**Q1) Which of the following halogenated compounds is most reactive towards nucleophilic substitution reaction?**

a) 1-chloro-2,2-dimethylpropane

b) 1-chlorobutane

c) 1-chloro-2-methylpropane

d) 1-chloro-3-methylbutane

Correct Answer: Option (c)

Explanation: The reactivity of a haloalkane towards nucleophilic substitution reaction depends on the steric hindrance around the carbon atom to which the halogen is attached. The more the steric hindrance, the less is the reactivity. 1-chloro-2-methylpropane has the least steric hindrance among the given options, and thus it is the most reactive towards nucleophilic substitution reaction.

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q2) Which of the following haloarenes can undergo nucleophilic substitution reaction?**

a) Fluorobenzene

b) Chlorobenzene

c) Bromobenzene

d) All of the above

Correct Answer: Option (d)

Explanation: Haloarenes are generally less reactive towards nucleophilic substitution reactions compared to haloalkanes. However, among the given options, all of them can undergo nucleophilic substitution reaction under suitable conditions. Bromobenzene is more reactive than chlorobenzene, and fluorobenzene is the least reactive among the given options.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q3) The order of boiling points of the following compounds is:**

a) 1-bromobutane < 1-bromo-3-methylbutane < 1-bromo-2-methylbutane

b) 1-bromobutane > 1-bromo-3-methylbutane > 1-bromo-2-methylbutane

c) 1-bromo-2-methylbutane > 1-bromo-3-methylbutane > 1-bromobutane

d) 1-bromo-2-methylbutane < 1-bromo-3-methylbutane < 1-bromobutane

Correct Answer: Option (c)

Explanation: The boiling point of a haloalkane increases with the increase in molecular weight and branching decreases the boiling point. Among the given options, 1-bromo-2-methylbutane has the highest molecular weight and is the most branched, thus it has the highest boiling point. 1-bromo-3-methylbutane has a lower molecular weight than 1-bromo-2-methylbutane, but it is more branched than 1-bromobutane, thus it has a higher boiling point than 1-bromobutane.

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q4) The most reactive electrophile in Friedel-Crafts alkylation is:**

a) Alkyl halides

b) Alcohols

c) Alkenes

d) Carbocations

Correct Answer: Option (d)

Explanation: In Friedel-Crafts alkylation, a carbocation is generated as an intermediate, which is highly reactive and can react with the arene to form the alkyl substituted arene. Among the given options, carbocations are the most reactive electrophiles as they have a positive charge and are thus highly electron-deficient.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q5) Which of the following haloalkanes is optically active?**

a) 1-bromo-3-methylbutane

b) 2-bromobutane

c) 1-chloro-2,2-dimethylpropane

d) 1-bromobutane

Correct Answer: Option (a)

Explanation: A molecule is optically active if it is not superimposable on its mirror image. A molecule with a chiral carbon atom is optically active. Among the given options, 1-bromo-3-methylbutane has a chiral carbon atom and is therefore optically active.

Thus, the correct answer is option (a).

Difficulty Level- Very Hard Bloom's Taxonomy: Apply

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**Q6) Which of the following is a haloarene?**

a) 1-chlorobutane

b) Chlorobenzene

c) 1-chloro-2-methylpropane

d) 1-chloro-3-methylbutane

Correct Answer: Option (b)

Explanation: Haloarenes are aromatic compounds that contain at least one halogen atom attached to the ring. Chlorobenzene is a haloarene as it contains a chlorine atom attached to the benzene ring.

Thus, the correct answer is option (b).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q7) Which of the following is not a reaction of haloalkanes?**

a) Nucleophilic substitution

b) Elimination

c) Addition

d) Electrophilic substitution

Correct Answer: Option (d)

Explanation: Haloalkanes are organic compounds that contain at least one halogen atom (fluorine, chlorine, bromine, or iodine) bonded to a carbon atom. The most common reactions of haloalkanes are nucleophilic substitution, elimination, and addition reactions. Electrophilic substitution, on the other hand, is a type of reaction that occurs with aromatic compounds, such as benzene, and involves the replacement of an atom or group in the aromatic ring by an electrophile.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q8) Which of the following is the most reactive towards nucleophilic substitution reaction?**

a) 1-chlorobutane

b) 1-chloro-2-methylpropane

c) 1-chloro-2,2-dimethylpropane

d) 1-chloro-3-methylbutane

Correct Answer: Option (b)

Explanation: The reactivity of a haloalkane towards nucleophilic substitution reaction depends on the steric hindrance around the carbon atom to which the halogen is attached. The more the steric hindrance, the less is the reactivity. 1-chloro-2-methylpropane has the least steric hindrance among the given options, and thus it is the most reactive towards nucleophilic substitution reaction.

Thus, the correct answer is option (b).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q9) Which of the following is not a haloalkane?**

a) chlorobenzene

b) ethyl chloride

c) 1,2-dichloroethane

d) 1-bromobutane

Correct Answer: Option (a)

Explanation: Chlorobenzene is not a haloalkane, but a haloarene. Haloalkanes are compounds in which a halogen is attached to an alkyl group. The haloalkanes, also known as alkyl halides, are a group of chemical compounds comprised of an alkane with one or more hydrogens replaced by a halogen atom.

Thus, the correct answer is option (a).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q10) Which of the following haloalkanes will undergo nucleophilic substitution most easily?**

a) 1-chloro-4-methylpentane

b) 1-bromo-4-methylpentane

c) 1-iodo-4-methylpentane

d) 1-fluoro-4-methylpentane

Correct Answer: Option (d)

Explanation: 1-fluoro-4-methylpentane will undergo nucleophilic substitution most easily. This is because fluorine is the smallest halogen and the carbon-fluorine bond is the strongest, making it the most reactive towards nucleophilic substitution.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q11) Which of the following haloalkanes is optically active?**

a) 1-bromo-3-chlorocyclohexane

b) 1-chloro-2-iodobutane

c) 2-bromo-3-chloropentane

d) 1-chloro-1-phenylethane

Correct Answer: Option (d)

Explanation: 1-chloro-1-phenylethane is optically active due to the presence of a chiral carbon. A chiral carbon is a carbon atom attached to four different groups, resulting in two non-superimposable mirror images.

Thus, the correct answer is option (d).

Difficulty Level- Very Hard Bloom's Taxonomy: Apply

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**Q12) Answer the following question with reference to the image.**

**(** [**https://drive.google.com/file/d/1v9dOtk5z8oeLDCKiAvFqKbhr6U-yHP90/view?usp=sharing**](https://drive.google.com/file/d/1v9dOtk5z8oeLDCKiAvFqKbhr6U-yHP90/view?usp=sharing) **)**

**Type: Image**

**Match the structures of compounds given in column I with compounds given in column II.**

a) A-3, B-1, C-2, D-4

b) A-2, B-4, C-1, D-3

c) A-1, B-2, C-4, D-3

d) A-4, B-3, C-2, D-1

Correct Answer: Option (b)

Explanation: Aryl halides: These are compounds in which a halogen atom (such as chlorine, bromine, or iodine) is attached to an aromatic ring, such as benzene or a derivative of benzene. Examples of aryl halides include chlorobenzene and bromobenzene.

Alkyl halides: These are compounds in which a halogen atom is attached to a carbon atom in an alkyl group. Examples of alkyl halides include chloroethane and bromopropane.

Vinyl halides: These are compounds in which a halogen atom is attached to a carbon atom in a vinyl group, which consists of two carbon atoms connected by a double bond. Examples of vinyl halides include vinyl chloride and vinyl bromide.

Allylic halides: These are compounds in which a halogen atom is attached to a carbon atom adjacent to a double bond, known as an allylic position. Examples of allylic halides include allyl chloride and allyl bromide.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q13) Which of the following haloalkanes will undergo elimination most easily?**

a) 1-bromo-3-methylbutane

b) 1-chloro-4-methylpentane

c) 1-iodo-2-methylpropane

d) 1-fluoro-2-methylbutane

Correct Answer: Option (c)

Explanation: 1-iodo-2-methylpropane will undergo elimination most easily. This is because the carbon-iodine bond is the weakest and the iodide ion is a good leaving group, making it the most reactive towards elimination.

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q14) Which of the following is a primary halide?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: Primary halide is a compound in which the halogen atom is attached to a primary carbon atom, which is directly attached to only one other carbon atom. In Ethyl bromide, the halogen atom is attached to a primary carbon atom, making it a primary halide.

Thus, the correct answer is option (a).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q15) Which of the following halogen compounds undergoes the fastest reaction?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The rate of reaction increases with the size of the halogen atom because the size of the halogen atom determines the strength of the bond between the halogen and the carbon atom. Since iodine is the largest halogen, it has the weakest bond with the carbon atom, making it easier for the nucleophile to attack and undergo the reaction.

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q16) Answer the following question with reference to the image.**

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**Type: Image**

**What is the IUPAC name of the below mentioned compound?**

a) 1-Chloro-1-(4-iodophenyl)-3,3-dimethylbut-1-ene

b) 1-Chloro-1-(3-iodophenyl)-2,3-dimethylbut-1-ene

c) 1-Chloro-1-(4-iodophenyl)-1,1-dimethylbut-1-ene

d) 1-Chloro-1-iodo-(4-iodophenyl)-3,3-dimethylbut-1-ene

Correct Answer: Option (a)

Explanation: It is a haloalkene, which means it contains both a halogen atom (chlorine) and a carbon-carbon double bond (alkene). The compound also contains a phenyl group (-) attached to the carbon atom adjacent to the double bond, which has an iodine atom (I) attached to it. Finally, the compound has two methyl groups () attached to the carbon atoms on either side of the double bond.

Thus, the correct answer is option (a).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q17) Which of the following compounds undergoes nucleophilic substitution more easily?**

a) Allyl chloride

b) Vinyl chloride

c) Ethyl chloride

d) Benzyl chloride

Correct Answer: Option (d)

Explanation: Benzyl chloride contains a benzene ring, which increases the electron density on the carbon atom to which the halogen is attached. This makes it easier for the nucleophile to attack and undergo the reaction. Allyl chloride and vinyl chloride have fewer electron-donating groups, making them less reactive, and ethyl chloride is a primary halide, which is less reactive than a secondary or tertiary halide.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q18) Which of the following reactions converts a haloalkane into an alcohol?**

a) Reduction

b) Oxidation

c) Hydrolysis

d) Dehydration

Correct Answer: Option (c)

Explanation: Hydrolysis is a reaction in which a compound reacts with water to form two or more products, one of which is usually water. In the case of a haloalkane, hydrolysis with water results in the formation of an alcohol and a halogen acid. Reduction and oxidation involve a change in the oxidation state of the compound, and dehydration involves the removal of water from the compound.

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q19) Answer the following question with reference to the image.**

**(**[**https://drive.google.com/file/d/1cesb94fhfL1hRHeHPocg0QIcsQ25NsEq/view?usp=sharing**](https://drive.google.com/file/d/1cesb94fhfL1hRHeHPocg0QIcsQ25NsEq/view?usp=sharing) **)**

**Type: Image**

**Which of the following shows geometrical isomerism?**

a) 1.

b) 2.

c) 3.

d) 4.

Correct Answer: Option (c)

Explanation: Geometrical isomerism is a type of stereoisomerism that arises due to the restricted rotation around a double bond or a ring in a molecule. In geometrical isomerism, two or more stereoisomers have the same molecular formula and connectivity of atoms, but differ in the spatial arrangement of atoms in the molecule.

Thus, the correct answer is option (c).

Difficulty Level- Very Hard Bloom's Taxonomy: Apply

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**Q20) Which of the following haloalkanes is most reactive towards nucleophilic substitution?**

a) Chloroethane

b) Bromoethane

c) Iodoethane

d) Fluoroethane

Correct Answer: Option (d)

Explanation: Fluoroalkanes are the most reactive towards nucleophilic substitution reactions because the carbon-fluorine bond is the strongest bond in organic chemistry. Due to the high bond dissociation energy of the bond, it is easier to break the bond, making it easier for the nucleophile to attack the carbon atom. The reactivity of haloalkanes towards nucleophilic substitution reactions follows the trend: .

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q21) Which of the following statements is true about haloarenes?**

a) They contain a halogen atom bonded to a carbon atom.

b) They are more reactive than haloalkanes towards nucleophilic substitution reactions.

c) They have higher boiling points than their corresponding haloalkanes.

d) They are only used as pesticides.

Correct Answer: Option (a)

Explanation: Haloarenes are organic compounds that contain at least one halogen atom (fluorine, chlorine, bromine, or iodine) bonded to an aromatic ring. They are less reactive towards nucleophilic substitution reactions than haloalkanes due to the presence of the aromatic ring, which stabilises the molecule. The boiling point of haloarenes is higher than their corresponding haloalkanes due to the presence of the aromatic ring, which increases the London dispersion forces between the molecules. Haloarenes are used as intermediates in the synthesis of many organic compounds and are also used as pesticides.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q22) Which of the following reactions converts haloalkanes into alcohols?**

a) Nucleophilic substitution

b) Nucleophilic addition

c) Elimination

d) Reduction

Correct Answer: Option (d)

Explanation: Haloalkanes can be converted into alcohols by reduction using reducing agents such as lithium aluminium hydride () or sodium borohydride (). In this reaction, the halogen atom is replaced by a hydrogen atom, resulting in the formation of an alcohol. Nucleophilic substitution, nucleophilic addition, and elimination reactions do not convert haloalkanes into alcohols.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q23) Which of the following statements is true about haloalkanes?**

a) They are more reactive than alkanes

b) They are less reactive than alkanes

c) They are insoluble in water

d) They do not undergo substitution reactions

Correct Answer: Option (a)

Explanation: Haloalkanes have a polar bond, where is a halogen atom. This bond is weaker than the C-H bond in alkanes, making it more reactive. Haloalkanes undergo substitution reactions, where the halogen atom is replaced by another atom or group of atoms.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q24) Which of the following halogen derivatives is used as a refrigerant?**

a) Chloromethane

b) Chloroform

c) Dichloromethane

d) Freon-12

Correct Answer: Option (d)

Explanation: Freon-12 or dichlorodifluoromethane is a haloalkane that is widely used as a refrigerant. It is a stable, non-flammable, and non-toxic gas that has excellent heat transfer properties. A refrigerant is a working fluid used in the refrigeration cycle of air conditioning systems and heat pumps.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q25) Which of the following is the most reactive haloarene towards nucleophilic substitution?**

a) Chlorobenzene

b) Bromobenzene

c) Iodobenzene

d) Fluorobenzene

Correct Answer: Option (c)

Explanation: The reactivity of haloarenes towards nucleophilic substitution follows the order: Fluorobenzene < Chlorobenzene < Bromobenzene < Iodobenzene. This is due to the decreasing electron-withdrawing effect of the halogen atom in the order mentioned.

Thus, the correct answer is option (c).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q26) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/14yHuP-3mdmlokDXC-mocRGtFXSuMPxBY/view?usp=sharing**](https://drive.google.com/file/d/14yHuP-3mdmlokDXC-mocRGtFXSuMPxBY/view?usp=sharing)**)**

**Type: Audio**

**Which of the following statement is true about haloalkanes?**

a) They are highly polar compounds.

b) They undergo nucleophilic substitution reactions readily.

c) They do not react with aqueous .

d) They have high boiling points.

Correct Answer: Option (b)

Explanation: Haloalkanes are highly reactive compounds and undergo nucleophilic substitution reactions easily. This is due to the polar nature of the bond, where is a halogen atom. Haloalkanes also react with aqueous to form alcohols.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q27) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following is not a haloalkane?**

a) Chloroform

b) Ethylene

c) 1-Bromobutane

d) 1-Chlorobutane

Correct Answer: Option (b)

Explanation: Ethylene is an unsaturated hydrocarbon and does not contain any halogen atoms. Chloroform, 1-Bromobutane, and 1-Chlorobutane are all examples of haloalkanes. The haloalkanes, also known as alkyl halides, are a group of chemical compounds comprised of an alkane with one or more hydrogens replaced by a halogen atom.

Thus, the correct answer is option (b).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q28) Which of the following is the major product of the reaction between 2-bromopropane and alcoholic KOH?**

a) Propene

b) 1-Propanol

c) 2-Propanol

d) Propanone

Correct Answer: Option (a)

Explanation: The reaction between 2-bromopropane and alcoholic is an example of an elimination reaction. The major product of this reaction is Propene, which is formed through the elimination of

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q29) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following reactions is an example of an reaction?**

a) The reaction between 1-bromobutane and

b) The reaction between 1-chlorobutane and

c) The reaction between 2-bromopropane and alcoholic

d) The reaction between 1-iodobutane and

Correct Answer: Option (a)

Explanation: The reaction between 1-bromobutane and is an example of an (substitution nucleophilic bimolecular) reaction. In this reaction, the hydroxide ion acts as a nucleophile and attacks the carbon atom attached to the bromine atom, causing the bromine to leave and form a new bond.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q30) Answer the following question with reference to the audio**

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**Type: Audio**

**What is the main difference between haloalkanes and haloarenes?**

a) Haloalkanes contain at least one halogen atom, while haloarenes contain a halogen atom attached to an aromatic ring.

b) Haloalkanes contain a halogen atom attached to an aromatic ring, while haloarenes contain at least one halogen atom.

c) Haloalkanes and haloarenes are the same thing.

d) There is no difference between haloalkanes and haloarenes.

Correct Answer: Option (a)

Explanation: The main difference between haloalkanes and haloarenes is that haloalkanes contain at least one halogen atom attached to an aliphatic carbon chain, while haloarenes contain a halogen atom attached to an aromatic ring.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q31) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following is an example of a secondary haloalkane?**

a) 1-chloro-2-methylpropane

b) 1-chloropropane

c) 2-chlorobutane

d) 1-chlorobutane

Correct Answer: Option (c)

Explanation: 2-chlorobutane is an example of a secondary haloalkane. Secondary haloalkanes have two alkyl groups attached to the carbon atom that is bonded to the halogen. In a secondary (2°) haloalkane, the carbon with the halogen attached is joined directly to two other alkyl groups, which may be the same or different.

Thus, the correct answer is option (c).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q32) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following is not a common use of haloalkanes?**

a) As solvents

b) In the production of plastics

c) In refrigerants

d) In food preservation

Correct Answer: Option (d)

Explanation: Haloalkanes are organic compounds that contain at least one halogen atom (fluorine, chlorine, bromine, or iodine) bonded to a carbon atom. They are used in a variety of industrial applications. Common uses of haloalkanes include as solvents, in the production of plastics, and in refrigerants. However, they are not commonly used in food preservation.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q33) Which of the following is a reaction that can be used to convert a haloalkane to an alcohol?**

a) Nucleophilic substitution

b) Elimination

c) Oxidation

d) Reduction

Correct Answer: Option (a)

Explanation: Nucleophilic substitution is a reaction that can be used to convert a haloalkane to an alcohol. In this reaction, a nucleophile replaces the halogen atom. The general equation for nucleophilic substitution is:

where R represents the organic group, represents the halogen, and represents the nucleophile.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q34) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1F-cHW4G780RCg22I3NDXML2S-rsvyAOa/view?usp=sharing**](https://drive.google.com/file/d/1F-cHW4G780RCg22I3NDXML2S-rsvyAOa/view?usp=sharing)**)**

**Type: Audio**

**Which of the following is not a mechanism of nucleophilic substitution?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: (elimination, unimolecular) is not a mechanism of nucleophilic substitution. (substitution, unimolecular), (substitution, bimolecular), and (elimination, bimolecular) are all mechanisms of nucleophilic substitution. The choice of mechanism depends on the substrate, the nucleophile, and the solvent used. In reactions, the substrate undergoes a unimolecular substitution, while in reactions, the substrate undergoes a bimolecular substitution. In reactions, the substrate undergoes a unimolecular elimination, while in reactions, the substrate undergoes a bimolecular elimination.

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q35) Which of the following is a common solvent used for haloalkanes?**

a) Water

b) Benzene

c) Ethanol

d) Dichloromethane

Correct Answer: Option (d)

Explanation: Dichloromethane (also known as methylene chloride) is a common solvent used for haloalkanes due to its ability to dissolve organic compounds and its low boiling point. Water is not a good solvent for haloalkanes, as they are generally insoluble in water.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q36) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1KZl4eGwbzStkrDW9TmgNxQg5fRwkSXKR/view?usp=sharing**](https://drive.google.com/file/d/1KZl4eGwbzStkrDW9TmgNxQg5fRwkSXKR/view?usp=sharing) **)**

**Type: Audio**

**Which of the following is an example of a primary haloalkane?**

a) 1-chloropropane

b) 2-chloropropane

c) 2-chlorobutane

d) 2-chloropentane

Correct Answer: Option (a)

Explanation: Primary haloalkanes have the halogen atom attached to a primary carbon atom (i.e. a carbon atom that is attached to only one other carbon atom). In 1-chloropropane, the chloro group is attached to the primary carbon atom. 2-chloropropane, 2-chlorobutane, and 2-chloropentane are all secondary or tertiary haloalkanes.

Thus, the correct answer is option (a).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q37) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1eqCOex5McH9VTi9hDbG1QrhQOaoRZnN9/view?usp=sharing**](https://drive.google.com/file/d/1eqCOex5McH9VTi9hDbG1QrhQOaoRZnN9/view?usp=sharing) **)**

**Type: Audio**

**Which of the following is an alkyl halide?**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: Alkyl halides are compounds in which one or more hydrogen atoms in an alkane molecule are replaced by halogen atoms. In this case, is an alkyl halide because one of the hydrogen atoms in ethane is replaced by a chlorine atom.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q38) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1GCPDExVMspb7euf7k9qyMlShnhCJjyUO/view?usp=sharing**](https://drive.google.com/file/d/1GCPDExVMspb7euf7k9qyMlShnhCJjyUO/view?usp=sharing) **)**

**Type: Audio**

**Which of the following is an aryl halide?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: Aryl halides are compounds in which a halogen atom is directly attached to an aromatic ring. In this case, is an aryl halide because a chlorine atom is attached to a benzene ring.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q39) Which of the following reactions involve the formation of a new carbon-halogen bond?**

a) Dehydrohalogenation

b) Nucleophilic substitution

c) Elimination

d) Electrophilic substitution

Correct Answer: Option (b)

Explanation: Nucleophilic substitution is a reaction in which a nucleophile attacks an electron-deficient carbon atom, resulting in the displacement of a leaving group (usually a halogen). In this process, a new carbon-halogen bond is formed.

Dehydrohalogenation and elimination reactions involve the removal of a halogen atom (or a hydrogen halide molecule) from a molecule, but they do not result in the formation of a new carbon-halogen bond.

Electrophilic substitution involves the substitution of a hydrogen atom with an electrophile, such as a halogen, but it does not result in the formation of a new carbon-halogen bond.

Thus, the correct answer is option (b).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q40) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1P6\_lCqO\_q5vH9SVrJGscejVJinjo8Mhy/view?usp=sharing**](https://drive.google.com/file/d/1P6_lCqO_q5vH9SVrJGscejVJinjo8Mhy/view?usp=sharing) **)**

**Type: Audio**

**Which of the following is a primary halide?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: Primary halides are compounds in which the carbon atom bonded to the halogen atom is only bonded to one other carbon atom. In this case, is a primary halide because the carbon atom bonded to the chlorine atom is only bonded to one other carbon atom.

Thus, the correct answer is option (b).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q41) Which of the following is an example of nucleophilic substitution?**

a) Dehydrohalogenation of 2-chloropropane

b) Addition of hydrogen bromide to propene

c) Bromination of benzene

d) Reaction of ammonia with methyl chloride

Correct Answer: Option (d)

Explanation: Nucleophilic substitution reactions involve the replacement of a leaving group (such as a halide ion) with a nucleophile (such as ammonia or hydroxide ion). In this case, the reaction of ammonia with methyl chloride is an example of nucleophilic substitution.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q42) Which of the following is an example of electrophilic substitution?**

a) Dehydrohalogenation of 2-chloropropane

b) Addition of hydrogen bromide to propene

c) Bromination of benzene

d) Reaction of ammonia with methyl chloride

Correct Answer: Option (c)

Explanation: Electrophilic substitution reactions involve the substitution of a hydrogen atom on an aromatic ring with an electrophile (such as a halogen or a nitro group). In this case, the bromination of benzene is an example of electrophilic substitution.

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q43) Which of the following is not a halogen-containing compound?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: Halogen-containing compounds are those compounds that contain halogen atoms, such as fluorine (F), chlorine (Cl), bromine (Br), or iodine (I). does not contain any halogen atoms; it is a strong dehydrating agent and a powerful acid.

Thus, the correct answer is option (b).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q44) Which of the following is not an example of a haloalkane?**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: Haloalkanes are organic compounds that contain at least one halogen atom, such as fluorine (F), chlorine (Cl), bromine (Br), or iodine (I). is not a haloalkane; it is a type of alcohol.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q45) Which of the following is not a characteristic of haloalkanes?**

a) They have a high boiling point.

b) They are non-polar.

c) They are often used as solvents.

d) They are not reactive towards nucleophiles.

Correct Answer: Option (a)

Explanation: Haloalkanes generally have lower boiling points than alkanes due to the presence of polar halogen atoms, which cause weaker intermolecular forces. Haloalkanes are often used as solvents because of their ability to dissolve both polar and non-polar substances. They are generally less reactive towards nucleophiles compared to other organic compounds due to the electron-withdrawing effects of the halogen atoms.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q46) Which of the following is an example of a haloarene?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: Haloarenes are organic compounds that contain at least one halogen atom attached to an aromatic ring, such as benzene. is an example of a haloarene, also known as chlorobenzene.

Thus, the correct answer is option (b).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q47) Which of the following is not a method of preparation of haloalkanes?**

a) Halogenation of alkanes

b) Addition of halogens to alkenes

c) Nucleophilic substitution of alcohols

d) Hydrolysis of alkenes

Correct Answer: Option (d)

Explanation: Haloalkanes can be prepared by the halogenation reaction of alkanes, the addition reaction of halogens to alkenes, and the nucleophilic substitution of alcohols. Hydrolysis of alkenes does not produce haloalkanes.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q48) Which of the following is not a characteristic of haloarenes?**

a) They are often used as solvents.

b) They have a lower boiling point than haloalkanes.

c) They are generally less reactive than haloalkanes.

d) They are more stable than haloalkanes.

Correct Answer: Option (b)

Explanation: Haloarenes generally have higher boiling points than haloalkanes due to the presence of the aromatic ring, which causes stronger intermolecular forces. They are often used as solvents and are generally less reactive towards nucleophiles compared to haloalkanes. Haloarenes are more stable than haloalkanes due to the resonance stabilisation of the aromatic ring.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q49) Which of the following factors increases the rate of nucleophilic substitution of haloalkanes?**

a) Increasing the size of the halogen atom

b) Increasing the branching of the alkyl chain

c) Increasing the strength of thebond

d) Decreasing the polarity of the solvent

Correct Answer: Option (b)

Explanation: Increasing the branching of the alkyl chain adjacent to the halogen atom sterically hinders the approach of the nucleophile to the carbon atom, decreasing the rate of reaction. However, increasing the branching further away from the halogen atom increases the rate of reaction by destabilising the transition state, making it easier for the nucleophile to attack the carbon atom.

Increasing the size of the halogen atom, increasing the strength of the bond, and decreasing the polarity of the solvent all decrease the rate of nucleophilic substitution of haloalkanes.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q50) Which of the following is not a method for the preparation of haloarenes?**

a) Sandmeyer's reaction

b) Gattermann reaction

c) Wurtz-Fittig reaction

d) Williamson's synthesis

Correct Answer: Option (d)

Explanation: Williamson's synthesis is a method for the preparation of ethers and does not involve the formation of haloarenes. Sandmeyer's reaction, Gattermann reaction, and Wurtz-Fittig reaction are methods for the preparation of haloarenes.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q51) Answer the following question with reference to the image.**

**(**[**https://drive.google.com/file/d/1aWvJ8qG\_SB5JYOkFNk4Spzt1O9bqB7\_V/view?usp=sharing**](https://drive.google.com/file/d/1aWvJ8qG_SB5JYOkFNk4Spzt1O9bqB7_V/view?usp=sharing) **)**

**Type: Image**

**The given reaction can be classified as:**

a) Gatterman-koch reaction

b) Etard reaction

c) Rosenmund reaction

d) Williamson ether synthesis reaction

Correct Answer: Option (d)

Explanation: The Williamson ether synthesis is a widely used organic reaction that involves the formation of an ether from an alkyl halide (or a tosylate) and an alkoxide ion (or a phenoxide ion) in the presence of a strong base. The general reaction can be represented as:

where and represent alkyl or aryl groups, and is a leaving group (usually a halide ion).

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q52) Answer the following question with reference to the image.**

**(**[**https://drive.google.com/file/d/12XA6pMNPY6GfIRYKOPSYk9BWg\_DL0usT/view?usp=sharing**](https://drive.google.com/file/d/12XA6pMNPY6GfIRYKOPSYk9BWg_DL0usT/view?usp=sharing) **)**

**Type: Image**

**What is the IUPAC name of the compound?**

a) 1-Phenylpropan-1-ol

b) 2-Phenylpropan-1-ol

c) 2-Phenylpropan-2-ol

d) 1-Phenylpropan-2-ol

Correct Answer: Option (d)

Explanation: 1-Phenylpropan-2-ol is an organic compound with the chemical formula . The compound consists of a phenyl group (a benzene ring) attached to a carbon chain that contains a hydroxyl group () and is located at the second carbon atom from the end of the chain.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q53) Which of the following is an example of secondary alcohol?**

a) Methanol

b) Ethanol

c) 2-Propanol

d) 1-Propanol

Correct Answer: Option (c)

Explanation: Secondary alcohols have an group attached to the carbon atom that is attached to two other carbon atoms. 2-Propanol is an example of secondary alcohol as the group is attached to the carbon atom which is attached to two other carbon atoms.

Thus, the correct answer is option (c).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q54) The IUPAC name of is:**

a) Ethanol

b) Methanol

c) Propanol

d) Butanol

Correct Answer: Option (a)

Explanation: The IUPAC name of is ethyl alcohol or ethanol. It is an example of primary alcohol as the group is attached to the carbon atom that is attached to only one other carbon atom.

Thus, the correct answer is option (a).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q55) Which of the following compounds is most soluble in water?**

a) Propan-1-ol

b) Phenol

c) Diethyl ether

d) Butan-2-ol

Correct Answer: Option (b)

Explanation: Phenol is more soluble in water than the other compounds because it can form hydrogen bonds with water molecules through its group. Propan-1-ol and butan-2-ol can also form hydrogen bonds with water, but their longer hydrophobic hydrocarbon chains make them less soluble in water than phenol. Diethyl ether cannot form hydrogen bonds with water, making it the least soluble in water among the given compounds.

Thus, the correct answer is option (b).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q56) Which of the following functional groups is present in both alcohol and phenol?**

a) Carbonyl group

b) Carboxyl group

c) Hydroxyl group

d) Amine group

Correct Answer: Option (c)

Explanation: Both alcohol and phenol have a hydroxyl group as their functional group. However, the difference between the two is the location of the hydroxyl group in their structure. In alcohols, the hydroxyl group is attached to a saturated carbon atom, while in phenols, the hydroxyl group is attached to an aromatic ring.

Thus, the correct answer is option (c).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q57) Which of the following is an example of primary aromatic alcohol?**

a) Methanol

b) Ethanol

c) Phenol

d) Benzyl alcohol

Correct Answer: Option (d)

Explanation: Primary aromatic alcohols have angroup attached to the carbon atom that is attached to only one other carbon atom, and this carbon atom is attached to an aromatic ring. Benzyl alcohol is an example of primary aromatic alcohol.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q58) Which of the following is not a property of alcohols?**

a) They can form hydrogen bonds.

b) They have a higher boiling point than alkanes of similar molecular weight.

c) They have a lower boiling point than aldehydes and ketones.

d) They have a sweet smell.

Correct Answer: Option (c)

Explanation: Alcohols have a higher boiling point than alkanes of similar molecular weight due to their ability to form hydrogen bonds, but they have a lower boiling point than aldehydes and ketones due to the absence of a polar carbonyl group. Alcohols can have a sweet smell, but this is not a defining property.

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q59) Which of the following compounds will have the strongest hydrogen bonding interactions?**

a) Methanol

b) Ethanol

c) 1-Propanol

d) 1-Butanol

Correct Answer: Option (d)

Explanation: The strength of hydrogen bonding interactions depends on the size and polarity of the molecule. The larger the molecule, the more sites there are for hydrogen bonding to occur. The more polar the molecule, the stronger the hydrogen bonding will be.

Among the given options, 1-butanol is the largest and most polar due to the presence of a long hydrocarbon chain and a hydroxyl group. Therefore, it will have the strongest hydrogen bonding interactions. Methanol and ethanol are smaller in size and have weaker hydrogen bonding interactions. 1-Propanol is larger than ethanol but smaller than 1-butanol, so it will have weaker hydrogen bonding interactions than 1-butanol.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q60) Which of the following is a secondary alcohol?**

a) Methanol

b) Ethanol

c) Propanol

d) Isopropyl alcohol

Correct Answer: Option (d)

Explanation: Secondary alcohols have a hydroxyl group attached to a carbon atom that is bonded to two other carbon atoms. In the isopropyl alcohol, the hydroxyl group is attached to a carbon atom that is bonded to two other carbon atoms, making it a secondary alcohol.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q61) What is the general formula of alcohols?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: The general formula of alcohols indicates the number and types of atoms present in a molecule of any alcohol. It is represented by , where n is the number of carbon atoms in the molecule.

Thus, the correct answer is option (b).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q62) Which of the following is not a characteristic property of alcohols?**

a) They are polar molecules

b) They can form hydrogen bonds with water

c) They have higher boiling points than corresponding alkanes

d) They undergo nucleophilic substitution reactions

Correct Answer: Option (d)

Explanation: Alcohols are a class of organic compounds containing a hydroxyl group attached to a carbon atom. They are polar molecules due to the presence of the group and can form hydrogen bonds with water. This makes them soluble in water and also increases their boiling points compared to corresponding alkanes. Alcohols undergo nucleophilic substitution reactions, but this is not a characteristic property of alcohols since other functional groups can also undergo nucleophilic substitution reactions.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q63) Which of the following is an example of a primary alcohol?**

a) 2-propanol

b) 2-butanol

c) 1-propanol

d) 2-Methylbutanol

Correct Answer: Option (c)

Explanation: Primary alcohols have the group attached to a primary carbon atom (which is bonded to only one other carbon atom). In 1-propanol, the group is attached to the primary carbon atom, making it a primary alcohol. Methanol is not a primary alcohol as it has only one carbon atom. 2-propanol and 2-butanol are secondary alcohols as the group is attached to a secondary carbon atom.

Thus, the correct answer is option (c).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q64) Which of the following is the most acidic phenol?**

a) p-nitrophenol

b) p-methoxyphenol

c) phenol

d) p-bromophenol

Correct Answer: Option (a)

Explanation: Phenols are acidic due to the presence of the group, which can donate a proton () to form the phenoxide ion. The acidity of phenols is affected by the substituents on the phenyl ring. In p-nitrophenol, the nitro (-) group is electron-withdrawing, which stabilises the phenoxide ion, making it easier to donate a proton. So, p-nitrophenol is the most acidic phenol. In p-methoxyphenol, the methoxy (-) group is electron-donating, making it less acidic than phenol. In p-bromophenol, the bromine atom is also electron-withdrawing, but not as much as the nitro group.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q65) Which of the following reactions can be used to prepare ether?**

a) Williamson synthesis

b) Clemmensen reduction

c) Grignard reaction

d) Cannizzaro reaction

Correct Answer: Option (a)

Explanation: Ether can be prepared by the Williamson synthesis, which involves the reaction of an alkoxide ion with an alkyl halide. In this reaction, the alkoxide ion acts as a nucleophile and attacks the alkyl halide, displacing the halide ion and forming the ether.

Clemmensen reduction is used to reduce ketones and aldehydes to alkanes. Grignard reaction is used to prepare alcohols and other functional groups. Cannizzaro reaction is used to convert aldehydes into alcohols and carboxylic acids.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q66) Which of the following alcohols will react most rapidly with Lucas reagent?**

a) 1-propanol

b) 2-propanol

c) 1-butanol

d) 2-butanol

Correct Answer: Option (d)

Explanation: Lucas reagent is a mixture of concentrated hydrochloric acid and zinc chloride, which is used to distinguish between primary, secondary, and tertiary alcohols. It reacts readily with tertiary alcohols and gives a cloudy solution, while it reacts slowly with secondary alcohols and gives a turbid solution. Primary alcohols do not react with Lucas reagent. 2-butanol is a secondary alcohol and will react more rapidly than 1-propanol, which is a primary alcohol.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q67) Which of the following statements is true regarding phenols?**

a) They are stronger acids than alcohols

b) They are weaker acids than alcohols

c) They are neutral

d) None of the above

Correct Answer: Option (a)

Explanation: Phenols contain a hydroxyl group attached to an aromatic ring. The presence of the aromatic ring stabilises the phenoxide ion formed after losing a proton from the hydroxyl group. This stabilisation makes phenols stronger acids than alcohols.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q68) Which of the following reactions is not possible for phenols?**

a) Bromination

b) Nitration

c) Friedel-Crafts acylation

d) Cannizzaro reaction

Correct Answer: Option (d)

Explanation: The Cannizzaro reaction is not possible for phenols as they do not have alpha-hydrogens required for the reaction to occur.

The other reactions mentioned, bromination, nitration, and Friedel-Crafts acylation, are all possible for phenols.

Bromination and nitration reactions involve the substitution of a hydrogen atom with a bromine or nitro group, respectively, while Friedel-Crafts acylation involves the addition of an acyl group to the aromatic ring.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q69) Which of the following alcohols cannot be oxidised to a ketone?**

a) Ethanol

b) Isopropanol

c) 2-methyl-2-propanol

d) 2-butanol

Correct Answer: Option (c)

Explanation: 2-methyl-2-propanol is a tertiary alcohol, which cannot be oxidised to a ketone by any oxidising agent. On the other hand, ethanol, isopropanol, and 2-butanol are primary or secondary alcohols that can be oxidised to ketones using oxidising agents such as potassium permanganate or chromic acid.

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q70) Which of the following compounds is a secondary ether?**

a) Diethyl ether

b) Methyl propyl ether

c) Ethyl methyl ether

d) Dimethyl ether

Correct Answer: Option (b)

Explanation: Methyl propyl ether is a secondary ether because it has two alkyl groups attached to the oxygen atom. Diethyl ether and ethyl methyl ether are both primary ethers because they have only one alkyl group attached to the oxygen atom. Dimethyl ether is a symmetrical ether, also known as methoxymethane.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q71) Which of the following is a secondary alcohol?**

a) Propan-1-ol

b) Propan-2-ol

c) Butan-1-ol

d) Butan-2-ol

Correct Answer: Option (d)

Explanation: The classification of alcohols is based on the number of alkyl groups attached to the carbon atom that is attached to the hydroxyl group . In this case, propan-1-ol and propan-2-ol are primary alcohols as the carbon atom attached to the group has only one alkyl group attached to it. Butan-1-ol is a primary alcohol too. Butan-2-ol, on the other hand, has a secondary carbon atom attached to the group, which means it is a secondary alcohol.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q72) Which of the following is a major product of the reaction of phenol with bromine water?**

a) 2,4,6-tribromophenol

b) 2-bromophenol

c) 4-bromophenol

d) No reaction takes place

Correct Answer: Option (a)

Explanation: Phenol reacts with bromine water in the presence of a mild oxidising agent like or to form 2,4,6-tribromophenol as the major product. This is due to the substitution reaction of the hydrogen atoms on the aromatic ring with bromine atoms. The presence of a mild oxidising agent is necessary to activate the ring and make it more susceptible to the attack by the bromine atoms.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q73) Which of the following is an example of an ether?**

a) Methanol

b) Ethanol

c) Diethyl ether

d) Phenol

Correct Answer: Option (c)

Explanation: An ether is a compound in which an oxygen atom is bonded to two alkyl or aryl groups. Methanol and ethanol are alcohols, and phenol is an aromatic compound containing a hydroxyl group . Diethyl ether, on the other hand, has two ethyl groups attached to the oxygen atom, making it an example of an ether.

Thus, the correct answer is option (c).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q74) Which of the following is an example of a tertiary alcohol?**

a) Ethanol

b) 2-propanol

c) 2-methyl-2-propanol

d) Methanol

Correct Answer: Option (c)

Explanation: A tertiary alcohol is an alcohol in which the carbon atom attached to the -OH group has three alkyl groups attached to it. In this case, ethanol and methanol are primary alcohols, and 2-propanol is a secondary alcohol as the carbon atom attached to the group has two alkyl groups attached to it. 2-methyl-2-propanol has three alkyl groups attached to the carbon atom, making it a tertiary alcohol.

Thus, the correct answer is option (c).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q75) Which of the following is a characteristic property of phenols?**

a) They are acidic in nature

b) They have a fruity odour

c) They are colourless liquids

d) They have high solubility in water

Correct Answer: Option (a)

Explanation: Phenols are acidic in nature due to the presence of the hydroxyl group (-OH) attached to the aromatic ring. This group can donate a hydrogen ion () to the surrounding medium, making phenols acidic. They do not have a fruity odour, but rather have a characteristic odour that varies depending on the substitution pattern on the aromatic ring. They are usually colourless.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q76) What happens when primary alcohols are oxidised with acidified potassium dichromate ()?**

a) Primary alcohols are not oxidised with

b) Primary alcohols are oxidised to aldehydes

c) Primary alcohols are oxidised to ketones

d) Primary alcohols are oxidised to carboxylic acids

Correct Answer: Option (d)

Explanation: When primary alcohols are oxidised with acidified potassium dichromate (), they undergo complete oxidation and are converted into carboxylic acids. This reaction is a very important oxidation reaction in organic chemistry and is often used to convert primary alcohols into carboxylic acids. Secondary alcohols are oxidised to ketones, while tertiary alcohols cannot be oxidised by this method.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q77) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1do-yjfy1l62pR8BIv8hMS9KU4xK57zU9/view?usp=sharing**](https://drive.google.com/file/d/1do-yjfy1l62pR8BIv8hMS9KU4xK57zU9/view?usp=sharing)**)**

**Type: Audio**

**Which of the following is an example of a tertiary alcohol?**

a) Ethanol

b) Propan-2-ol

c) Butan-1-ol

d) 2-Methylpropan-2-ol

Correct Answer: Option (d)

Explanation: A tertiary alcohol has three alkyl groups attached to the carbon atom bearing the hydroxyl group. Ethanol is a primary alcohol, propan-2-ol is a secondary alcohol, butan-1-ol is a primary alcohol, while 2-Methylpropan-2-ol is a tertiary alcohol.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q78) What is the reaction of phenol with sodium hydroxide** ) **called?**

a) Electrophilic substitution

b) Nucleophilic substitution

c) Acid-base neutralization

d) Oxidation

Correct Answer: Option (c)

Explanation: Phenol is a weak acid and reacts with strong bases such as sodium hydroxide (NaOH) to form a salt and water. This reaction is called acid-base neutralization. The reaction can be represented as follows:

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q79) What is the main difference between alcohols and ethers?**

a) Alcohols have a hydroxyl (-OH) group, while ethers have an ether (-O-) linkage.

b) Alcohols are more soluble in water than ethers.

c) Alcohols are less reactive than ethers.

d) Alcohols are less volatile than ethers.

Correct Answer: Option (a)

Explanation: Alcohols and ethers are both organic compounds that contain oxygen atoms. However, alcohols have a hydroxyl group attached to a carbon atom, while ethers have an etherlinkage between two carbon atoms. Alcohols are more soluble in water than ethers due to the presence of the polar hydroxyl group, while ethers are less reactive than alcohols. Ethers are also more volatile than alcohols due to the absence of the polar hydroxyl group.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q80) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1RmPsmMzOGgCIWolj-dUB0CV83cPb0bRi/view?usp=sharing**](https://drive.google.com/file/d/1RmPsmMzOGgCIWolj-dUB0CV83cPb0bRi/view?usp=sharing)**)**

**Type: Audio**

**Which of the following is an example of a secondary alcohol?**

a) Ethanol

b) Propanol

c) Butanol

d) Isopropyl alcohol

Correct Answer: Option (d)

Explanation: Isopropyl alcohol, also known as 2-propanol, is a secondary alcohol as it has two carbon atoms bonded to the hydroxyl group. Ethanol and propanol are primary alcohols, whereas butanol is a primary alcohol with a longer carbon chain.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q81) Which of the following is not a physical property of ethers?**

a) Ethers have a pleasant, sweet odour.

b) Ethers are polar and have a high boiling point.

c) Ethers are less dense than water.

d) Ethers are generally unreactive with other substances.

Correct Answer: Option (b)

Explanation: Ethers are generally nonpolar and have a lower boiling point than alcohols of similar molecular weight. They have a pleasant, sweet odour and are less dense than water. Ethers can undergo various chemical reactions such as cleavage, oxidation, and reduction.

Thus, the correct answer is option (b).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q82) Which of the following statements is not true for alcohols?**

a) Alcohols can act as both acids and bases.

b) Alcohols can be synthesized by the hydration of alkenes.

c) Alcohols can undergo dehydration to form alkenes.

d) Alcohols can undergo nucleophilic substitution reactions.

Correct Answer: Option (a)

Explanation: Alcohols can act as weak acids, donating a proton () to a base, but they cannot act as bases since they do not have a lone pair of electrons to donate. Alcohols can be synthesized by the hydration of alkenes, undergo dehydration to form alkenes, and can undergo nucleophilic substitution reactions.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q83) What is the general formula for alcohols?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: The general formula for alcohols is , where R represents any organic group. The hydroxyl group is attached to a carbon atom in the molecule, and the carbon atom is bonded to one or more other organic groups.

Thus, the correct answer is option (b).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q84) Which of the following is a primary alcohol?**

a) 1-propanol

b) 2-propanol

c) Tert-butanol

d) 2-butanol

Correct Answer: Option (a)

Explanation: A primary alcohol has the hydroxyl group attached to a carbon atom that is bonded to only one other carbon atom. 1-propanol has the hydroxyl group attached to the first carbon atom in the chain, which is bonded to only one other carbon atom. In contrast, 2-propanol, Tert-butanol, and 2-butanol are secondary or tertiary alcohol alcohols because their hydroxyl groups are attached to carbon atoms that are bonded to two or three other carbon atoms.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q85) Answer the following question with reference to the image.**

**(**[**https://drive.google.com/file/d/1OeBkSemj08xoqok46ChVwg7txwOW3ob7/view?usp=sharing**](https://drive.google.com/file/d/1OeBkSemj08xoqok46ChVwg7txwOW3ob7/view?usp=sharing) **)**

**Type: Image**

**Name the catalyst used in this reaction?**

a) Ethanol

b)

c) PCC

d)

Correct Answer: Option (d)

Explanation: (lithium aluminium hydride) is a powerful reducing agent used in organic chemistry to reduce a wide range of functional groups. It is a white or greyish crystalline powder that is highly reactive and can react violently with water, alcohols, and other protic solvents.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q86) Which of the following is a common use of ethers?**

a) As solvents

b) As fuels

c) As fragrances

d) As food additives

Correct Answer: Option (a)

Explanation: Ethers are commonly used as solvents in a variety of applications, such as in the production of pharmaceuticals, perfumes, and lacquers. They are known for their ability to dissolve a wide range of organic and inorganic compounds and their low toxicity.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q87) What is the general formula for ethers?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The general formula for ethers is , where R and R' represent any organic groups. Ethers have two organic groups bonded to an oxygen atom, which is in turn bonded to two other organic groups. This structure makes ethers relatively unreactive, which is one of the reasons they are used as solvents.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q88) Which of the following statement is incorrect for Phenol?**

a) It is an aromatic compound

b) It is soluble in water

c) It is less acidic than ethanol

d) It is used in the preparation of various chemicals

Correct Answer: Option (c)

Explanation: Phenol is more acidic than ethanol due to the presence of the electron-withdrawing group (-OH) in its structure, which stabilizes the phenoxide ion formed after deprotonation. Ethanol, on the other hand, is a weaker acid because the hydroxyl group is not attached to an aromatic ring.

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q89) Which of the following is true for primary alcohols?**

a) They undergo oxidation to form aldehydes

b) They cannot be oxidized

c) They undergo oxidation to form carboxylic acids

d) They undergo oxidation to form ketones

Correct Answer: Option (c)

Explanation: Primary alcohols can undergo oxidation with strong oxidizing agents such as potassium dichromate or potassium permanganate to form carboxylic acids. Secondary alcohols are oxidized to form ketones, while tertiary alcohols cannot be oxidized.

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q90) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1jnczY6dBPIY7TYkfLUIPtRZHw9gaG877/view?usp=sharing**](https://drive.google.com/file/d/1jnczY6dBPIY7TYkfLUIPtRZHw9gaG877/view?usp=sharing)**)**

**Type: Audio**

**Which of the following statements is incorrect for Williamson synthesis?**

a) It is used for the preparation of ethers

b) It involves the reaction of an alkyl halide with an alcohol

c) It is an acid-catalysed reaction

d) It is a nucleophilic substitution reaction

Correct Answer: Option (c)

Explanation: Williamson synthesis is not an acid-catalysed reaction, but a nucleophilic substitution reaction. It involves the reaction of an alkyl halide with an alcohol in the presence of a strong base such as sodium or potassium hydroxide.

Thus, the correct answer is option (c).

Difficulty Level- Very Hard Bloom's Taxonomy: Apply

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**Q91) Which of the following is true for phenols?**

a) They do not react with sodium bicarbonate solution

b) They are weaker acids than alcohols

c) They do not undergo esterification

d) They undergo electrophilic substitution reactions

Correct Answer: Option (d)

Explanation: Phenols undergo electrophilic substitution reactions due to the presence of the electron-rich benzene ring in their structure. They react with sodium bicarbonate solution to produce carbon dioxide gas, and are stronger acids than alcohols. They can undergo esterification reactions with carboxylic acids.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q92) Which of the following alcohols will undergo dehydration most easily?**

a) 1-butanol

b) 2-butanol

c) 2-methyl-1-propanol

d) 1-pentanol

Correct Answer: Option (b)

Explanation: The ease of dehydration of an alcohol depends on the stability of the intermediate carbocation formed during the reaction. The more stable the carbocation, the easier the dehydration. In the case of 2-butanol, the intermediate carbocation formed is a secondary carbocation, which is more stable than the primary carbocation formed in the case of 1-butanol and 1-pentanol. 2-methyl-1-propanol will also form a secondary carbocation, but the presence of the methyl group hinders the dehydration process.

Thus, the correct answer is option (b).

Difficulty Level- Very Hard Bloom's Taxonomy: Apply

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**Q93) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following is not a primary alcohol?**

a) Methanol

b) Ethanol

c) 1-propanol

d) 2-propanol

Correct Answer: Option (d)

Explanation: A primary alcohol has the -OH group attached to a carbon atom that is attached to only one other carbon atom. Methanol, ethanol and 1-propanol are all primary alcohols as they have the -OH group attached to a primary carbon atom. However, 2-propanol has the -OH group attached to a secondary carbon atom, making it a secondary alcohol.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q94) Phenol reacts with sodium hydroxide to form:**

a) Phenoxide ion

b) Phenylamine

c) Phenylacetic acid

d) Phenyl chloride

Correct Answer: Option (a)

Explanation: Phenol reacts with sodium hydroxide to form sodium phenoxide and water. The phenoxide ion is formed due to the deprotonation of the group of phenol by the strong base, sodium hydroxide.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q95) Which of the following ethers will not undergo cleavage by ?**

a) Dimethyl ether

b) Ethyl methyl ether

c) Diethyl ether

d) Methyl tert-butyl ether

Correct Answer: Option (d)

Explanation: Ethers can be cleaved by strong acids such as . The cleavage reaction involves the protonation of the oxygen atom, followed by the attack of the iodide ion to form an alcohol and an alkyl iodide. In the case of methyl tert-butyl ether, the tert-butyl group is a bulky group, which hinders the attack of the iodide ion on the oxygen atom.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q96) Which of the following is not an application of phenols?**

a) As antiseptics and disinfectants

b) In the manufacture of plastics and resins

c) In the production of dyes and pigments

d) In the production of ethanol

Correct Answer: Option (d)

Explanation: Phenols have a wide range of applications such as antiseptics and disinfectants, in the manufacture of plastics and resins, in the production of dyes and pigments, as well as in the production of drugs and explosives. However, phenols are not used in the production of ethanol.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q97) Which of the following alcohols can be oxidized to a ketone but not to a carboxylic acid?**

a) Ethanol

b) Isopropyl alcohol

c) Tertiary butyl alcohol

d) 2-butanol

Correct Answer: Option (c)

Explanation: Tertiary butyl alcohol (TBA) is a tertiary alcohol and cannot be further oxidized to a carboxylic acid. However, TBA can be oxidized to a ketone using strong oxidizing agents such as potassium permanganate or chromic acid. Ethanol, isopropyl alcohol, and 2-butanol are all secondary alcohols and can be oxidized to ketones and further to carboxylic acids.

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q98) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1vkSe89KOKANr22kkjeBlCn4oWYWCaDsd/view?usp=sharing**](https://drive.google.com/file/d/1vkSe89KOKANr22kkjeBlCn4oWYWCaDsd/view?usp=sharing) **)**

**Type: Audio**

**Which of the following is not an example of a phenol?**

a) Catechol

b) Resorcinol

c) Hydroquinone

d) Benzyl alcohol

Correct Answer: Option (d)

Explanation: Phenols are compounds in which a hydroxyl group is attached to a benzene ring. Catechol, resorcinol, and hydroquinone are all examples of phenols as they contain hydroxyl groups attached to a benzene ring. Benzyl alcohol, on the other hand, is an alcohol in which a hydroxyl group is attached to a carbon atom that is attached to a benzene ring.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q99) Which of the following is not a reaction of phenol?**

a) Electrophilic substitution

b) Nucleophilic substitution

c) Esterification

d) Oxidation

Correct Answer: Option (b)

Explanation: Phenol undergoes electrophilic substitution reactions due to the presence of the electron-rich benzene ring. Esterification and oxidation are also possible reactions of phenol. However, nucleophilic substitution is not a reaction of phenol as thegroup of phenol is a poor leaving group and cannot be easily replaced by a nucleophile.

Thus, the correct answer is option (b).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q100) Which of the following compounds will undergo oxidation reaction most easily?**

a) Phenol

b) Diethyl ether

c) 2-propanol

d) Butanal

Correct Answer: Option (c)

Explanation: The ease of oxidation reaction depends on the presence of hydrogen atoms attached to the carbon atom next to the hydroxyl group () in alcohols. The presence of such hydrogen atoms allows for the formation of an aldehyde or ketone upon oxidation.

Among the given options, 2-propanol has the highest number of such hydrogen atoms (3), making it the most easily oxidizable. Phenol and diethyl ether do not have such hydrogen atoms and cannot undergo oxidation. Butanal has only one such hydrogen atom and is less easily oxidizable than 2-propanol.

Thus, the correct answer is option (b).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q101) What is the general formula for ketones?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: The general formula for aldehydes is where R can be any alkyl or aryl group. For ketones, the general formula is where both R and R' can be alkyl or aryl groups. The common feature of both aldehydes and ketones is the presence of a carbonyl group () which gives them similar chemical properties.

Thus, the correct answer is option (b).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q102) Which of the following compounds is an aldehyde?**

a) Butanone

b) Propanal

c) Acetic acid

d) Methanoic acid

Correct Answer: Option (b)

Explanation: Propanal is an aldehyde with the chemical formula . It has a carbonyl group at the end of the carbon chain, which is a characteristic feature of aldehydes. Butanone is a ketone, while acetic acid and methanoic acid are carboxylic acids.

Thus, the correct answer is option (b).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q103) Which of the following reactions is used for the oxidation of primary alcohols to aldehydes?**

a) Jones oxidation

b) Tollens' test

c) Fehling's test

d) PCC oxidation

Correct Answer: Option (d)

Explanation: PCC (pyridinium chlorochromate) oxidation is a mild and selective method for the oxidation of primary alcohols to aldehydes. Jones oxidation, Tollens' test, and Fehling's test are all used for the detection of aldehydes, but they are not used for the selective oxidation of alcohols to aldehydes.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q104) Which of the following compounds will give a positive Fehling's test?**

a) Ethanal

b) Methanal

c) Propanal

d) Butanal

Correct Answer: Option (a)

Explanation: Fehling's test is a common test for the detection of aldehydes, which involves the reduction of ions to ions. Ethanal is an aldehyde and will give a positive Fehling's test, while methanal and propanal will also give a positive test. Butanal is a ketone and will not give a positive test.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q105) Answer the following question with reference to the image.**

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**Type: Image**

**Which of the following electrophile is involved in the given reaction?**

a) Dichlorocarbene

b) carbocation

c) halogen

d) Dichloromethyl anion

Correct Answer: Option (a)

Explanation: Dichlorocarbene is a reactive intermediate in organic chemistry with the formula . It is generated by treating chloroform () with a strong base such as sodium or potassium hydroxide in the presence of a phase transfer catalyst. The reaction proceeds through a base-induced elimination of HCl from chloroform, resulting in the formation of dichlorocarbene.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q106) Which of the following reagents can be used to distinguish between an aldehyde and a ketone?**

a) Tollen's reagent

b) Benedict's reagent

c) Fehling's reagent

d) Schiff's reagent

Correct Answer: Option (a)

Explanation: Tollen's reagent is a solution of silver nitrate in aqueous ammonia. When Tollen's reagent is added to an aldehyde, it is oxidized to a carboxylic acid while silver ions in the reagent are reduced to metallic silver, giving a shiny silver mirror on the inner surface of the test tube. In contrast, ketones do not react with Tollen's reagent under normal conditions. Hence, Tollen's reagent can be used to distinguish between aldehydes and ketones.

Benedict's reagent and Fehling's reagent are used to test for the presence of reducing sugars, not aldehydes or ketones. Schiff's reagent is used to test for the presence of aldehydes but cannot distinguish between aldehydes and ketones.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q107) Which of the following compounds can form an enol tautomer?**

a) Acetaldehyde

b) Acetone

c) Ethanal

d) Propanone

Correct Answer: Option (d)

Explanation: Enol tautomers are keto-enol isomers that can exist in equilibrium with each other. Propanone, also known as acetone, can form an enol tautomer in the presence of an acid or base catalyst. The enol form of acetone has a hydroxyl group attached to one of its carbon atoms, making it an alcohol.

Acetaldehyde and ethanal do not have a hydrogen atom attached to their carbonyl carbon, so they cannot form an enol tautomer. Acetone and ethanal are both ketones, but only acetone can form an enol tautomer.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q108) Which of the following acids has the strongest acidic character?**

a) Ethanoic acid

b) Methanoic acid

c) Propanoic acid

d) Butanoic acid

Correct Answer: Option (d)

Explanation: The strength of an acid is determined by its ability to donate a proton ( ion). The acidity of a carboxylic acid increases with increasing number of carbon atoms in the molecule due to the electron-withdrawing effect of the carbonyl group . This electron-withdrawing effect is stronger when there are more carbon atoms attached to the carbonyl group, making the acid more acidic.

Butanoic acid has the most carbon atoms among the given acids, making it the strongest acid.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q109) Which of the following is a characteristic property of aldehydes and ketones?**

a) They are soluble in water

b) They are highly reactive

c) They have a sharp, pungent odour

d) They are highly viscous

Correct Answer: Option (c)

Explanation: Aldehydes and ketones have a characteristic sharp, pungent odour which is due to the presence of a carbonyl group () in their structure. This odour is often described as sweet, fruity, or floral. The presence of the carbonyl group also makes aldehydes and ketones highly reactive, but they are not generally considered highly viscous. They are usually soluble in water, especially when the molecule is small.

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q110) Which of the following is the common name for ethanal?**

a) Acetone

b) Acetaldehyde

c) Methanal

d) Butanal

Correct Answer: Option (b)

Explanation: Ethanal is also known as acetaldehyde, and it is an aldehyde with the chemical formula . Acetone is a ketone with the chemical formula , and methanal (also known as formaldehyde) has the chemical formula . Butanal is another aldehyde, but it has a longer carbon chain than ethanal.

Thus, the correct answer is option (b).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q111) Which of the following is an example of a dicarboxylic acid?**

a) Acetic acid

b) Oxalic acid

c) Propionic acid

d) Butanoic acid

Correct Answer: Option (b)

Explanation: Dicarboxylic acids have two carboxylgroups in their structure. Oxalic acid () is an example of a dicarboxylic acid, as it has two carboxyl groups. Acetic acid (), propionic acid , and butanoic acid () are all monocarboxylic acids, as they only have one carboxyl group.

Thus, the correct answer is option (b).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q112) Which of the following reactions is used to prepare carboxylic acids from primary alcohols?**

a) Reduction

b) Oxidation

c) Hydrolysis

d) Condensation

Correct Answer: Option (b)

Explanation: Primary alcohols can be oxidized to carboxylic acids using an oxidizing agent such as potassium dichromate () or sodium hypochlorite (). This reaction involves the loss of two hydrogen atoms and the addition of an oxygen atom to the carbon chain. Reduction involves the addition of hydrogen atoms, hydrolysis involves the use of water to break a bond, and condensation involves the loss of a small molecule (such as water) to form a larger molecule.

Thus, the correct answer is option (b).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q113) Which of the following is an example of a keto-enol tautomerism?**

a) Acetone

b) Propanal

c) Butanone

d) Methanal

Correct Answer: Option (a)

Explanation: Keto-enol tautomerism is a phenomenon where a molecule exists in two forms, one with a carbonyl group (keto form) and one with a hydroxyl group (enol form). Acetone () is an example of a molecule that can exhibit keto-enol tautomerism. In the presence of a base, the enol form can be stabilized and the equilibrium can shift towards the enol form.

Thus, the correct answer is option (a).

Difficulty Level- Very Hard Bloom's Taxonomy: Apply

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**Q114) Answer the following question with reference to the image.**

**(**[**https://drive.google.com/file/d/1j22TQwrz3EP7oax22RUqSjOVZAuEuIVL/view?usp=sharing**](https://drive.google.com/file/d/1j22TQwrz3EP7oax22RUqSjOVZAuEuIVL/view?usp=sharing) **)**

**Type: Image**

**What will be the final product ‘B’ in this reaction?**

a) Phenol

b) Benzene

c) Ether

d) Acetal

Correct Answer: Option (d)

Explanation: An acetal is a functional group in organic chemistry consisting of two alkoxy groups attached to the same carbon atom. The general formula for an acetal is , where and are organic groups. The formation of an acetal involves the reaction of an aldehyde or a ketone with an alcohol in the presence of an acid catalyst, typically under reflux conditions.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q115) Which of the following is a strong acid?**

a) Ethanoic acid

b) Methanoic acid

c) Formic acid

d) Acetic acid

Correct Answer: Option (c)

Explanation: Formic acid () is a strong acid because it completely dissociates into and ions in water. Ethanoic acid, methanoic acid, and acetic acid are weak acids and only partially dissociate in water.

Thus, the correct answer is option (c).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q116) Which of the following is not an oxidation reaction?**

a) Tollen's test

b) Fehling's test

c) Reduction of silver nitrate

d) Benedict's test

Correct Answer: Option (c)

Explanation: Tollen's test, Fehling's test, and Benedict's test are all oxidation reactions used to detect the presence of aldehydes and reducing sugars. Reduction of silver nitrate is a reduction reaction used to detect the presence of halides in a solution.

Thus, the correct answer is option (c).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q117) Which of the following compounds is a ketone?**

a) Propanal

b) Butanal

c) Butanone

d) Ethanal

Correct Answer: Option (c)

Explanation: Butanone is a compound containing a carbonyl group () attached to a carbon chain. It is a ketone because the carbonyl group is located in the middle of the carbon chain. Propanal and ethanal are aldehydes, as the carbonyl group is located at the end of the carbon chain. Butanal is also an aldehyde, as it has a carbonyl group at the end of the carbon chain.

Thus, the correct answer is option (c).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q118) Which of the following is a carboxylic acid?**

a) Butanone

b) Propanoic acid

c) Ethanal

d) Benzaldehyde

Correct Answer: Option (b)

Explanation: Propanoic acid is a compound containing a carboxyl group () attached to a carbon chain. It is a carboxylic acid due to the presence of the carboxyl group. Butanone and ethanal are ketones, while benzaldehyde is an aldehyde.

Thus, the correct answer is option (b).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q119) Which of the following compounds is not an example of a carboxylic acid?**

a) Formic acid

b) Acetic acid

c) Butyric acid

d) Propanone

Correct Answer: Option (d)

Explanation: Carboxylic acids contain a carboxyl group () which gives them their acidic properties. Formic acid, acetic acid, and butyric acid are all examples of carboxylic acids, while propanone (also known as acetone) is a ketone.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q120) Which of the following reactions is not a characteristic reaction of aldehydes?**

a) Reduction to form primary alcohols

b) Oxidation to form carboxylic acids

c) Nucleophilic addition reactions

d) Dehydration to form ketones

Correct Answer: Option (d)

Explanation: Aldehydes can undergo reduction to form primary alcohols and oxidation to form carboxylic acids. They are also highly reactive towards nucleophiles, leading to nucleophilic addition reactions. Dehydration reactions do not occur with aldehydes, but they can undergo condensation reactions to form hemiacetals and acetals.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q121) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1YUWfX7MaU6J\_C-twwZzbWtOjoLdsDHcm/view?usp=sharing**](https://drive.google.com/file/d/1YUWfX7MaU6J_C-twwZzbWtOjoLdsDHcm/view?usp=sharing)**)**

**Type: Audio**

**Which of the following is not a characteristic property of carboxylic acids?**

a) They have a carbonyl group

b) They have an acidic hydrogen

c) They are soluble in water

d) They react with bases to form salts

Correct Answer: Option (a)

Explanation: Carboxylic acids contain a carboxyl group () which gives them their acidic properties. They have an acidic hydrogen that can be deprotonated by a base to form a carboxylate ion. They are soluble in water due to their ability to form hydrogen bonds with water molecules. They also react with bases to form salts, but they do not have a carbonyl group.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q122) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following is not a characteristic reaction of ketones?**

a) Reduction to form secondary alcohols

b) Nucleophilic addition reactions

c) Oxidation to form carboxylic acids

d) Reaction with to form a salt

Correct Answer: Option (c)

Explanation: Ketones can undergo reduction to form secondary alcohols and are highly reactive towards nucleophiles, leading to nucleophilic addition reactions. They do not undergo oxidation to form carboxylic acids. They can react with to form a salt if the ketone is a methyl ketone or if there are no other reactive groups present.

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q123) Which of the following is not a characteristic property of aldehydes and ketones?**

a) They both have a carbonyl group

b) They are both polar compounds

c) They both have a distinctive odour

d) They both are soluble in water

Correct Answer: Option (d)

Explanation: Aldehydes and ketones have a carbonyl group () which is responsible for their polar nature. They are both soluble in organic solvents but have limited solubility in water due to their non-polar alkyl groups. They have a distinctive odour, with aldehydes having a fruity or floral odour and ketones having a sweet or fruity odour.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q124) Answer the following question with reference to the image.**

**(**[**https://drive.google.com/file/d/1pGCJruB7N6BTwE1L4KwqCZEMj7eeB8Z0/view?usp=sharing**](https://drive.google.com/file/d/1pGCJruB7N6BTwE1L4KwqCZEMj7eeB8Z0/view?usp=sharing) **)**

**Type: Image**

**What will be the major product in reaction below?**

a) 1.

b) 2.

c) 3.

d) 4.

Correct Answer: Option (a)

Explanation: Reaction involves the reaction of an aldehyde or a ketone with methanol () in the presence of an acid catalyst such as ion, resulting in the formation of a methyl acetal. Methyl acetals are useful compounds in organic synthesis and are often used as protecting groups for carbonyl functional groups.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q125) What is the general formula for carboxylic acids?**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: Carboxylic acids have a functional group, which is formed by the oxidation of aldehydes or primary alcohols. The general formula for a carboxylic acid is , where R is any alkyl group.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q126) Which of the following is a reducing agent in the oxidation of aldehydes and ketones?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: Aldehydes and ketones can be oxidized to carboxylic acids using a strong oxidizing agent, such as. However, if a reducing agent is present during the oxidation reaction, the aldehyde or ketone can be converted to an alcohol instead of a carboxylic acid. (hydroxylamine) is a reducing agent that can be used to prevent the formation of carboxylic acids during the oxidation of aldehydes and ketones.

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q127) Which of the following is not a characteristic of carboxylic acids?**

a) They are weak acids

b) They have high boiling points

c) They have a sour taste

d) They can form hydrogen bonds

Correct Answer: Option (c)

Explanation: Carboxylic acids are weak acids due to the presence of thefunctional group, which can donate a proton to form a carboxylate ion. They have high boiling points due to the ability to form hydrogen bonds between molecules. However, they do not have a sour taste, unlike other acids such as hydrochloric acid or sulfuric acid.

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q128) Which of the following reactions is used to prepare carboxylic acids from primary alcohols?**

a) Dehydration

b) Reduction

c) Oxidation

d) Esterification

Correct Answer: Option (c)

Explanation: Carboxylic acids can be prepared from primary alcohols by oxidizing the alcohol using a strong oxidizing agent, such as or . The group in the alcohol is converted to a group during the oxidation reaction.

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q129) Which of the following compounds is not an aldehyde?**

a) Formaldehyde

b) Acetaldehyde

c) Benzaldehyde

d) Acetone

Correct Answer: Option (d)

Explanation: Acetone is a ketone and not an aldehyde. It is the simplest ketone with the molecular formula . It is a colourless liquid that is used as a solvent, and in the production of various chemicals and materials.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q130) Which of the following compounds is an example of a carboxylic acid?**

a) Methanol

b) Propanal

c) Acetic acid

d) Acetophenone

Correct Answer: Option (c)

Explanation: Acetic acid is a carboxylic acid with the molecular formula . It is a colourless liquid with a strong and pungent odour. It is used in the production of various chemicals, including vinyl acetate monomer, cellulose acetate, and polyvinyl acetate.

Thus, the correct answer is option (c).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q131) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following compounds is an example of an alpha-hydroxy acid?**

a) Glycolic acid

b) Butyric acid

c) Propionic acid

d) Benzoic acid

Correct Answer: Option (a)

Explanation: Glycolic acid is an alpha-hydroxy acid (AHA) with the molecular formula. It is used in skin care products and as a chemical peel to improve the texture and appearance of the skin. AHAs are organic compounds that contain a hydroxyl group attached to the alpha-carbon atom of the molecule.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q132) Which of the following compounds would undergo Cannizzaro reaction?**

a) 2-methylpropanal

b) Ethanal

c) Propanone

d) Benzaldehyde

Correct Answer: Option (d)

Explanation: The Cannizzaro reaction is a disproportionation reaction where an aldehyde that lacks an α-hydrogen is converted to its corresponding carboxylic acid and alcohol. Benzaldehyde lacks an α-hydrogen and hence undergoes Cannizzaro reaction.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q133) What is the IUPAC name of the following compound?**

a) 3-oxo-pentanoic acid

b) 3-carboxy-pentanone

c) 3-hydroxy-pentanoic acid

d) 3-carboxy-pentanoic acid

Correct Answer: Option (d)

Explanation: The parent chain of the given compound contains 5 carbon atoms, and there is a carboxylic acid functional group at the third carbon. Therefore, the IUPAC name is 3-carboxy-pentanoic acid.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q134) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following compounds can undergo Cannizzaro reaction?**

a) Benzaldehyde

b) Acetone

c) Acetaldehyde

d) Ethanol

Correct Answer: Option (a)

Explanation: The Cannizzaro reaction is a disproportionation reaction of an aldehyde. Benzaldehyde is an aldehyde and can undergo the Cannizzaro reaction, whereas acetone, acetaldehyde, and ethanol are not aldehydes and cannot undergo this reaction.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q135) What is the product obtained when acetaldehyde is treated with Tollens' reagent?**

a) Silver mirror

b) Fehling's solution

c) Sodium bicarbonate

d) Lime water

Correct Answer: Option (a)

Explanation: Tollens' reagent is a mild oxidizing agent that is used to distinguish between aldehydes and ketones. When acetaldehyde is treated with Tollens' reagent, a silver mirror is obtained due to the formation of a silver mirror of metallic silver on the walls of the test tube, which indicates the presence of an aldehyde group.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q136) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following is an example of an α-hydroxy acid?**

a) Glycolic acid

b) Lactic acid

c) Malonic acid

d) Succinic acid

Correct Answer: Option (b)

Explanation: An α-hydroxy acid is a type of organic acid that has a hydroxyl group attached to the carbon atom adjacent to the carboxyl group. Lactic acid is an example of an α-hydroxy acid, whereas glycolic acid, malonic acid, and succinic acid do not have a hydroxyl group attached to the adjacent carbon atom.

Thus, the correct answer is option (b).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q137) Which of the following compounds is an aromatic carboxylic acid?**

a) Propanoic acid

b) Benzoic acid

c) Acetic acid

d) Butanoic acid

Correct Answer: Option (b)

Explanation: Benzoic acid is an aromatic carboxylic acid, which means that it contains a benzene ring as well as a carboxylic acid functional group. Propanoic acid, acetic acid, and butanoic acid are not aromatic carboxylic acids and do not contain a benzene ring.

Thus, the correct answer is option (b).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q138) Which of the following compounds would give a positive Tollen's test and negative Schiff's test?**

a) Ethanal

b) Propanal

c) Butanal

d) Butanone

Correct Answer: Option (a)

Explanation: Tollen's test is a test for the presence of aldehydes. When an aldehyde is treated with Tollen's reagent, it gets oxidized to a carboxylic acid and the Tollen's reagent gets reduced to silver metal, which forms a silver mirror on the inner surface of the test tube.

Schiff's test is a test for the presence of carbonyl compounds. When a carbonyl compound is treated with Schiff's reagent, it forms a pink-purple coloration.

Ethanal is an aldehyde and will give a positive Tollen's test because it can be oxidized to acetic acid. However, it will give a negative Schiff's test because it does not have a reactive double bond to form a Schiff's base.

Propanal and butanal are also aldehydes and will give positive Tollen's tests, but they will also give positive Schiff's tests because they have reactive double bonds to form Schiff's bases.

Butanone is a ketone and will give a negative Tollen's test because ketones cannot be oxidized to carboxylic acids. It will also give a negative Schiff's test because it does not have a reactive double bond to form a Schiff's base.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q139) Which of the following is not a test for aldehydes?**

a) Fehling's test

b) Tollens' test

c) Schiff's test

d) Benedict's test

Correct Answer: Option (d)

Explanation: Benedict's test is used to detect the presence of reducing sugars, such as glucose and fructose. It is not a test for aldehydes specifically. Fehling's test, Tollens' test, and Schiff's test are all tests for aldehydes. Fehling's and Tollens' tests are based on the reduction of to by aldehydes, while Schiff's test involves the reaction of aldehydes with Schiff's reagent to form a coloured compound.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q140) Which of the following compounds will not react with Tollen's reagent?**

a) Ethanal

b) Propanal

c) Ethanoic acid

d) Butanone

Correct Answer: Option (c)

Explanation: Tollen's reagent is a solution of silver nitrate () and ammonia (), and is used to detect the presence of aldehydes. Aldehydes are oxidized by Tollen's reagent to form a silver mirror. Ethanal and propanal are both aldehydes and will react with Tollen's reagent. However, ethanoic acid is a carboxylic acid and will not react with Tollen's reagent. Butanone is a ketone and will also not react with Tollen's reagent.

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q141) Which of the following is a ketone?**

a) Ethanol

b) Ethanal

c) Propanone

d) Butanoic acid

Correct Answer: Option (c)

Explanation: Ketones are organic compounds that contain a carbonyl group () bonded to two carbon atoms. Propanone or acetone is a ketone that has a carbonyl group in the middle of its carbon chain. Ethanol is an alcohol, Ethanal is an aldehyde and Butanoic acid is a carboxylic acid.

Thus, the correct answer is option (c).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q142) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following compounds is an aldehyde?**

a) Ethanoic acid

b) Benzaldehyde

c) Butanone

d) Acetophenone

Correct Answer: Option (b)

Explanation: Aldehydes are organic compounds that contain a carbonyl group () bonded to at least one hydrogen atom. Benzaldehyde is an aldehyde that has a carbonyl group bonded to a phenyl group. Ethanoic acid is a carboxylic acid, Butanone and Acetophenone are both ketones.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q143) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1smROUAnLSegzaLflOibzgTHacKQTD-Dl/view?usp=sharing**](https://drive.google.com/file/d/1smROUAnLSegzaLflOibzgTHacKQTD-Dl/view?usp=sharing)**)**

**Type: Audio**

**Which of the following is an example of a dicarboxylic acid?**

a) Formic acid

b) Acetic acid

c) Oxalic acid

d) Citric acid

Correct Answer: Option (c)

Explanation: Dicarboxylic acids are organic compounds that contain two carboxylic acid functional groups in their molecules. Oxalic acid is an example of a dicarboxylic acid, which has two carboxylic acid groups. Formic acid and acetic acid are both monocarboxylic acids, while citric acid is a tricarboxylic acid.

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q144) Which of the following reagents is used to differentiate between aldehydes and ketones?**

a) Ammonia solution

b) Tollen's reagent

c) Fehling's solution

d) NaOH solution

Correct Answer: Option (b)

Explanation: Tollen's reagent or silver mirror test is used to distinguish between aldehydes and ketones. When an aldehyde is treated with Tollen's reagent, it reduces the ions to metallic silver, which deposits on the inside of the test tube, forming a silver mirror. Ketones do not react with Tollen's reagent and hence do not give a silver mirror. Ammonia solution and solution are used for testing acidity and basicity of compounds, while Fehling's solution is used for testing the presence of reducing sugars.

Thus, the correct answer is option (b).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q145) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following is an example of a carboxylic acid derivative?**

a) Butanoic acid

b) Ethyl butyrate

c) Butanone

d) Propanal

Correct Answer: Option (b)

Explanation: Carboxylic acid derivatives are compounds that are derived from carboxylic acids by replacing the hydroxyl group of the carboxylic acid with a different functional group. Ethyl butyrate is an example of a carboxylic acid derivative that is derived from butyric acid, which is a carboxylic acid. Ethyl butyrate is an ester, which is formed by the reaction of an alcohol with a carboxylic acid. Butanoic acid is a carboxylic acid, while Butanone and Propanal are both carbonyl compounds, but not carboxylic acid derivatives.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q146) Which of the following compounds will give a positive Tollen's test?**

a) Propanal

b) Propanone

c) Acetic acid

d) Butyric acid

Correct Answer: Option (a)

Explanation: Tollen's reagent, also known as silver mirror test, is used to identify the presence of aldehydes. When an aldehyde is present, it reduces the Ag+ ions in Tollen's reagent to metallic silver, which gets deposited on the inner surface of the test tube, producing a silver mirror. Propanal is an aldehyde and thus will give a positive Tollen's test, while propanone, acetic acid, and butyric acid do not have aldehyde functional groups and will not give a positive Tollen's test.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q147) Which of the following statements about carboxylic acids is true?**

a) They have a carbonyl group.

b) They are weak acids.

c) They are soluble in water.

d) They can form esters with alcohols.

Correct Answer: Option (d)

Explanation: Carboxylic acids are organic compounds that have a carboxyl functional group () attached to an alkyl chain. They are weak acids because they donate a proton (H+) to water molecules, resulting in the formation of hydronium ions (). They are also soluble in water due to the presence of the polar carboxyl group. However, the most characteristic property of carboxylic acids is their ability to form esters with alcohols. In this reaction, the carboxyl group ()) of the carboxylic acid reacts with the hydroxyl group of the alcohol to form an ester ().

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q148) Which of the following compounds would show the highest boiling point?**

a) Ethanal

b) Propanal

c) Butanal

d) Pentanal

Correct Answer: Option (d)

Explanation: Boiling point of aldehydes and ketones increases with increase in molecular weight due to the increase in the strength of van der Waals forces between the molecules. As pentanal has the highest molecular weight among the given options, it would have the highest boiling point.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q149) Which of the following tests can be used to distinguish between aldehydes and ketones?**

a) Tollen's test

b) Fehling's test

c) Schiff's test

d) Benedict's test

Correct Answer: Option (a)

Explanation: Tollen's test can be used to distinguish between aldehydes and ketones. In this test, a solution of silver nitrate and sodium hydroxide is added to the carbonyl compound. Aldehydes reduce silver ions to metallic silver, while ketones do not react. This reaction results in the formation of a silver mirror on the inside of the test tube in case of aldehydes.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q150) Which of the following compounds is a stronger acid?**

a) Methanol

b) Ethanol

c) Propanoic acid

d) Butanoic acid

Correct Answer: Option (d)

Explanation: Acidity of carboxylic acids increases with the increase in the number of carbon atoms due to the stabilization of the negative charge on the carboxylate ion by the electron-donating effect of the alkyl groups. As butanoic acid has the longest carbon chain among the given options, it would be the strongest acid. Methanol and ethanol are not acidic, whereas propanoic acid has a shorter carbon chain than butanoic acid, so it would be less acidic than butanoic acid.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q151) The compound that does not exhibit the basic character among the following is:**

a) Aniline

b) Methylamine

c) Ethylamine

d) Phenylamine

Correct Answer: Option (d)

Explanation: Phenylamine or aniline is an aromatic amine. Due to the resonance stabilization of the benzene ring, the lone pair of electrons on the nitrogen atom is delocalized and is not easily available for protonation. Therefore, aniline is a weak base and does not exhibit the basic character to a significant extent.

On the other hand, methylamine and ethylamine are aliphatic amines and have a higher basicity due to the availability of the lone pair of electrons on the nitrogen atom.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q152) Which of the following reagents is used for the preparation of primary amines from alkyl halides?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The preparation of primary amines from alkyl halides involves the reaction of alkyl halides with the reagent that can act as a nucleophile and replace the halogen atom. (Sodium amide) is a strong base that can abstract a proton from to form ion, which is a strong nucleophile. The nucleophilic ion replaces the halogen atom in the alkyl halide to give the primary amine. This reaction is known as the Gabriel synthesis.

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q153) The reaction of aniline with nitrous acid at low temperature results in the formation of:**

a) Benzene diazonium chloride

b) Nitrobenzene

c) Benzoic acid

d) Aniline hydrochloride

Correct Answer: Option (a)

Explanation: The reaction of aniline () with nitrous acid () at low temperature (0-5°C) results in the formation of benzene diazonium chloride (). This reaction is known as diazotization.

During diazotization, nitrous acid reacts with aniline to form a diazonium salt intermediate, which is highly unstable and can decompose readily. The diazonium salt can be isolated as its chloride salt, which is a stable crystalline compound and is widely used in the synthesis of various organic compounds. The reaction of benzene diazonium chloride with various reagents can lead to the formation of a wide variety of organic compounds, such as azo dyes, phenols, and aromatic amines.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q154) Which of the following compounds is an aromatic amine?**

a) Ethylamine

b) Aniline

c) Methylamine

d) Dimethylamine

Correct Answer: Option (b)

Explanation: Aniline is an aromatic amine because it contains a benzene ring attached to an amino group. Ethylamine, methylamine, and dimethylamine are all aliphatic amines because they do not contain an aromatic ring.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q155) Which of the following is the primary amine?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: A primary amine has one alkyl or aryl group attached to the nitrogen atom. is a primary amine because it has one methyl group attached to the nitrogen atom. is not an amine because it does not have an alkyl or aryl group attached to the nitrogen atom. is a secondary amine, and is a primary amine with two carbon atoms between the nitrogen and the amino group.

Thus, the correct answer is option (b).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q156) Which of the following is an example of a quaternary ammonium salt?**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: Quaternary ammonium salts have four alkyl or aryl groups attached to the nitrogen atom, as well as a counterion to balance the charge. is a quaternary ammonium salt because it has four methyl groups attached to the nitrogen atom and a bromide ion to balance the charge. is an ammonium salt, not a quaternary ammonium salt, because it has four hydrogen atoms attached to the nitrogen atom. ( and are tertiary amines because they have three alkyl or aryl groups attached to the nitrogen atom.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q157) Which of the following reactions is an example of Hofmann degradation?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: Hofmann degradation is a reaction that is used to prepare a primary amine by the removal of one carbon atom from a carboxylic acid. In this reaction, a primary amide is treated with bromine and sodium hydroxide, which leads to the formation of an isocyanate intermediate. This intermediate is then hydrolyzed to yield a primary amine with one less carbon atom than the original amide.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q158) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following compounds is a primary amine?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: Primary amines have one alkyl group attached to the nitrogen atom. Ethyl amine has one ethyl group in which the middle carbon atom is attached to nitrogen and hence is a primary amine.

Thus, the correct answer is option (a).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q159) Which of the following is a common method for preparing amines?**

a) Reduction of nitro compounds

b) Reduction of aldehydes and ketones

c) Hydrolysis of nitriles

d) All of the above

Correct Answer: Option (d)

Explanation: Amines can be prepared by several methods. One of the most common methods is reduction of nitro compounds. Amines can also be prepared by reduction of aldehydes and ketones using reducing agents like lithium aluminium hydride () or sodium borohydride (). Another method for preparing amines is hydrolysis of nitriles.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q160) What is the product formed when acetaldehyde is treated with Tollen's reagent?**

a) A carboxylic acid

b) A ketone

cA primary alcohol

d) A secondary alcohol

Correct Answer: Option (d)

Explanation: Tollen's reagent is a commonly used test for the presence of aldehydes in a given sample. It is a solution of silver nitrate in ammonia and is known to oxidize aldehydes to carboxylic acids. However, in the presence of a reducing agent, Tollen's reagent can be reduced to metallic silver, indicating the presence of an aldehyde.

Acetaldehyde is an aldehyde and can be easily oxidized by Tollen's reagent. The oxidation of acetaldehyde with Tollen's reagent results in the formation of a silver mirror on the inner surface of the test tube. However, if acetaldehyde is treated with Tollen's reagent in the presence of a reducing agent like sodium hydroxide, it undergoes reduction to form a secondary alcohol, namely, ethyl alcohol.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q161) Which of the following reagents can be used to distinguish between primary, secondary and tertiary amines?**

a) Nitrous acid

b) Bromine water

c) Acetic anhydride

d) Sodium hydroxide

Correct Answer: Option (a)

Explanation: Nitrous acid () is used to distinguish between primary, secondary and tertiary amines. Primary amines react with nitrous acid to form an alcohol, nitrogen gas and water. Secondary amines react with nitrous acid to form a nitrosamine and water. Tertiary amines do not react with nitrous acid.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q162) Which of the following statements is true for the boiling point of amines?**

a) Boiling point decreases with an increase in molecular weight

b) Boiling point decreases with an increase in branching of the alkyl groups attached to nitrogen

c) Boiling point increases with an increase in hydrogen bonding

d) Boiling point is independent of the nature of the alkyl groups attached to nitrogen

Correct Answer: Option (c)

Explanation: Amines can form intermolecular hydrogen bonding between the lone pair of electrons on nitrogen and a hydrogen atom on a neighbouring molecule. As the number of hydrogen bonds increases, so does the boiling point. Therefore, the boiling point of amines increases with an increase in hydrogen bonding. This trend is independent of the nature of the alkyl groups attached to nitrogen and is opposite to the trend observed for alkanes.

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q163) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following is an example of a secondary amine?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: A secondary amine is an amine in which two of the three hydrogen atoms in ammonia are replaced by organic substituents (alkyl or aryl groups). In other words, it has two alkyl or aryl groups attached to the nitrogen atom.

Thus, the correct answer is option (b).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q164) Which of the following amines is a gas at room temperature?**

a) Ethylamine

b) Diethylamine

c) Triethylamine

d) Tetraethylammonium chloride

Correct Answer: Option (a)

Explanation: Ethylamine is a primary amine with a boiling point of 17.3°C, making it a gas at room temperature. Diethylamine and triethylamine are both secondary amines with boiling points of 55°C and 89°C, respectively, making them liquids at room temperature. Tetraethylammonium chloride is a quaternary ammonium salt and is a solid at room temperature.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q165) Which of the following reactions is used to prepare an amine from an amide?**

a) Hofmann degradation

b) Gabriel synthesis

c) Clemmensen reduction

d) Cannizzaro reaction

Correct Answer: Option (a)

Explanation: Hofmann degradation is a reaction used to prepare a primary amine from a primary amide. The amide is treated with bromine and sodium or potassium hydroxide, followed by treatment with excess chlorine or bromine in the presence of aqueous sodium or potassium hydroxide. The product is then hydrolyzed to give the primary amine. Gabriel synthesis is used to prepare primary amines from potassium phthalimide and alkyl halides, Clemmensen reduction is used to reduce ketones to alkanes, and Cannizzaro reaction is used to convert aldehydes to alcohols and carboxylic acids.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q166) Which of the following amines is an example of an aromatic amine?**

a) Methylamine

b) Aniline

c) Ethylenediamine

d) Trimethylamine

Correct Answer: Option (b)

Explanation: Aniline is an aromatic amine with a benzene ring attached to the nitrogen atom. It is a primary amine and is used in the production of various dyes and pharmaceuticals. Methylamine and trimethylamine are both aliphatic amines, while ethylenediamine is a diamine with two amino groups.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q167) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following is an example of a quaternary ammonium salt?**

a) Ammonia

b) Methylamine

c) Dimethylamine

d) Tetramethylammonium chloride

Correct Answer: Option (d)

Explanation: Quaternary ammonium salts have four alkyl or aryl groups attached to the nitrogen atom. They are often used as surfactants, disinfectants, and phase transfer catalysts. Ammonia, methylamine, and dimethylamine are all primary or secondary amines and do not have four alkyl or aryl groups attached to the nitrogen atom.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q168) Which of the following is not a primary amine?**

a) Methylamine

b) Propylamine

c) Butylamine

d) Dimethylamine

Correct Answer: Option (d)

Explanation: Primary amines have one carbon atom attached to the nitrogen atom, whereas secondary amines have two carbon atoms and tertiary amines have three carbon atoms. Dimethylamine has two methyl groups attached to the nitrogen atom and no carbon atoms, which makes it a secondary amine.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**169) Which of the following amine is the most basic one?**

a) Methylamine

b) Ethylamine

c) Propylamine

d) Butylamine

Correct Answer: Option (d)

Explanation: The basicity of amines depends on the number of alkyl groups attached to the nitrogen atom. The more the number of alkyl groups, the less basic the amine. Butylamine has four carbon atoms attached to the nitrogen atom, which makes it the most basic amine among the given options.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q170) Which of the following amines is used in the preparation of dyes?**

a) Aniline

b) Phenylamine

c) Benzylamine

d) Methylamine

Correct Answer: Option (a)

Explanation: Aniline is an aromatic amine which is used as a starting material for the synthesis of various dyes, such as azo dyes, by diazotization and coupling reactions. Azo dyes are a class of synthetic dyes that contain the azo group () as the chromophore.

Phenylamine and benzylamine are also aromatic amines, but they are not commonly used in the preparation of dyes. Methylamine is an aliphatic amine and is not used in the preparation of dyes either.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q171) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following amines is used as a local anaesthetic?**

a) Ethylamine

b) Methylamine

c) Benzylamine

d) Procaine

Correct Answer: Option (d)

Explanation: Procaine, also known as Novocain, is a synthetic amide local anaesthetic. It works by blocking the generation and conduction of nerve impulses, thereby producing a reversible loss of sensation in the area where it is applied. Procaine is commonly used in dentistry and minor surgical procedures.

Ethylamine and methylamine are simple aliphatic amines and are not used as local anaesthetics. Benzylamine is an aromatic amine and is also not used as a local anaesthetic.

Thus, the correct answer is option (d).

Difficulty Level- Very Hard Bloom's Taxonomy: Apply

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**Q172) Which of the following reactions is used for the preparation of primary amines?**

a) Reduction of nitroalkanes

b) Reduction of nitriles

c) Gabriel phthalimide synthesis

d) Hoffmann bromamide degradation

Correct Answer: Option (d)

Explanation: The Hoffmann bromamide degradation is a method for the preparation of primary amines. In this reaction, an amide is treated with excess bromine and sodium hydroxide to form a brominated amine. The brominated amine is then treated with aqueous sodium hydroxide to give the primary amine.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q173) Which of the following is not a primary amine?**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: Primary amines have one alkyl or aryl group and two hydrogen atoms attached to the nitrogen atom. , also known as triethylamine, is a tertiary amine as it has three alkyl groups attached to the nitrogen atom.

Thus, the correct answer is option (d).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q174) Which of the following reactions of amines is not possible?**

a) Amines react with acids to form salts.

b) Amines react with alcohols to form ethers.

c) Amines react with nitrous acid to form diazonium salts.

d) Amines react with sodium metal to form amides.

Correct Answer: Option (d)

Explanation: Amines can react with acids to form salts , with alcohols to form ethers, and with nitrous acid to form diazonium salts. However, amines do not react with sodium metal to form amides.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q175) Which of the following amines is the strongest base?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The basicity of amines depends on the availability of the lone pair of electrons on the nitrogen atom. In , the nitrogen atom has one lone pair of electrons, while in the other options, the nitrogen atom has two or more alkyl or aryl groups attached to it, which decreases the availability of the lone pair. Therefore, is the strongest base among the given.

Thus, the correct answer is option (a).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q176) Which of the following amines would undergo Hoffmann degradation when treated with bromine and sodium hydroxide?**

a) Aniline

b) N-methylaniline

c) N-phenylethylamine

d) 2,4-dimethylaniline

Correct Answer: Option (b)

Explanation: N-methylaniline has a methyl group attached to the nitrogen. The Hoffmann degradation involves the conversion of primary amides to primary amines by reaction with bromine and sodium hydroxide, followed by treatment with excess hot alkali. This reaction proceeds through a mechanism involving the formation of an isocyanate intermediate, which is then hydrolyzed to yield the primary amine. The presence of a bulky group on the nitrogen, as in the case of aniline or 2,4-dimethylaniline, inhibits the formation of the isocyanate intermediate and thus prevents the Hoffmann degradation from occurring. N-phenylethylamine does not have a reactive hydrogen on the nitrogen and would not undergo the Hoffmann degradation.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q177) Which of the following is an example of an aromatic amine?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: Aromatic amines, also known as aryl amines, have an aryl group (a benzene ring) attached to the nitrogen atom. , also known as aniline, is an example of an aromatic amine. , , and are examples of amine.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q178) Which of the following compounds is not an amine?**

a) Methoxyethane

b) Methylamine

c) N,N-Dimethylbenzylamine

d) Aniline

Correct Answer: Option (a)

Explanation: Methoxyethane is not an amine because it does not contain the - functional group. It is an ether, which has the functional group -O-. The other options all contain the - functional group and are therefore amines. Methylamine is a primary amine, N,N-dimethylbenzylamine is a tertiary amine, and aniline is a primary aromatic amine.

Thus, the correct answer is option (a).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q179) Which of the following statements about the basicity of amines is true?**

a) Primary amines are more basic than secondary amines.

b) Tertiary amines are more basic than primary amines.

c) Secondary amines are more basic than tertiary amines.

d) Amines are not basic.

Correct Answer: Option (b)

Explanation: The basicity of an amine is determined by the availability of the lone pair of electrons on the nitrogen atom. Tertiary amines have three alkyl or aryl groups attached to the nitrogen, which makes the lone pair of electrons more available to accept a proton. Primary amines have one alkyl or aryl group attached to the nitrogen, which makes the lone pair of electrons less available to accept a proton. Secondary amines have two alkyl or aryl groups attached to the nitrogen, which makes the basicity intermediate between primary and tertiary amines.

Thus, the correct answer is option (b).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q180) Which of the following amines would be most likely to exhibit stereoisomerism?**

a) Ethylamine

b) N-methylethylamine

c) N-ethyl-2-methylpropanamine

d) 1-phenylpropan-2-amine

Correct Answer: Option (d)

Explanation: 1-phenylpropan-2-amine contains a chiral center at the nitrogen atom, and therefore exists as a pair of enantiomers. Ethylamine and N-methylethylamine do not contain chiral centers and are achiral. N-ethyl-2-methylpropanamine does contain a chiral center, but the molecule is symmetrical and therefore exists as a single stereoisomer.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q181) Which of the following amines would exhibit the strongest basicity in aqueous solution?**

a) Ethylamine

b) Aniline

c) Triethylamine

d) Benzylamine

Correct Answer: Option (c)

Explanation: Triethylamine has three ethyl groups which are electron-donating and increase the basicity of the amine group. Aniline is a weaker base than the other amines listed because the lone pair on the nitrogen is partially delocalized into the aromatic ring, making it less available for protonation.

Thus, the correct answer is option (c).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q182) Which of the following is the correct IUPAC name for the given amine?**

a) methylamine

b) ethylamine

c) dimethylamine

d) trimethylamine

Correct Answer: Option (c)

Explanation: The IUPAC name of an amine is determined by the number of carbon atoms in the longest carbon chain that includes the nitrogen atom. In this case, the longest carbon chain is two, and there are two methyl groups attached to the nitrogen atom. Therefore, the IUPAC name for this amine is N,N-dimethylamine, which is represented as .

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q183) Which of the following reactions of acetaldehyde is a nucleophilic addition reaction?**

a) Reaction with Tollens' reagent

b) Reaction with Fehling's solution

c) Reaction with hydrogen cyanide

d) Reaction with sodium bisulfite

Correct Answer: Option (c)

Explanation: Acetaldehyde is an aldehyde with the molecular formula . It can undergo a variety of reactions, including nucleophilic addition reactions, oxidation reactions, and reduction reactions.

The reaction of acetaldehyde with hydrogen cyanide is a nucleophilic addition reaction. In this reaction, the cyanide ion acts as a nucleophile and attacks the electrophilic carbon atom of the carbonyl group in acetaldehyde. The resulting intermediate is a cyanohydrin, which contains both a hydroxyl group and a cyano group attached to the same carbon atom.

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q184) Which of the following compounds would undergo aldol condensation when treated with dilute alkali?**

a) Acetone

b) Propanal

c) Butanone

d) Methanal

Correct Answer: Option (b)

Explanation: Aldol condensation is a reaction in which an enol or an enolate ion reacts with another carbonyl compound to form a β-hydroxy carbonyl compound, which may undergo dehydration to form an α,β-unsaturated carbonyl compound. This reaction is commonly catalyzed by dilute alkali, such as or

Out of the given compounds, only propanal has the necessary structure to undergo aldol condensation. It has an α-hydrogen atom, which can be deprotonated to form an enolate ion, and a carbonyl group, which can react with the enolate ion to form the β-hydroxy carbonyl compound.

Acetone and butanone do not have an α-hydrogen atom and thus cannot undergo aldol condensation. Methanal does have an α-hydrogen atom, but it is too reactive and unstable to undergo aldol condensation under mild conditions.

Thus, the correct answer is option (b).

Difficulty Level- Very Hard Bloom's Taxonomy: Apply

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**Q185) Which of the following amines has the highest boiling point?**

a) Methylamine

b) Ethylamine

c) Propylamine

d) Butylamine

Correct Answer: Option (d)

Explanation: The boiling point of amines increases with an increase in the size of the alkyl groups attached to the nitrogen atom. This is because the larger the alkyl groups, the greater the surface area of the molecule, and hence the stronger the van der Waals forces between the molecules. Therefore, butylamine, which has four carbon atoms attached to the nitrogen atom, will have the highest boiling point among the given options.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q186) Which of the following amines is an aliphatic amine?**

a) Aniline

b) Phenethylamine

c) Methylamine

d) Benzylamine

Correct Answer: Option (c)

Explanation: Methylamine is an example of an aliphatic amine as it contains a straight carbon chain. Aniline, Phenethylamine, and Benzylamine are all examples of aromatic amines, as they contain an aromatic ring.

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q187) Which of the following is not an example of a secondary amine?**

a) Diethylamine

b) Dimethylamine

c) Methyl ethylamine

d) Ethanolamine

Correct Answer: Option (d)

Explanation: Ethanolamine is not an example of a secondary amine because it contains an -OH group in addition to the -NH group. Diethylamine, Dimethylamine, and Methyl ethylamine are all examples of secondary amines.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q188) Which of the following is the strongest base?**

a) Aniline

b) Methylamine

c) Benzylamine

d) Ethylamine

Correct Answer: Option (b)

Explanation: The strength of a base is related to the basicity of the nitrogen atom in the amine. The more basic the nitrogen, the stronger the base. Methylamine has the highest basicity because it is a smaller molecule than the other amines and therefore has a higher electron density around the nitrogen atom.

Thus, the correct answer is option (b).

Difficulty Level- Easy Bloom's Taxonomy: Remember

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**Q189) Which of the following reagents is used to prepare primary amines from nitro compounds?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: Primary amines can be prepared by reducing nitro compounds with iron and hydrochloric acid (). , , and are reducing agents used for the reduction of other functional groups, such as ketones, aldehydes, and acids.

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q190) Which of the following is the general formula for a primary amine?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The general formula for a primary amine is , where R represents a carbon chain or a hydrogen atom. Secondary amines have the formula’, where R and R' are carbon chains or hydrogen atoms. Tertiary amines have the formula , where R and R' are carbon chains or hydrogen atoms. is the formula for an amine that has an ether group attached to the nitrogen atom. is the formula for an alcohol.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q191) Which of the following is the correct order of basicity for the given amines?**

a) Primary amine < Secondary amine < Tertiary amine

b) Secondary amine < Primary amine < Tertiary amine

c) Tertiary amine < Secondary amine < Primary amine

d) Tertiary amine < Primary amine < Secondary amine

Correct Answer: Option (c)

Explanation: Basicity of amines depends on the availability of lone pair of electrons on the nitrogen atom. Tertiary amines have three alkyl groups attached to the nitrogen atom which makes it less basic as the lone pair is less available due to steric hindrance. Secondary amines have two alkyl groups attached to the nitrogen atom which makes it more basic than tertiary amines. Primary amines have only one alkyl group attached to the nitrogen atom and have maximum availability of lone pair of electrons on the nitrogen atom which makes it the most basic.

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q192) Which of the following methods is used for the preparation of a primary amine?**

a) Reduction of nitroalkanes

b) Hoffman bromamide degradation

c) Gabriel phthalimide synthesis

d) Reduction of nitriles

Correct Answer: Option (a)

Explanation: Nitroalkanes can be reduced to primary amines by catalytic hydrogenation using a metal catalyst such as palladium or platinum. During the reaction, the nitro group is reduced to an amino group () by the addition of hydrogen gas.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q193) Which of the following amines will exhibit the strongest basicity?**

a) p-toluidine

b) Aniline

c) ethylamine

d) diethylamine

Correct Answer: Option (d)

Explanation: Diethylamine has two ethyl groups that donate electrons to the nitrogen atom, making it more basic than the other three options. Aniline is the least basic due to the electron-withdrawing effect of the benzene ring. Ethylamine and p-toluidine are intermediate in basicity.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q194) Which of the following amines is used for the production of dyes?**

a) Aniline

b) Diethylamine

c) Triethylamine

d) Methylamine

Correct Answer: Option (a)

Explanation: Aniline is an aromatic primary amine which is used for the production of a variety of dyes. Aniline derivatives are used to produce dyes of different colours and shades. Aniline is also used in the production of rubber additives, herbicides, and pharmaceuticals.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q195) Which of the following statements is true about the basicity of aniline and its derivatives?**

a) Ortho and para substituents increase the basicity of aniline.

b) Meta substituents increase the basicity of aniline.

c) Substituents on the benzene ring have no effect on the basicity of aniline.

d) The basicity of aniline is solely dependent on the presence of the NH2 group and is not affected by any substituent on the benzene ring.

Correct Answer: Option (a)

Explanation: The presence of electron-donating groups at the ortho and para positions on the benzene ring can stabilize the positive charge on the nitrogen atom of the aniline molecule after it accepts a proton, making it easier for the aniline molecule to act as a base and accept the proton. On the other hand, the presence of electron-withdrawing groups at these positions can destabilize the positive charge on the nitrogen atom and decrease the basicity of the molecule. The effect of meta-substituents on the basicity of aniline is minimal or negligible.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q196) Which of the following reagents is used for the conversion of primary amines to isocyanates?**

a) Phosgene

b) Chlorine and water

c) Bromine and water

d) Nitrous acid

Correct Answer: Option (a)

Explanation: Primary amines can be converted to isocyanates by treating them with phosgene (During the reaction, the amine is first converted to an amine salt by the addition of phosgene. The amine salt is then treated with a base to form an isocyanate.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q197) Which of the following is the correct order of boiling points for the given amines?**

a) Primary amine < Secondary amine < Tertiary amine

b) Tertiary amine < Secondary amine < Primary amine

c) Secondary amine < Primary amine < Tertiary amine

d) Secondary amine < Tertiary amine < Primary amine

Correct Answer: Option (a)

Explanation: Boiling points of amines depend on the strength of the intermolecular forces of attraction. Primary amines have hydrogen bonding between the nitrogen and hydrogen atoms which results in a higher boiling point compared to secondary and tertiary amines. Secondary and tertiary amines have weaker dipole-dipole interactions which results in lower boiling points compared to primary amines.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q198) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/10-\_asQd45IPnh4OsYALUsxW--qXm3o5-/view?usp=sharing**](https://drive.google.com/file/d/10-_asQd45IPnh4OsYALUsxW--qXm3o5-/view?usp=sharing)**)**

**Type: Audio**

**Which of the following statements is true for a secondary amine?**

a) It has two alkyl groups and one hydrogen atom attached to the nitrogen atom.

b) It has one alkyl group and two hydrogen atoms attached to the nitrogen atom.

c) It has three alkyl groups attached to the nitrogen atom.

d) It has one alkyl group and one hydrogen atom attached to the nitrogen atom.

Correct Answer: Option (a)

Explanation: A secondary amine is a type of amine in which two of the hydrogen atoms of the ammonia molecule are replaced by alkyl groups. The nitrogen atom in a secondary amine has two alkyl groups and one hydrogen atom attached to it. This is in contrast to a primary amine, which has one alkyl group and two hydrogen atoms attached to the nitrogen atom.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q199) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1KVPiOTFXlB1h7bnuSKdbN5pQGIR9n-IW/view?usp=sharing**](https://drive.google.com/file/d/1KVPiOTFXlB1h7bnuSKdbN5pQGIR9n-IW/view?usp=sharing)**)**

**Type: Audio**

**Which of the following compounds is an example of an aromatic amine?**

a) Aniline

b) Methylamine

c) Ethylamine

d) Butylamine

Correct Answer: Option (a)

Explanation: An aromatic amine is a type of amine in which the nitrogen atom is bonded to an aromatic ring. Aniline is an example of an aromatic amine, in which the nitrogen atom is bonded to a benzene ring. Methylamine, ethylamine, and butylamine are all examples of aliphatic amines, in which the nitrogen atom is not bonded to an aromatic ring.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q200) Which of the following reagents is commonly used to distinguish between primary, secondary, and tertiary amines?**

a) Nitrous acid

b) Sodium nitrite

c) Benzoyl chloride

d) Bromine water

Correct Answer: Option (a)

Explanation: Nitrous acid () is commonly used to distinguish between primary, secondary, and tertiary amines. When a primary amine is treated with nitrous acid, it forms a diazonium salt, which is highly unstable and decomposes quickly. When a secondary amine is treated with nitrous acid, it forms a nitrosamine, which is a stable compound. When a tertiary amine is treated with nitrous acid, no reaction occurs.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q201) The standard electrode potential of an electrode depends on:**

a) The nature of the electrode material

b) The concentration of ions in the solution

c) The temperature of the solution

d) All of the above

Correct Answer: Option (d)

Explanation: The standard electrode potential of an electrode depends on the nature of the electrode material, the concentration of ions in the solution, and the temperature of the solution. The electrode potential is the measure of the tendency of an electrode to lose or gain electrons. The standard electrode potential is the potential difference between the electrode and the standard hydrogen electrode (SHE) when both electrodes are in their standard states (i.e., 1 M concentration and 1 atm pressure at 25°C). The electrode potential changes with the change in the concentration of the ions in the solution, the temperature of the solution, and the nature of the electrode material.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q202) The molar conductivity of an electrolyte solution depends on:**

a) The nature of the electrolyte

b) The concentration of the electrolyte

c) The temperature of the solution

d) All of the above

Correct Answer: Option (d)

Explanation: The molar conductivity of an electrolyte solution depends on the nature of the electrolyte, the concentration of the electrolyte, and the temperature of the solution. The molar conductivity is the conductivity of a solution containing one mole of the electrolyte in a volume of one litre of the solution. The molar conductivity increases with the increase in the concentration of the electrolyte due to the increase in the number of ions present in the solution. The molar conductivity also depends on the nature of the electrolyte and the temperature of the solution.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q203) In the electrochemical cell, the anode is the electrode:**

a) Where oxidation takes place

b) Where reduction takes place

c) Where the electrolyte is reduced

d) Where the electrolyte is oxidized

Correct Answer: Option (a)

Explanation: In the electrochemical cell, the anode is the electrode where oxidation takes place. Oxidation is the process where an atom, ion, or molecule loses one or more electrons. Therefore, the anode is the electrode where the oxidation half-reaction takes place, and electrons are released from the electrode. The cathode is the electrode where reduction takes place, and electrons are gained by the electrode. The electrolyte is not reduced or oxidized, but it helps in the transfer of ions between the electrodes.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q204) The Nernst equation is given by:**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: The Nernst equation is used to calculate the electrode potential under non-standard conditions. The equation is given by , where Ecell is the electrode potential, Eºcell is the standard electrode potential, n is the number of electrons transferred, and Q is the reaction quotient.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q205) What happens during the electrolysis of molten sodium chloride?**

a) Sodium ions migrate to the cathode and chloride ions migrate to the anode.

b) Sodium ions migrate to the anode and chloride ions migrate to the cathode.

c) Both sodium and chloride ions migrate to the cathode.

d) Both sodium and chloride ions migrate to the anode.

Correct Answer: Option (b)

Explanation: During the electrolysis of molten sodium chloride, the positive sodium ions () are attracted to the negatively charged cathode and are reduced to sodium metal. Meanwhile, the negative chloride ions () are attracted to the positively charged anode and are oxidized to form chlorine gas. This is an example of a redox reaction where sodium is oxidized and chlorine is reduced.

Thus, the correct answer is option (b).

Difficulty Level- Very Hard Bloom's Taxonomy: Apply

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**Q206) Which of the following is NOT a requirement for a substance to act as an electrolyte?**

a) The substance must be able to conduct electricity.

b) The substance must be able to dissolve in water or another solvent.

c) The substance must contain ions.

d) The substance must have a low melting point.

Correct Answer: Option (d)

Explanation: For a substance to act as an electrolyte, it must be able to conduct electricity, contain ions, and be able to dissolve in water or another solvent. A low melting point is not a requirement for an electrolyte, as some electrolytes can exist as solids at room temperature.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q207) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1ZXSZmVd8NkLBSXcIbRMGaOnEwDjl4lVY/view?usp=sharing**](https://drive.google.com/file/d/1ZXSZmVd8NkLBSXcIbRMGaOnEwDjl4lVY/view?usp=sharing)**)**

**Type: Audio**

**Which of the following statements is TRUE about the Standard Hydrogen Electrode (SHE)?**

a) It has a standard potential of 1.00 V.

b) It is used as the reference electrode for all electrochemical cells.

c) It consists of a platinum electrode in contact with a solution of HCl.

d) It is used to measure the potential of half-cells under non-standard conditions.

Correct Answer: Option (b)

Explanation: The Standard Hydrogen Electrode (SHE) is used as the reference electrode for all electrochemical cells. It consists of a platinum electrode in contact with a solution of 1 M HCl, and a hydrogen gas electrode is placed in the solution. The SHE has a standard potential of 0.00 V and is used to measure the potential of half-cells under standard conditions.

Thus, the correct answer is option (b).

Difficulty Level- Very Hard Bloom's Taxonomy: Apply

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**Q208) What is the relationship between the cell potential (Ecell) and the Gibbs free energy change (ΔG) for an electrochemical cell?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The relationship between the cell potential (Ecell) and the Gibbs free energy change (ΔG) for an electrochemical cell is given by the equation , where n is the number of electrons transferred in the reaction and F is the Faraday constant. Rearranging this equation gives

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q209) Which of the following is not an electrode?**

a) Graphite rod

b) Copper plate

c) Silver wire

d) None of the above

Correct Answer: Option (d)

Explanation: Graphite rod, copper plate, and silver wire were the examples of electrodes. An electrode is a conductor through which electrons can be transferred to or from a substance undergoing a chemical reaction.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q210) What is the standard potential of hydrogen electrode (SHE) at 25°C?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The standard potential of the hydrogen electrode (SHE) is defined to be at all temperatures. It is used as a reference electrode to measure the potential difference of other half-cells.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q211) Which of the following statements is true about the Nernst equation?**

a) It relates the standard electrode potential to the concentration of the reacting species.

b) It relates the standard electrode potential to the temperature.

c) It relates the cell potential to the standard electrode potential and the concentrations of the reacting species.

d) It relates the cell potential to the temperature and the standard electrode potential.

Correct Answer: Option (c)

Explanation: The Nernst equation relates the cell potential to the standard electrode potential and the concentrations (or activities) of the reacting species. It can be used to calculate the cell potential under non-standard conditions.

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q212) Which of the following is an example of a non-spontaneous reaction?**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: A non-spontaneous reaction is one that requires an external energy source to occur. The reduction of requires an external energy source, such as an electric current, to proceed.

Thus, the correct answer is option (d).

Difficulty Level- Very Hard Bloom's Taxonomy: Apply

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**Q213) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1QDO-C3DSPttPjeW8bqtgDkQ1VW5MYeAU/view?usp=sharing**](https://drive.google.com/file/d/1QDO-C3DSPttPjeW8bqtgDkQ1VW5MYeAU/view?usp=sharing)**)**

**Type: Audio**

**Which of the following statements is true about galvanic cells?**

a) They convert chemical energy into electrical energy.

b) They convert electrical energy into chemical energy.

c) They require an external energy source to operate.

d) They cannot operate under standard conditions.

Correct Answer: Option (a)

Explanation: Galvanic cells, also known as voltaic cells, are devices that convert chemical energy into electrical energy. They consist of two half-cells connected by a salt bridge or porous membrane, and generate an electrical potential difference between the two half-cells.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q214) Which of the following statements about the electrolysis of a concentrated solution of is correct?**

a) gas is liberated at the cathode and gas is liberated at the anode.

b) gas is liberated at the anode and gas is liberated at the cathode.

c) is oxidized at the anode and reduced at the cathode.

d) is reduced at the anode and oxidized at the cathode.

Correct Answer: Option (d)

Explanation: In the electrolysis of a concentrated solution of , the anode reaction involves the oxidation of sulphate ions () to form sulphur trioxide and oxygen gas () while at the cathode, the reduction of hydrogen ions (H+) occurs to form hydrogen gas (). Overall, the net reaction is: . Therefore, is reduced at the anode and oxidized at the cathode.

Thus, the correct answer is option (d).

Difficulty Level- Very Hard Bloom's Taxonomy: Apply

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**Q215) Which of the following statements about a galvanic cell is incorrect?**

a) It converts chemical energy into electrical energy.

b) It has a positive cell potential.

c) It involves oxidation at the anode and reduction at the cathode.

d) It requires an external source of energy to operate.

Correct Answer: Option (d)

Explanation: A galvanic cell, also known as a voltaic cell, converts chemical energy into electrical energy spontaneously. The cell potential is positive, indicating that the reaction is thermodynamically favourable. The anode undergoes oxidation while the cathode undergoes reduction. No external source of energy is required for the operation of a galvanic cell.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q216) In the following reaction, what is the role of ions?**

a) Oxidizing agent

b) Reducing agent

c) Anode

d) Cathode

Correct Answer: Option (b)

Explanation: In the given reaction, ions are reduced to by gaining two electrons. Therefore, ions act as a reducing agent by providing electrons to another species. The reduction of to occurs at the cathode in an electrochemical cell.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q217) Which of the following statements about the Nernst equation is correct?**

a) It relates the standard cell potential to the equilibrium constant.

b) It relates the cell potential to the activities of the reactants and products.

c) It is only applicable to galvanic cells.

d) It is independent of temperature.

Correct Answer: Option (b)

Explanation: The Nernst equation is a mathematical equation that relates the cell potential to the activities (or concentrations) of the reactants and products involved in the electrochemical reaction. It is given as , where E°cell is the standard cell potential, R is the gas constant, T is the temperature, n is the number of electrons transferred, F is Faraday's constant, and Q is the reaction quotient. The Nernst equation is applicable to both galvanic and electrolytic cells and is dependent on temperature.

Thus, the correct answer is option (b).

Difficulty Level- Very Hard Bloom's Taxonomy: Apply

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**Q218) Which of the following reactions does not involve the transfer of electrons?**

a)

b) )

c)

d)

Correct Answer: Option (a)

Explanation: In this reaction, the hydrogen and chlorine combine to form hydrogen chloride, but no electrons are transferred between the reactants. The other three reactions all involve the transfer of electrons.

Thus, the correct answer is option (a).

Difficulty Level- Very Hard Bloom's Taxonomy: Apply

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**Q219) What is the oxidation state of nitrogen in ?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: In , there are three oxygen atoms with an oxidation state of each, which sums up to a total of . The overall charge of is neutral, so the sum of the oxidation states of all the atoms must be zero, so, . then

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q220) Which of the following is not a characteristic of an ideal solution?**

a) Zero heat of mixing

b) Non-ideal enthalpy of mixing

c) Non-ideal entropy of mixing

d) Non-ideal Gibbs free energy of mixing

Correct Answer: Option (b)

Explanation: An ideal solution is one in which the components mix perfectly and the enthalpy of mixing is zero. The other three options all describe non-ideal solutions. An ideal solution is a hypothetical mixture of substances that obeys Raoult's law, which states that the vapour pressure of each component in the mixture is proportional to its mole fraction in the solution.

Thus, the correct answer is option (b).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q221) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1f\_r8nzXWUCVSHbVIZJaPePcOdl\_wDW9\_/view?usp=sharing**](https://drive.google.com/file/d/1f_r8nzXWUCVSHbVIZJaPePcOdl_wDW9_/view?usp=sharing)**)**

**Type: Audio**

**Which of the following statements about electrochemical cells is true?**

a) The anode is the site of reduction

b) Electrons flow from the cathode to the anode

c) The cell potential is negative if the reaction is spontaneous

d) The standard reduction potential is the potential difference between the anode and the cathode

Correct Answer: Option (b)

Explanation: Electrons flow from the cathode to the anode in an electrochemical cell, which is the opposite direction to the flow of current. The anode is the site of oxidation, not reduction. The cell potential is positive if the reaction is spontaneous, and the standard reduction potential is the potential difference between the cathode and the standard hydrogen electrode.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q222) Which of the following metals is most likely to be oxidized in a solution containing Cu2+ ions?**

a) Zinc

b) Iron

c) Magnesium

d) Silver

Correct Answer: Option (a)

Explanation: Zinc is more reactive than copper and is therefore more likely to be oxidized in a solution containing ions. The other three metals are less reactive than copper and would not be oxidized under these conditions.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q223) Which of the following statements about redox reactions is incorrect?**

a) Oxidation involves the loss of electrons

b) Reduction involves the gain of electrons

c) Redox reactions involve the transfer of electrons

d) Oxidation and reduction occur simultaneously

Correct Answer: Option (d)

Explanation: Oxidation and reduction always occur together in a redox reaction, as one species loses electrons (undergoes oxidation) and another gains electrons (undergoes reduction). This is because electrons cannot be created or destroyed, only transferred from one species to another.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q224) Which of the following is not a type of electrode used in electrochemical cells?**

a) Reference electrode

b) Working electrode

c) Counter electrode

d) Reactant electrode

Correct Answer: Option (d)

Explanation: The three main types of electrodes used in electrochemical cells are the reference electrode, working electrode, and counter electrode. The reactants are not considered an electrode as they are the species being oxidized or reduced in the cell.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q225) Which of the following factors affects the potential difference of an electrochemical cell?**

a) The concentration of the electrolyte

b) The temperature of the cell

c) The types of electrodes used

d) All of the above

Correct Answer: Option (d)

Explanation: The potential difference of an electrochemical cell is affected by a variety of factors, including the concentration of the electrolyte (which affects the activity of the species involved in the redox reaction), the temperature of the cell (which affects the rate of the redox reaction), and the types of electrodes used (which affects the electron transfer between the species).

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q226) Which of the following is not a type of battery?**

a) Lead-acid battery

b) Alkaline battery

c) Fuel cell

d) Lithium-ion battery

Correct Answer: Option (c)

Explanation: A fuel cell is not a type of battery, as it generates electricity through the reaction between a fuel (such as hydrogen) and an oxidizing agent (such as oxygen). In contrast, batteries store electrical energy and release it as needed.

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q227) Which of the following is an example of a spontaneous redox reaction?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: A spontaneous redox reaction is one in which the products have a lower Gibbs free energy than the reactants. In the given options, only option b) has a spontaneous redox reaction as silver ions are being reduced and zinc is being oxidized, forming a solid silver and zinc nitrate solution.

Thus, the correct answer is option (a).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q228) Which of the following statements is not true for a galvanic cell?**

a) The anode is negative

b) The cathode is positive

c) The anode is the site of oxidation

d) The cathode is the site of reduction

Correct Answer: Option (a)

Explanation: In a galvanic cell, the anode is the site of oxidation, where the electrons are lost. Therefore, it is positively charged. The cathode is the site of reduction, where the electrons are gained. Therefore, it is negatively charged. Thus, options b, c, and d are correct statements. However, option a is incorrect because the anode is positively charged.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q229) Which of the following is not a standard hydrogen electrode?**

a. Platinum electrode coated with platinum black

b. Platinum electrode coated with graphite

c. Platinum electrode coated with palladium

d. All of the above are standard hydrogen electrodes

Correct Answer: Option (b)

Explanation: A standard hydrogen electrode consists of a platinum electrode coated with platinum black and immersed in a solution of 1 M ions. The hydrogen electrode is used as a reference electrode to measure the potential of other half-cells. The coating of platinum black provides a larger surface area for the electrode. Palladium can also be used as a coating material. However, graphite cannot be used as a coating material as it does not form a stable electrode.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q230) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1DHYCi01oj1Ntpsf1tlT678Xw\_jHVNdyD/view?usp=sharing**](https://drive.google.com/file/d/1DHYCi01oj1Ntpsf1tlT678Xw_jHVNdyD/view?usp=sharing)**)**

**Type: Audio**

**Which of the following is true for a concentration cell?**

a) The cell potential is zero

b) The cell potential is positive

c) The cell potential is negative

d) The cell potential depends on the concentration of the electrolyte

Correct Answer: Option (c)

Explanation: A concentration cell is a type of electrochemical cell where the same electrode is used as both the anode and cathode, but the concentrations of the electrolyte solutions on either side of the cell are different. The cell potential is negative because the electrode in the higher concentration solution will lose electrons and undergo oxidation, while the electrode in the lower concentration solution will gain electrons and undergo reduction. Thus, the overall cell reaction will be spontaneous and the cell potential will be negative.

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q231) Which of the following is not a factor affecting the electrode potential?**

a) Temperature

b) Concentration of electrolyte

c) Nature of electrode

d) Nature of electrolyte

Correct Answer: Option (b)

Explanation: The electrode potential is the measure of the tendency of an electrode to undergo oxidation or reduction. The electrode potential is affected by various factors such as temperature, nature of electrode, nature of electrolyte, and concentration of the electrolyte solution. However, the concentration of the electrolyte solution does not affect the electrode potential, as long as it is not extremely dilute or concentrated.

Thus, the correct answer is option (b).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q232) Which of the following statements is not true for a galvanic cell?**

a) The anode is negative

b) The cathode is positive

c) The anode is the site of oxidation

d) The cathode is the site of reduction

Correct Answer: Option (a)

Explanation: In a galvanic cell, the anode is the site of oxidation, where the electrons are lost. Therefore, it is positively charged. The cathode is the site of reduction, where the electrons are gained. Therefore, it is negatively charged.

Thus, the correct answer is option (a).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q233) Which of the following is not a standard hydrogen electrode?**

a) Platinum electrode coated with platinum black

b) Platinum electrode coated with graphite

c) Platinum electrode coated with palladium

d) All of the above are standard hydrogen electrodes

Correct Answer: Option (b)

Explanation: A standard hydrogen electrode consists of a platinum electrode coated with platinum black and immersed in a solution of 1 M ions. The hydrogen electrode is used as a reference electrode to measure the potential of other half-cells. The coating of platinum black provides a larger surface area for the electrode. Palladium can also be used as a coating material. However, graphite cannot be used as a coating material as it does not form a stable electrode.

Thus, the correct answer is option (b).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q234) Which of the following is true for a concentration cell?**

a) The cell potential is zero

b) The cell potential is positive

c) The cell potential is negative

d) The cell potential depends on the concentration of the electrolyte

Correct Answer: Option (c)

Explanation: A concentration cell is a type of electrochemical cell where the same electrode is used as both the anode and cathode, but the concentrations of the electrolyte solutions on either side of the cell are different. The cell potential is negative because the electrode in the higher concentration solution will lose electrons and undergo oxidation, while the electrode in the lower concentration solution will gain electrons and undergo reduction. Thus, the overall cell reaction will be spontaneous and the cell potential will be negative.

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q235) Which of the following is not a factor affecting the electrode potential?**

a) Temperature

b) Concentration of electrolyte

c) Nature of electrode

d) Nature of electrolyte

Correct Answer: Option (b)

Explanation: The electrode potential is the measure of the tendency of an electrode to undergo oxidation or reduction. The electrode potential is affected by various factors such as temperature, nature of electrode, nature of electrolyte, and concentration of the electrolyte solution. However, the concentration of the electrolyte solution does not affect the electrode potential, as long as it is not extremely dilute or concentrated.

Thus, the correct answer is option (b).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q236) Which of the following statements is true for a concentration cell at equilibrium?**

a) The concentrations of the electrolyte solutions are the same

b) The cell potential is zero

c) The cell potential is positive

d) The cell potential is negative

Correct Answer: Option (b)

Explanation: A concentration cell is a type of electrochemical cell where the same electrode is used as both the anode and cathode, but the concentrations of the electrolyte solutions on either side of the cell are different. At equilibrium, the concentrations of the electrolyte solutions become equal, and there is no net flow of electrons. Therefore, the cell potential becomes zero.

Thus, the correct answer is option (b).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q237) Which of the following is not a characteristic of a good conductor?**

a) High electrical conductivity

b) High thermal conductivity

c) Low resistance

d) High activation energy

Correct Answer: Option (d)

Explanation: A good conductor is a material that allows electricity or heat to flow through it with ease. The characteristics of a good conductor include high electrical conductivity, high thermal conductivity, and low resistance. However, a good conductor should not have high activation energy, as this would make it difficult for the electrons to move through the material.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q238) Which of the following is not a type of electrode?**

a) Reference electrode

b) Working electrode

c) Auxiliary electrode

d) Primary electrode

Correct Answer: Option (d)

Explanation: The three types of electrodes used in electrochemical cells are the reference electrode, working electrode, and auxiliary electrode. The reference electrode is used as a reference point to measure the potential of other half-cells. The working electrode is the electrode where the reaction occurs, and the current is measured. The auxiliary electrode is used to complete the circuit and provide a pathway for the electrons to flow. There is no such thing as a primary electrode.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q239) Which of the following is not a function of a salt bridge?**

a) To complete the electrical circuit

b) To maintain electrical neutrality

c) To prevent the mixing of the two half-cells

d) To facilitate the flow of ions between the two half-cells

Correct Answer: Option (c)

Explanation: A salt bridge is a tube filled with a solution of an electrolyte that connects the two half-cells of an electrochemical cell. The function of the salt bridge is to complete the electrical circuit, maintain electrical neutrality, and facilitate the flow of ions between the two half-cells. However, the salt bridge does not prevent the mixing of the two half-cells, as it is designed to allow the ions to flow freely between the two solutions.

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q240) Which of the following is not a characteristic of a cathodic protection system?**

a) It involves the use of a sacrificial anode

b) It prevents the oxidation of the metal

c) It increases the rate of corrosion

d) It is used to protect buried pipelines

Correct Answer: Option (c)

Explanation: Cathodic protection is a technique used to protect metal structures from corrosion. It involves the use of a sacrificial anode, which is a more reactive metal that corrodes in place of the protected metal. The sacrificial anode is connected to the metal structure, and an electric current is passed through the system to force the metal ions to move towards the cathode, preventing the oxidation of the metal. This technique is commonly used to protect buried pipelines, offshore platforms, and other metal structures exposed to corrosive environments. However, cathodic protection does not increase the rate of corrosion.

Thus, the correct answer is option (c).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q241) What happens when an electric current is passed through an electrolyte?**

a) Electrolyte becomes acidic

b) Electrolyte becomes basic

c) Chemical changes occur in the electrolyte

d) The electrolyte becomes a solid

Correct Answer: Option (c)

Explanation: When an electric current is passed through an electrolyte, chemical changes occur in the electrolyte. The electrolyte is made up of ions, which are atoms or groups of atoms with an electrical charge. When an electric current is passed through the electrolyte, the ions move towards the electrodes (positive and negative), and they may gain or lose electrons. These chemical changes may result in the formation of new compounds or the decomposition of the electrolyte.

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q242) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following is a strong oxidizing agent?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: A strong oxidizing agent is a substance that can easily accept electrons from other substances and get reduced. Chlorine ( ) is a strong oxidizing agent as it can easily accept electrons to form chloride ions. In other words, it has a strong tendency to gain electrons and get reduced.

Thus, the correct answer is option (c).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q243) What is the standard reduction potential of hydrogen ion (H+)?**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: The standard reduction potential (E°) of hydrogen ion ( ) is . This means that when hydrogen ions gain electrons, they have a tendency to be reduced to hydrogen gas with a potential of . The sign of E° indicates the direction of electron flow, and a positive value indicates that the reaction is spontaneous in the forward direction.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q244) Which of the following is a spontaneous redox reaction?**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: A spontaneous redox reaction is a reaction that occurs without any external supply of energy. In other words, the reaction occurs spontaneously and releases energy. In the given options, option (d) represents a spontaneous redox reaction where zinc (Zn) is oxidized to form ions, and copper () ions are reduced to form copper metal. This reaction occurs spontaneously because zinc has a higher tendency to lose electrons and get oxidized than copper ions, which have a higher tendency to gain electrons and get reduced.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q245) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1OJevFme6Wyw7c2Lw\_C4-XDgeJpZasdGN/view?usp=sharing**](https://drive.google.com/file/d/1OJevFme6Wyw7c2Lw_C4-XDgeJpZasdGN/view?usp=sharing)**)**

**Type: Audio**

**Which of the following is an example of a redox reaction?**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: A redox reaction involves a transfer of electrons between species. In this case, sodium () loses an electron to become , while chlorine gains an electron to become . The transfer of electrons is represented by the oxidation number changing from 0 to for , and from to for

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q246) Which of the following is a reducing agent?**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: A reducing agent is a species that donates electrons to another species, causing that species to be reduced (i.e. gain electrons). In this case, can donate an electron to another species, making it a reducing agent.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q247) Which of the following conditions would result in the highest electrode potential for a redox reaction?**

a) A high concentration of oxidant and a low concentration of reductant.

b) A low concentration of oxidant and a high concentration of reductant.

c) Equal concentrations of oxidant and reductant.

d) None of the above, as electrode potential is not dependent on concentration.

Correct Answer: Option (d)

Explanation: The electrode potential of a redox reaction depends on the standard electrode potential, which is a thermodynamic property that is independent of concentration. Standard electrode potential is defined as the potential difference between an electrode and a solution of ions at standard conditions (1 M concentration, 25°C, and 1 atm pressure).

The concentration of the oxidant and reductant only affect the reaction rate, not the electrode potential. The reaction rate increases as the concentration of the reactants increases, but the electrode potential remains constant.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q248) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/12dJ7E-DaehEN5muawKpBPfPXRrLgUh2u/view?usp=sharing**](https://drive.google.com/file/d/12dJ7E-DaehEN5muawKpBPfPXRrLgUh2u/view?usp=sharing)**)**

**Type: Audio**

**Which of the following is a galvanic cell?**

a) A battery

b) A hydrogen fuel cell

c) An electrolytic cell

d) A voltaic cell

Correct Answer: Option (d)

Explanation: A galvanic cell, also known as a voltaic cell, is a type of electrochemical cell that converts chemical energy into electrical energy. It does this by allowing a spontaneous redox reaction to occur, with the electrons flowing through an external circuit to generate a current.

Thus, the correct answer is option (d).

Difficulty Level- Medium Bloom's Taxonomy: Understand

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**Q249) Which of the following factors affect the electrode potential?**

a) Concentration of the electrolyte

b) Temperature

c) Nature of the electrode material

d) All of the above

Correct Answer: Option (d)

Explanation: The electrode potential is affected by a number of factors, including the concentration of the electrolyte, the temperature, and the nature of the electrode material. Changes in any of these factors can cause the electrode potential to shift, which can have an impact on the overall cell potential.

Thus, the correct answer is option (d).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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**Q250) Answer the following question with reference to the audio**

**(**[**https://drive.google.com/file/d/1RWdrug1x0CYUuonbGuMoeQem\_Lw8t2nc/view?usp=sharing**](https://drive.google.com/file/d/1RWdrug1x0CYUuonbGuMoeQem_Lw8t2nc/view?usp=sharing)**)**

**Type: Audio**

**Which of the following statements is true about electrolysis?**

a) It involves a spontaneous redox reaction.

b) It can be used to plate one metal onto another.

c) The anode is the site of reduction.

d) The cathode is the site of oxidation.

Correct Answer: Option (b)

Explanation: Electrolysis involves using an external source of electrical energy to drive a non-spontaneous redox reaction. One application of this is electroplating, where a metal is plated onto another metal by using electrolysis. In this process, the metal to be plated acts as the cathode and the metal to be deposited acts as the anode.

Thus, the correct answer is option (b).

Difficulty Level- Hard Bloom's Taxonomy: Analyze

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