and add few drops of concentrated H_2SO_4 . Warm the testtube for 5 minutes over a waterbath. Transfer the content in a beaker. Sweet smell confirms the formation of Ester.



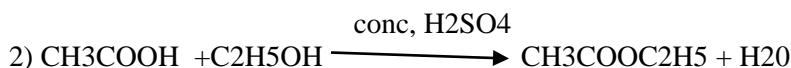


52. A compound C (molecular formula, $\text{C}_2\text{H}_4\text{O}_2$) reacts with Na - metal to form a compound R and evolves a gas which burns with a pop sound. Compound C on treatment with an alcohol A in presence of an acid forms a sweet smelling compound S (molecular formula, $\text{C}_3\text{H}_6\text{O}_2$). On addition of NaOH to C, it also gives R and water. S on treatment with NaOH solution gives back R and A. Identify C, R, A, S and write down the reactions involved.

Soln:

1) Compound C is Ethanoic acid[Acetic acid]

It reacts with sodium metal to form a compound called R . R is Sodium Ethanoate.



so compound S is Ester or Ethyl ethanoate and compound A is Ethanol



so compound R is again Sodium Ethanoate.

So compound C is Ethanoic acid

A is Ethanol

S is EsterR is sodium Ethanoate.

53. Look at Figure 4.1 and answer the following questions

- (a) What change would you observe in the calcium hydroxide solution taken in tube B?
- (b) Write the reaction involved in test tubes A and B respectively.
- (c) If ethanol is given instead of ethanoic acid, would you expect the same change?
- (d) How can a solution of lime water be prepared in the laboratory?

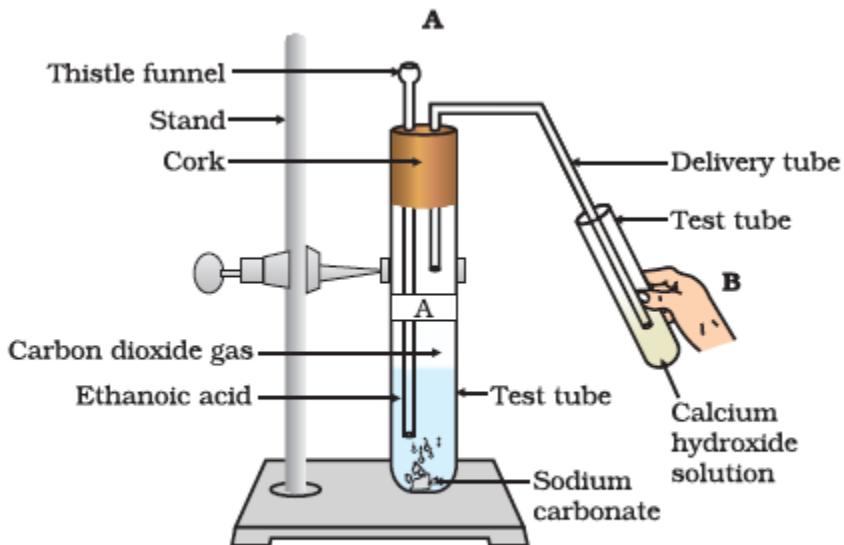


Fig. 4.1

Soln:

- a) Calcium Hydroxide solution would become milky
- b) Reaction in Tube A

$$\text{CH}_3\text{COOH} + \text{NaHCO}_3 \longrightarrow \text{CH}_3\text{COONa} + \text{CO}_2 + \text{H}_2\text{O}$$

Reaction in tube B



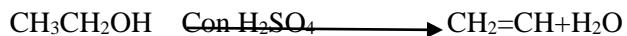
- c) Ethanol will not react with Sodium Hydrgen carbonate. Hence same change will not be observed.
- d) In a beaker take distilled water and mix Calcium carbonate powder and mix thoroughly. Allow the solution to settle and decant the clear solution to obtain the lime water.

54. How would you bring about the following conversions? Name the process and write the reaction involved.

- (a) ethanol to ethene.
- b) propanol to propanoic acid. Write the reactions.

Soln:

- a) Ethene is formed when ethanol is heated at 443 K with excess of concentrated sulphuric acid.

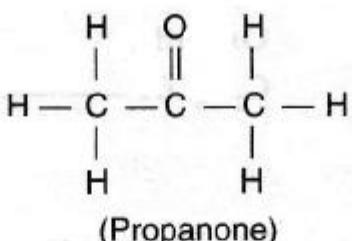
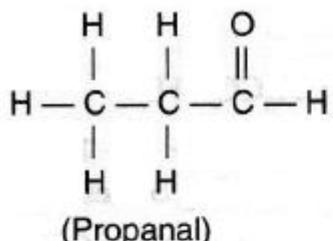


- b) Propanol is treated with alkaline Potassium permanganate or acidified Potassium-di-chromate to obtain propanoic acid.

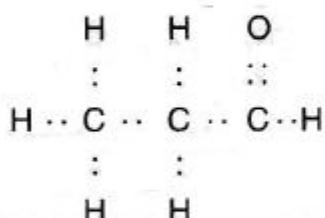


55. Draw the possible isomers of the compound with molecular formula C₃H₆O and also give their electron dot structures.

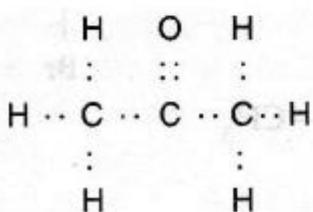
Soln:



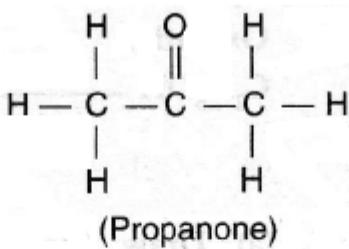
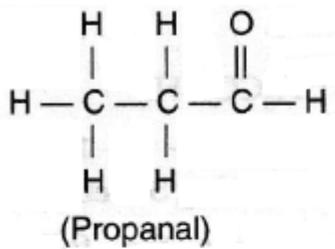
(ii) Electron dot structure of propanal.



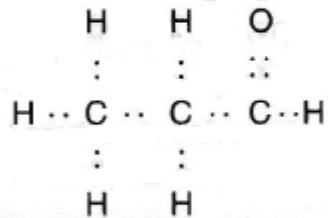
Electron dot structure of propanone



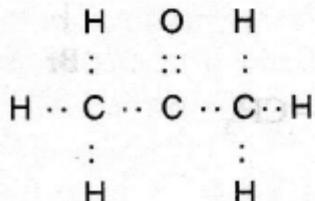
(i) The two possible isomers of the compound with molecular formula C_2H_6O are :



(ii) Electron dot structure of propanal.



Electron dot structure of propanone

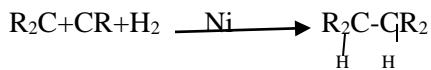


56. Explain the given reactions with the examples

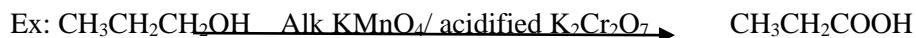
- (a) Hydrogenation reaction
- (b) Oxidation reaction
- (c) Substitution reaction
- (d) Saponification reaction
- (e) Combustion reaction

Soln:

- a) Addition of Hydrogen to unsaturated Hydrocarbons to convert into saturated Hydrocarbons is called as Hydrogenation. This process is used in the conversion of unsaturated vegetable oil into saturated fats.



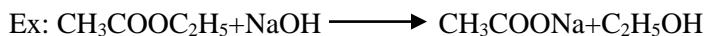
- b) When oxygen is added to alcohol to form carboxylic acid the process is known as oxidation.



- c) Saturated hydrocarbons are fairly unreactive. But in the presence of sunlight chlorine substitutes Hydrogen one by one.



- d) When Ester is treated with alkali, the reaction gives ethanol and Sodium ethanoate. This reaction is called saponification.



- e) Combustion is the burning of a substance in presence of Oxygen.

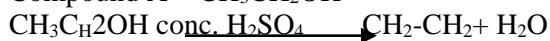


57. An organic compound A on heating with concentrated H₂ SO₄ forms a compound B which on addition of one mole of hydrogen in presence of Ni forms a compound C. One mole of compound C on combustion forms two moles of CO₂ and 3 moles of H₂O. Identify the compounds A, B and C and write the chemical equations of the reactions involved.

Soln:

Compound A is Ethanol

Compound A = $\text{CH}_3\text{CH}_2\text{OH}$



Compound B is Ethane

Compound B = $\text{CH}_2=\text{CH}_2$



Compound C = $\text{CH}_3 - \text{CH}_3$



Chapter - 3

Metals and Non-metals

Multiple Choice Questions

1. Which of the following property is generally not shown by metals?

- (a) Electrical conduction
- (b) Sonorous in nature
- (c) Dullness
- (d) Ductility

Soln:

Answer is (c) Dullness

2. The ability of metals to be drawn into thin wire is known as

- (a) ductility
- (b) malleability
- (c) sonorosity
- (d) conductivity

Soln:

Answer is (a) ductility

Explanation:

- Ductility is property of metals to be drawn into thin wire.
- Malleability is property of metals to be drawn into thin wire
- Sonorosity is the ability of metal to be sonorous in nature
- Conductivity is the ability to conduct electricity

3. Aluminium is used for making cooking utensils. Which of the following properties of aluminium are responsible for the same?

- (i) Good thermal conductivity
 - (ii) Good electrical conductivity
 - (iii) Ductility
 - (iv) High melting point
-
- (a) (i) and (ii)
 - (b) (i) and (iii)
 - (c) (ii) and (iii)
 - (d) (i) and (iv)

Soln:

Answer is (d) (i) and (iv)

Explanation:

Ductility and electric conductivity has no relation to cooking hence thermal conductivity and high melting point are the right answers.

4. Which one of the following metals do not react with cold as well as hot water?

- (a) Na
- (b) Ca
- (c) Mg
- (d) Fe

Soln:

Answer is (d) Fe

Explanation:

Sodium and Calcium reacts vigorously with water and Magnesium reacts with hot water to form Magnesium Oxide. Iron does not react with cold and hot water but it reacts with steam.

5. Which of the following oxide(s) of iron would be obtained on prolonged reaction of iron with steam?

- (a) FeO
- (b) Fe₂O₃
- (c) Fe₃O₄
- (d) Fe₂O₃ and Fe₃O₄

Soln:

Answer is (c) Fe₃O₄

Explanation:



6. What happens when calcium is treated with water?

- (i) It does not react with water
 - (ii) It reacts violently with water
 - (iii) It reacts less violently with water
 - (iv) Bubbles of hydrogen gas formed stick to the surface of calcium
-
- (a) (i) and (iv)
 - (b) (ii) and (iii)
 - (c) (i) and (ii)
 - (d) (iii) and (iv)

Soln:

Answer is (d) (iii) and (iv)

Explanation:

Calcium reacts vigorously with water and forms hydrogen which will make calcium to float.

7. Generally metals react with acids to give salt and hydrogen gas. Which of the following acids does not give hydrogen gas on reacting with metals (except Mn and Mg)?

- (a) H₂ SO₄
- (b) HCl
- (c) HNO₃
- (d) All of these

Soln:

Answer is (c) HNO₃

Explanation:

Nitric acid is a powerful oxidizing agent. It reacts with metal to form water.

8. The composition of aqua-regia is

- (a) Dil.HCl : Conc. HNO₃ 3 : 1
- (b) Conc.HCl : Dil. HNO₃ 3 : 1
- (c) Conc.HCl : Conc.HNO₃ 3 : 1
- (d) Dil.HCl : Dil.HNO₃ 3 : 1

Soln:

Answer is (c) Conc.HCl : Conc.HNO₃ 3 : 1

9. Which of the following are not ionic compounds?

- (i) KCl
- (ii) HCl
- (iii) CCl₄
- (iv) NaCl

- (a) (i) and (ii)
- (b) (ii) and (iii)
- (c) (iii) and (iv)
- (d) (i) and (iii)

Soln:

Answer is (b) (ii) and (iii)

Explanation:

HCl and CCl₄ are covalent compound hence they cannot be ionic.

10. Which one of the following properties is not generally exhibited by ionic compounds?

- (a) Solubility in water
- (b) Electrical conductivity in solid state
- (c) High melting and boiling points
- (d) Electrical conductivity in molten state

Soln:

Answer is (b) Electrical conductivity in solid state

Explanation:

In ionic compound free ions are not available in solid state hence solid ionic compounds cannot conduct electricity.

11. Which of the following metals exist in their native state in nature?

- (i) Cu
- (ii) Au
- (iii) Zn
- (iv) Ag

- (a) (i) and (ii)
- (b) (ii) and (iii)
- (c) (ii) and (iv)
- (d) (iii) and (iv)

Soln:

Answer is (c) (ii) and (iv)

Explanation:

Gold and silver are non-reactive metals because of they are non-reactive they exist in native state in nature.

12. Metals are refined by using different methods. Which of the following metals are refined by electrolytic refining?

- (i) Au
- (ii) Cu
- (iii) Na
- (iv) K

- (a) (i) and (ii)
- (b) (i) and (iii)
- (c) (ii) and (iii)
- (d) (iii) and (iv)

Soln:

Answer is (d) (iii) and (iv)

Explanation:

Sodium and potassium are at the top in reactivity series hence they can be refined by electrolytic refining.

13. Silver articles become black on prolonged exposure to air. This is due to the formation of

- (a) Ag_3N
- (b) Ag_2O
- (c) Ag_2S
- (d) Ag_2S and Ag_3N

Soln:

Answer is (c) Ag_2S

Explanation:

Silver metal reacts with sulphur present in the atmosphere to form Ag_2S . Ag_2S is responsible for black coloration of silver articles.

14. Galvanisation is a method of protecting iron from rusting by coating with a thin layer of

- (a) Gallium
- (b) Aluminium
- (c) Zinc
- (d) Silver

Soln:

Answer is (c) Zinc

Explanation:

Galvanization is a process of applying a layer of Zinc on iron by using electrolysis.

15. Stainless steel is very useful material for our life. In stainless steel, iron is mixed with

- (a) Ni and Cr
- (b) Cu and Cr
- (c) Ni and Cu
- (d) Cu and Au

Soln:

Answer is (a) Ni and Cr

Explanation :

Stainless steel is an alloy of Iron, Nickel and chromium. This alloy makes the metal strong, durable and corrosion resistant.

16. If copper is kept open in air, it slowly loses its shining brown surface and gains a green coating. It is due to the formation of

- (a) CuSO₄
- (b) CuCO₃
- (c) Cu(NO₃)₂
- (d) CuO

Soln:

Answer is (d) CuO

Explanation:

On exposure to air copper reacts to atmospheric oxygen to form copper oxide layer which is green in color.

17. Generally, metals are solid in nature. Which one of the following metals is found in liquid state at room temperature?

- (a) Na
- (b) Fe
- (c) Cr
- (d) Hg

Soln:

Answer is (d) Hg

18. Which of the following metals are obtained by electrolysis of their chlorides in molten state ?

- (i) Na
 - (ii) Ca
 - (iii) Fe
 - (iv) Cu
-
- (a) (i) and (iv)
 - (b) (iii) and (iv)
 - (c) (i) and (iii)
 - (d) (i) and (ii)

Soln:

Answer is (d) (i) and (ii)

Explanation:

Sodium and Calcium are in the top in reactivity series

19. Generally, non-metals are not lustrous. Which of the following nonmetal is lustrous?

- (a) Sulphur
- (b) Oxygen
- (c) Nitrogen
- (d) Iodine

Soln:

Answer is (d) Iodine

20. Which one of the following four metals would be displaced from the solution of its salts by other three metals?

- (a) Mg
- (b) Ag
- (c) Zn
- (d) Cu

Soln:

Answer is (b) Ag

Explanation:

Because silver is a non-reactive metal it can be displaced easily.

21. 2 mL each of concentrated HCl, HNO₃ and a mixture of concentrated HCl and concentrated HNO₃ in the ratio of 3 : 1 were taken in test tubes labelled as A, B and C. A small piece of metal was put in each test tube. No change occurred in test tubes A and B but the metal got dissolved in test tube C respectively. The metal could be

- (a) Al
- (b) Au
- (c) Cu
- (d) Pt

Soln:

Answer is (b) Au

Explanation:

Answer is gold because solution C is mixture of Concentrated HCl and Concentrated HNO₃ which is called aqua rezia. Aqua Rezia dissolves gold.

22. An alloy is

- (a) an element
- (b) a compound
- (c) a homogeneous mixture
- (d) a heterogeneous mixture

Soln:

Answer is (c) a homogeneous mixture

Explanation:

An Alloy is a homogeneous mixture because its composition is uniform.

23. An electrolytic cell consists of

- (i) positively charged cathode
 - (ii) negatively charged anode
 - (iii) positively charged anode
 - (iv) negatively charged cathode
-
- (a) (i) and (ii)
 - (b) (iii) and (iv)
 - (c) (i) and (iii)
 - (d) (ii) ad (iv)

Soln:

Answer is (b) (iii) and (iv)

24. During electrolytic refining of zinc, it gets

- (a) deposited on cathode
- (b) deposited on anode
- (c) deposited on cathode as well as anode
- (d) remains in the solution

Soln:

Answer is (a) deposited on cathode

Explanation:

Zinc is positively charged hence it moves towards negatively charged cathode.

25. An element A is soft and can be cut with a knife. This is very reactive to air and cannot be kept open in air. It reacts vigorously with water. Identify the element from the following

- (a) Mg
- (b) Na
- (c) P
- (d) Ca

Soln:

Answer is (b) Na

Explanation:

Sodium is soft which can be cut with a knife. Sodium reacts with water and air vigorously hence it is kept in kerosene.

26. Alloys are homogeneous mixtures of a metal with a metal or nonmetal. Which among the following alloys contain non-metal as one of its constituents?

- (a) Brass
- (b) Bronze
- (c) Amalgam
- (d) Steel

Soln:

Answer is (d) Steel

Explanation:

Steel is an alloy made up of carbon and iron where carbon is a non-metal.

27. Which among the following statements is incorrect for magnesium metal?

- (a) It burns in oxygen with a dazzling white flame
- (b) It reacts with cold water to form magnesium oxide and evolves hydrogen gas
- (c) It reacts with hot water to form magnesium hydroxide and evolves hydrogen gas
- (d) It reacts with steam to form magnesium hydroxide and evolves hydrogen gas

Soln:

Answer is (b) It reacts with cold water to form magnesium oxide and evolves hydrogen gas

Explanation:

Magnesium reacts with cold water to form magnesium oxide and evolves hydrogen gas is a wrong statement because Magnesium Hydroxide is formed not Magnesium oxide.

28. Which among the following alloys contain mercury as one of its constituents?

- (a) Stainless steel
- (b) Alnico
- (c) Solder
- (d) Zinc amalgam

Soln:

Answer is (d) Zinc amalgam

Explanation:

Zinc amalgam is an alloy of Mercury and Zinc

29. Reaction between X and Y, forms compound Z. X loses electron and Y gains electron. Which of the following properties is not shown by Z?

- (a) Has high melting point
- (b) Has low melting point
- (c) Conducts electricity in molten state
- (d) Occurs as solid

Soln:

Answer is (b) Has low melting point

Explanation:

Here Z is an ionic compound and Ionic compounds have melting point hence option b) is a wrong statement.

30. The electronic configurations of three elements X, Y and Z are X — 2, 8; Y — 2, 8, 7 and Z — 2, 8, 2. Which of the following is correct?

- (a) X is a metal
- (b) Y is a metal
- (c) Z is a non-metal
- (d) Y is a non-metal and Z is a metal

Soln:

Answer is (d) Y is a non-metal and Z is a metal

Explanation:

Element Y has 3 electron in its outer which is electronegative in nature. Z has 2 electrons in its outermost shell hence it is electropositive. Hence it is a metal.

31. Although metals form basic oxides, which of the following metals form an amphoteric oxide?

- (a) Na
- (b) Ca
- (c) Al
- (d) Cu

Soln:

Answer is (c) Al

Explanation:

Oxides of Aluminum are both acidic and basic in nature. Hence aluminum oxides are amphoteric in nature.

32. Generally, non-metals are not conductors of electricity. Which of the following is a good conductor of electricity?

- (a) Diamond
- (b) Graphite
- (c) Sulphur
- (d) Fullerene

Soln:

Answer is (b) Graphite

33. Electrical wires have a coating of an insulating material. The material, generally used is

- (a) Sulphur
- (b) Graphite
- (c) PVC
- (d) All can be used

Soln:

Answer is (c) PVC

Explanation:

Sulphur is brittle in nature, hence it can be used and Graphite is a good conductor of electricity hence it cannot be used as insulator.

34. Which of the following non-metals is a liquid?

- (a) Carbon
- (b) Bromine
- (c) Phosphorus
- (d) Sulphur

Soln:

Answer is (b) Bromine

35. Which of the following can undergo a chemical reaction?

- (a) $\text{MgSO}_4 + \text{Fe}$
- (b) $\text{ZnSO}_4 + \text{Fe}$
- (c) $\text{MgSO}_4 + \text{Pb}$
- (d) $\text{CuSO}_4 + \text{Fe}$

Soln:

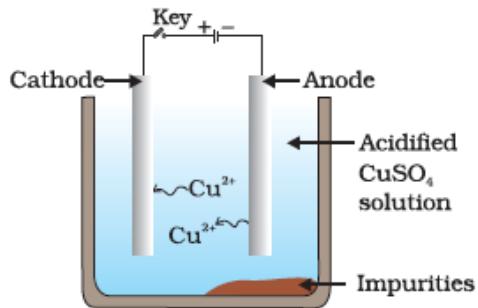
Answer is (d) $\text{CuSO}_4 + \text{Fe}$

Explanation:

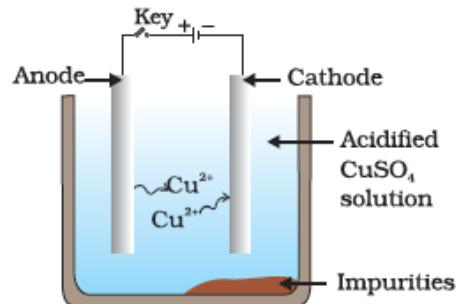
Iron is more reactive than copper hence it displaces copper in the reaction to form FeSO_4 .

36. Which one of the following figures correctly describes the process of electrolytic refining?

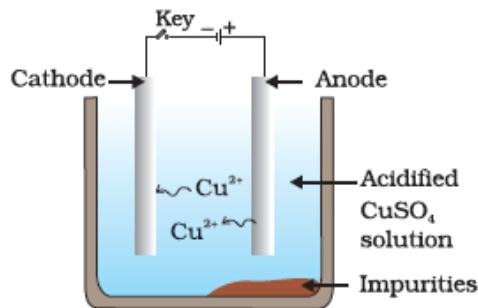
of electrolytic refining?



(a)



(b)



(c)

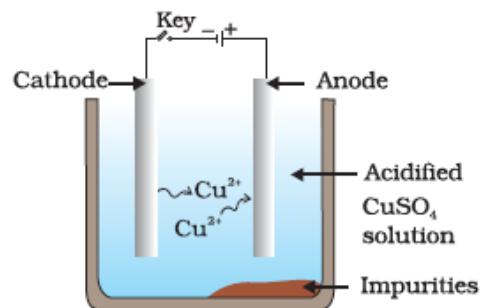


Fig. 3.1

(d)

Soln:

Answer is b)

Explanation:

Copper ions are dispersed from positively charged anode and deposited on negatively charged cathode.

Short Answer Questions

37. Iqbal treated a lustrous, divalent element M with sodium hydroxide. He observed the formation of bubbles in reaction mixture. He made the same observations when this element was treated with hydrochloric acid. Suggest how can he identify the produced gas. Write chemical equations for both the reactions.

Soln:

To identify the produced gas, lighted matchstick should be brought near the gas. If match stick burns with pop sound, it indicates the evolution of Hydrogen gas.



With HCl



38. During extraction of metals, electrolytic refining is used to obtain pure metals. (a) Which material will be used as anode and cathode for refining of silver metal by this process? (b) Suggest a suitable electrolyte also. (c) In this electrolytic cell, where do we get pure silver after passing electric current?

Soln:

- During extraction of metals, impure metal will be used as anode and pure metal is used as cathode for refining of silver metal by this electrolytic refining.
- Silver Sulphate or Silver Nitrate
- Pure silver is obtained on cathode

39. Why should the metal sulphides and carbonates be converted to metal oxides in the process of extraction of metal from them?

Soln:

Metal sulphides and carbonates are converted to metal oxides in the process of extraction of metal from them because metals can be obtained easier in oxide form than its sulphide or carbonate form.

40. Generally, when metals are treated with mineral acids, hydrogen gas is liberated but when metals (except Mn and Mg), treated with HNO₃, hydrogen is not liberated, why?

Soln:

HNO₃ is a strong oxidizing agent. It oxidises the liberated Hydrogen into water while converting itself to nitrogen oxide.

41. Compound X and aluminium are used to join railway tracks. (a) Identify the compound X (b) Name the reaction (c) Write down its reaction.

Soln:

- a) Answer is Fe₂O₃
- b) Involved reaction is a thermite reaction which is also called as aluminothermy
- c) Fe₂O₃(s) + 2Al(s) → Al₂O₃ (s) + 2Fe(s) + Heat Ferric oxide Aluminium Aluminium Iron Oxide.

42. When a metal X is treated with cold water, it gives a basic salt Y with molecular formula XOH (Molecular mass = 40) and liberates a gas Z which easily catches fire. Identify X, Y and Z and also write the reaction involved.

Soln:

X is Na because molecular mass of NaOH is 40.

Hence Y is NaOH

Z is hydrogen which catches fire when reacts with water.



43. A non-metal X exists in two different forms Y and Z. Y is the hardest natural substance, whereas Z is a good conductor of electricity. Identify X, Y and Z.

Soln:

X is Carbon, Y and Z are Diamond and Graphite which are allotropes of the carbon.

**44. The following reaction takes place when aluminium powder is heated with MnO₂
3 MnO₂ (s) + 4 Al (s) → 3 Mn (l) + 2 Al₂O₃ (l) + Heat**

(a) Is aluminium getting reduced? (b) Is MnO₂ getting oxidised?

Soln:

In this reaction aluminium gets oxidized as oxygen gets combined with it. Since oxygen is removed from MnO₂ it is getting reduced.

45. What are the constituents of solder alloy? Which property of solder makes it suitable for welding electrical wires?

Soln:

Solder alloy is made of Lead and aluminium. Its low melting point makes it suitable for welding electrical wires.

46. A metal A, which is used in thermite process, when heated with oxygen gives an oxide B, which is amphoteric in nature. Identify A and B. Write down the reactions of oxide B with HCl and NaOH.

Soln:

Metal A is Aluminium and B is Al_2O_3

With HCl



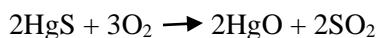
With NaOH



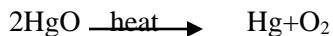
47. A metal that exists as a liquid at room temperature is obtained by heating its sulphide in the presence of air. Identify the metal and its ore and give the reaction involved.

Soln:

Mercury is the metal which is liquid at room temperature. Ore of Mercury is Cinnabar. When we heat cinnabar in atmospheric oxygen following reaction takes place.



Mercuric oxide is again heated to get Mercury and Oxygen



48. Give the formulae of the stable binary compounds that would be formed by the combination of following pairs of elements.

- (a) Mg and N₂
- (b) Li and O₂
- (c) Al and Cl₂
- (d) K and O₂

Soln:

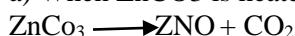
- a) Magnesium Nitride (Mg_3N_2)
- b) Lithium Oxide(Li_2O)
- c) Aluminium Chloride($AlCl_3$)
- d) Potassium Oxide (K_2O)

49. What happens when

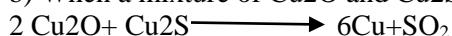
- (a) $ZnCO_3$ is heated in the absence of oxygen?
- (b) a mixture of Cu_2O and Cu_2S is heated?

Soln:

a) When $ZnCO_3$ is heated in the absence of oxygen Zinc Oxide and Carbon-di-oxide are liberated.



b) When a mixture of Cu_2O and Cu_2S is heated we get pure copper



50. A non-metal A is an important constituent of our food and forms two oxides B and C. Oxide B is toxic whereas C causes global warming

- (a) Identify A, B and C
- (b) To which Group of Periodic Table does A belong?

Soln:

a) A is Carbon. B is Carbon monoxide C is Carbon-dioxide

b) Group 14

51. Give two examples each of the metals that are good conductors and poor conductors of heat respectively.

Soln:

Good conductors- Iron and Copper

Bad conductors- Lead and Mercury

52. Name one metal and one non-metal that exist in liquid state at room temperature. Also name two metals having melting point less than 310 K ($37^\circ C$)

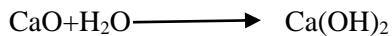
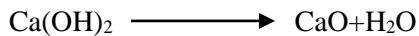
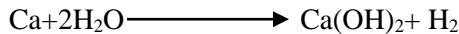
Soln:

Mercury and Bromine are liquid at room temperature. Caesium and Gallium are the metals whose melting point is less than 310K($37^\circ C$).

53. An element A reacts with water to form a compound B which is used in white washing. The compound B on heating forms an oxide C which on treatment with water gives back B. Identify A, B and C and give the reactions involved.

Soln:

A is calcium, B is calcium Hydroxide and C is Calcium Oxide.



54. An alkali metal A gives a compound B (molecular mass = 40) on reacting with water. The compound B gives a soluble compound C on treatment with aluminium oxide. Identify A, B and C and give the reaction involved.

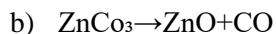
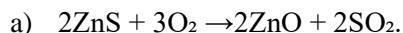
Soln:

A is sodium and B is Sodium Hydroxide. Because molecular mass of NaOH is 40. So C is Sodium Aluminate.



55. Give the reaction involved during extraction of zinc from its ore by (a) roasting of zinc ore (b) calcination of zinc ore

Soln:

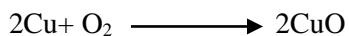


56. A metal M does not liberate hydrogen from acids but reacts with oxygen to give a black colour product. Identify M and black coloured product and also explain the reaction of M with oxygen.

Soln:

Copper is the metal which does not react with acids. With oxygen it forms Copper Oxide.

Metal M is Copper and black colored product is Copper oxide.



57. An element forms an oxide A₂O₃ which is acidic in nature. Identify A as a metal or non-metal.

Soln:

A is a non-metal because oxides of non-metals are acidic in nature.

58. A solution of CuSO₄ was kept in an iron pot. After few days the iron pot was found to have a number of holes in it. Explain the reason in terms of reactivity. Write the equation of the reaction involved.

Soln:

Iron is more reactive than copper hence Iron displaces Copper to produce FeSO₄. In this process a portion of Iron Gets dissolved which results in Holes in the pot.



Long Answer Questions

59. A non-metal A which is the largest constituent of air, when heated with H₂ in 1:3 ratio in the presence of catalyst (Fe) gives a gas B. On heating with O₂ it gives an oxide C. If this oxide is passed into water in the presence of air it gives an acid D which acts as a strong oxidising agent.

(a) Identify A, B, C and D

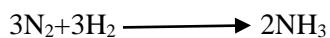
(b) To which group of periodic table does this non-metal belong?

Soln:

a)

Non-metal a is nitrogen because it is the largest constituent of air which constitute around 78% of the gases.. B is Ammonia, C is Nitrogen-di-oxide and D is Nitric acid.

When heated with H₂ in 1:3 ratio in the presence of catalyst (Fe) following reaction takes place.



On heating Nitrogen with O₂ it gives nitrogen-di-oxide



When nitrogen-di-oxide is passed into water in the presence of air it gives an Nitric acid



b)

Nitrogen belongs to group 15

60. Give the steps involved in the extraction of metals of low and medium reactivity from their respective sulphide ores.

Soln:

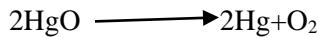
During the extraction of metals of low and medium reactivity from their respective sulphide ores.

They are first heated in presence of atmospheric oxygen. This step will give out oxides of metal. This step is used as it is more efficient method to extract methods.

Ex: Cinnabar is heated in air to get mercuric sulphide oxidize to produce mercuric oxide.



Mercuric oxide is further heat to get Mercury

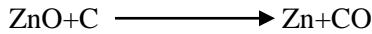


Zinc is a metal of medium reactivity and its ore is Zinc Blende

Zinc Blend is roasted to get Zinc oxide



Zinc oxide when heated wit CO₂ Zinc is obtained



61. Explain the following

- (a) Reactivity of Al decreases if it is dipped in HNO₃
- (b) Carbon cannot reduce the oxides of Na or Mg
- (c) NaCl is not a conductor of electricity in solid state whereas it does conduct electricity in aqueous solution as well as in molten state
- (d) Iron articles are galvanised.
- (e) Metals like Na, K, Ca and Mg are never found in their free state in nature.

Soln:

a) Reactivity of Aluminium decreases if it is dipped in HNO₃ because HNO₃ is a strong oxidizing agent. Here a layer a layer of aluminium oxide gets deposited because of which reactivity of aluminium gets reduced .

(b) Carbon cannot reduce the oxides of Na or Mg because these are highly reactive metals. Na and Mg have higher affinity to oxygen than carbon. Hence carbon fails to reduce the oxides of Na and Mg.

(c) NaCl is not a conductor of electricity in solid state whereas it does conduct electricity in aqueous solution as well as in molten state because NaCl is an ionic compound. Ionic compounds cannot conduct electricity in solid state but they can conduct electricity in aqueous solution and in molten state.

- d) Iron readily reacts with atmospheric oxygen and forms rust. To avoid rusting of iron it is galvanized.
- e) Metals like Na, K, Ca and Mg are highly reactive metals. They can form compounds with almost every element. Because of this they are not found in their native form in nature.

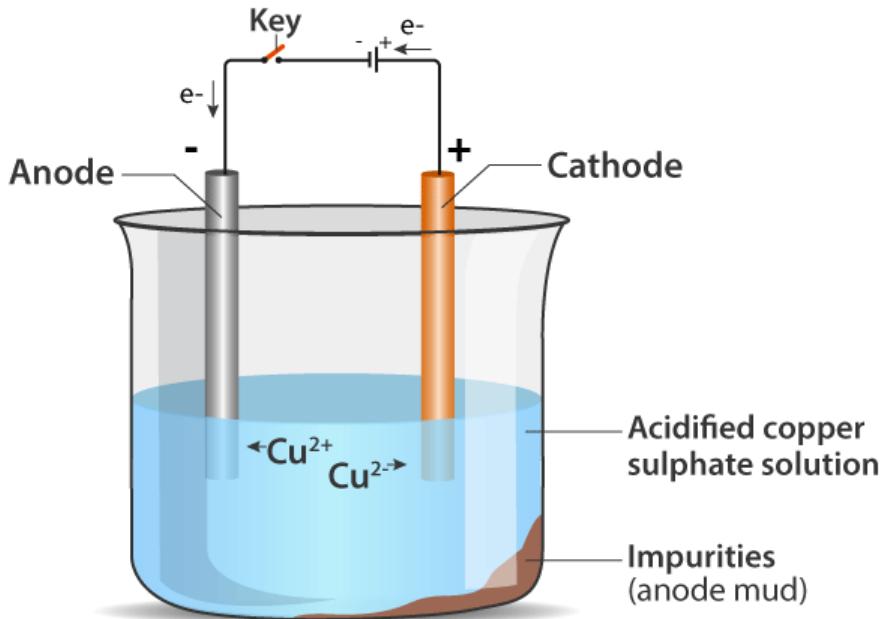
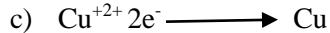
62. (i) Given below are the steps for extraction of copper from its ore. Write the reaction involved.

- (a) Roasting of copper (1) sulphide
 (b) Reduction of copper (1) oxide with copper (1) sulphide.

(c) Electrolytic refining

- (ii) Draw a neat and well labelled diagram for electrolytic refining of copper

Soln:



63. Of the three metals X, Y and Z. X reacts with cold water, Y with hot water and Z with steam only. Identify X, Y and Z and also arrange them in order of increasing reactivity.

Soln:

X reacts with cold water.

Hence , the element should be Sodium



Y reacts with hotwater, Hence, it is "Magnesium"



Z reacts with steam only. Hence , it is Iron



Arranging in ascending order (increasing order of reactivity)



64. An element A burns with golden flame in air. It reacts with another element B, atomic number 17 to give a product C. An aqueous solution of product C on electrolysis gives a compound D and liberates hydrogen. Identify A, B, C and D. Also write down the equations for the reactions involved.

Soln:

Element A is 17 Sodium because it will burn with golden flame in air.

Element B is Chlorine for its atomic number is 17.

Product C is Sodium Chloride



Product D is Sodium hydroxide



65. Two ores A and B were taken. On heating ore A gives CO₂ whereas, ore B gives SO₂. What steps will you take to convert them into metals?

Soln:

Ore A gives CO₂ on heating hence it is a carbonate ore

Steps involved in Extraction of ore A

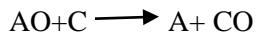
a) Calcination

Ore is heated in limited supply of air to obtain metal oxide



b) Reduction

Metal oxide is reduced with coke to obtain metal.



Ore B is a sulphide ore

Steps involved in extraction of element B are

a) Roasting

Ore is heated in presence of air to obtain metal oxide



b) Reduction

Metal oxide is reduced to metal by carbon



Chapter - 2

Acids, Bases and Salts

Multiple Choice Questions

1. What happens when a solution of an acid is mixed with a solution of a base in a test tube?

- (i) The temperature of the solution increases
 - (ii) The temperature of the solution decreases
 - (iii) The temperature of the solution remains the same
 - (iv) Salt formation takes place
-
- (a) (i) only (b)
 - (i) and (iii)
 - (c) (ii) and (iii)
 - (d) (i) and (iv)

Soln:

Answer is (d) (i) and (iv)

Explanation:

When acid is mixed with a solution of base it results in neutralization reaction. Neutralization is an exothermic reaction which result in the formation salt.

2. An aqueous solution turns red litmus solution blue. Excess addition of which of the following solution would reverse the change?

- (a) Baking powder
- (b) Lime
- (c) Ammonium hydroxide solution
- (d) Hydrochloric acid

Soln:

Answer is (d) Hydrochloric acid

Explanation:

If the solution turns red litmus to blue color then the solution should be basic in nature. Its effect can be neutralized by adding an acid hence (d) Hydrochloric acid is the answer.

3. During the preparation of hydrogen chloride gas on a humid day, the gas is usually passed through the guard tube containing calcium chloride. The role of calcium chloride taken in the guard tube is to

- (a) absorb the evolved gas
- (b) moisten the gas
- (c) absorb moisture from the gas
- (d) absorb Cl⁻ ions from the evolved gas

Soln:

Answer is (c) absorb moisture from the gas

Explanation:

Calcium is a good dehydrating agent. It has property to absorb moisture. Hence it is used as a desiccant to dry gases and Hydrocarbons in the industries.

4. Which of the following salts does not contain water of crystallisation?

- (a) Blue vitriol
- (b) Baking soda
- (c) Washing soda
- (d) Gypsum

Soln:

Answer is (b) Baking soda

Explanation

Baking soda is white amorphous powder whereas other salts given in the question are crystalline in nature.

5. Sodium carbonate is a basic salt because it is a salt of

- (a) strong acid and strong base
- (b) weak acid and weak base
- (c) strong acid and weak base
- (d) weak acid and strong base

Soln:

Answer is (d) weak acid and strong base

Explanation:

Salt formed by weak acid and strong base form strong salt. Here Sodium is a strong base and carbonate is a weak acid.

6. Calcium phosphate is present in tooth enamel. Its nature is

- (a) basic
- (b) acidic
- (c) neutral
- (d) amphoteric

Soln:

Answer is (a) basic

Explanation:

Phosphate ion present in calcium phosphate is a strong base and it forms a strong salt. Hence calcium

phosphate is basic in nature.

7. A sample of soil is mixed with water and allowed to settle. The clear supernatant solution turns the pH paper yellowish-orange. Which of the following would change the colour of this pH paper to greenish-blue?

- (a) Lemon juice
- (b) Vinegar
- (c) Common salt
- (d) An antacid

Soln:

Answer is (d) An antacid

Explanation:

Sample solution turn pH paper yellowish-orange which confirms the acidic nature of the sample. In order to make the color to greenish-blue we have to add an antacid.

8. Which of the following gives the correct increasing order of acidic strength

- (a) Water < Acetic acid < Hydrochloric acid
- (b) Water < Hydrochloric acid < Acetic acid
- (c) Acetic acid < Water < Hydrochloric acid
- (d) Hydrochloric acid < Water < Acetic acid

Soln:

Answer is a) Water < Acetic acid < Hydrochloric acid

Explanation:

Water is neutral in its pure form, Acetic acid is an organic acid which is weak in nature and Hydrochloric acid is a strong acid.

9. If a few drops of a concentrated acid accidentally spills over the hand of a student, what should be done?

- (a) Wash the hand with saline solution
- (b) Wash the hand immediately with plenty of water and apply a paste of sodium hydrogencarbonate
- (c) After washing with plenty of water apply solution of sodium hydroxide on the hand
- (d) Neutralise the acid with a strong alkali

Soln:

Answer is (b) Wash the hand immediately with plenty of water and apply a paste of sodium hydrogencarbonate

Explanation:

Washing affected hand with plenty of water will reduce the concentration of the acid. Remaining traces of the acid can be neutralized by applying a paste of Hydrogen carbonate which is basic in nature. Though NaOH is also a base but it is corrosive in nature hence it is not used to neutralize the acid.

10. Sodium hydrogencarbonate when added to acetic acid evolves a gas. Which of the following statements are true about the gas evolved?

- (i) It turns lime water milky
- (ii) It extinguishes a burning splinter
- (iii) It dissolves in a solution of sodium hydroxide
- (iv) It has a pungent odour

- (a) (i) and (ii)
- (b) (i), (ii) and (iii)
- (c) (ii), (iii) and (iv)
- (d) (i) and (iv)

Soln:

Answer is (a) (i) and (ii)

Explanation:

Reaction between Sodium hydrogencarbonate and acetic acid lead to evolution of carbon-di-oxide gas. CO_2 turns the lime water milky and extinguish a burning splinter.

11. Common salt besides being used in kitchen can also be used as the raw material for making

- (i) washing soda
- (ii) bleaching powder
- (iii) baking soda
- (iv) slaked lime

- (a) (i) and (ii)
- (b) (i), (ii) and (iv)
- (c) (i) and (iii)
- (d) (i), (iii) and (iv)

Soln:

Answer is (a) (i) and (ii)

12. One of the constituents of baking powder is sodium hydrogencarbonate, the other constituent is

- (a) hydrochloric acid
- (b) tartaric acid
- (c) acetic acid
- (d) sulphuric acid

Soln:

Answer is (b) tartaric acid

Explanation:

A Mild edible acid along with Sodium Hydrogen Carbonate is used to prepare baking powder. Here acetic acid or citric acid can also be used in place of tartaric acid.

13. To protect tooth decay we are advised to brush our teeth regularly. The nature of the tooth paste commonly used is

- (a) acidic
- (b) neutral
- (c) basic
- (d) corrosive

Soln:

Answer is c) Basic

Explanation:

Teeth will be acidic in nature because of bacterial activity in mouth. To neutralize the acid toothpaste will be neutral in nature.

14. Which of the following statements is correct about an aqueous solution of an acid and of a base?

- (i) Higher the pH, stronger the acid
 - (ii) Higher the pH, weaker the acid
 - (iii) Lower the pH, stronger the base
 - (iv) Lower the pH, weaker the base
-
- (a) (i) and (iii)
 - (b) (ii) and (iii)
 - (c) (i) and (iv)
 - (d) (ii) and (iv)

Soln:

Answer is (d) (ii) and (iv)

Explanation:

On a P^H scale acids are those whose P^H is below 7 lower is the PH stronger will be acid and similarly Bases are those whose P^H is more than 7. Higher is the P^H strong will be acid.

15. The pH of the gastric juices released during digestion is

- (a) less than 7
- (b) more than 7
- (c) equal to 7
- (d) equal to 0

Soln:

Answer is (a) less than 7

Explanation:

The PH is acidic to below 7 to ensure easy breakdown of food particles. PH of stomach juices is usually 3.

16. Which of the following phenomena occur, when a small amount of acid is added to water?

- (i) Ionisation
 - (ii) Neutralisation
 - (iii) Dilution
 - (iv) Salt formation
-
- (a) (i) and (ii)
 - (b) (i) and (iii)
 - (c) (ii) and (iii)
 - (d) (ii) and (iv)

Soln:

Answer is (b) (i) and (iii)

17. Which one of the following can be used as an acid–base indicator by a visually impaired student?

- (a) Litmus
- (b) Turmeric
- (c) Vanilla essence
- (d) Petunia leaves

Soln:

Answer is (c) Vanilla essence

Explanation:

Vanilla essence can be used as an olfactory indicator hence it can be used as acid base indicator by visually impaired students.

18. Which of the following substance will not give carbon dioxide on treatment with dilute acid?

- (a) Marble
- (b) Limestone
- (c) Baking soda
- (d) Lime

Soln:

Answer is (d) Lime

Explanation:

Marble, Limestone and baking soda have carbonates which produces CO₂ gas. Lime contains Hydroxide which will not produce CO₂.

19. Which of the following is acidic in nature?

- (a) Lime juice
- (b) Human blood
- (c) Lime water
- (d) Antacid

Soln:

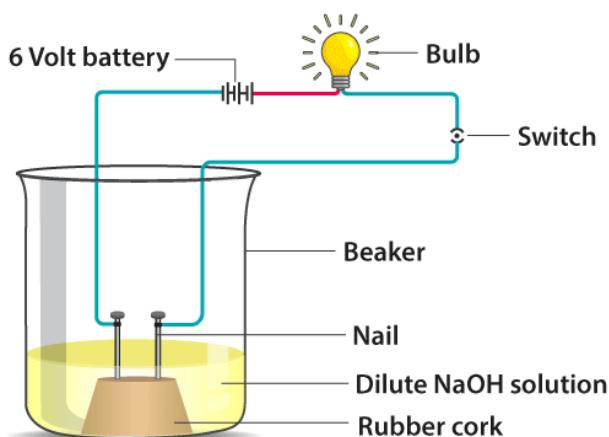
Answer is (a) Lime juice

Explanation:

Lime juice has citric acid in it. Hence it is acidic in nature.

20. In an attempt to demonstrate electrical conductivity through an electrolyte, the following apparatus (Figure 2.1) was set up. Which among the following statement(s) is(are) correct?

- (i) Bulb will not glow because electrolyte is not acidic
 - (ii) Bulb will glow because NaOH is a strong base and furnishes ions for conduction.
 - (iii) Bulb will not glow because circuit is incomplete
 - (iv) Bulb will not glow because it depends upon the type of electrolytic solution
-
- (a) (i) and (iii)
 - (b) (ii) and (iv)
 - (c) (ii) only
 - (d) (iv) only



Soln:

Answer is (c) (ii) only

21. Which of the following is used for dissolution of gold?

- (a) Hydrochloric acid
- (b) Sulphuric acid
- (c) Nitric acid
- (d) Aqua regia

Solution:

Answer is (d) Aqua regia

Explanation:

Gold is a noble metal which will not react even with strong acids, hence aqua regia which is a mixture of Nitric and Hydrochloric acid in the ratio 1:3 is used for dissolution of gold.

22. Which of the following is not a mineral acid?

- (a) Hydrochloric acid
- (b) Citric acid
- (c) Sulphuric acid
- (d) Nitric acid

Soln:

Answer is (b) Citric acid

Explanation:

Citric acid is the organic acid hence it is the answer

23. Which among the following is not a base?

- (a) NaOH
- (b) KOH
- (c) NH₄OH
- (d) C₂H₅ OH

Soln:

Answer is (d) C₂H₅ OH

Explanation:

C₂H₅ OH is an alcohol not a base

24. Which of the following statements is not correct?

- (a) All metal carbonates react with acid to give a salt, water and carbon dioxide
- (b) All metal oxides react with water to give salt and acid
- (c) Some metals react with acids to give salt and hydrogen
- (d) Some non metal oxides react with water to form an acid

Soln:

Answer is (b) All metal oxides react with water to give salt and acid

Explanation:

Metal oxides are basic in nature hence they give alkaline solution when dissolved in water.

25. Match the chemical substances given in Column (A) with their appropriate application given in Column (B)

Column (A)	Column (B)
(A) Bleaching powder	(i) Preparation of glass
(B) Baking soda	(ii) Production of H ₂ and Cl ₂
(C) Washing soda	(iii) Decolourisation
(D) Sodium chloride	(iv) Antacid

- (a) A—(ii), B—(i), C—(iv), D—(iii)
(b) A—(iii), B—(ii), C—(iv), D—(i)
(c) A—(iii), B—(iv), C—(i), D—(ii)
(d) A—(ii), B—(iv), C—(i), D—(iii)

Soln:

Answer is (c) A—(iii), B—(iv), C—(i), D—(ii)

26. Equal volumes of hydrochloric acid and sodium hydroxide solutions of same concentration are mixed and the pH of the resulting solution is checked with a pH paper. What would be the colour obtained? (You may use colour guide given in Figure 2.2

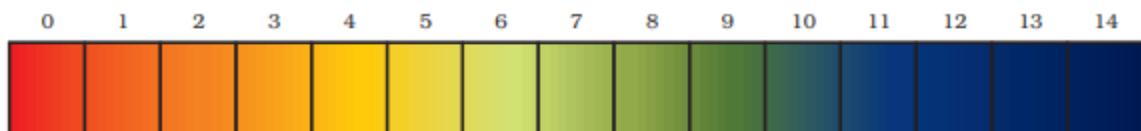


Figure 2.2

- (a) Red
(b) Yellow
(c) Yellowish green
(d) Blue

Soln:

Answer is (c) Yellowish green

Explanation:

Here neutralization takes place between HCl and NaOH solution hence P^H will remain neutral which will be in the yellowish green zone in P^H paper.

27. Which of the following is(are) true when HCl (g) is passed through water?

- (i) It does not ionise in the solution as it is a covalent compound.
 - (ii) It ionises in the solution
 - (iii) It gives both hydrogen and hydroxyl ion in the solution
 - (iv) It forms hydronium ion in the solution due to the combination of hydrogen ion with water molecule
- (a) (i) only**
(b) (iii) only
(c) (ii) and (iv)
(d) (iii) and (iv)

Soln:

Answer is (c) (ii) and (iv)

Explanation:

HCl is a strong acid which ionizes completely in water to produce Hydrogen as well as Hydrogen and chlorine. Hydrogen produces combine with water molecules to give Hydronium ions.

28. Which of the following statements is true for acids?

- (a) Bitter and change red litmus to blue**
- (b) Sour and change red litmus to blue**
- (c) Sour and change blue litmus to red**
- (d) Bitter and change blue litmus to red**

Soln:

Answer is (c) Sour and change blue litmus to red

29. Which of the following are present in a dilute aqueous solution of hydrochloric acid?

- (a) H₃O⁺ + Cl⁻**
- (b) H₃O⁺ + OH⁻**
- (c) Cl⁻ + OH⁻**
- (d) unionised HCl**

Soln:

Answer is (a) H₃O⁺ + Cl⁻

Explanation:

Acid produces Hydrogen which will combine with water molecule to produce Hydronium ion.

30. Identify the correct representation of reaction occurring during chloralkali process

- (a) $2\text{NaCl(l)} + 2\text{H}_2\text{O(l)} \rightarrow 2\text{NaOH(l)} + \text{Cl}_2(\text{g}) + \text{H}_2(\text{g})$
- (b) $2\text{NaCl(aq)} + 2\text{H}_2\text{O(aq)} \rightarrow 2\text{NaOH(aq)} + \text{Cl}_2(\text{g}) + \text{H}_2(\text{g})$
- (c) $2\text{NaCl(aq)} + 2\text{H}_2\text{O(l)} \rightarrow 2\text{NaOH(aq)} + \text{Cl}_2(\text{aq}) + \text{H}_2(\text{aq})$
- (d) $2\text{NaCl(aq)} + 2\text{H}_2\text{O(l)} \rightarrow 2\text{NaOH(aq)} + \text{Cl}_2(\text{g}) + \text{H}_2(\text{g})$

Soln:

Answer is (d) $2\text{NaCl(aq)} + 2\text{H}_2\text{O(l)} \rightarrow 2\text{NaOH(aq)} + \text{Cl}_2(\text{g}) + \text{H}_2(\text{g})$

Short Answer Questions

31. Match the acids given in Column (A) with their correct source given in Column (B)

Column (A)	Column (B)
(a) Lactic acid	(i) Tomato
(b) Acetic acid	(ii) Lemon
(c) Citric acid	(iii) Vinegar
(d) Oxalic acid	(iv) Curd

Soln:

Column (A)	Column (B)
(a) Lactic acid	(iv) Curd
(b) Acetic acid	(iii) Vinegar
(c) Citric acid	(ii) Lemon
(d) Oxalic acid	(i) Tomato

Column (A) Column (B)

- (a) Lactic acid (iv) Curd
- (b) Acetic acid (iii) Vinegar
- (c) Citric acid (ii) Lemon
- (d) Oxalic acid (i) Tomato

32. Match the important chemicals given in Column (A) with the chemical formulae given in Column (B)

Column (A)	Column (B)
(a) Plaster of Paris	(i) Ca(OH)_2
(b) Gypsum	(ii) $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$
(c) Bleaching Powder	(iii) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
(d) Slaked Lime	(iv) CaOCl_2

Soln:

Column (A)	Column (B)
(a) Plaster of Paris	(ii) $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$
(b) Gypsum	(iii) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
(c) Bleaching Powder	(iv) CaOCl_2
(d) Slaked Lime	(i) Ca(OH)_2

33. What will be the action of the following substances on litmus paper? Dry HCl gas, Moistened NH₃ gas, Lemon juice, Carbonated soft drink, Curd, Soap solution.

Soln:

Dry HCl gas- No effect

Moistened NH₃ gas- Turns litmus paper to blue colour

Lemon juice- Turns litmus paper to red colour

Carbonated soft drink- Turns litmus paper to blue colour

Curd- Turns litmus paper to red colour

Soap solution- Turns litmus paper to blue colour

34. Name the acid present in ant sting and give its chemical formula. Also give the common method to get relief from the discomfort caused by the ant sting.

Soln:

Ant sting release methanoic acid. Chemical formula of methanoic acid is HCOOH. If we rub baking soda on the affected area it can give relief from the discomfort caused by ant sting.

35. What happens when nitric acid is added to egg shell?

Soln:

Nitric acid dissolved egg shell which is made up of Calcium carbonate. Calcium carbonate on reacting with nitric acid yield Calcium Nitrate and carbon-di-oxide gas.

36. A student prepared solutions of (i) an acid and (ii) a base in two separate beakers. She forgot to label the solutions and litmus paper is not available in the laboratory. Since both the solutions are colourless, how will she distinguish between the two?

Soln:

Student can use Phenolphthalein indicator to check the nature of the solution.

37. How would you distinguish between baking powder and washing soda by heating?

Soln:

When we heat baking powder CO_2 is released which can be confirmed by passing evolved gas into lime water which will turn milky. This reaction will not happen when you heat washing soda.

38. Salt A commonly used in bakery products on heating gets converted into another salt B which itself is used for removal of hardness of water and a gas C is evolved. The gas C when passed through lime water, turns it milky. Identify A, B and C.

Soln:

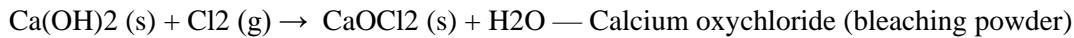
Salt A is Baking soda (Sodium Hydrogen Carbonate) which will turn to Sodium carbonate(Salt B) on heating. Gas C turn lime water milky hence it must be CO_2 .

39. In one of the industrial processes used for manufacture of sodium hydroxide, a gas X is formed as by product. The gas X reacts with lime water to give a compound Y which is used as a bleaching agent in chemical industry. Identify X and Y giving the chemical equation of the reactions involved.

Soln:

X = Chlorine (Cl_2)

Y = Bleaching powder (CaOCl_2)



40. Fill in the missing data in the following table

		Salted Obtained from	
Name of the Salt	Formula	Base	Acid
Ammonium chloride	NH_4Cl	NH_4OH	-
Copper sulphate	-	-	H_2SO_4
Sodium chloride	NaCl	NaOH	-
Magnesium nitrate	$\text{Mg}(\text{NO}_3)_2$	-	HNO_3
Potassium sulphate	K_2SO_4	-	-
Calcium nitrate	$\text{Ca}(\text{NO}_3)_2$	$\text{Ca}(\text{OH})_2$	-

Soln:

		Salted Obtained from	
Name of the Salt	Formula	Base	Acid
Ammonium chloride	NH ₄ Cl	NH ₄ OH	HCl
Copper sulphate	CuSO ₄	Cu(OH) ₂	H ₂ SO ₄
Sodium chloride	NaCl	NaOH	HCl
Magnesium nitrate	Mg(NO ₃) ₂	Mg(OH) ₂	HNO ₃
Potassium sulphate	K ₂ SO ₄	KOH	H ₂ SO ₄
Calcium nitrate	Ca(NO ₃) ₂	Ca(OH) ₂	HNO ₃

41 What are strong and weak acids? In the following list of acids, separate strong acids from weak acids.
Hydrochloric acid, citric acid, acetic acid, nitric acid, formic acid, sulphuric acid.

Soln:

Strong acids are those which gets completely ionized and weak acids are those which gets partially ionized.

Hydrochloric acid- Strong Acid
citric acid- Weak Acid
acetic acid- Weak Acid
nitric acid, - Strong Acid
formic acid- Weak Acid
sulphuric acid- Strong Acid

42. When zinc metal is treated with a dilute solution of a strong acid, a gas is evolved, which is utilised in the hydrogenation of oil. Name the gas evolved. Write the chemical equation of the reaction involved and also write a test to detect the gas formed.

Soln:

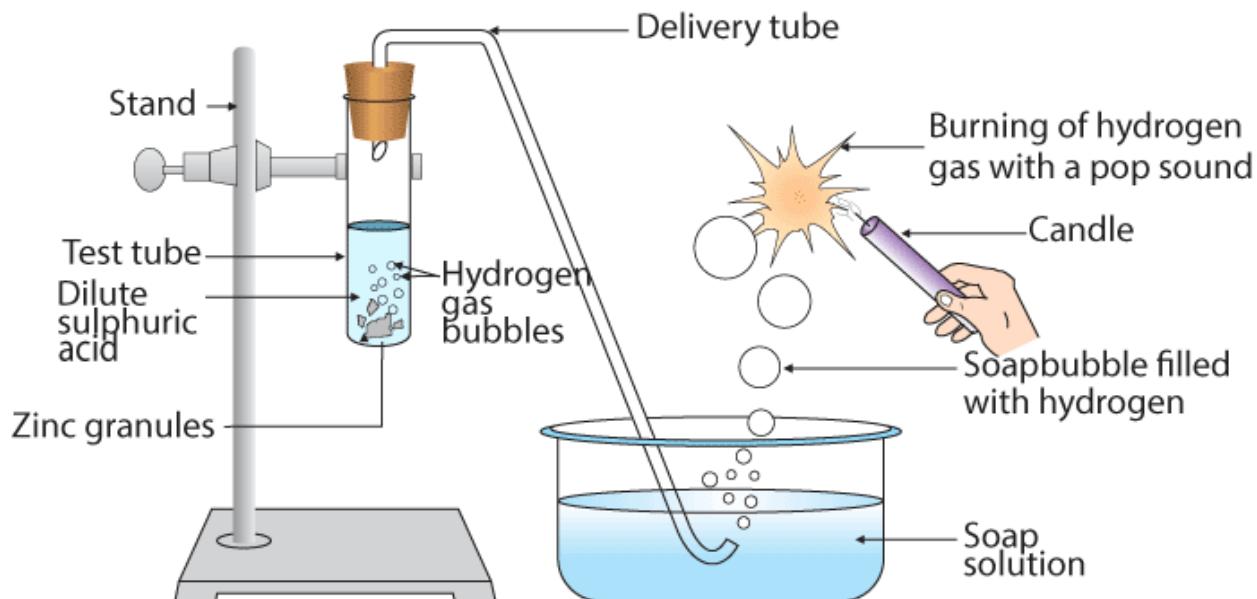
When Zinc reacts with Dilute acid solution, following reaction takes place Hydrogen gas is evolved



When Hydrogen gas is brought near Burning flame, pop pops up which is the confirmation for evolution of Hydrogen gas.

Long Answer Questions

43. In the following schematic diagram for the preparation of hydrogen gas as shown in Figure 2.3, what would happen if following changes are made?



- (a) In place of zinc granules, same amount of zinc dust is taken in the test tube
- (b) Instead of dilute sulphuric acid, dilute hydrochloric acid is taken
- (c) In place of zinc, copper turnings are taken
- (d) Sodium hydroxide is taken in place of dilute sulphuric acid and the tube is heated.

Soln:

- a) In place of Zinc granules if we use Zinc dust reaction speed increases
- b) Instead of dilute sulphuric acid if we use dilute hydrochloric acid ZINC Chloride is formed

$$\text{Zn} + 2\text{HCl} \longrightarrow \text{ZnCl}_2 + \text{H}_2$$
- c) If we use copper in place of Zinc there will be no reaction as copper will not react with dilute acids
- d) Sodium Zinate is produced if we use NaOH solution in place of acid

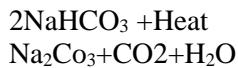
$$\text{Zn} + 2\text{NaOH} \longrightarrow \text{Na}_2\text{ZnO}_2 + \text{H}_2$$

44. For making cake, baking powder is taken. If at home your mother uses baking soda instead of baking powder in cake,

- (a) how will it affect the taste of the cake and why?
- (b) how can baking soda be converted into baking powder?
- (c) what is the role of tartaric acid added to baking soda?

Soln:

- a) If we use baking soda instead of baking powder taste of the cake will be bitter. Upon heating baking soda sodium carbonate will be formed which will make the cake taste bitter.



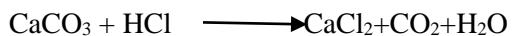
b) Baking soda can be converted into baking powder by adding an edible weak acid like tartaric acid.

c) When tartaric acid is dissolved in water it gives out Hydrogen ions. Hydrogen ions reacts with Sodium Carbonate to produce carbon di-oxide which will make the cake fluffy.

45. A metal carbonate X on reacting with an acid gives a gas which when passed through a solution Y gives the carbonate back. On the other hand, a gas G that is obtained at anode during electrolysis of brine is passed on dry Y, it gives a compound Z, used for disinfecting drinking water. Identity X, Y, G and Z.

Soln:

X is Calcium . When calcium carbonate reacts with HCl it gives out CO₂ gas.



When CO₂ is passed into lime water it turns milky due to formation of Calcium carbonate.

Hence solution Y is lime water

When chlorine gas is passed on dry lime water it gives bleaching powder which is used for disinfecting water.

46. A dry pellet of a common base B, when kept in open absorbs moisture and turns sticky. The compound is also a by-product of chloralkali process. Identify B. What type of reaction occurs when B is treated with an acidic oxide? Write a balanced chemical equation for one such solution.

Soln:

A compound which is a byproduct of chloralkali process is NaOH. Hence compound B is NaOH.

When NaOH is treated with acidic oxide neutralization process occurs. For Example If NaOH is treated with carbon-di-oxide, it gives Sodium carbonate.



47. A sulphate salt of Group 2 element of the Periodic Table is a white, soft substance, which can be moulded into different shapes by making its dough. When this compound is left in open for some time, it becomes a solid mass and cannot be used for moulding purposes. Identify the sulphate salt and why does it show such a behaviour? Give the reaction involved.

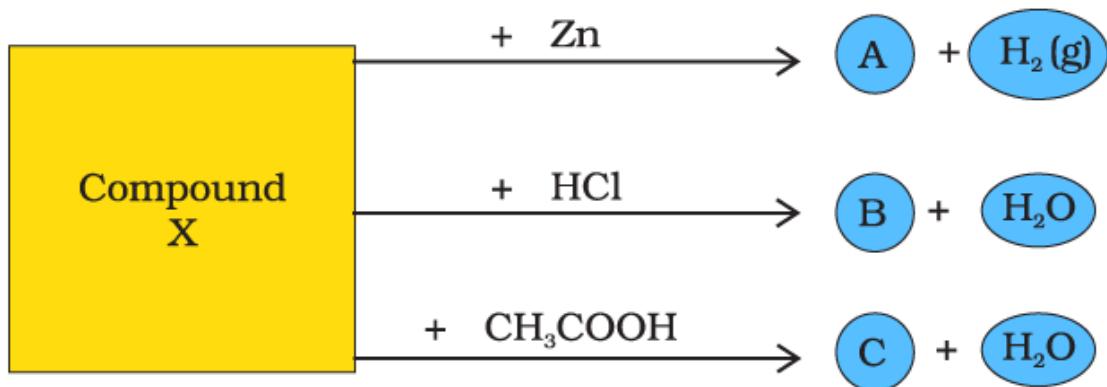
Soln:

The sulphate salt should be calcium sulphate which is white and soft substance. Calcium sulphate is popularly known as plaster of paris.

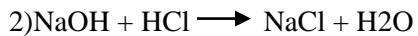
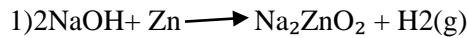
Plaster of paris has half

molecule of water of crystallization. When we leave plaster of paris open for some time, it absorbs moisture to gain number of molecules of crystallization. This newly formed compound is called Gypsum which is hard to make moulds.

48. Identify the compound X on the basis of the reactions given below. Also, write the name and chemical formulae of A, B and C.



Soln:



By following reaction it is confirmed that compound X is Sodium Zincate

Chapter - 1

Chemical Reactions and Equations

Multiple Choice Questions

1. Which of the following is not a physical change?

- (a) Boiling of water to give water vapour
- (b) Melting of ice to give water
- (c) Dissolution of salt in water
- (d) Combustion of Liquefied Petroleum Gas (LPG)

Soln:

Answer is (d) Combustion of Liquefied Petroleum Gas (LPG)

Explanation:

Combustion is always a chemical change because new compound is formed after burning and it is irreversible.

2. The following reaction is an example of a $4\text{NH}_3(\text{g}) + 5\text{O}_2(\text{g}) \rightarrow 4\text{NO}(\text{g}) + 6\text{H}_2\text{O}(\text{g})$

- (i) displacement reaction
 - (ii) combination reaction
 - (iii) redox reaction
 - (iv) neutralisation reaction
-
- (a) (i) and (iv)
 - (b) (ii) and (iii)
 - (c) (i) and (iii)
 - (d) (iii) and (iv)

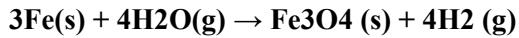
Soln:

Answer is (a) (i) and (iv)

Explanation:

The reaction provided is a mixture of displacement and redox reaction because in this reaction oxygen displace hydrogen in the ammonia. Here nitrogen is getting oxidized and oxygen is reduced.

3. Which of the following statements about the given reaction are correct?



- (i) Iron metal is getting oxidised
 - (ii) Water is getting reduced
 - (iii) Water is acting as reducing agent
 - (iv) Water is acting as oxidising agent
-
- (a) (i), (ii) and (iii)
 - (b) (iii) and (iv)
 - (c) (i), (ii) and (iv)
 - (d) (ii) and (iv)

Soln:

Here Oxygen combines with water to get oxidized. Oxygen is removed from water hence it is getting reduced. Water is providing oxygen and it acts as an oxidizing agent.

4. Which of the following are exothermic processes?

- (i) Reaction of water with quick lime
 - (ii) Dilution of an acid
 - (iii) Evaporation of water
 - (iv) Sublimation of camphor (crystals)
-
- (a) (i) and (ii)
 - (b) (ii) and (iii)
 - (c) (i) and (iv)
 - (d) (iii) and (iv)

Soln:

Answer is (a) (i) and (ii)

Explanation:

Exothermic process are the one which release enormous amount of heat When water reacts with water and acid reacts with water it releases enormous amount of heat hence Answer is (a) (i) and (ii).

5. Three beakers labelled as A, B and C each containing 25 mL of water were taken. A small amount of NaOH, anhydrous CuSO₄ and NaCl were added to the beakers A, B and C respectively. It was observed that there was an increase in the temperature of the solutions contained in beakers A and B, whereas in case of beaker C, the temperature of the solution falls. Which one of the following statement(s) is(are) correct?

- (i) In beakers A and B, exothermic process has occurred.
 - (ii) In beakers A and B, endothermic process has occurred.
 - (iii) In beaker C exothermic process has occurred.
 - (iv) In beaker C endothermic process has occurred.
- (a) (i) only
 - (b) (ii) only
 - (c) (i) and (iv)
 - (d) (ii) and (iii)

Soln:

Answer is (c) (i) and (iv)

Explanation:

Exothermic processes will increase the temperature whereas exothermic processes will decrease the temperature.

6. A dilute ferrous sulphate solution was gradually added to the beaker containing acidified permanganate solution. The light purple colour of the solution fades and finally disappears. Which of the following is the correct explanation for the observation?

- (a) KMnO₄ is an oxidising agent, it oxidises FeSO₄
- (b) FeSO₄ acts as an oxidising agent and oxidises KMnO₄
- (c) The colour disappears due to dilution; no reaction is involved
- (d) KMnO₄ is an unstable compound and decomposes in presence of FeSO₄ to a colourless compound.

Soln:

Answer is (a) KMnO₄ is an oxidising agent, it oxidises FeSO₄

Explanation:

In this reaction potassium permanganate is an oxidizing agent. Purple color appeared due to potassium permanganate when all the permanganate solution is utilized.

7. Which among the following is(are) double displacement reaction(s)?

- (i) $\text{Pb} + \text{CuCl}_2 \rightarrow \text{PbCl}_2 + \text{Cu}$
- (ii) $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4 + 2\text{NaCl}$
- (iii) $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
- (iv) $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$

- (a) (i) and (iv)
- (b) (ii) only
- (c) (i) and (ii)
- (d) (iii) and (iv)

Soln:

Answer is (b) (ii) only

Explanation:

Here Sodium and Barium are displaced from each other's salts hence it is a double displacement reaction.

8. Which among the following statement(s) is (are) true? Exposure of silver chloride to sunlight for a long duration turns grey due to

- (i) the formation of silver by decomposition of silver chloride
- (ii) sublimation of silver chloride
- (iii) decomposition of chlorine gas from silver chloride
- (iv) oxidation of silver chloride

- (a) (i) only
- (b) (i) and (iii)
- (c) (ii) and (iii)
- (d) (iv) only

Soln:

Answer is (a) (i) only

9. Solid calcium oxide reacts vigorously with water to form calcium hydroxide accompanied by liberation of heat. This process is called slaking of lime. Calcium hydroxide dissolves in water to form its solution called lime water. Which among the following is (are) true about slaking of lime and the solution formed?

- (i) It is an endothermic reaction
- (ii) It is an exothermic reaction
- (iii) The pH of the resulting solution will be more than seven
- (iv) The pH of the resulting solution will be less than seven

- (a) (i) and (ii)
- (b) (ii) and (iii)
- (c) (i) and (iv)
- (d) (iii) and (iv)

Soln:

Answer is (b) (ii) and (iii)

Explanation:

When Solid calcium oxide reacts vigorously with water to form calcium hydroxide accompanied by liberation of heat. It proves the reaction is exothermic . P^H of the solution will be more than 7 because oxides and hydorxides of metals are alkaline.

10. Barium chloride on reacting with ammonium sulphate forms barium sulphate and ammonium chloride. Which of the following correctly represents the type of the reaction involved?

- (i) Displacement reaction
- (ii) Precipitation reaction
- (iii) Combination reaction
- (iv) Double displacement reaction

- (a) (i) only
- (b) (ii) only
- (c) (iv) only
- (d) (ii) and (iv)

Soln:

Answer is (c) (iv) only

Explanation:

Ammonium and barium are getting displaced from their respective salts. Hence this is a double displacement reaction.

11. Electrolysis of water is a decomposition reaction. The mole ratio of hydrogen and oxygen gases liberated during electrolysis of water is

- (a) 1:1
- (b) 2:1
- (c) 4:1
- (d) 1:2

Soln:

Answer is (b) 2:1

Explanation:

1 Mole of water has 2 moles of Hydrogen and 1 mole of water. Hence mole ration between hydrogen and oxygen is 2:1.

12. Which of the following is(are) an endothermic process(es)?

- (i) Dilution of sulphuric acid
 - (ii) Sublimation of dry ice
 - (iii) Condensation of water vapours
 - (iv) Evaporation of water
-
- (a) (i) and (iii)
 - (b) (ii) only (c)
 - (iii) only
 - (d) (ii) and (iv)

Soln:

Answer is (d) (ii) and (iv)

Explanation:

Change of solid to gas or liquid to gas absorbs heat hence sublimation of dry ice and evaporation is an endothermic reaction.

13. In the double displacement reaction between aqueous potassium iodide and aqueous lead nitrate, a yellow precipitate of lead iodide is formed. While performing the activity if lead nitrate is not available, which of the following can be used in place of lead nitrate?

- (a) Lead sulphate (insoluble)
- (b) Lead acetate
- (c) Ammonium nitrate
- (d) Potassium sulphate

Soln:

Answer is (b) Lead acetate

Explanation:

To get lead iodide we need a compound containing lead hence Ammonium nitrate and Potassium sulphate are ruled out. Lead sulphate is insoluble hence it cannot be used so the answer is (b) Lead acetate

14. Which of the following gases can be used for storage of fresh sample of an oil for a long time?

- (a) Carbon dioxide or oxygen
- (b) Nitrogen or oxygen
- (c) Carbon dioxide or helium
- (d) Helium or nitrogen

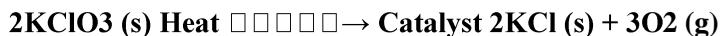
Soln:

Answer is (d) Helium or nitrogen

Explanation:

Oxygen cannot be used as it is an oxidizing agent. Helium can be used as it is an inert gas. Nitrogen is less reactive and it is cheaper than Helium. In most cases nitrogen is used in packet to prevent rancidity.

15. The following reaction is used for the preparation of oxygen gas in the laboratory



Which of the following statement(s) is(are) correct about the reaction?

- (a) It is a decomposition reaction and endothermic in nature
- (b) It is a combination reaction
- (c) It is a decomposition reaction and accompanied by release of heat
- (d) It is a photochemical decomposition reaction and exothermic in nature

Soln:

Answer is (a) It is a decomposition reaction and endothermic in nature

Explanation:

Potassium chlorate decomposes to give potassium chloride and oxygen. This is a decomposition reaction which is endothermic in nature.

16. Which one of the following processes involve chemical reactions?

- (a) Storing of oxygen gas under pressure in a gas cylinder
- (b) Liquefaction of air
- (c) Keeping petrol in a china dish in the open
- (d) Heating copper wire in presence of air at high temperature

\Soln:

Answer is (d) Heating copper wire in presence of air at high temperature

Explanation :

In first three options given here there is no involvement of chemical reaction. When copper is heated in presence of air at high temperature copper undergoes oxidation reaction to give out copper oxide.

17. In which of the following chemical equations, the abbreviations represent the correct states of the reactants and products involved at reaction temperature?

- (a) $2\text{H}_2(\text{l}) + \text{O}_2(\text{l}) \rightarrow 2\text{H}_2\text{O}(\text{g})$
- (b) $2\text{H}_2(\text{g}) + \text{O}_2(\text{l}) \rightarrow 2\text{H}_2\text{O}(\text{l})$
- (c) $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l})$
- (d) $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g})$

Soln:

Answer is (c) $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l})$

Explanation:

At room temperature hydrogen and oxygen are gases while water is liquid in nature hence option c) represents correct states of reactants and products.

18. Which of the following are combination reactions?

- (i) $2\text{KClO}_3 \xrightarrow{\text{Heat}} 2\text{KCl} + 3\text{O}_2$
 - (ii) $\text{MgO} + \text{H}_2\text{O} \rightarrow \text{Mg(OH)}_2$
 - (iii) $4\text{Al} + 3\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3$
 - (iv) $\text{Zn} + \text{FeSO}_4 \rightarrow \text{ZnSO}_4 + \text{Fe}$
-
- (a) (i) and (iii)
 - (b) (iii) and (iv)
 - (c) (ii) and (iv)
 - (d) (ii) and (iii)

Soln:

Answer is (d) (ii) and (iii)

Explanation:

Here two reactants react to form a single product hence option ii) and iii) represents combination reactions

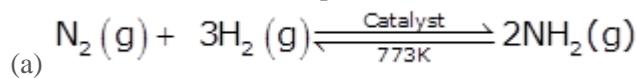
Short Answer Questions

19. Write the balanced chemical equations for the following reactions and identify the type of reaction in each case.

- (a) Nitrogen gas is treated with hydrogen gas in the presence of a catalyst at 773K to form ammonia gas.
- (b) Sodium hydroxide solution is treated with acetic acid to form sodium acetate and water.
- (c) Ethanol is warmed with ethanoic acid to form ethyl acetate in the presence of concentrated H₂ SO₄.
- (d) Ethene is burnt in the presence of oxygen to form carbon dioxide, water and releases heat and light.

Soln:

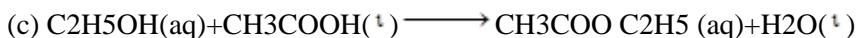
Chemical Reactions and Equations



This is an example of combination reaction.



This is an example of neutralisation reaction between a strong base and weak acid



This is an example of neutralisation reaction as double displacement reaction.



This is an example of oxidation reaction.

20. Write the balanced chemical equations for the following reactions and identify the type of reaction in each case.

- (a) Thermit reaction, iron (III) oxide reacts with aluminium and gives molten iron and aluminium oxide.
- (b) Magnesium ribbon is burnt in an atmosphere of nitrogen gas to form solid magnesium nitride.
- (c) Chlorine gas is passed in an aqueous potassium iodide solution to form potassium chloride solution and solid iodine.
- (d) Ethanol is burnt in air to form carbon dioxide, water and releases heat.

Soln:

- (a) Thermit reaction, iron (III) oxide reacts with aluminium and gives molten iron and aluminium oxide.



This is a Single displacement reaction

- (b) Magnesium ribbon is burnt in an atmosphere of nitrogen gas to form solid magnesium nitride.



The reaction is a Combination reaction

- (c) Chlorine gas is passed in an aqueous potassium iodide solution to form potassium chloride solution and solid iodine.



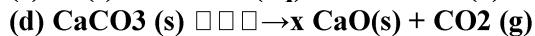
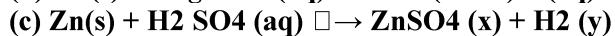
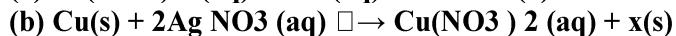
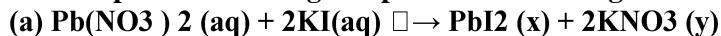
This is a Single displacement reaction

- (d) Ethanol is burnt in air to form carbon dioxide, water and releases heat.

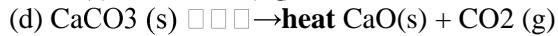
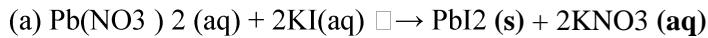


This is a Combustion reaction

21. Complete the missing components/variables given as x and y in the following reactions



Soln:



a) x(s), y (aq)

b) x is 2Ag

c) x-(aq) y(g)

d) x is heat

22. Which among the following changes are exothermic or endothermic in nature?

- (a) Decomposition of ferrous sulphate
- (b) Dilution of sulphuric acid
- (c) Dissolution of sodium hydroxide in water
- (d) Dissolution of ammonium chloride in water

Soln:

Exothermic reactions

- (b) Dilution of sulphuric acid
- (c) Dissolution of sodium hydroxide in water

Endothermic reaction

- (a) Decomposition of ferrous sulphate
- (d) Dissolution of ammonium chloride in water

23. Identify the reducing agent in the following reactions

- (a) $4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$
- (b) $\text{H}_2\text{O} + \text{F}_2 \rightarrow \text{HF} + \text{HOF}$
- (c) $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$
- (d) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

Soln:

- a) NH₃-Ammonia
- b) F₂- Fluorine
- c) CO-Carbon monoxide
- d) H₂- Hydrogen

24. Identify the oxidising agent (oxidant) in the following reactions

- (a) $\text{Pb}_3\text{O}_4 + 8\text{HCl} \rightarrow 3\text{PbCl}_2 + \text{Cl}_2 + 4\text{H}_2\text{O}$
- (b) $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$
- (c) $\text{CuSO}_4 + \text{Zn} \rightarrow \text{Cu} + \text{ZnSO}_4$
- (d) $\text{V}_2\text{O}_5 + 5\text{Ca} \rightarrow 2\text{V} + 5\text{CaO}$
- (e) $3\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$
- (f) $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$

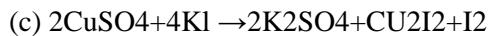
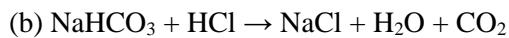
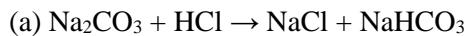
Soln:

- a) Pb₃O₄
- b) O₂
- c) CuSO₄
- d) V₂O₅
- e) H₂O
- f) CuO

25. Write the balanced chemical equations for the following reactions

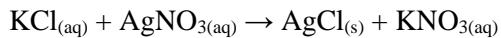
- (a) Sodium carbonate on reaction with hydrochloric acid in equal molar concentrations gives sodium chloride and sodium hydrogencarbonate.
- (b) Sodium hydrogencarbonate on reaction with hydrochloric acid gives sodium chloride, water and liberates carbon dioxide.
- (c) Copper sulphate on treatment with potassium iodide precipitates cuprous iodide (Cu_2I_2), liberates iodine gas and also forms potassium sulphate.

Soln:



26. A solution of potassium chloride when mixed with silver nitrate solution, an insoluble white substance is formed. Write the chemical reaction involved and also mention the type of the chemical reaction?

Soln:



This is a double displacement and precipitation reaction.

27. Ferrous sulphate decomposes with the evolution of a gas having a characteristic odour of burning sulphur. Write the chemical reaction involved and identify the type of reaction.

Soln



This is a decomposition reaction.

28. Why do fire flies glow at night?

Soln:

Fire flies produce an enzyme called as luciferase which carries oxidation of Magnesium. Because of oxidation of Magnesium in presence of atmospheric oxygen fireflies glow in the night.

29. Grapes hanging on the plant do not ferment but after being plucked from the plant can be fermented. Under what conditions do these grapes ferment? Is it a chemical or a physical change?

Soln:

Grapes on the plant do not ferment because of defense mechanism of plants. When grapes are plucked from plant grapes react with yeast to carry out fermentation. Here sugar changes to alcohol and it is a chemical change.

30. Which among the following are physical or chemical changes?

- (a) Evaporation of petrol
- (b) Burning of Liquefied Petroleum Gas (LPG)
- (c) Heating of an iron rod to red hot.
- (d) Curdling of milk
- (e) Sublimation of solid ammonium chloride

Soln:

Physical changes

- (a) Evaporation of petrol
- (b) Heating of an iron rod to red hot.
- (e) Sublimation of solid ammonium chloride

Chemical changes

- (c) Burning of Liquefied Petroleum Gas (LPG)
- (d) Curdling of milk

31. During the reaction of some metals with dilute hydrochloric acid, following observations were made.

- (a) Silver metal does not show any change
- (b) The temperature of the reaction mixture rises when aluminium (Al) is added.
- (c) The reaction of sodium metal is found to be highly explosive
- (d) Some bubbles of a gas are seen when lead (Pb) is reacted with the acid.

Explain these observations giving suitable reasons.

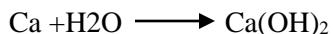
Soln:

- a) There will not be any reaction between silver and dilute HCl as silver lies in low reactive series of metals.
- b) Because it is an exothermic reaction temperature increases
- c) Sodium is highly reactive metals it reacts with atmospheric oxygen to form exothermic reaction which result in temperature increase.
- d) When lead reacts with acid it produces Hydrogen gas which are responsible for the formation of bubbles.

32. A substance X, which is an oxide of a group 2 element, is used intensively in the cement industry. This element is present in bones also. On treatment with water it forms a solution which turns red litmus blue. Identify X and also write the chemical reactions involved.

Soln:

Compound X is Calcium oxide. CaO is extensively used in cement industry. On treatment with water CaO produces Ca(OH)₂ which is alkaline in nature and turns red litmus to blue color.



33. Write a balanced chemical equation for each of the following reactions and also classify them.

- (a) Lead acetate solution is treated with dilute hydrochloric acid to form lead chloride and acetic acid solution.
- (b) A piece of sodium metal is added to absolute ethanol to form sodium ethoxide and hydrogen gas.
- (c) Iron (III) oxide on heating with carbon monoxide gas reacts to form solid iron and liberates carbon dioxide gas.
- (d) Hydrogen sulphide gas reacts with oxygen gas to form solid sulphur and liquid water.

Soln:



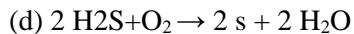
This is a Double Displacement reaction.



This is a Displacement reaction.



This is a redox reaction.



This is a replacement reaction.

34. Why do we store silver chloride in dark coloured bottles?

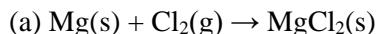
Soln:

Silver chloride decomposes into silver and chlorine gas when exposed to sunlight. Hence Silver chloride is stored in dark colored bottles.

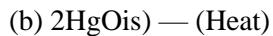
35. Balance the following chemical equations and identify the type of chemical reaction.

- (a) Mg(s) + Cl₂(g) → MgCl₂(s)
- (b) HgO(s) → Heat Hg(l) + O₂(g)
- (c) Na(s) + S(s) → Fuse Na₂S(s)
- (d) TiCl₄(l) + Mg(s) → Ti(s) + MgCl₂(s)
- (e) CaO(s) + SiO₂(s) → CaSiO₃(s)
- (f) H₂O₂(l) → U V H₂O(l) + O₂(g)

Soln:



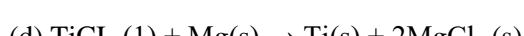
This type of reaction is called a combination reaction or a synthesis reaction.



This is an example of thermal decomposition reaction.



This is an example of a Combination reaction.



This reaction falls under the category of Displacement reactions



This is a synthesis reaction.



This is a decomposition reaction.

36. A magnesium ribbon is burnt in oxygen to give a white compound X accompanied by emission of light.

If the burning ribbon is now placed in an atmosphere of nitrogen, it continues to burn and forms a compound Y.

(a) Write the chemical formulae of X and Y.

(b) Write a balanced chemical equation, when X is dissolved in water.

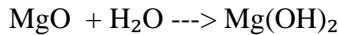
Soln:



Compound X $\longrightarrow \text{MgO}$ [Magnesium Oxide]

Compound Y $\longrightarrow \text{Mg}_3\text{N}_2$ [Magnesium Nitride]

If Magnesium Oxide is dissolved in water , the product is Magnesium Hydroxide



37. Zinc liberates hydrogen gas when reacted with dilute hydrochloric acid, whereas copper does not. Explain why?

Soln:

Zinc is more reactive than copper as Zinc is placed above Hydrogen and Copper is placed below hydrogen in the activity series of metals. Because of this Zinc reacts with HCl whereas Copper will not react.

38. A silver article generally turns black when kept in the open for a few days. The article when rubbed with toothpaste again starts shining. (a) Why do silver articles turn black when kept in the open for a few days? Name the phenomenon involved. (b) Name the black substance formed and give its chemical formula.

Soln:

- a) Silver reacts with H₂S present in the atmosphere to form a black color compound Silver Sulphide. This phenomenon is called as corrosion.
 - b) Black color compound formed is Silver Sulphide



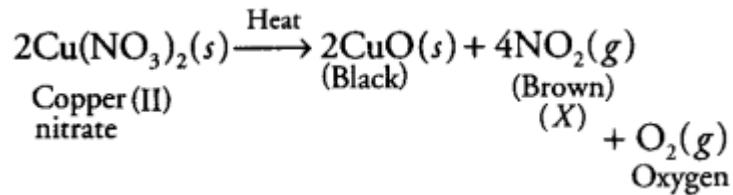
Long Answer Questions

39. On heating blue coloured powder of copper (II) nitrate in a boiling tube, copper oxide (black), oxygen gas and a brown gas X is formed

- (a) Write a balanced chemical equation of the reaction.
 - (b) Identity the brown gas X evolved.
 - (c) Identity the type of reaction.
 - (d) What could be the pH range of aqueous solution of the gas X?

Soln:

(a)



- (b) The brown gas X is nitrogen dioxide, NO_2 .
 - (c) Reaction involved is Thermal decomposition.
 - (d) $\text{pH} < 7$ because NO_2 dissolves in water to form acidic solution (pH range below 7).

40. Give the characteristic tests for the following gases

- (a) CO₂
 - (b) SO₂
 - (c) O₂
 - (d) H₂

Soln:

- a) Pass CO_2 into limewater which will turn water into milky. This is the confirmation test for the presence of Carbon-di-oxide.
 - b) Smell is the characteristic feature of SO_2 which smells like rotten egg.
 - c) Test for oxygen involves burning of match stick near oxygen makes it burn even more brightly.
 - d) When Burning matchstick is brought near H_2 gas, the flame burns with the pop sound. This is the test to confirm Hydrogen gas.

41. What happens when a piece of

- (a) zinc metal is added to copper sulphate solution?
- (b) aluminium metal is added to dilute hydrochloric acid?
- (c) silver metal is added to copper sulphate solution?

Also, write the balanced chemical equation if the reaction occurs

Soln:

a) When Zinc is added to copper sulphate solution Zinc displaces copper to form Zinc sulphate.



b) Aluminium reacts with dilute HCl to form Aluminum Chloride and Hydrogen gas is evolved in the reaction.

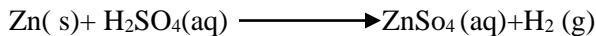


c) When silver metal is added to Copper Sulphate solution there will not be any reaction as silver is non-reactive metal.

42. What happens when zinc granules are treated with dilute solution of H_2SO_4 , HCl , HNO_3 , NaCl and NaOH , also write the chemical equations if reaction occurs.

Soln:

When Zinc granules reacts with dil H_2SO_4 displacement reaction takes place leading to the formation of ZnSO_4 liberating H_2 gas



When Zinc granules reacts with dil HCl displacement reaction takes place leading to the formation of ZnCl_2 liberating H_2 gas

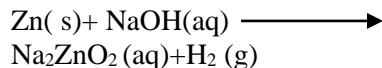


When Zinc granules reacts with dil HNO_3 it leads to the formation of Zinc nitrate evolving H_2O and nitrous oxide



When Zinc granules reacts with NaCl there will not be any reaction

When Zinc granules reacts with NaOH solution



43. On adding a drop of barium chloride solution to an aqueous solution of sodium sulphite, white precipitate is obtained.

- (a) Write a balanced chemical equation of the reaction involved
- (b) What other name can be given to this precipitation reaction?
- (c) On adding dilute hydrochloric acid to the reaction mixture, white precipitate disappears. Why?

Soln:

a) On adding a drop of Barium Chloride solution to an aqueous solution of sodium sulphite, barium sulphite is obtained which is white colour precipitate.



b) In this case precipitation reaction is a double displacement.

c) When we add dilute HCl to this reaction mixture Barium chloride, Sulphur dioxide and water are formed. Barium chloride is a soluble substance which will make the white precipitate disappear.



44. You are provided with two containers made up of copper and aluminium. You are also provided with solutions of dilute HCl, dilute HNO₃, ZnCl₂ and H₂O. In which of the above containers these solutions can be kept?

These solution can be kept in copper container because copper is a noble metal which will not react with HCl or even HNO₃. If we keep solution in Aluminum container aluminum reacts with acids to form Zinc chloride.

Water can be stored in either copper or aluminum as they both aluminum and copper are very less reactive with copper.