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CHEMISTRY-XII

HYDROCARBONS

OBJECTIVES

1. Hydrocarbons are organic compounds with element

- a) Hydrogen
- b) Oxygen
- c) Carbon
- d) Both hydrogen and carbon

Answer: d

Explanation: These organic compounds are made up of only carbon and hydrogen and hence the name hydrocarbons.

2. Find the odd one out.

- a) Aromatic
- b) Alkanes
- c) Alkynes
- d) Alkenes

Answer: a

Explanation: aromatic is a separate branch of hydrocarbons. Whereas the alkanes, alkenes, and alkynes are subfamilies of the branch aliphatic hydrocarbons.

3. The simplest member of organic compounds is?

- a) Methanol

- b) Methane
- c) Formaldehyde
- d) Formic acid

Answer: b

Explanation: Methane is the simplest member of alkane family and indeed the simplest of organic compounds, as all other compounds are derived by altering this compound.

4. Ethane is obtained by electrolyzing _____

- a) Potassium formate
- b) Potassium succinate
- c) Potassium acetate
- d) Potassium fumarate

Answer: b

Explanation: By electrolyzing potassium succinate (the process is generally called Kolbe's electrolysis), ethane is obtained.

5. "Methane is a product of aerobic respiration".

- a) False
- b) True

Answer: a

Explanation: Methane is the end product of anaerobic decay of plants due to the breakdown of very complicated molecules.

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6. Calcium carbide on reaction with water gives?

- a) Methane
- b) Ethane
- c) propane
- d) Acetylene

Answer: d

Explanation: $\text{CaC}_2 + \text{H}_2\text{O} \longrightarrow \text{C}_2\text{H}_2 + \text{Ca(OH)}_2$.

7. Name the process associated with acylation of benzene.

- a) Friedel craft reaction
- b) Wurtz reaction
- c) Wurtz fitting reaction
- d) Debey Huckel reaction

Answer: a

Explanation: The electrophilic substitution reaction that takes place between ethanoyl chloride and benzene is called as Friedel craft reaction.

8. The hydrocarbon in which all the 4 valencies of carbon are fully occupied is called as _____

- a) Alkene
- b) Alkyne
- c) Alkane
- d) Cycloalkane

Answer: c

Explanation: Alkanes, the saturated hydrocarbons are those in which the carbon atoms are bonded covalently to each other (fully occupied). Each carbon atom is tetrahedrally surrounded by H-atoms.

9. Liquid hydrocarbon is converted into gaseous hydrocarbon by _____

- a) Oxidation
- b) Hydrolysis
- c) Cracking
- d) Distillation

Answer: c

Explanation: Under cracking with high temperature, the liquid form of hydrocarbon is converted into gaseous form.

10. Chlorination of alkanes is an example of _____

- a) Radical
- b) Elimination
- c) Free radical
- d) Addition

Answer: c

Explanation: Free radical chlorination is a reaction that substitutes a chlorine for a hydrogen on an alkane.

11. When chlorine gas reacts with methane, Which of the product is formed?

- a) CHCl
- b) CH_2Cl
- c) CH_3Cl

d) CH_4Cl

Answer: c

Explanation: Under the influence of UV light or with a temperature of 250-400(degree) chlorine and methane react vigorously to give hydrogen chloride and chloromethane (CH_3Cl).

12. The methyl chloride undergoes substitution to form

a) CHCl

b) CH_2Cl

c) CHCl_2

d) CH_2Cl_2

Answer: d

Explanation: Chloromethane undergoes further substitution to form hydrogen chloride and dichloromethane (CH_2Cl_2).

13. Methane reacts more readily with chlorine than with Fluorine.

a) True

b) False

Answer: b

Explanation: Methane reacts with chlorine but not as vigorously as with fluorine. The reactivity order is as follows:
 $\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$.

14. Identify the one which is not a type of chlorination?

a) Free radical chlorination

b) Electrophobic chlorination

c) Ketone chlorination

d) Chlorine addition reaction

Answer: b

Explanation: Electrophobic is not a kind of halogenation. It is electrophilic chlorination, in which aromatic substitutions takes place.

15. Which among the following on chlorination undergoes substitution at the alkyl group?

- a) Ethers
- b) Hydroxyl groups
- c) Carbonyl compounds
- d) Carboxylic acids

Answer: a

Explanation: In the absence of sunlight, the alpha hydrogen of ethers undergoes substitution when treated with chlorine.

16. In the presence of red phosphorous, chlorine converts the fatty acids having alpha hydrogen atoms into _____

- a) Halo acids
- b) Alpha-halo acids
- c) Alpha,alpha-dihalo acids
- d) Trihalo acids

Answer: b

Explanation: The propionic acid, in the presence of Cl_2/P gets converted into alpha chloro propionic acid due to the action of the halogen chlorine.

17. Chlorine in the presence of which among the following generates positively charged species?

- a) Ferric chloride
- b) Anhydrous ferric chloride
- c) Ferrous chloride
- d) Anhydrous ferrous chloride

Answer: b

Explanation: Ferric chloride is a lewis acid catalyst and in the presence of chlorine, it converts nitrobenzene into 3-chloro nitro benzene.

18. p-nitrotoluene on reaction with chlorine forms hydrogen chloride and _____

- a) p-Nitrobenzyl chloride
- b) o-Nitrobenzyl chloride

- c) m-Nitrobenzyl chloride
- d) Nitrobenzyl chloride

Answer: a

Explanation: p-Nitrotoluene reacts with chlorine in the presence of CCl_4 at 80 (degree) C to form p-nitrobenzyl chloride under the conditions of photochemical initiation.

19. Chlorination of cyclobutane gives which among the following in addition to hydrogen chloride?

- a) Cyclobutyl chloride
- b) Cyclobutyl chlorite
- c) 1-chlorobutene
- d) 1,1-chlorobutene

Answer: b

Explanation: All the hydrogens of cyclobutane are equivalent and substitution of any gives the same product as that of others.

20. The step in which Cl-Cl bond homolysis occurs is called

-
- a) Initiation step
 - b) Propagation step
 - c) Intermediate step
 - d) Termination step

Answer: a

Explanation: Each Cl atom in the initiation step has several valence electrons and is very reactive and hence it abstracts a hydrogen atom from methane and homolysis occurs.

21. Saturated hydrocarbons are otherwise referred as

-
- a) Alkanes
 - b) Alkenes
 - c) Alkynes

d) Alkaloids

Answer: a

Explanation: Saturated hydrocarbons contain large number of hydrogen atoms in them and hence they are known as alkanes.

22. Identify the correct alkane name for the molecular formula $C_{30}H_{62}$.

a) Propdecane

b) Eicosane

c) Triacontane

d) Dodecane

Answer: c

Explanation: Triacontane is the alkane with the molecular formula $C_{30}H_{62}$ as alkanes have the general formula C_nH_{2n+2} .

23. Identify the smallest alkane which can form a ring structure (cycloalkane)?

a) Cyclomethane

b) Methane

c) Cyclopropane

d) Propane

Answer: c

Explanation: Cyclopropane is the only smallest alkane that can form a successful ring structure with C-C bond on removal of a hydrogen atom.

24. In which among the following alkane, a carbon atom is displaced so as to form a compactly structure with the resemblance of a butterfly wing?

- a) Cyclopropane
- b) Cyclobutane
- c) Cyclopentane
- d) Cyclohexane

Answer: b

Explanation: If one of the carbon atoms of cyclobutane is not displaced, then the C-C bond would be exactly at right angles to each other and they do not form a cyclic structure.

25. The first step in IUPAC nomenclature is to identify the total number of carbon atoms present in the compound.

- a) True
- b) False

Answer: b

Explanation: The first step is to find the number of carbon atoms present only in the main/longest chain of the compound.

26. The substituent in the chain is named by replacing the “ane” in the alkanes by _____

- a) ene
- b) ic
- c) one
- d) yl

Answer: d

Explanation: ene, ic and one are used for representing alkenes, carboxylic acids, and ketones respectively, hence yl is the term which is to be substituted in place of ane in the alkanes.

27. The C=C bond in the chain of the compound considered is shown by _____

- a) Specifying the number of carbon atoms associated with the bond
- b) Specifying the number of carbon atoms at beginning of the C=C bond
- c) Specifying the number of carbon atoms at end of the C=C bond
- d) Specifying the number of carbon atoms in the entire chain

Answer: b

Explanation: According to the rules of IUPAC, The C=C bond in the chain of the compound considered is shown by specifying the number of carbon atoms at beginning of the C=C bond.

28. Dienes are the name given to compounds with _____

- a) Exactly a double bond
- b) Exactly a triple bond
- c) Exactly two double bond
- d) More than two double bond

Answer: c

Explanation: Alkenes are the name given to compound with one double bond and dienes are the one given to compounds with two double bond.

29. Triple bond with two carbon atoms on either side is called _____

- a) Methnyl group
- b) Ethynyl group
- c) Propionyl group
- d) Propargyl group

Answer: b

Explanation: Triple bond with two atoms on either side are called as ethynyl group and those with one carbon on one side and two carbon on another side are called as propargyl group.

30. The substituent groups that are commonly associated with benzene ring are _____

- a) Phenyl and benzyl
- b) Propyl and phenyl
- c) Methyl and benzyl
- d) Butyl and phenyl

Answer: a

Explanation: Phenyl and benzyl are commonly associated with benzene ring due to their closely associated structure with difference in hydrogen atom

31. Organic compounds are broadly classified as _____

- a) Open chain compounds and acyclic compounds

- b) Open chain compounds and linear chain compounds
- c) Cyclic compounds and alicyclic compounds
- d) alicyclic compounds and acyclic compounds

Answer: d

Explanation: Organic compounds are broadly classified into open chain and closed chain compounds.

32. Aliphatic compound is the other name for _____

- a) Acyclic compounds
- b) Alicyclic compounds
- c) Ring compounds
- d) Closed chain compounds

Answer: a

Explanation: open chain compounds or acyclic compounds are otherwise called as aliphatic compounds.

33. Which among the following is not an example of Acyclic compound?

- a) Acetaldehyde
- b) Ethane
- c) Cyclopropane
- d) Isobutane

Answer: c

Explanation: Cyclopropane is a ring (cyclic) compound and hence it does not come with the examples of open chain compounds.

34. Which among the following is not an example of alicyclic compound?

- a) Cyclohexane
- b) Cyclohexene
- c) Tetrahydrofuran
- d) Acetic acid

Answer: d

Explanation: Acetic acid is a linear chain compound (acyclic) and hence it is not an example of ring compound (alicyclic).

35. Which among the following is not an aromatic compound (in specific)?

- a) Naphthalene
- b) Aniline
- c) Pyridine
- d) Tropolone

Answer: c

Explanation: Pyridine is heterocyclic aromatic compound. Whereas naphthalene and aniline are benzenoid aromatic compounds and tropolone is a non-benzenoid aromatic compound.

36. Find the odd one among the following.

- a) Alicyclic compounds
- b) Heterogeneous compounds
- c) Branched chain compounds

d) Aromatic compounds

Answer: c

Explanation: Branched chain compound is a classification of open-chain compounds. Whereas, alicyclic, aromatic and heterogeneous compounds are sub-classifications of cyclic compounds.

37. Identify the odd one among the following.

a) Indene

b) Anthracene

c) o,m,p-xylene

d) Azulene

Answer: d

Explanation: Azulene is a non-benzenoid compound. Whereas, Indene, anthracene, and o,m,p-Xylene are examples of benzenoid aromatic compounds.

38. Organic compounds can be classified even based upon the function groups. Identify the one which is not a functional group?

a) Isocyanide

b) Isocyano

c) Carboxyl

d) Carbonyl

Answer: a

Explanation: Isocyanide is a compound and it is not a functional group.

39. Which among the following is not a class of organic compound?

- a) Carbonyl compound
- b) Nitro compound
- c) Amides
- d) Electro compounds

Answer: d

Explanation: Classes of organic compounds are those which involves organic compounds such as carbon, hydrogen and oxygen. Hence, electro compounds is not a class of organic compounds.

40. Which among these is not associated with aliphatic compounds?

- a) They contain $(4n+2)\pi$ electrons
- b) Contain straight chain compounds
- c) Contain branched chain compounds
- d) Has appropriate number of H-atoms and functional groups

Answer: a

Explanation: The aromatic compounds $(4n+2)\pi$ electrons, which comes under the classification of cyclic compounds and hence they are not associated with aliphatic compounds.

41. Resonance forms are in equilibrium with each other.

- a) True
- b) False

Answer: b

Explanation: Resonance forms are hybrid in nature and hence it is not correct to say that they are in equilibrium with each other.

42. Identify the false statement regarding resonance.

- a) As the number of charges increases, the resonance forms gets more significant
- b) Zero charge of resonance is the most significant one
- c) Atoms with full octet resonance form are more stable when compared with the one with unfilled octet
- d) Resonance is unstable in case of unfilled octet of nitrogen atom

Answer: a

Explanation: Greater the number of charges, less stable and less significant gets the resonance form.

43. Identify the correct sequence according to electronegativity.

- a) $F > NH_2 > CH_3 > OH^-$
- b) $NH_2^- > F^- > CH_3^- > OH^-$
- c) $NH_2^- > OH^- > CH_3^- > F^-$
- d) $F^- > OH^- > NH_2^- > CH_3^-$

Answer: d

Explanation: In the sequence " $F^- > OH^- > NH_2^- > CH_3^-$ ", F^- is the most stable one and CH_3^- is the least stable one, as the stability of the anions increases on moving towards the right of the periodic table.

44. Identify the correct sequence with respect to Inductive effects.

- a) $\text{CF}_3 > \text{CH}_2\text{F} > \text{CHF}_2 > \text{CF}_3$
- b) $\text{CF}_3 > \text{CHF}_2 > \text{CH}_2\text{F} > \text{CH}_3$
- c) $\text{CH}_3 > \text{CH}_2\text{F} > \text{CHF}_2 > \text{CF}_3$
- d) $\text{CH}_3 > \text{CHF}_2 > \text{CH}_2\text{F} > \text{CF}_3$

Answer: b

Explanation: As electron withdrawing substituent is greater in CF_3 , it is more stable and CH_3 is the least stable one and hence the sequence.

45. Stability sequence: primary carbocation > secondary carbocation > tertiary carbocation. Is this sequence correct?

- a) Yes
- b) No

Answer: b

Explanation: The tertiary carbocation has the highest stability and the primary carbocation has the least stability, as it lies close to electron withdrawing group and hence the sequence is not correct.

46. Identify the incorrect statement regarding aromaticity.

- a) It is the extra stability possessed by a molecule
- b) p-orbitals must be planar and overlap
- c) Cyclic delocalization takes place
- d) It does not follow Huckel's rule

Answer: d

Explanation: It follows Huckel's rule, according to which a molecule must possess specific number of pi electrons within a closed ring of p-orbitals.

47. Aromatic rings do not have resonance structures.

a) False

b) True

Answer: a

Explanation: Aromatic rings have resonance structure due to cycling double bonds and all aromatic rings must have resonance but the converse need not be satisfied.

48. Select the correct statement regarding the aromatic nitrogen molecule.

a) It is not hybridized

b) It is sp hybridized

c) It is sp² hybridized

d) It is sp³ hybridized

Answer: c

Explanation: As a result of its overall structure and electron delocalization, it becomes a sp² hybridized, aromatic molecule.

49. Can a linear molecule have aromaticity.

a) Yes

b) No

Answer: b

Explanation: A molecule can have aromaticity if it is closed loop or ring-shaped or has p-orbitals and hence linear molecule cannot have aromaticity.

50. Select the incorrect statement.

- a) A resonance may sometimes cause sp^3 atoms to become sp^2 hybridized
- b) Delocalizing one lone pair causes aromaticity
- c) One lone pair will be counted as two pi electrons according to Huckel's equation
- d) Two sigma bonds make up a double bond

Answer: d

Explanation: A double bond is one which has a sigma bond and a pi bond. Each pi bond has two pi electrons.

51. Identify the one which does not come under the organic addition reaction?

- a) Hydration
- b) Dehydration
- c) Halogenation
- d) Hydrohalogenation

Answer: b

Explanation: Dehydration comes under elimination reaction and hence it does not come under addition reaction.

52. Choose the correct one which will react faster in the SN_2 nucleophilic substitution reaction?

- a) $CH_2 = CH - CH_2 - Br$

b) $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{Br}$

c) $\text{CH}_2 = \text{CH} - \text{CH}_2 = \text{Br}$

d) $\text{CH} = \text{CH}_2 - \text{CH}_2 - \text{Br}$

Answer: b

Explanation: The carbocation character in the transition state causes stabilization of the resonance and hence $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{Br}$ (2-bromobutane) is the one which will react faster compared to the others.

53. What will be the reactivity of chlorobenzene in an electrophilic substitution reaction with benzene?

a) Reacts very slowly than benzene

b) Reacts in the same way as benzene

c) Reacts faster than benzene

d) Does not react with benzene

Answer: a

Explanation: The rate of the reaction depends on the electron density in the ring and here in this case resonance is not favorable and the electronegativity dipole dominates. This slows down the reactivity of chlorobenzene.

54. Alcohol on refluxing with Cr_2O_7 gives _____

a) Ester

b) Aldehyde

c) Sugar

d) Carboxylic acid

Answer: d

Explanation: Alcohol (R-OH), when it is refluxed with Cr_2O_7 , it forms carboxylic acid (R-COOH).

55. Alkene under high temperature and high-pressure forms

- a) Alcohol
- b) Polyalkyne
- c) Polyalkane
- d) Polyalkene

Answer: c

Explanation: Alkenes undergoes polymerization reaction under high temperature and pressure to form poly alkanes $-(\text{C}-\text{C})_n$.

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56. Identify the one which on reaction with carboxylic acid at high temperature gives Ester?

- a) Ketone
- b) Alcohol
- c) Aldehyde
- d) Sugars

Answer: b

Explanation: Alcohols on reaction with carboxylic acid at high temperature, in the presence of sulphuric acid gives Ester.

57. Select the correct statement regarding carboxylic acids.

- a) They form acyl chlorides on reaction with PCl_5
- b) Aldehydes in the presence of $\text{H}^+/\text{Cr}_2\text{O}_7$ forms carboxylic acids
- c) They combine with alcohols to form esters
- d) Upon polymerization, they form polymers

Answer: d

Explanation: Carboxylic acids do not undergo polymerization reaction.

58. Primary alcohols undergo what reaction to form alkenes?

- a) Elimination
- b) Oxidation
- c) Reduction
- d) Hydrolysis

Answer: a

Explanation: Upon elimination or dehydration, the primary alcohols form alkenes.

59. Carbonyl compounds especially ketones undergo reduction to form _____

- a) Primary alcohols
- b) Secondary alcohols
- c) Alkanes
- d) Alkenes

Answer: b

Explanation: Ketones in the presence of NaBH_4 undergoes reduction to form secondary alcohols.

60. Primary amides get converted into primary amines by

-
- a) Addition
 - b) Oxidation
 - c) Reduction
 - d) Acylation

Answer: b

Explanation: Primary amides upon heating in the presence of hydrogen and nickel catalyst, gets reduced to form primary amines.

61. Select the incorrect statement regarding alkanes.

- a) It is otherwise known as Paraffin
- b) It is an acyclic saturated hydrocarbon
- c) In alkanes, C-C bonds are single
- d) Alkanes have the general formula C_nH_{2n}

Answer: d

Explanation: Alkanes have the general formula $\text{C}_n\text{H}_{2n+2}$, i.e; they have two additional hydrogen atoms in comparison with the others.

62. Identify the simplest alkane.

- a) Methane
- b) Methene
- c) Ethane
- d) Ethene

Answer: a

Explanation: Methane, called the parent molecule, is the

simplest among the alkanes and it has the simplest formula with one carbon atom.

63. Select the minimum number of carbon atoms, a molecule must possess so as to be regarded as a higher alkane.

- a) 15
- b) 16
- c) 17
- d) 18

Answer: c

Explanation: A molecule with more than 17 carbon atoms are regarded as higher alkanes such as waxes and solids.

64. Identify the incorrect statement.

- a) Alkanes with repeated $-\text{CH}_2-$ units constitute a homologous series
- b) They are very reactive
- c) They have very less biological activity
- d) Petroleum and natural gas are the main sources of alkanes

Answer: b

Explanation: Alkanes in general are not very reactive, but they are associated with functional groups which are reactive.

65. Which among the following is not an alkane isomer with 6 carbon atoms?

- a) Hexane
- b) 2,3-dimethylbutane
- c) 2,2-dimethylbutane
- d) Neopentane

Answer: d

Explanation: Neopentane is an isomer with 5 carbon atoms and hence it is not an isomer with 6 carbon atoms.

66. The other name for branched chain alkanes is

-
- a) Paraffins
 - b) Isoparaffins

c) Neoparaffins

d) Naphthenes

Answer: b

Explanation: Linear and branched chain alkanes have difference in their physical properties and hence they are given different prefix like n- and iso-respectively.

67. Select the incorrect statement regarding the boiling points of alkanes.

a) Boiling point increases with stronger Vander Waal's forces

b) Surface area is the only factor which determines the boiling point of alkane

c) Boiling point of straight chain alkanes is greater than that of branched chain alkanes

d) The boiling point of cycloalkanes is always higher than that of linear alkanes

Answer: b

Explanation: Number of electrons and surface area are the two factors which determine the boiling point.

68. Choose the correct statement.

a) Alkanes have poor conductivity

b) They form hydrogen bonds

c) They have good solubility in non polar solvents than polar solvents

d) Alkanes have less density than that of water

Answer: b

Explanation: They undergo polarization and hence they do not form hydrogen bonds.

69. Liquified petroleum gas is mainly composed of

a) Methane and ethane

b) Ethane and propane

c) Propane and butane

d) Butane and hexane

Answer: c

Explanation: At low pressure both propane and butane gets liquefied, hence they form the main components of LPG.

70. An alkane with 6 carbon atoms will have how many hydrogen atoms?

a) 11

b) 12

c) 13

d) 14

Answer: d

Explanation: From the formula C_nH_{2n+2} , if $n=6$ then $(2*6)+2=14$.

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