NEET-UG EXAMINATION PAPER-2015

(Solved)

Time allowed : 3 hours | Maximum Marks : 540

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **135 questions.** All questions are **compulsory.**

ii. This question paper is divided into **1 sections.**

iii. **Section A** – questions number **1 to 135** are multiple choice questions

iv. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

v. Use of calculator is NOT allowed.

Section A

Question 1.

Pick up the wrong statement

[4 Marks]

(A) Protista have photosynthetic and heterotrophic modes of nutrition

(B) Some fungi are edible

(C) Nuclear membrane is present in Monera

(D) Cell wall is absent in Animalia

Explanation:

The kingdom Monera possesses unicellular organisms (e.g - bacteria) having no nuclear membrane.

Question 2.

Which of the following structures is not found in a prokaryotic cell?

[4 Marks]

(A) Ribosome

(B) Mesosome

(C) Nuclear envelope

(D) Plasma membrane

Explanation:

Nuclear envelope is not found in a prokaryotic cell.

Question 3.

The structures that help some bacteria to attach to rocks and / or host tissues are:

[4 Marks]

(A) Fimbriae

(B) Mesosomes

(C) Holdfast

(D) Rhizoids

Explanation:

Fimbriae assist some bacteria in attaching to rocks or host body for obtaining establishment and nutrition.

Question 4.

In which group of organisms the cell walls form two thin overlapping shells which fit together?

[4 Marks]

(A) Euglenoids

(B) Slime moulds

(C) Chrysophytes

(D) Dinoflagellates

Explanation:

In chrysophytes, the cell walls form two thin overlapping shells held together. The body of Diatoms appears like soap box due to overlapping shells.

Question 5.

Which one one of the following matches is correct ?

[4 Marks]

(a)	*Alternaria*	Sexual reproduc-tion absent	Deuteromycetes
(b)	*Mucor*	Reproduction by Conjugation	Ascomycetes
(c)	*Agaricus*	Parasitic fungus	Basidiomycetes
(d)	*Phytophthora*	Aseptate mycelium	Basidiomycetes

(A) A

(B) B

(C) C

(D) D

Explanation:

Alternaria belongs to class - Deuteromycetes, which lack sexual reproduction. Asexual reproduction takes place by conidia produced on conidiophores.

Question 6.

True nucleus is absent in :

[4 Marks]

(A) Mucor

(B) Vaucheria

(C) Volvox

(D) Anabaena

Explanation:

Anabaena is a cyanobacteria which lack a true nucleus because of absence of nuclear membrane.

Question 7.

The imperfect fungi which are decomposers of litter and help in mineral cycling belong to:

[4 Marks]

(A) Deuteromycetes

(B) Ascomycetes

(C) Basidiomycetes

(D) Phycomycetes

Explanation:

Class- deuteromycetes comprises of imperfect fungi which play role in decomposition of organic wastes.

Question 8.

Choose the wrong statements:

[4 Marks]

(A) Morels and truffles are poisonoues mushrooms

(B) Neurospora is used in the study of biochemical genetics

(C) Yeast is unicellular and useful in fermentation

(D) Penicillium is multicellular and produces antibiotics

Explanation:

Morel and truffles are used as food and they are members of Ascomycetes fungi.

Question 9.

Which of the following are most suitable indicators of SO_2 pollution in the environment?

[4 Marks]

(A) Algae

(B) Conifers

(C) Fungi

(D) Lichens

Explanation:

Lichens cannot grow in places where sulphur dioxide is present in the environment.

Question 10.

Male gametes are flagellated in:

[4 Marks]

(A) Spirogyra

(B) Polysiphonia

(C) Ectocarpus

(D) Anabaena

Explanation:

Male gametes are flagellated in Ectocarpus belonging to Phaeophyceae. The flagella of male gamete plays an important role in establishing initial sexual contact with the female gamete. However, in Ectocarpus the female gamete oo, is flagellated but is different in structure. In Polysiphonia (Rhodophiyceae) flagellated gametes are not observed, in Anabaena sexual reproduction through gametes is absent while in Spirogyra sexual reproduction takes place by conjugation wherein male gamete passes through a tube to the adjacent filament. The male gametes here are non-flagellated and show amoeboid movement.

Question 11.

Which one of the following statements is wrong?

[4 Marks]

(A) Agar - agar is obtained from Gelidium and Gracilaria

(B) Chlorella and Spirulina are used as space food

(C) Mannitol is stored food in Rhodophyceae

(D) Algin and carragen are products of algae

Explanation:

Mannitol or laminarin is the stored food in phaeophyceae (brown algae). Example, Ectocarpus, fucus, Sargassam etc.

Question 12.

Which one is wrong statement ?

[4 Marks]

(A) Brown algae have chlorophyll a and c and fucoxanthin

(B) Haploid endosperm is typical feature of gymnosperms

(C) Archegonia are found in Bryophyta, Pteridophyta and Gymnosperms.

(D) Mucor has biflagellate zoospores

Explanation:

The spores are non-motile in Mucor.

Question 13.

In which of the following gametophyte is not independent free living ?

[4 Marks]

(A) Pinus

(B) Funaria

(C) Pteris

(D) Marchantia

Explanation:

Pinus belongs to gymnosperms in which male and female gametophytes do not have an independent free living existence. They remain within the sporangia which are of two types — microsporangia and megasporangia.

Question 14.

Read the following five statements (A to E) and select the option with all correct statements:

(A) Mosses and Lichens are the first organisms to colonise a bare rock.

(B) *Selaginella* is a homosporous pteridophyte.

(C) Coralloid roots in *Cycas* have VAM.

(D) Main plant body in bryophytes is gametophytic, whereas in pteridophytes it is sporophytic.

(E) In gymnosperms, male and female gametophytes are present within sporangia located on sporophyte.

[4 Marks]

(A) (A), (C) and (D)

(B) (B), (C) and (E)

(C) (A), (D) and (E)

(D) (B), (C) and (D)

Explanation:

Selaginella s a heterosporus pteridophyte containing micro & megaspores. In Cycas, corolloid root has the cyanobacteria - Anabaena.

Question 15.

Male gametophyte in angiosperms produces:

[4 Marks]

(A) Single sperm and vegetative cell

(B) Single sperm and vegetative cell

(C) Three sperms

(D) Two sperms and a vegetative cell

Explanation:

Two sperms and a vegetative cell are produced by male gametophyte in angiosperms.

Question 16.

In angiosperms, microsporogenesis and megasporogenesis:

[4 Marks]

(A) form gametes without further divisions

(B) involve meiosis

(C) occur in ovule

(D) occur in anther

Explanation:

In meiosis, the number of chromosomes are reduced by half producing haploid daughter cells. The microspore mother cell and the megaspore mother cell undergo meiosis to produce haploid microspore and megaspore respectively.

Question 17.

Which of the following characteristics is mainly responsible for diversification of insects on land?

[4 Marks]

(A) Bilateral symmetry

(B) Exoskeleton

(C) Segmentation

(D) Eyes

Explanation:

The exoskeleton of insects consists of chitinous cuticle. It gets hardened due to deposition of calcium. It prevents desiccation and gives protection.

Question 18.

Metagenesis refers to:

[4 Marks]

(A) Alteration of generation between asexual and sexual phases of an organisms

(B) resence of a segmented body and parthenogenetic mode of reproduction

(C) Presence of different morphic forms

(D) Presence of a segmented body and parthenogenetic mode of reproduction

Explanation:

Metagenesis is defined as alteration of generation found in phylum Cnidaria (e.g. *Obelia*). In this phenomenon one generation of an organism reproduces asexually, followed by a sexually reproducing generation.

Question 19.

Body having meshwork of cell, internal cavities lined with food filtering flagellated cells and indirect develpment are the characteristics of phylum.

[4 Marks]

(A) Porifera

(B) Mollusca

(C) Protozoa

(D) Coelenterate

Explanation:

The given characteristic features define the phylum Porifera.

Question 20.

A jawless fish, which lays eggs in fresh water and whose ammocoetes larvae after metamorphosis return to the ocean is:

[4 Marks]

(A) Petromyzon

(B) Eptatretus

(C) Neomyxine

(D) Myxine

Explanation:

Petromyzon marinus, commonly known as **sea lamprey**, lays eggs in fresh water and its larvae, after metamorphosis, return to the ocean (saline water).

Question 21.

Which of the following animals is not viviparous?

[4 Marks]

(A) Elephant

(B) Platypus

(C) Whale

(D) Flying fox (Bat)

Explanation:

Platypus is an oviparous (egg laying animal). It belongs to class Mammalia.

Question 22.

Which of the following represents the correct combination without any exception?

[4 Marks]

	Characteristics	Class
(a)	Mouth ventral, gills without operculum; skin with placoid scales; persistent notochord	Chondrichthyes
(b)	Sucking and circular mouth; jaws absent, integument without scales; paired appendages	Cyclostomata
(c)	Body covered with feathers; skin moist and glandular; fore-limbs form wings; lungs with air sacs	Aves
(d)	Mammary gland; hair on body; pinnae; two pairs of Limbs	Mammalia

(A) a

(B) b

(C) c

(D) d

Explanation:

(i) Aves possess dry skin, without glands except oil gland near the base of tail.

(ii) Pinnae are not found in aquatic animals and egg-laying mammals.

(iii) In cyclostomes, unpaired appendages (fins) are found.

Question 23.

Leaves become modified into spines in:

[4 Marks]

(A) Opuntia

(B) Pea

(C) Silk Cotton

(D) Onion

Explanation:

In *Opuntia*, leaves become modified into spines to avoid transpiration so as to save water for desert adaptation. The stems of this plant appear like leaves, termed as phylloclades, which perform the process of photosynthesis.

Question 24.

Perigynous flowers are found in:

[4 Marks]

(A) Guava

(B) Rose

(C) China rose

(D) Cucumber

Explanation:

Ovary is partly superior and partly inferior in perigynous flower.

Question 25.

Axile placentation is present in:

[4 Marks]

(A) Dianthus

(B) Argemone

(C) Pea

(D) Lemon

Explanation:

In a multilocular ovary, when the placenta is axial and ovules are attached to it, it is known as axile placentation.

Question 26.

Coconut water from a tender coconut is:

[4 Marks]

(A) Free nuclear endosperm

(B) Innermost layers of the seed coat

(C) Degenerated nucellus

(D) Immature embryo

Explanation:

Coconut water is free nuclear endosperm which is used.

Question 27.

Which one of the following fruits is parthenocarpic ?

[4 Marks]

(A) Jackfruit

(B) Apple

(C) Banana

(D) Brinjal

Explanation:

Parthenocarpic fruits (e.g., banana) are produced without fertilization.

Question 28.

The wheat grain has an embryo with one, large, shield-shaped cotyledon known as:

[4 Marks]

(A) Coleorrhiza

(B) Scutellum

(C) Coleoptile

(D) Epiblast

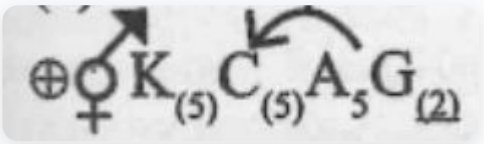
Explanation:

Scutellum is a large, shield-shaped cotyledon that helps in the absorption of nutrients from the endosperm during germination.

Question 29.

is the floral formula of:

[4 Marks]



(A) Allium

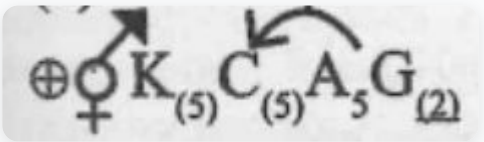
(B) Sesbania

(C) Petunia

(D) Brassica

Explanation:

Floral formula of *Petunia* (Solanaceae) is



Question 30.

Keel is the characteristic feature of flower of:

[4 Marks]

(A) Tomato

(B) Tulip

(C) Indigofera

(D) Aloe

Explanation:

Indigofera is a member of family Fabaceae. It has a keel-type floral structure in which two anterior fused petals are present.

Question 31.

Among china rose, mustard, brinjal, potato, guava, cucumber, onion and tulip, how many plants have superior ovary?

[4 Marks]

(A) Three

(B) Six

(C) Four

(D) Five

Explanation:

Superior ovary is found in China rose, mustard, brinjal, potato, onion and tulip. Guava and cucumber have inferior ovary.

Question 32.

Flowers are unisexual in:

[4 Marks]

(A) Cucumber

(B) China rose

(C) Onion

(D) Pea

Explanation:

The flowers of cucumber are unisexual, it means they have only male flowers or only female flowers.

Question 33.

Transmission tissue is characteristic feature of:

[4 Marks]

(A) Solid style

(B) Dry stigma

(C) Wet stigma

(D) Hollow style

Explanation:

A solid style has transmission tissue which has large intercellular spaces. It allows growth of pollen tube in pistil.

Question 34.

In a ring girdled plant:

[4 Marks]

(A) The root dies first

(B) The shoot and root die together

(C) Neither root nor shoot will die

(D) The shoot dies first

Explanation:

In a ring girdled plant, roots die first due to damage of phloem causing inhibition of translocation of food.

Question 35.

A major characteristic of the monocot root is the presence of:

[4 Marks]

(A) Open vascular bundles

(B) Cambium sandwiched between phloem and xylem along the radius

(C) Vasculature without cambium

(D) Scattered vascular bundles

Explanation:

Monocot root shows radial and closed vascular bundles (xylem & phloem).

Question 36.

Vascular bundles in monocotyledons are considered closed because:

[4 Marks]

(A) A bundle sheath surrounds each bundle

(B) Xylem is surrounded all around by phloem

(C) There are no vessels with perforations

(D) Cambium is absent

Explanation:

Vascular bundles in monocotyledons are considered closed due to absence of cambium.

Question 37.

Read the different components from (a) to (d) in the list given below and tell the correct order of the components with reference to their arrangement from outer side to inner side in a woody dicot stem.

(A) Secondary cortex
(B) Wood
(C) Secondary phloem
(D) Phellem

The correct order is:

[4 Marks]

(A) (D), (C), (A), (B)

(B) (C), (D), (B), (A)

(C) (A), (B), (D), (C)

(D) (D), (A), (C), (B)

Explanation:

The correct sequence from outer side to inner side in a woody dicot stem is as follows:

Phellem → Secondary cortex → Secondary phloem → Wood, [(D) → (A) → (C) → (B)]

Question 38.

The body cells in cockroach discharge their nitrogenous waste in the haemolymph mainly in the form of:

[4 Marks]

(A) Potassium urate

(B) Urea

(C) Calcium carbonate

(D) Ammonia

Explanation:

The body cells in cockroach discharge their nitrogenous waste in the haemolymph as a solution of sodium or potassium urate (a weak alkaline fluid).

Question 39.

The terga, sterna and pleura of cockroach body are joined by:

[4 Marks]

(A) Muscular tissue

(B) Arthrodial membrane

(C) Cartilage

(D) Cementing glue

Explanation:

Between the various sclerite, a flexible membrane exists which is known as arthrodial membrane.

Question 40.

Identify the correct order of organisation of genetic material from largest to smallest:

[4 Marks]

(A) Genome, chromosome, nucleotide, gene

(B) Genome, chromosome, gene, nucleotide

(C) Chromosome, genome, nucleotide, gene

(D) Chromosome, gene, genome, nucleotide

Explanation:

Genome > chromosomes > gene > nucleotide.

Question 41.

A protoplast is a cell:

[4 Marks]

(A) without nucleus

(B) without cell wall

(C) without plasma membrane

(D) undergoing division

Explanation:

Cell wall is absent in a protoplast.

Question 42.

Which one of the following is not an inclusion body found in prokaryotes?

[4 Marks]

(A) Cyanophycean granule

(B) Glycogen granule

(C) Phosphate granule

(D) Polysome

Explanation:

Polysomes are defined as a cluster of ribosomes attached to a mRNA molecule.

Question 43.

Cell wall is absent in:

[4 Marks]

(A) Funaria

(B) Nostoc

(C) Mycoplasma

(D) Aspergillus

Explanation:

Mycoplasma lacks cell wall.

Question 44.

DNA is not present in:

[4 Marks]

(A) Ribosomes

(B) Nucleus

(C) Mitochondria

(D) Chloroplast

Explanation:

Ribosomes are composed of ribonucleic acid and proteins and are not surrounded by any membrane. These are the site for protein synthesis.

Question 45.

Nuclear envelope is a derivative of:

[4 Marks]

(A) Smooth endoplasmic reticulum

(B) Rough endoplasmic reticulum

(C) Membrane of Golgi complex

(D) Microtubules

Explanation:

In late prophase, nuclear envelope disappears and reappears in late telophase from rough endoplasmic reticulum (RER).

Question 46.

Select the correct matching in the following pairs:

[4 Marks]

(A) Smooth ER – Oxidation of phospholipids

(B) Rough ER – Oxidation of fatty acids

(C) Rough ER – Synthesis of glycogen

(D) Smooth ER – Synthesis of lipids

Explanation:

Lipid synthesis takes place in smooth endoplasmic reticulum.

Question 47.

Which of the following are not membrane-bound?

[4 Marks]

(A) Lysosomes

(B) Mesosomes

(C) Ribosomes

(D) Vacuoles

Explanation:

Ribosomes are not membrane-bound cell organelle.

Question 48.

The function of the gap junction is to:

[4 Marks]

(A) stop substance from leaking across a tissue.

(B) facilitate communication between adjoining cells by connecting the cytoplasm for rapid transfer of ions, small molecules and some large molecules.

(C) perform cementing to keep neighbouring cells together.

(D) separate two cells from each other.

Explanation:

The function of the gap junction is to facilitate communication between adjoining cells by connecting the cytoplasm for rapid transfer of ions, small molecules and some large molecules.

Question 49.

Balbiani rings are sites of:

[4 Marks]

(A) Nucleotide synthesis

(B) Polysaccharide synthesis

(C) Lipid synthesis

(D) RNA and protein synthesis

Explanation:

RNA and protein synthesis occur in Balbiani rings.

Question 50.

Match the columns and identify the correct option.

[4 Marks]

	Column-I		Column-II
(1)	Thylakoids	(i)	Disc-shaped sacs in Golgi apparatus
(2)	Cristae	(ii)	Condensed structure of DNA
(3)	Cisternae	(iii)	Flat membranous sacs in stroma
(4)	Chromatin	(iv)	Infoldings in mitochondria

	(1)	(2)	(3)	(4)
(a)	(iii)	(iv)	(i)	(ii)
(b)	(iii)	(i)	(iv)	(ii)
(c)	(iii)	(iv)	(ii)	(i)
(d)	(iv)	(iii)	(i)	(ii)

(A) b

(B) a

(C) c

(D) d

Explanation:

(1) → (iii), (2) → (iv), (3) → (i), (4) → (ii)

Question 51.

Cellular organelles with membranes are:

[4 Marks]

(A) Chromosomes, ribosomes and endoplasmic reticulum

(B) Endoplasmic reticulum, ribosomes and nuclei

(C) Lysosomes, Golgi apparatus and mitochondria

(D) Nuclei, ribosomes and mitochondria

Explanation:

Lysosomes, Golgi apparatus and mitochondria are the cell organelles which have membranes.

Question 52.

Which one of the following statements is incorrect?

[4 Marks]

(A) In competitive inhibition, the inhibitor molecule is not chemically changed by the enzyme.

(B) The competitive inhibitor does not affect the rate of breakdown of the enzyme-substrate complex.

(C) The presence of the competitive inhibitor decreases the K_m of the enzyme for the substrate. competitive inhibitor does not affect the rate of breakdown of the enzyme-substrate complex.

(D) A competitive inhibitor reacts reversibly with the enzyme to form an enzyme-inhibitor complex.

Explanation:

K_m increases but V_{max} remains the same in competitive inhibition. This is because, on slightly increasing the substrate concentration, the effect of inhibitor is removed.

Question 53.

Which of the following biomolecules does have phosphodiester bond?

[4 Marks]

(A) Monosaccharides in a polysaccharide

(B) Amino acids in a polypeptide

(C) Nucleic acids in a nucleotide

(D) Fatty acids in a diglyceride

Explanation:

Nucleic acids have phosphodiester bond in a nucleotide.

Question 54.

The introduction of t-DNA into plants involves:

[4 Marks]

(A) Altering the pH of the soil, then heat shocking the plants

(B) Exposing the plants to cold for a brief period

(C) Allowing the plant roots to stand in water

(D) Infection of the plant by Agrobacterium tumefaciens

Explanation:

Agrobacterium tumefaciens introduces T-DNA into the plant.

Question 55.

A somatic cell that has just completed the S phase of its cell cycle, as compared to a gamete of the same species, has:

[4 Marks]

(A) Four times the number of chromosomes and twice the amount of DNA

(B) Twice the number of chromosomes and twice the amount of DNA

(C) Same number of chromosomes but twice the amount of DNA

(D) Twice the number of chromosomes and four times the amount of DNA

Explanation:

When S-phase completes, a somatic cell contains 2n number of chromosomes and 4C content of DNA.

Question 56.

Select the correct option

[4 Marks]

	I		II
A	Synapsis aligns homologous chromosomes	(i)	Anaphase-II
B	Synthesis of RNA and protein	(ii)	Zygotene
C	Action of enzyme recombinase	(iii)	G2-phase
D	Centromeres do not separate but chromatids move towards opposite poles	(iv)	Anaphase-I
		(v)	Pachytene

	A	B	C	D
(a)	(ii)	(iii)	(v)	(iv)
(b)	(i)	(ii)	(v)	(iv)
(c)	(ii)	(iii)	(iv)	(v)
(d)	(ii)	(i)	(iii)	(iv)

(A) a

(B) b

(C) c

(D) d

Explanation:

- Pachytene – Crossing over mediated by recombinase enzyme.
- Zygotene – Pairing of homologous chromosomes.
- G_2 phase – Synthesis of RNA and protein.
- Anaphase I – Centromeres do not separate, but chromatids move towards opposite poles.

Question 57.

Choose the correct option for the following events of meiosis in correct sequence:

(A) Crossing over
(B) Synapsis
(C) Terminalisation of chiasmata
(D) Disappearance of nucleolus

[4 Marks]

(A) B → A → C → D

(B) A → B → C → D

(C) A → B → D → C

(D) A → B → D → C

Explanation:

Synapsis → Crossing over → Terminalisation of chiasmata → Disappearance of nucleolus.

Question 58.

Which one gives the most valid and recent explanation for stomatal movements?

[4 Marks]

(A) Starch hydrolysis

(B) Potassium influx and efflux

(C) Guard cell photosynthesis

(D) Transpiration

Explanation:

The opening and closing of stomata are caused by influx and efflux of potassium ions (K^+). The increase of K^+ results in opening of stomata and decrease of K^+ causes closing of stomata. The turgidity of guard cells induces the opening of the pores of stomata found on the surface of leaves.

Question 59.

A column of water within xylem vessels of tall trees does not break under its weight because of:

[4 Marks]

(A) Tensile strength of water

(B) Lignification of xylem vessels

(C) Positive root pressure

(D) Dissolved sugars in water

Explanation:

Due to tensile strength of water, a column of water within xylem vessels of tall trees does not break under its weight.

Question 60.

Root pressure develops due to:

[4 Marks]

(A) Passive absorption

(B) Low osmotic potential in soil

(C) Increase in transpiration

(D) Active absorption

Explanation:

Active absorption creates root pressure. In this process, the expenditure of energy takes place for the movement of substances against concentration gradient.

Question 61.

Roots play insignificant role in absorption of water in :

[4 Marks]

(A) Pea

(B) Pistia

(C) Wheat

(D) Sunflower

Explanation:

Pistia is a hydrophyte plant where absorption of water by root is not important.

Question 62.

Transpiration and root pressure cause water to rise in plants by :

[4 Marks]

(A) Pulling and pushing it, respectively

(B) Pushing it upward

(C) Pushing it upward

(D) Pushing and pulling it, respectively

Explanation:

Transpiration creates pulling (Negative pressure) force. Root pressure creates positive pressure developed in xylem. It is measured by manometer.

Question 63.

Minerals known to be required in large amounts for plant growth include :

[4 Marks]

(A) calcium, magnesium, manganese, copper

(B) potassium, phosphorus, selenium, boron

(C) magnesium, sulphur, iron, zinc

(D) phosphorus, potassium, sulphur, calcium

Explanation:

Phosphorus, potassium, sulphur and calcium play an important role in plants growth. These minerals are required in large amount. Phosphorus is required for all phosphorylation reactions and constitution of cell membrane, nucleic acids and some proteins. Potassium is related with protein synthesis, closing and opening of stomata and activation of enzyme. Calcium regulates metabolic activities, function of cell membrane and stabilizes the structure of chromosomes. Sulphur is the main constituent of the amino acids, cystine and methionine, coenzymes and vitamins.

Question 64.

The structures that are formed by stacking of organized flattened membranous sacs in the chloroplasts are :

[4 Marks]

(A) Grana

(B) Stroma lamellae

(C) Soma

(D) Cristae

Explanation:

In chloroplast which are green coloured plastids, thylakoids are arranged in stacks like the pile of coins called grana.

Question 65.

Chromatophores take part in:

[4 Marks]

(A) Movement

(B) Growth

(C) Respiration

(D) Photosynthesis

Explanation:

Chromatophores play an important role in the process of photosynthesis. They contain pigments and are found in blue green algae.

Question 66.

Cytochromes are found in :

[4 Marks]

(A) Outer wall of mitochondria

(B) Cristae of mitochondria

(C) Lysosomes

(D) Matrix of mitochondria

Explanation:

Cytochromes are found in mitochondria. These are located on the inner membrane of mitochondria and are related with phosphorylation.

Question 67.

The oxygen evolved during photosynthesis comes from water molecules. Which one of the following pairs of elements is involved in this reaction?

[4 Marks]

(A) Manganese and Potassium

(B) Magnesium and Molybdenum

(C) Magnesium and Chlorine

(D) Manganese and Chlorine

Explanation:

During photosynthesis photolysis of water is induced by Mn^{++} and Cl^{-} ions.

Question 68.

In photosynthesis the light-independent reactions take place at :

[4 Marks]

(A) Photosystem-I

(B) Stromal matrix

(C) Photosystem-II

(D) Thylakoid lumen

Explanation:

Stromal matrix contains a number of flattened membranous sacs called thylakoid or lamellae.

Question 69.

Typical growth curve in plants is :

[4 Marks]

(A) Linear

(B) Stair-steps shaped

(C) Sigmoid

(D) Parabolic

Explanation:

Sigmoid growth curve maintains equilibrium with carrying capacity, it forms asymptote stage in plants.

Question 70.

What causes a green plant exposed to the light on only one side, to bend toward the source of light as it grows ?

[4 Marks]

(A) Green plants seek light because they are phototropic

(B) Light stimulates plant cells on the lighted side to grow faster

(C) Auxin accumulates on the shaded side, stimulating greater cell elongation there.

(D) Auxin accumulates on the shaded side, stimulating greater cell elongation there.

Explanation:

Auxin stimulates cell elongation. It accumulates on shaded side which results in more elongation of cells towards shaded side of the plant. This causes bending of the plant towards source of light.

Question 71.

Auxin can be bioassayed by

[4 Marks]

(A) Hydroponics

(B) Potometer

(C) Lettuce hypocotyl elongation

(D) Avena coleoptile curvature

Explanation:

Avena coleoptile curvature is used for the bioassay of auxin.

Question 72.

Which of the following statements is not correct?

[4 Marks]

(A) Oxyntic cells are present in the mucosa of stomach and secrete HCL.

(B) Which of the following statements is not correct?

(C) Acini are present in the pancreas and secrete carboxypeptidase

(D) Brunner’s glands are present in the submucosa of stomach and secrete pepsinogen

Explanation:

Duodenum contains Brunner’s glands which secrete mucus and digestive juices.

Question 73.

The primary dentition in human differs from permanent dentition in not having one of the following type of teeth:

[4 Marks]

(A) Canine

(B) Incisors

(C) Molars

(D) Premolars

Explanation:

The dental formula for milk teeth is 2102/2102, so premolars are absent in the primary dentition.

Question 74.

Gastric juice of infants contains:

[4 Marks]

(A) nuclease, pepsinogen, lipase

(B) pepsinogen, lipase, rennin

(C) maltase, pepsinogen, rennin

(D) amylase, rennin, pepsinogen

Explanation:

Gastric juice of infants contains pepsinogen, lipase and rennin. Gastric juice does not contain amylase, maltase & nuclease.

Question 75.

When you hold your breath, which of the following gas changes in blood would first lead to the urge to breathe?

[4 Marks]

(A) falling CO_2 concentration

(B) rising CO_2 concentration

(C) rising CO_2 and falling O_2 concentration

(D) falling O_2 concentration

Explanation:

Chemoreceptors in the medulla get stimulated by increase in CO_2 concentration in the blood of arteries. Decrease in O_2 concentration has no significant effect on chemoreceptors.

Question 76.

Name the pulmonary disease in which alveolar surface area involved in gas exchange is drastically reduced due to damage in the alveolar walls.

[4 Marks]

(A) Pleurisy

(B) Pneumonia

(C) Emphysema

(D) Pneumonia

Explanation:

In the disease emphysema, alveolar surface area is reduced due to destruction of alveolar walls.

Question 77.

Which one of the following is correct?

[4 Marks]

(A) Plasma = Blood – Lymphocytes

(B) Blood = Plasma + RBC + WBC

(C) Lymph = Plasma + RBC + WBC

(D) Serum = Blood + Fibrinogen

Explanation:

Blood is a body fluid that delivers necessary substances such as nutrients and oxygen to the cells and transports metabolic waste products from those same cells. It is composed of blood cells (RBC, WBC, platelets) suspended in plasma.

Question 78.

Erythropoiesis starts in:

[4 Marks]

(A) Spleen

(B) Liver

(C) Red bone marrow

(D) Kidney

Explanation:

Erythropoiesis is the process of formation of RBC. In the first month of pregnancy, yolk sac is the haemopoietic tissue. After 5 weeks, it is followed by the liver. Red bone marrow from 6 months onwards becomes the principal site of erythropoiesis.

Question 79.

Blood pressure in the mammalian aorta is maximum during:

[4 Marks]

(A) Diastole of the right atrium.

(B) Systole of the left ventricle.

(C) Systole of the left atrium.

(D) Diastole of the right ventricle.

Explanation:

The wall of left ventricle is the thickest of all the chambers. It supplies oxygenated blood throughout the body. Aorta arises from left ventricle and the musculature is best developed.

Question 80.

Doctors use stethoscope to hear the sounds produced during each cardiac cycle. The second sound is heard when:

[4 Marks]

(A) Ventricular wall vibrate due to gushing in of blood from atria.

(B) Semilunar valves close down after the blood flows into vessels from ventricles.

(C) AV node receives signal from SA node.

(D) AV valves open up.

Explanation:

The second sound heard by doctors using stethoscope occurs when semilunar valves close down after the blood flows into vessels from ventricles.

Question 81.

'Which one of the following animals has two separate circulatory pathways?

[4 Marks]

(A) Lizard

(B) Whale

(C) Shark

(D) Frog

Explanation:

Whale is a mammal. It has a four-chambered heart having two atria and two ventricles. Oxygenated and deoxygenated blood flow in separate circulatory pathways.

Question 82.

Which of the following does not favour the formation of large quantities of dilute urine?

[4 Marks]

(A) Atrial-natriuretic factor

(B) Alcohol

(C) Renin

(D) Caffeine

Explanation:

The secretion of Renin is induced by decrease in blood pressure and blood volume. It maintains the proper BP and BV. It has no role in the formation of large quantities of urine.

Question 83.

Removal of proximal convoluted tubule from the nephron will result in:

[4 Marks]

(A) More concentrated urine

(B) No change in quality and quantity of urine

(C) No urine formation

(D) More diluted urine

Explanation:

Generally all of the essential nutrients and 70% to 80% of electrolytes and water are reabsorbed by this segment. Removal of proximal convoluted tubule from the nephron will result in dilution of urine.

Question 84.

Human urine is usually acidic because :

[4 Marks]

(A) the sodium transporter exchanges one hydrogen ion for each sodium ion, in peritubular capillaries.

(B) hydrogen ions are actively secreted into the filtrate.

(C) potassium and sodium exchange generates acidity

(D) excreted plasma proteins are acidic

Explanation:

Urine has acidic nature because hydrogen ions (H^+) are components of an acid which are secreted into the filtrate.

Question 85.

Sliding filament theory can be best explained as:

[4 Marks]

(A) Actin and Myosin filaments shorten and slide pass each other

(B) Actin and Myosin filaments do not shorten but rather slide pass each other

(C) When myofilaments slide pass each other Actin filaments shorten while Myosin filament do not. shorten

(D) When myofilaments slide pass each other, Myosin filaments shorten while Actin filaments do not. shorten

Explanation:

Sliding filament theory was given by Huxley and Huxley (1954). It states that Actin and Myosin filaments do not become short but rather slide past each other. Because of sliding of actin filaments over myosin, the length of I-band will change.

Question 86.

Glenoid cavity articulates:

[4 Marks]

(A) Scapula with acromion

(B) Clavicle with scapula

(C) Clavicle with acromion

(D) Humerus with scapula

Explanation:

Glenoid cavity articulates humerus with scapula.

Question 87.

Which of the following joints would allow no movement?

[4 Marks]

(A) Cartilaginous joint

(B) Synovial joint

(C) Ball and Socket joint

(D) Fibrous joint

Explanation:

Fibrous joint is an attachment between bones, being held together by fibrous connective tissue. For example—suture between skull bones.

Question 88.

Which of the following is **not** a function of the skeletal system?

[4 Marks]

(A) Storage of minerals

(B) Production of body heat

(C) Locomotion

(D) Production of erythrocytes

Explanation:

Production of body heat is caused by the process of metabolism (respiration).

Question 89.

Which of the following regions of the brain is incorrectly paired with its function?

[4 Marks]

(A) Medulla oblongata – homeostatic control

(B) Cerebrum – calculation and contemplation

(C) Corpus callosum – communication between the left and right cerebral cortices

(D) Cerebellum — language comprehension

Explanation:

Cerebellum maintains the balance and body posture. It is not concerned with logical part.

Question 90.

Destruction of the anterior horn cell of the spinal cord would result in loss of:

[4 Marks]

(A) Voluntary motor impulses

(B) Commissural impulses

(C) Integrating impulses

(D) Sensory impulses

Explanation:

In poliomyelitis, anterior horn cells of spinal cord are destroyed which causes loss of motor activities of limbs.

Question 91.

The number of water molecules is maximum in:

[4 Marks]

(A) 18 molecules of water

(B) 18 moles of water

(C) 18 gram of water

(D) 1.8 gram of water

Explanation:

No. of moles of water

In 1.8 g of H_2O = 0.1 moles

In 18 g of H_2O = 1 mole

1 mole contains 6.022×10^{23} molecules of water.

Therefore, maximum number of molecules is in 18 moles of water.

Question 92.

20.0 g of a magnesium carbonate sample decomposes on heating to give carbon dioxide and 8.0 g magnesium oxide. What will be the percentage purity of magnesium carbonate in the sample?

[4 Marks]

(A) 96

(B) 84

(C) 60

(D) 75

Explanation:

$MgCO_3 \rightarrow MgO + CO_2$

84 g of $MgCO_3$ forms 40 g of MgO

20 g of $MgCO_3$ forms

40×20 / 84 = 9.52 g of MgO

Since 8.0 g of MgO is formed,

Purity of sample = 8/9.52 × 100 = 84.0%

Question 93.

If Avogadro number N_A is changed from 6.022×10^{23} mol^{-1} to 6.022×10^{20} mol^{-1}, this would change:

[4 Marks]

(A) the definition of mass in units of grams

(B) the mass of one mole of carbon

(C) the ratio of elements to each other in a compound

(D) the ratio of chemical species to each other in a balanced equation

Explanation:

If 6.022×10^{23} changes to 6.022×10^{20}/mol, then this would change mass of one mole of carbon.

Question 94.

What is the mass of precipitate formed when 50 mL of 16.9% solution of $AgNO_3$ is mixed with 50 mL of 5.8% NaCl solution?

(Ag = 107.8, N = 14, O = 16, Na = 23, Cl = 35.5)

[4 Marks]

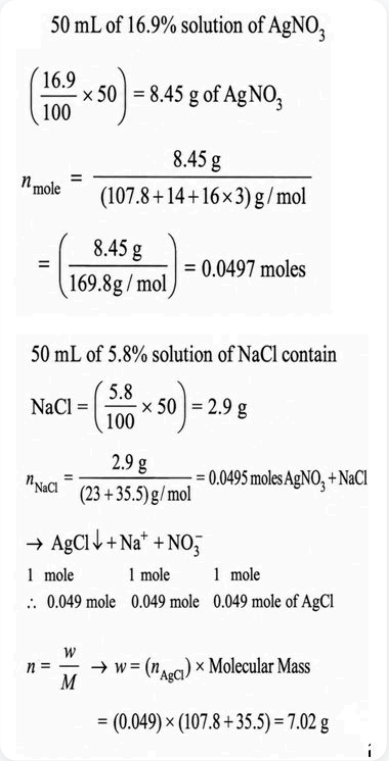
(A) 28 g

(B) 7 g

(C) 14 g

(D) 3.5 g

Explanation:



Question 95.

The formation of the oxide ion $O^{2-}(g)$, from oxygen atom requires first an exothermic and then an endothermic step as shown below:

$O(g) + e^- \rightarrow O^-(g)$; $\Delta_f H° = -141 kJ\ mol^{-1}$

$O^-(g) + e^- \rightarrow O^{2-}(g)$; $\Delta_f H° = +780\ kJ\ mol^{-1}$

Thus, the process of formation of O^{2-} ion in the gas phase is unfavourable even though O^{2-} is isoelectronic with neon. It is due to the fact that

[4 Marks]

(A) Electron repulsion outweighs the stability gained by achieving noble gas configuration

(B) O^- ion has comparatively smaller size than oxygen atom

(C) Addition of electron in oxygen results in larger size of the ion.

(D) Oxygen is more electronegative

Explanation:

Incoming electrons occupy the smaller $n = 2$ shell; also negative charge on oxygen (O^-) is another factor due to which incoming electron feels repulsion. Hence, electron repulsion outweighs the stability gained by achieving noble gas configuration.

Question 96.

In which of the following pairs, both the species are not isostructural?

[4 Marks]

(A) Diamond, silicon carbide

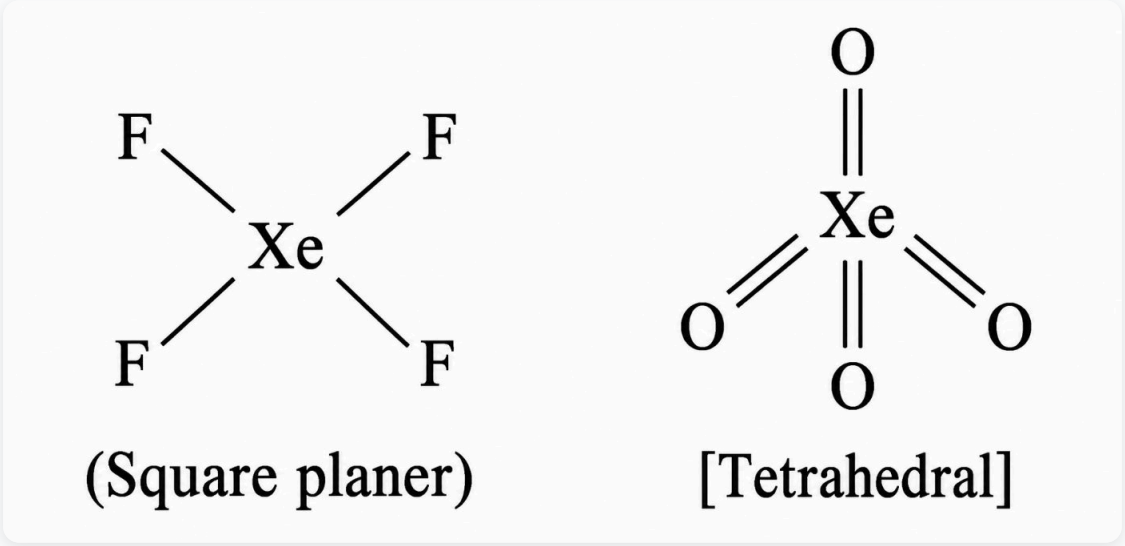
(B) $SiCl_4$, PCl_4^+

(C) NH_3, PH_3

(D) XeF_4, XeO_4

Explanation:

XeF_4, XeO_4



Question 97.

A gas such as carbon monoxide would be most likely to obey the ideal gas law at:

[4 Marks]

(A) High temperatures and low pressures.

(B) Low temperatures and high pressures.

(C) High temperatures and high pressures.

(D) Low temperatures and low pressures.

Explanation:

At high temperature and low pressure.

Question 98.

The heat of combustion of carbon to CO_2 is **−393.5 kJ/mol**. The heat released upon formation of **35.2 g of CO_2** from carbon and oxygen gas is

[4 Marks]

(A) −31.5 kJ

(B) −315 kJ

(C) −630 kJ

(D) +315 kJ

Explanation:

$C + O_2 \rightarrow CO_2 + 393.5$ kJ/mol

12 g C ⟶ 44 g

44 g CO_2 is formed from 12 g of carbon.

35.2 g is formed from 12 × 35.2/44 g of C

= 9.6 g of C

=9.6/12=0.8 mole

1 mole releases heat = 393.5 kJ

0.8 mole releases heat

= 393.5 × 0.8

= 314.8 kJ ≈ 315 kJ

Question 99.

If the equilibrium constant for

$N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ is **K**, the equilibrium constant for

$1/2N_2(g) + 1/2O_2(g) \rightleftharpoons NO(g)$ will be:

[4 Marks]

(A) K^2

(B) 1/2K

(C) K

(D) $K^{1/2}$

Explanation:

$N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$

$K = [NO]^2/[N_2][O_2]$

$1/2N_2 + 1/2O_2 \rightleftharpoons NO$

$K' = [NO]/[N_2]^{1/2}[O_2]^{1/2} = K^{1/2}$

Question 100.

What is the pH of the resulting solution when equal volumes of 0.1 M NaOH and 0.01 M HCl are mixed?

[4 Marks]

(A) 7.0

(B) 1.04

(C) 12.65

(D) 2.0

Explanation:

g eq of NaOH = $0.1 \times V = 0.1V$

g eq of HCl = $0.01 \times V = 0.01V$

g eq of NaOH > g eq. of HCl

Hence, the resultant solution should be basic.

hence, from the equation,

$M_1V_1 = M_2V_2 = MV$

$0.1V - 0.01V = MV$

$M = 0.09/2 = 0.045 = 4.5 \times 10^{-2}$

Now, pOH = - log $[OH^-]$

$-\log 4.5 \times 10^{-2} = 1.34$

$\therefore$ pH + pOH = 14

$\therefore$ pH = 14 − 1.34 = 12.65

Question 101.

Which one of the following pairs of solution is not an acidic buffer?

[4 Marks]

(A) $HClO_4$ and $NaClO_4$

(B) CH_3COOH and CH_3COONa

(C) H_2CO_3 and Na_2CO_3

(D) H_3PO_4 and Na_3PO_4

Explanation:

Among the given acids, $HClO_4$ is a very strong acid and completely dissociates.

$\therefore [HA] \rightarrow 0$

Hence, it cannot be used for an acidic buffer.

Question 102.

On heating, which of the following releases CO_2 most easily?

[4 Marks]

(A) $MgCO_3$

(B) $CaCO_3$

(C) K_2CO_3

(D) Na_2CO_3

Explanation:

Carbonates become more thermally stable down the group; therefore, $MgCO_3$ will leave CO_2 easily.

Question 103.

The stability of +1 oxidation state among Al, Ga, In and Tl increases in the sequence:

[4 Marks]

(A) In < Tl < Ga < Al

(B) Ga < In < Al < Tl

(C) Tl < In < Ga < Al

(D) Al < Ga < In < Tl

Explanation:

Lower oxidation state becomes more stable on moving down the group.

Al < Ga < In < Tl

Question 104.

Which of the following statements is **not correct** for a nucleophile?

[4 Marks]

(A) Ammonia is a nucleophile.

(B) Nucleophile is a Lewis acid.

(C) Nucleophiles attack on less e^- density sites.

(D) Nucleophiles are not electron seeking.

Explanation:

Nucleophiles are usually Lewis bases.

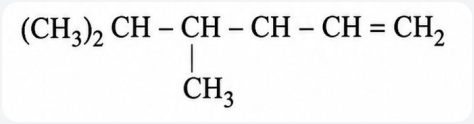
Question 105.

2,3-Dimethyl-2-butene can be prepared by heating which of the following compounds with a strong acid?

[4 Marks]

(A) $(CH_3)_3C-CH=CH_2$

(B)

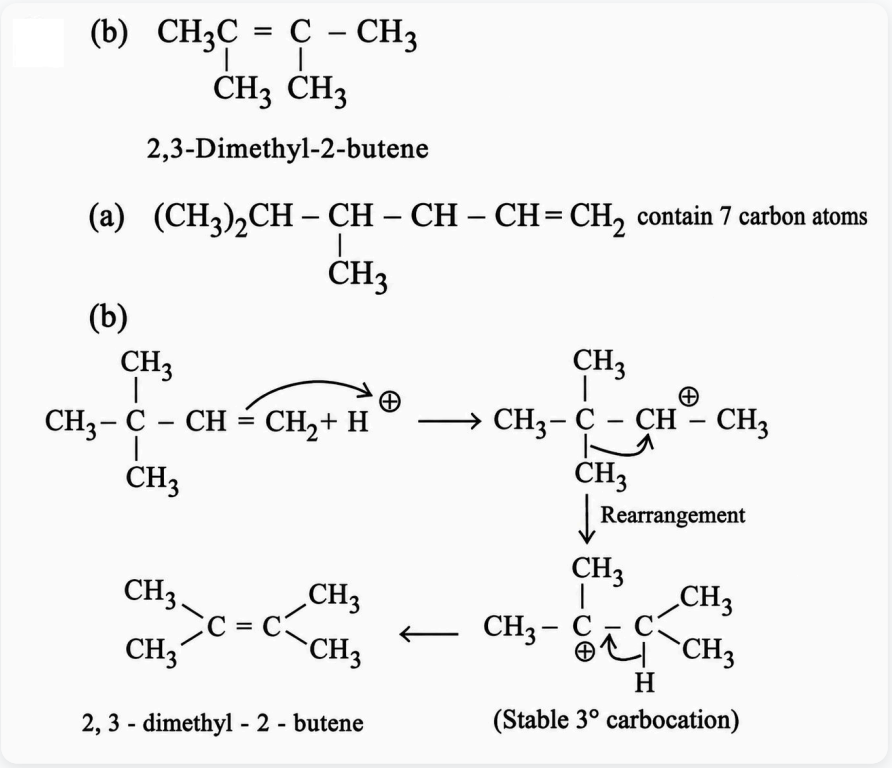


(C) $(CH_3)_2CH-CH_2-CH=CH2_2$

(D) $(CH_3)_2C=CH-CH_2CH_3$

Explanation:

.

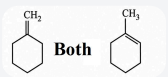


Question 106.

In the reaction with HCl, an alkene reacts in accordance with the Markovnikov's rule, to give a product 1-chloro-1-methylcyclohexane. The possible alkene is:

[4 Marks]

(A)



(B)



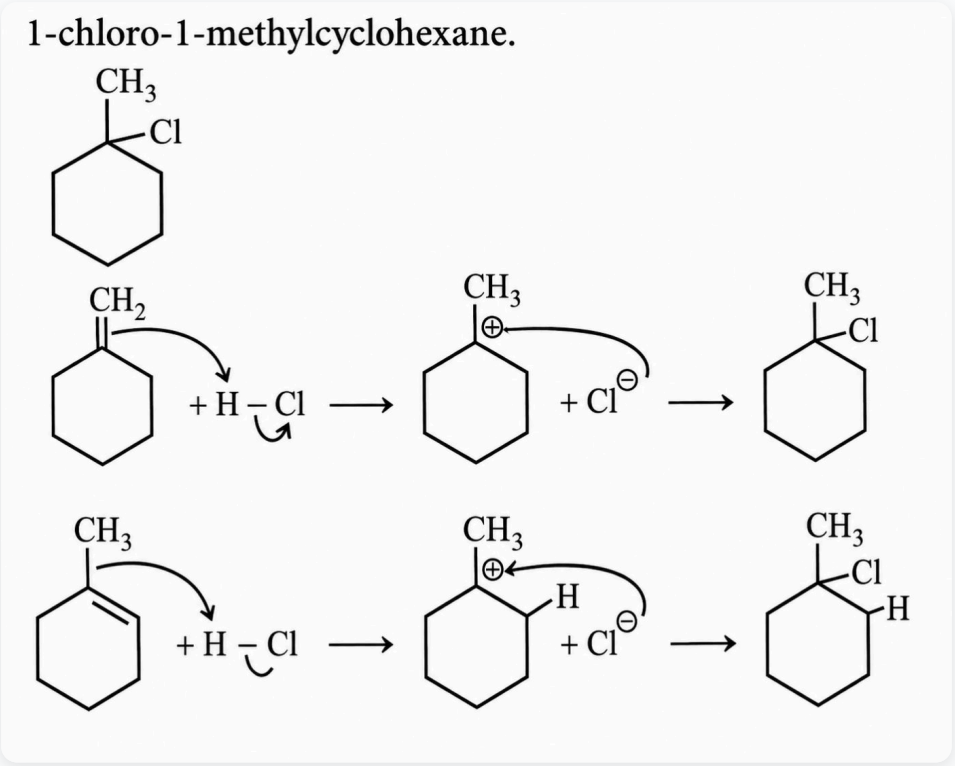
(C)



(D)



Explanation:



Question 107.

Aqueous solution of which of the following compounds is the best conductor of electric current?

[4 Marks]

(A) Ammonia, NH_3

(B) Hydrochloric acid, HCl

(C) Acetic acid, $C_2H_4O_2$

(D) Fructose, $C_6H_{12}O_6$

Explanation:

HCl completely dissociates to give H^+ and Cl^- ions; hence, it acts as a very good electrolyte, while the others are non-electrolytes.

Question 108.

The rate constant of the reaction A → B is 0.6×10^{-3} mol s^{-1}. If the concentration of A is 5 M, then the concentration of B after 20 minutes is:

[4 Marks]

(A) 1.08 M

(B) 3.60 M

(C) 0.36 M

(D) 0.72 M

Explanation:

Rate constant,

$k = 0.6 \times 10^{-3}$ mole per second. (Unit: mole per second shows zero order reaction.)

For a zero order reaction,

$[A] = [A]_0 - kt$

and $[A_0] - [A] = [B] = kt$

$0.6 \times 10^{-3} \times 20 \times 60 = 0.72M$

Question 109.

In the extraction of copper from its sulphide ore, the metal is finally obtained by the reduction of cuprous oxide with:

[4 Marks]

(A) Sulphur dioxide

(B) Carbon monoxide

(C) Iron (II) sulphide

(D) Copper (I) sulphide

Explanation:

$2Cu_2S(s) + 3O_2(g) \rightarrow 2Cu_2O(s) + 2SO_2(g)$

The unchanged Cu_2S, mixed with Cu_2O and heated strongly in the absence of air:

$Cu_2S + 2Cu_2O \rightarrow 6Cu + SO_2$

Question 110.

Strong reducing behaviour of H_3PO_2 is due to:

[4 Marks]

(A) Presence of two –OH groups and one P–H bond

(B) High oxidation state of phosphorus

(C) High electron gain enthalpy of phosphorus

(D) Presence of one –OH group and two P–H bonds

Explanation:

The acids which contain **P–H bond** have strong reducing properties.

Question 111.

Which of the statements given below is incorrect?

[4 Marks]

(A) O_3 molecule is bent.

(B) Cl_2O_7 is an anhydride of perchloric acid.

(C) ONF is isoelectronic with O_2N^-.

(D) OF_2 is an oxide of fluorine.

Explanation:

OF_2; among the following O and F, fluorine is more electronegative than oxygen.

So OF_2 cannot be called oxide because in that case fluorine would be in the +1 oxidation state, which is not possible. Therefore, OF_2 is called oxygen difluoride.

Question 112.

The variation of the boiling point of the hydrogen halides is in the order HF > HI > HBr > HCl. What explains the higher boiling point of hydrogen fluoride?

[4 Marks]

(A) There is strong hydrogen bonding between HF molecules.

(B) The bond energy of HF molecules is greater than in other hydrogen halides.

(C) The electronegativity of fluorine is much higher than for other elements in the group.

(D) The effect of nuclear shielding is much reduced in fluorine which polarises the HF molecule.

Explanation:

Hydrogen bonding is present in HF due to the high electronegativity of the fluorine atom. Hydrogen bonding is not present in HI, HBr, and HCl.

Question 113.

Which is the correct order of increasing energy of the listed orbitals in the atom of titanium?

[4 Marks]

(A) 3s 3p 3d 4s

(B) 3s 3p 4s 3d

(C) 3s 4s 3p 3d

(D) 4s 3s 3p 3d

Explanation:

(n+ l) rule can be used. Titanium is a multi electron system

$$\begin{array}{cccccccc} (n+l) & 3s & < & 3p & < & 4s & < & 3d \\ & \downarrow & & \downarrow & & \downarrow & & \downarrow \\ & (3+0) & & (3+1) & & (4+0) & & (3+2) \\ & \| & & \| & & \| & & \| \\ & 3 & & 4 & & 4 & & 5 \end{array}$$

Question 114.

Assuming complete ionization, same moles of which of the following compounds will require the least amount of acidified $KMnO_4$ for complete oxidation?

[4 Marks]

(A) $Fe(NO_2)_2$

(B) FeC_2O_4

(C) $FeSO_3$

(D) $FeSO_4$

Explanation:

Considering the same moles of compounds

Fe^{2+} SO_4^{2-} only Fe^{2+} is oxidised by $KMnO_4$, SO_4^{2-} in which sulphur is in highest oxidation state cannot be oxidised.

$$\overset{(+4)}{Fe^{2+}}\ \overset{(+6)}{SO_3^{2-}} \longrightarrow Fe^{3+}$$

$$SO_3^{2-} \longrightarrow SO_4^{2-} + 2e^-$$

Sulphur can be oxidised to (+6) *i.e.* to SO_4^{2-}

In $FeC_2O_4 \longrightarrow Fe^{3+}$

Carbon can be oxidised to (+IV) *i.e* to CO_2

$$\overset{(+3)}{Fe(NO_2)_2} \longrightarrow Fe^{3+}$$

$+ 2NO_2^-$ Nitrogen can be oxidised to (+V) state

$\downarrow$

$2NO_3^- + 2e^-$

$\uparrow$

$(+5)$

Question 115.

Gadolinium belongs to 4f series. Its atomic number is 64. Which of the following is the correct electronic configuration of gadolinium?

[4 Marks]

(A) $[Xe]4f^6 5d^2 6s^2$

(B) $[Xe]4f^7 5d^1 6s^2$

(C) $[Xe]4f^9 5s^1$

(D) $[Xe]4f^8 6d^2$

Explanation:

Gd(64) = $[Xe]4f^7 5d^1 6s^2$

Question 116.

The sum of coordination number and oxidation number of the metal M in the complex $[M(en)_2(C_2O_4)]Cl$ (where en is ethylenediamine) is:

[4 Marks]

(A) 6

(B) 9

(C) 8

(D) 7

Explanation:

$[M(en)_2(C_2O_4)]Cl$

C_2O_4 = bidentate ligand, carries −2 charge.

en = bidentate ligand, carries 0 charge.

∴ M carries +3 charge; coordination number = 6.

Sum = +3 + 6 = 9.

Question 117.

The name of complex ion, $[Fe(CN)_6]^{3-}$ is:

[4 Marks]

(A) Tricyanoferrate (III) ion

(B) Hexacyanitoferrate (III) ion

(C) Hexacyanidoferrate (III) ion

(D) Hexacyanoiron (III) ion

Explanation:

Hexacyanidoferrate (III) ion

Question 118.

Number of possible isomers for the complex $[Co(en)_2Cl_2]Cl$ will be (en = ethylenediamine):

[4 Marks]

(A) 3

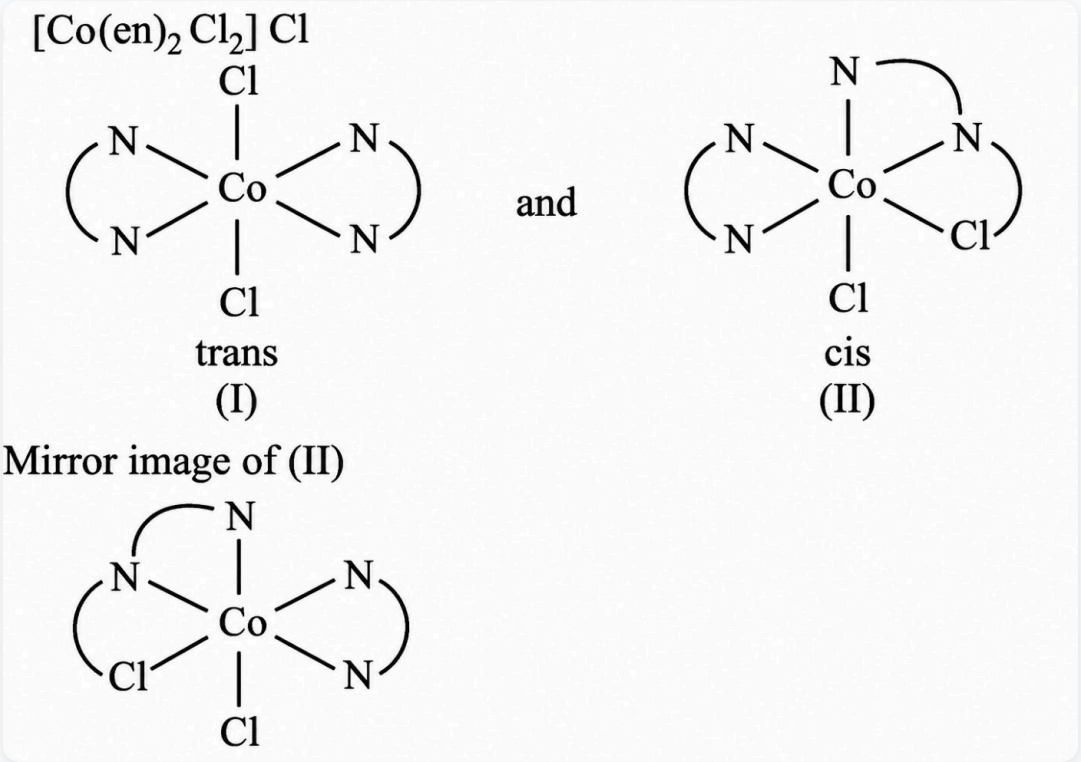
(B) 4

(C) 1

(D) 2

Explanation:

.



Question 119.

In an S_N1 reaction on chiral centres there is:

[4 Marks]

(A) Inversion more than retention leading to partial racemization

(B) 100% racemization

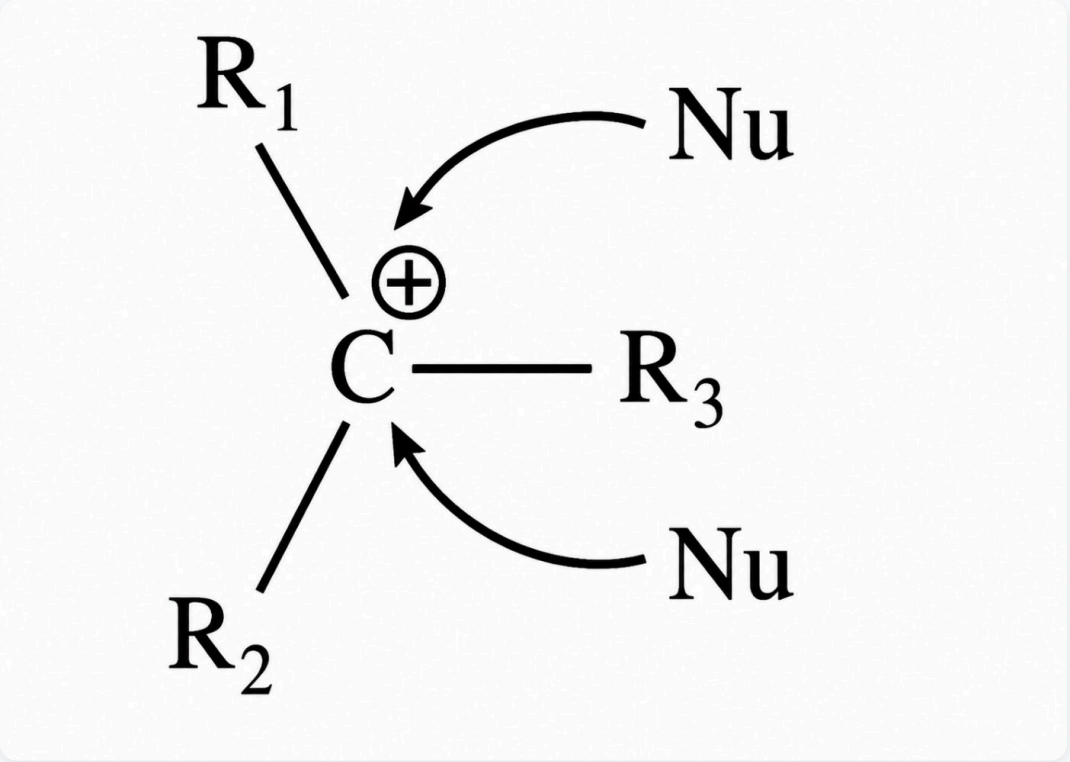
(C) 100% inversion

(D) 100% retention

Explanation:

In S_N1 reaction, carbocation a planar species as intermediate is formed.

So attack from below or above the plane can take place. 1f 50% attack below and above the plane of carbocation take place than 100% racemization occurs but it may not be highly probable. i.e. if inversion occurs more than retention leading to partial racemization.



Question 120.

Two possible stereo-structures of $CH_3CHOHCOOH$, which are optically active, are called:

[4 Marks]

(A) Mesomers

(B) Atropisomers

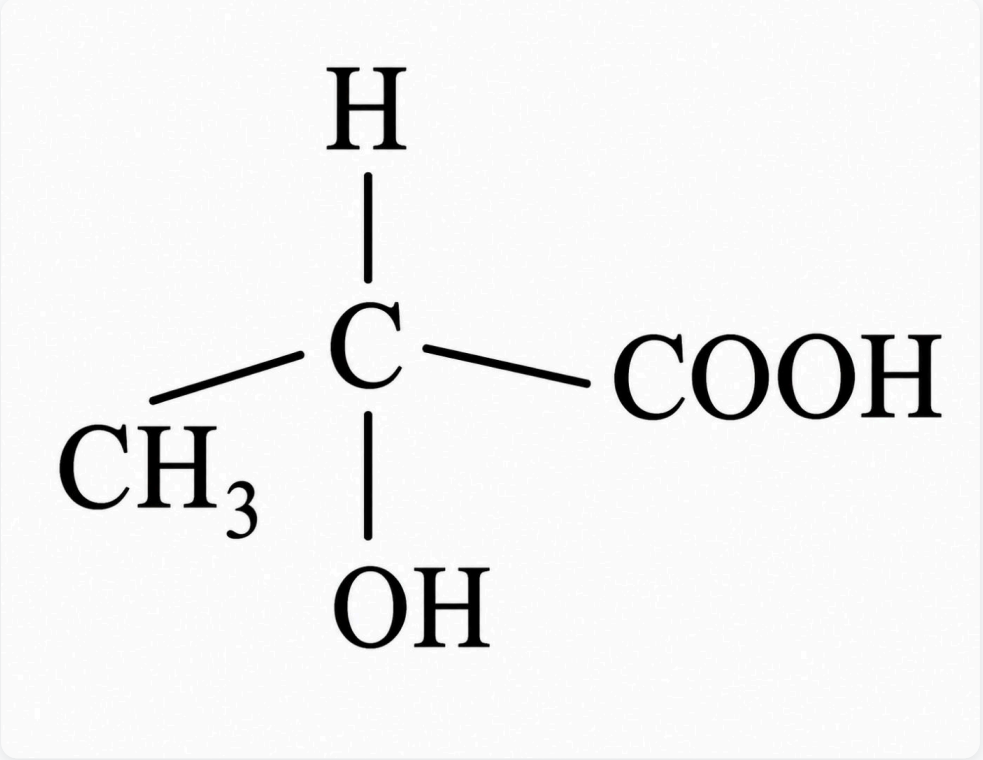
(C) Enantiomers

(D) Diastereomers

Explanation:

Four different Substituent, only one chiral centre.

Hence only enantiomers are possible.



Question 121.

Which of the following reaction(s) can be used for the preparation of alkyl halides?

(I) $CH_3CH_2OH+HCl$ —anh. $ZnCl_2 \rightarrow$

(II) $CH_3CH_2OH+HCl \rightarrow$

(III) $(CH_3)_3COH+HCl \rightarrow$

(IV) $(CH_3)_2CHOH+HCl$ —anh. $ZnCl_2 \rightarrow$

[4 Marks]

(A) (IV) only

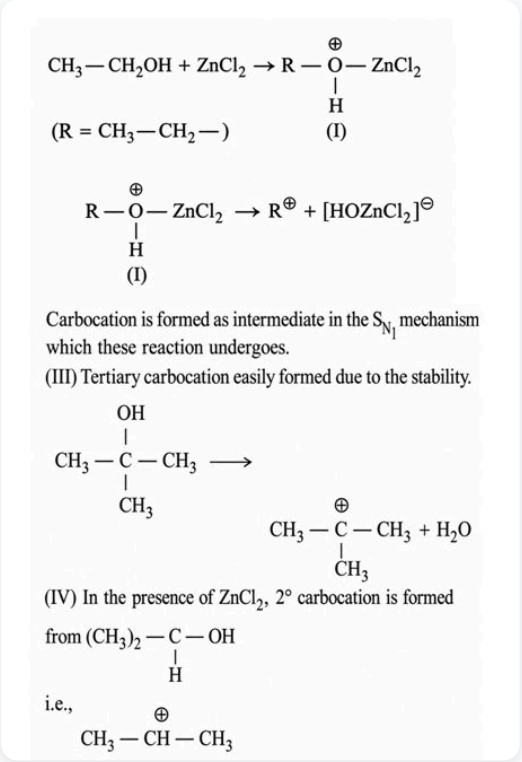
(B) (I) and (II) only

(C) (III) and (IV) only

(D) (I), (III) and (IV) only

Explanation:

.



Question 122.

Reaction of phenol with chloroform in presence of dilute sodium hydroxide finally introduces which one of the following functional group?

[4 Marks]

(A) –CHO

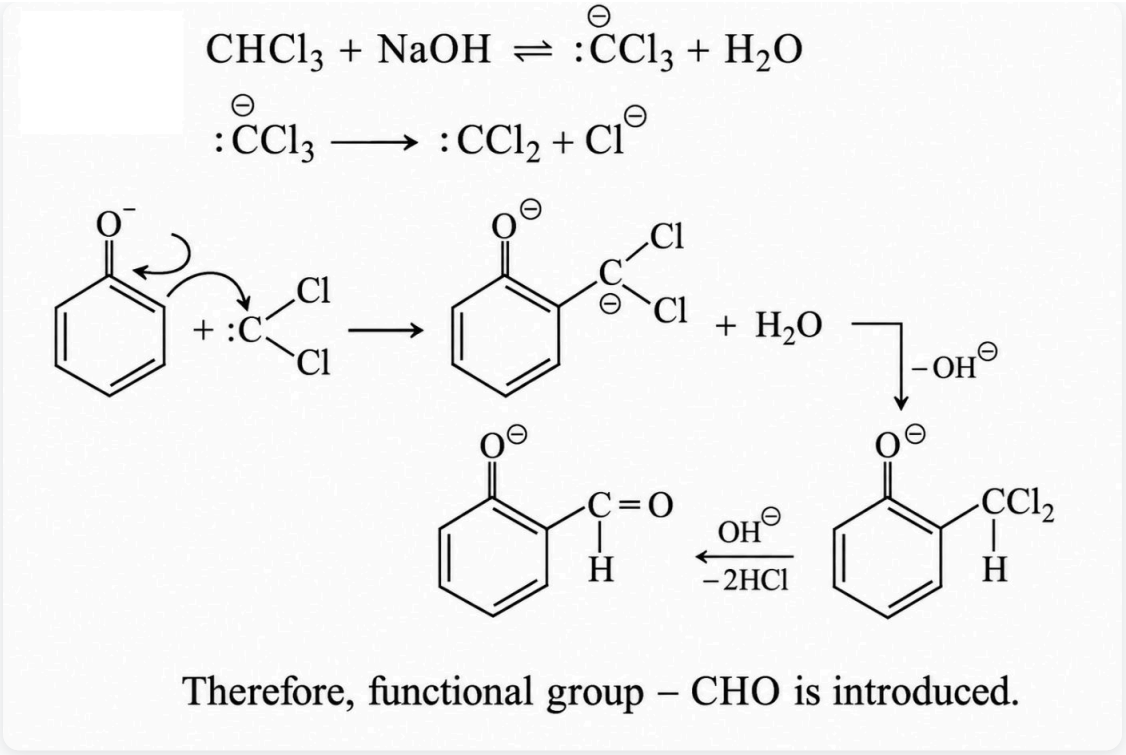
(B) –COOH

(C) $–CHCl_2$

(D) $–CH_2Cl$

Explanation:

.

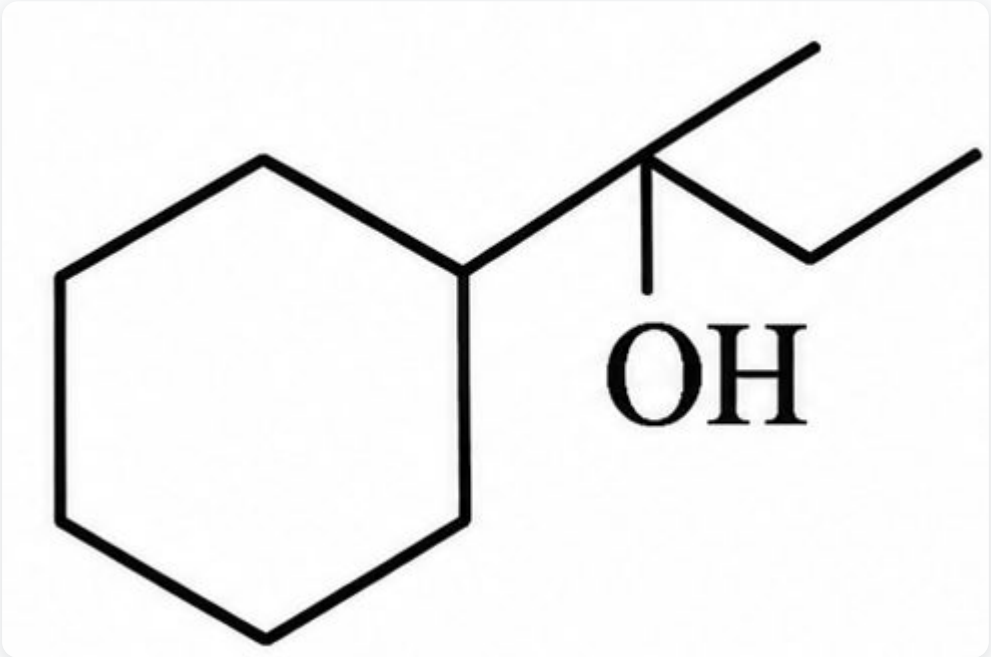


Therefore, functional group – CHO is introduced.

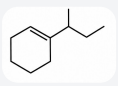
Question 123.

Which of the following is not the product of dehydration of ?

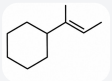
[4 Marks]



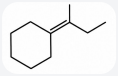
(A)



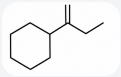
(B)



(C)

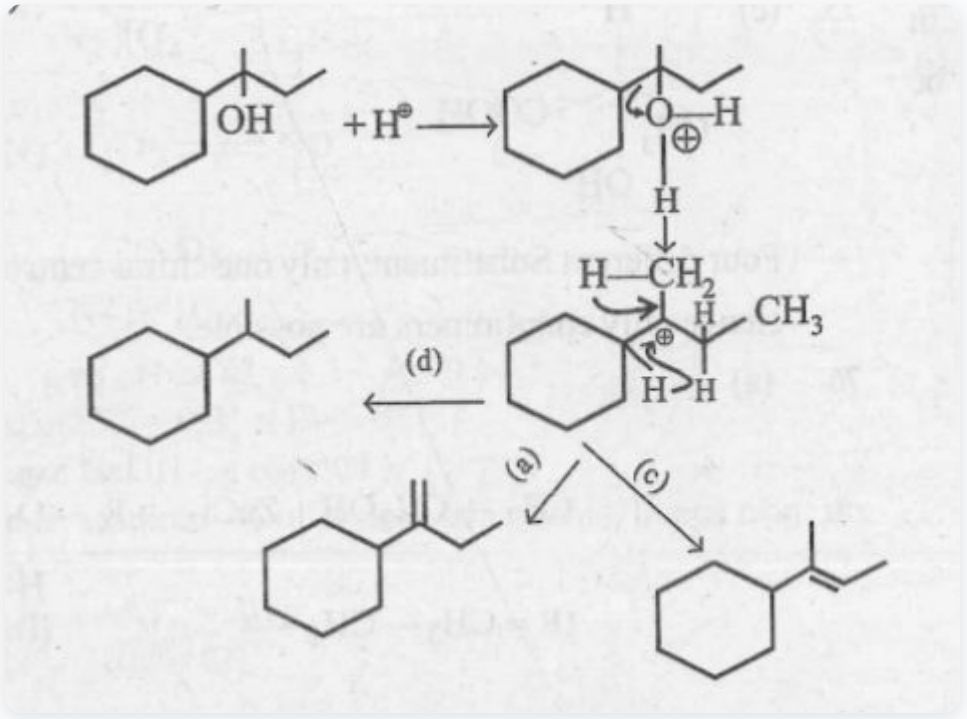


(D)



Explanation:

The intermediate is a 3° carbocation, which is very stable. Hence, rearrangement will not take place and product mentioned.



Question 124.

Reaction of a carbonyl compound with one of the following reagents involves nucleophilic addition followed by elimination of water. The reagent is:

[4 Marks]

(A) A Grignard reagent

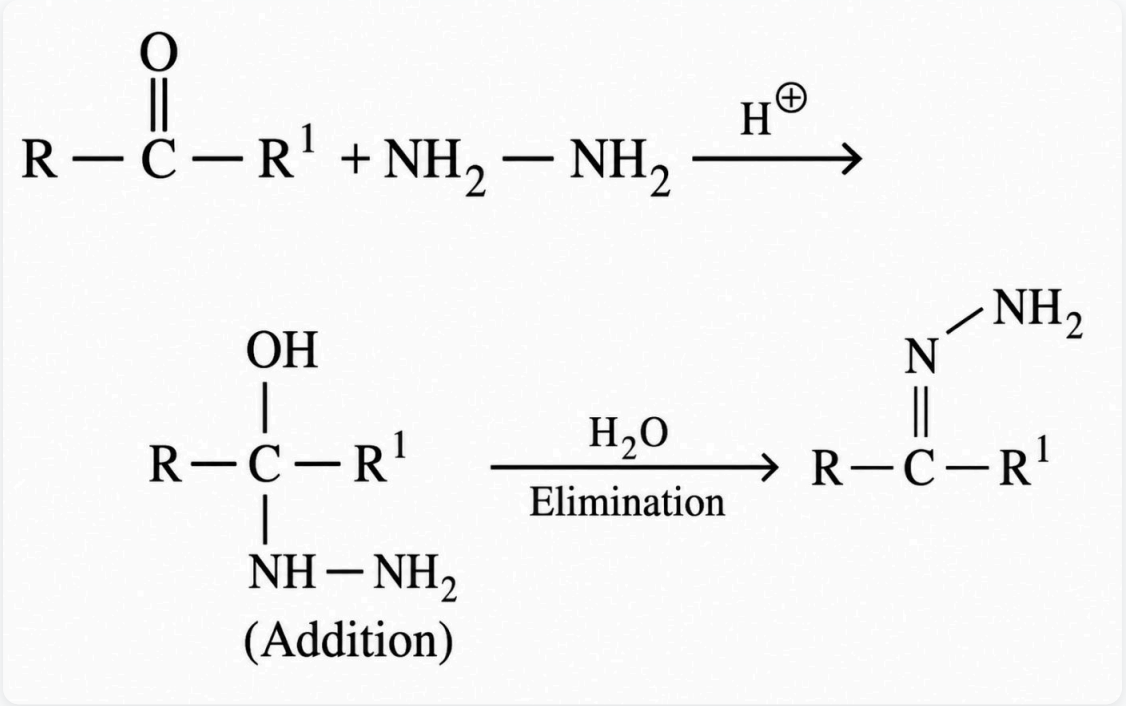
(B) Hydrazine in presence of feebly acidic solution

(C) Hydrocyanic acid

(D) Sodium hydrogen sulphite

Explanation:

While in all other cases no elimination take place.

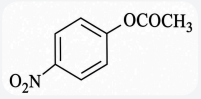


Question 125.

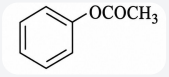
Which one of the following esters gets hydrolysed most easily under alkaline condition?

[4 Marks]

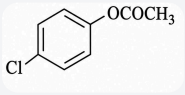
(A)



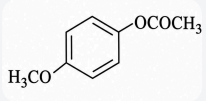
(B)



(C)

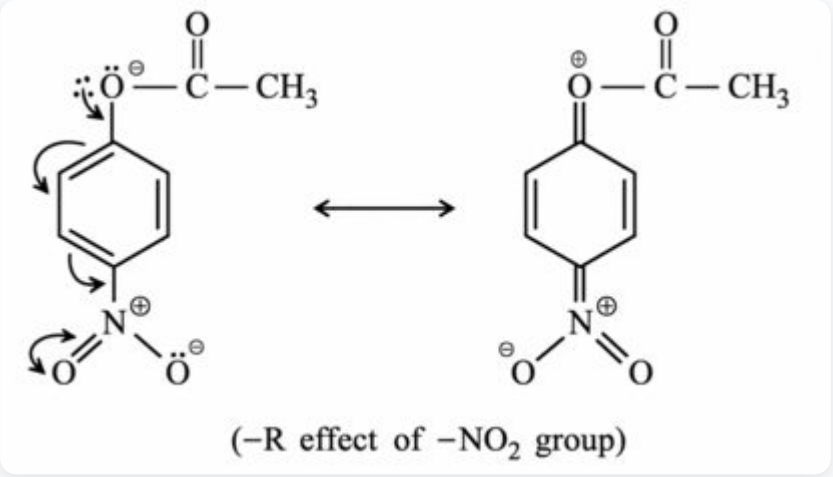


(D)



Explanation:

Among the substituents attached to the benzene ring, the $–NO_2$ group is the most electron-withdrawing. Thus, it withdraws electron density from the carbonyl carbon and facilitates the attack of the OH^- ion.



Question 126.

The number of structural isomers possible from the molecular formula C_3H_9N is:

[4 Marks]

(A) 4

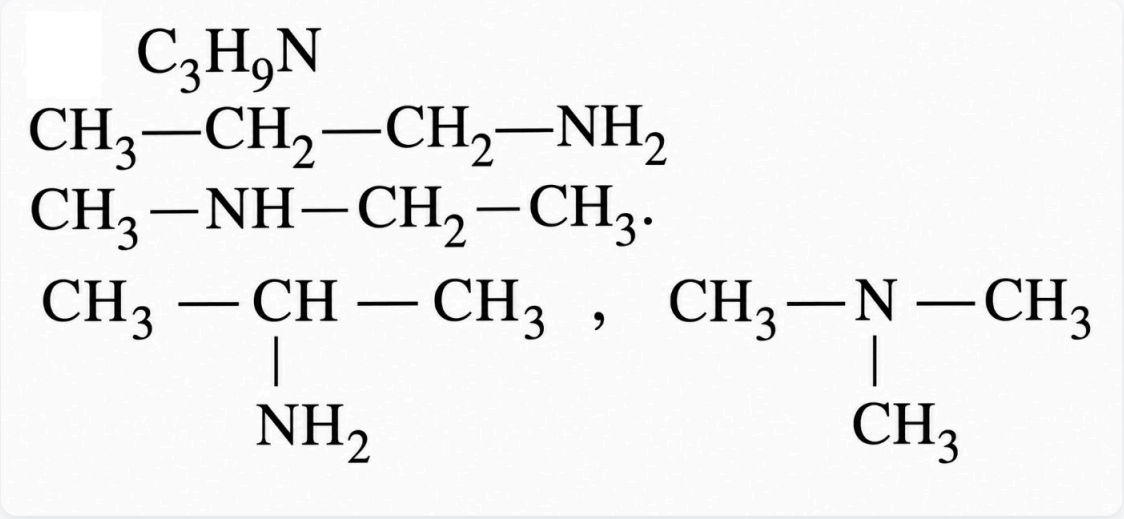
(B) 2

(C) 5

(D) 3

Explanation:

.



Question 127.

Method by which aniline cannot be prepared is:

[4 Marks]

(A) Potassium salt of phthalimide treated with chlorobenzene followed by hydrolysis with aqueous NaOH solution.

(B) Reduction of nitrobenzene with H_2/Pd in ethanol

(C) Degradation of benzamide with bromine in alkaline solution

(D) Hydrolysis of phenyl isocyanide with acidic solution

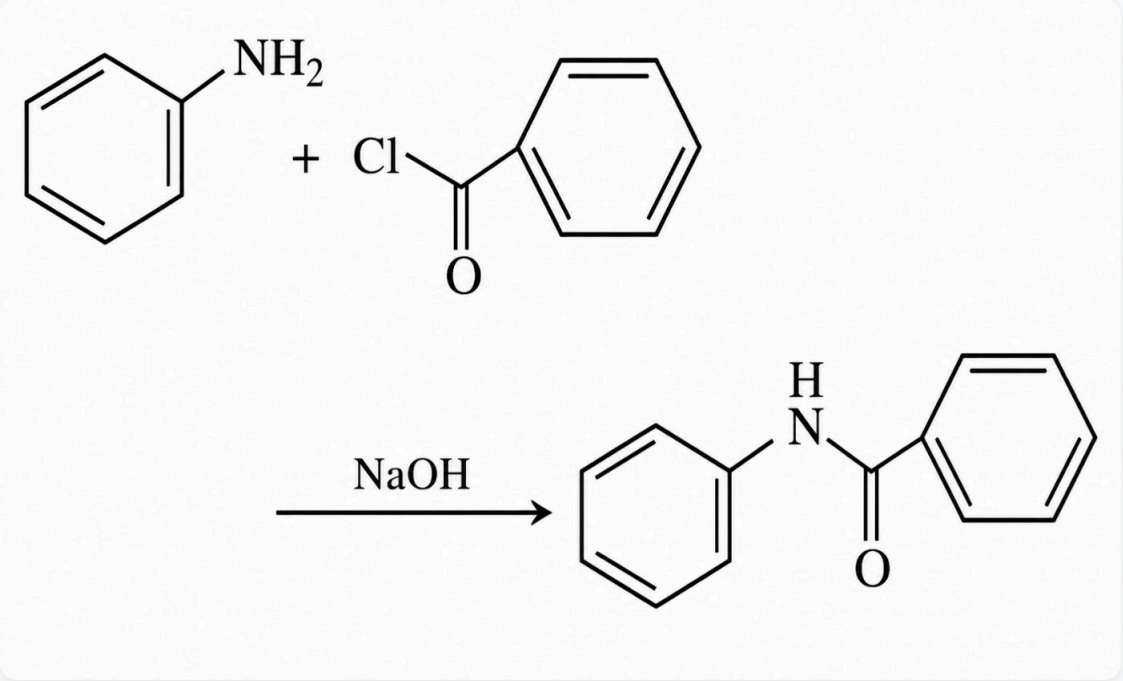
Explanation:

Because arylhalides do not undergo nucleophilic substitution reaction with potassium phthalimide easily.

Question 128.

The following reaction is known by the name

[4 Marks]



(A) Acetylation reaction

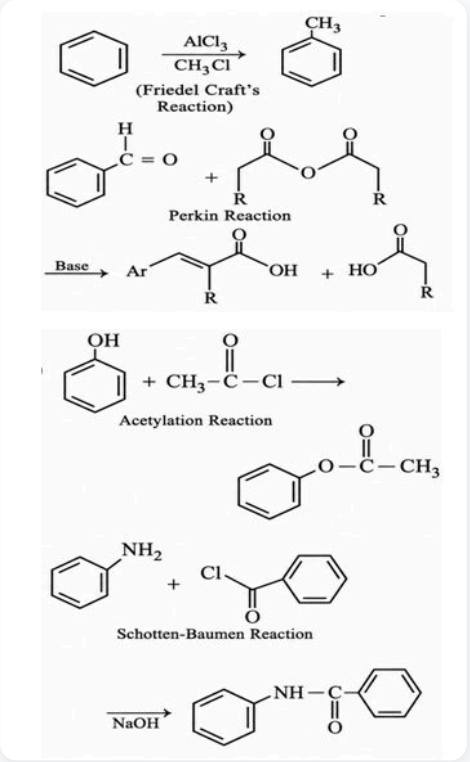
(B) Schotten-Baumen reaction

(C) Friedel-Craft's reaction

(D) Perkin's reaction

Explanation:

.



Question 129.

Caprolactum is used for the manufacture of:

[4 Marks]

(A) Nylon-6,6

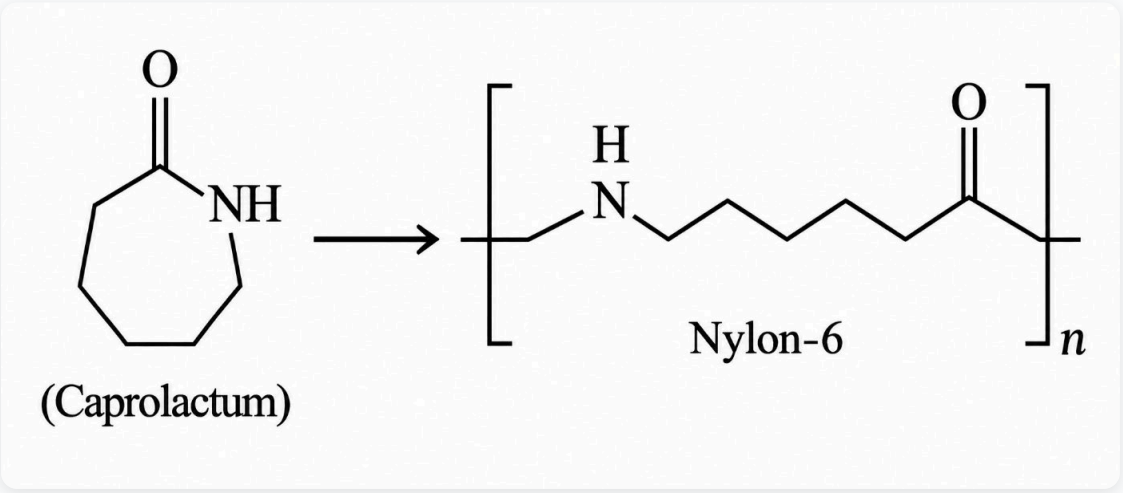
(B) Terylene

(C) Nylon-6

(D) Teflon

Explanation:

.



Question 130.

What is the mole fraction of the solute in a 1.00 m aqueous solution ?

[4 Marks]

(A) 0.177

(B) 0.0354

(C) 1.770

(D) 0.0177

Explanation:

Molality = W/M × 1/V(kg)

= n/V(kg) (where n_solute = W/M)

1.00 m = n/V(kg) i.e., 1 mole in 1 kg of water

Moles of 1 kg H_2O:

= 1000 g/18 g/mol = 55.55 mole

Moles of solute = 1

Mole fraction:

= n_solute/n_solute + n_water = 1/(1+55.55)

= 0.01768 ≈ 0.0177

Question 131.

Decreasing order of stability of O_2, O_2^-, O_2^+ and O_2^{2-} is:

[4 Marks]

(A) $O_2^- > O_2^{2-} > O_2^+ > O_2$

(B) $O_2^{2-} > O_2^- > O_2 > O_2^+$

(C) $O_2 > O_2^+ > O_2^{2-} > O_2^-$

(D) $O_2^+ > O_2 > O_2^- > O_2^{2-}$

Explanation:

According to molecular orbital theory, as bond order decreases, the stability of the molecule decreases.

Bond order = $1/2(N_b - N_a)$

Bond order for O_2^+:

= 1/2(10−5) = 2.5

Bond order for O_2:

= 1/2(10−6) = 2

Bond order for O_2^-:

= 1/2(10−7) = 1.5

Bond order for O_2^{2-}:

= 1/2(10−8) = 1.0

hence the correct order is $O_2^+ > O_2 > O_2^- > O_2^{2-}$

Question 132.

The hybridization involved in complex $[Ni(CN)_4]^{2-}$ is: (At. No. Ni = 28)

[4 Marks]

(A) dsp^2

(B) sp^3

(C) d^2sp^2

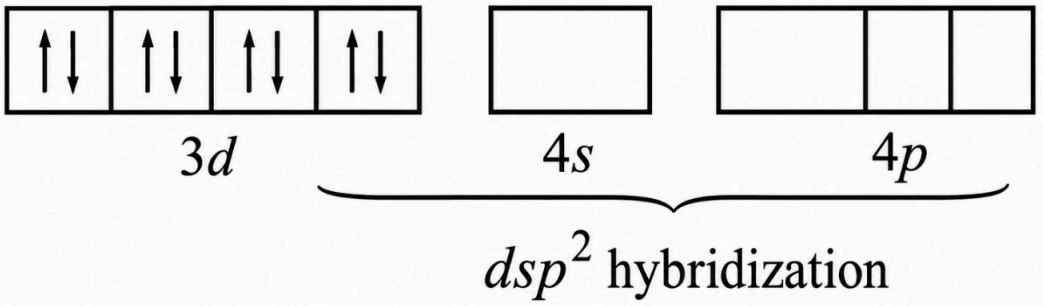
(D) d^2sp^3

Explanation:

.

$Ni^{2\oplus} = [Ar]^{18}\, 4s^0\, 3d^8$

Valence bond theory can be used to predict shape.



dsp^2 hybridization

(In presence of ligand, pairing of electron occurs)

$\therefore$ Square planar.

Question 133.

The vacant space in bcc lattice cell is:

[4 Marks]

(A) 32%

(B) 48%

(C) 26%

(D) 23%

Explanation:

.

Number of atoms per unit cell
$= 8 \times (1/8) + 1 = 2$

$$r = \frac{\sqrt{3}a}{4}$$

$$\text{Packing Fraction (P.F.)} = \frac{2 \times \frac{4}{3}\pi r^3}{(4r/\sqrt{3})^3}$$

$$= \frac{\sqrt{3}\pi}{8} = 0.68$$

% P.F. = 68% ; % of vacant space
$= 100 - 68 = 32\%$

Question 134.

The oxidation of benzene by V_2O_5 in the presence of air produces:

[4 Marks]

(A) Benzaldehyde

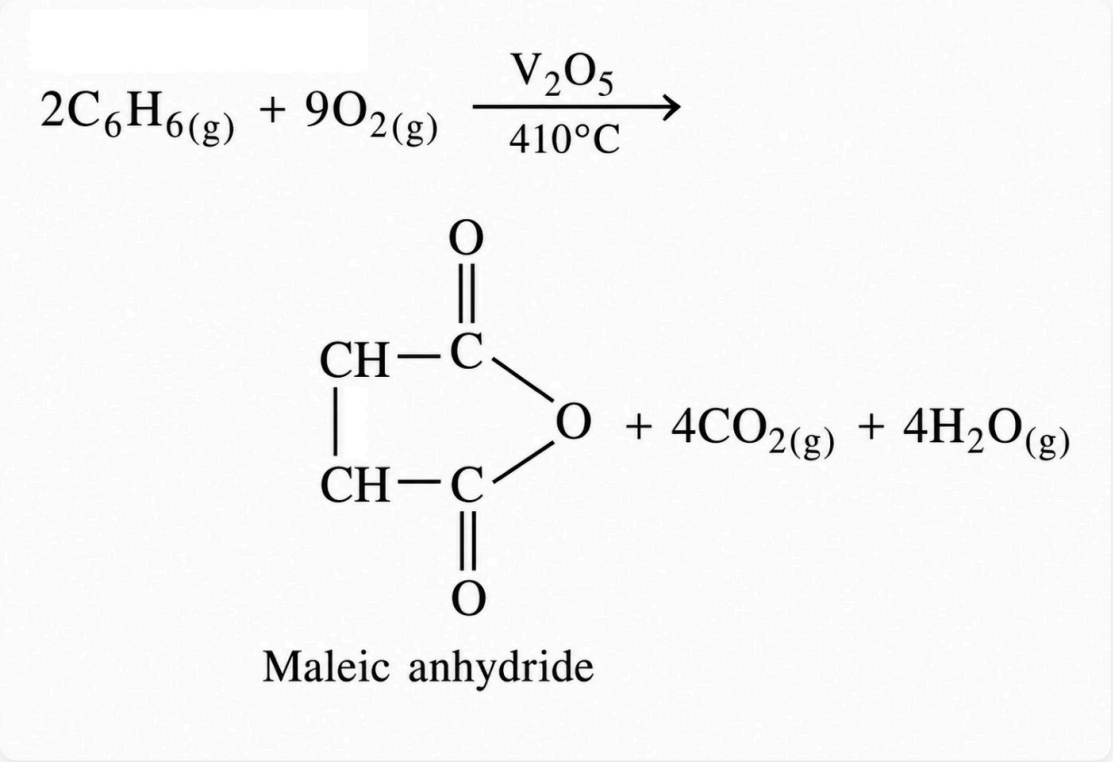
(B) Benzoic acid

(C) Benzoic anhydride

(D) Maleic anhydride

Explanation:

.



Question 135.

The correct statement regarding defects in crystalline solid is:

[4 Marks]

(A) Frenkel defect is a dislocation defect.

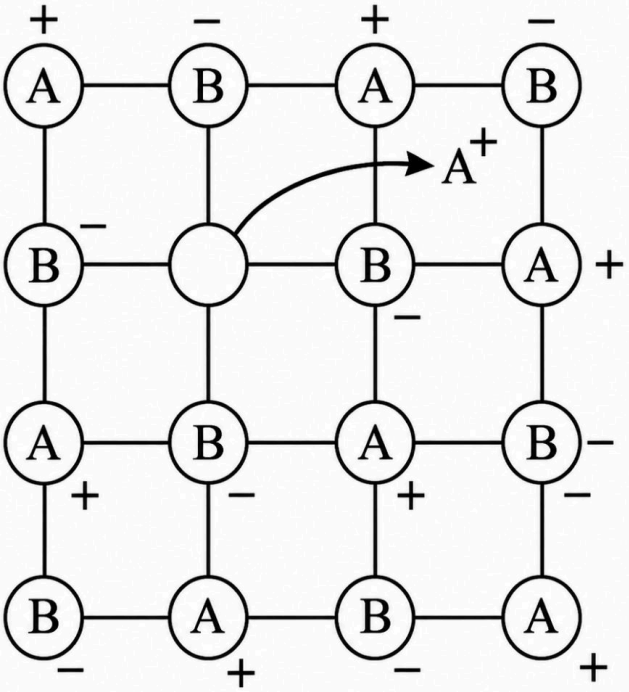
(B) Frenkel defect s found in halides of alkaline metals.

(C) Frenkel defects decrease the density of crystalline solids

(D) Schottky defects have no effect on the density of crystalline solids

Explanation:

.



Frenkel defect is dislocation effect