

Chemistry Worksheet Class 11 on Chapter 13

Hydrocarbons with Answers- Set 4

Q-1: Which of the following reactions is used to determine the double bond position in unsaturated compounds?

- a) Pyrolysis
- b) Aromatisation
- c) Hydrogenation
- d) Ozonolysis

Answer: d) Ozonolysis

Explanation: The addition of ozone molecules to alkenes results in the formation of ozonide. When ozone is passed through a solution of alkene in an inert solvent such as CCl_4 , addition occurs across the double bond to form an ozonide. As a result, this reaction is used to determine the position of the double bond in unsaturated compounds.

Q-2: Conformation arises due to rotation around

- a) C-C double bond
- b) C-C single bond
- c) C-C triple bond
- d) All of the above

Answer: b) C-C single bond

Explanation: Conformations are the various three-dimensional arrangements in the space of the atoms in a molecule that can be converted into one another simply by free rotation about the axis (C-C single bond).

Q-3: Which of the following happens in the Kharasch effect?

- a) Free radical substitution
- b) Electrophilic addition
- c) Free radical addition
- d) Nucleophilic addition

Answer: c) Free radical addition

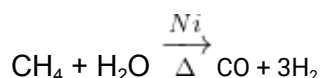
Q-4: $\text{C}_6\text{H}_6 + \text{X} + \text{AlCl}_3 \rightarrow \text{Toluene}$, X is

- a) Acetic acid
- b) Chloromethane
- c) Acetone
- d) Acetic anhydride

Answer: b) Chloromethane

Q-5: Describe the procedure for making dihydrogen gas for industrial applications.

Answer: In the presence of a nickel catalyst, methane interacts with steam at 1273 K to produce carbon monoxide and dihydrogen. This process is used to prepare dihydrogen gas for industrial usage. The following reaction takes place:



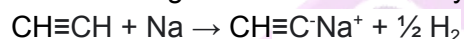
Q-6: Why are electrophilic reagents able to attack alkenes so quickly?

Answer: The presence of a weaker π -bond makes alkenes unstable molecules. Due to poor sideways overlap between the two 2p orbitals, the π (π) bond is weaker. As a result, alkenes behave as sources of loosely held mobile electrons when the π (π) bond is present. Alkenes are thus readily attacked by substances or agents looking for electrons. These substances are known as electrophilic reagents.

Q-7: How are alkynes distinguished from alkenes and alkanes? Describe using the reactions as support.

Answer: By reacting them with Na, alkynes can be differentiated from alkanes and alkenes. Alkynes that have a more acidic proton linked to the triple bond will pass this test, while alkanes and alkenes won't.

The following is the reaction of alkynes with sodium(Na) metal:



Q-8: Why are naphthalene balls used in toilets and for clothing preservation?

Answer: Naphthalene balls are used in toilets and for clothing preservation because of their unique smell and moth-repellent property.

Q-9: a) Write the general formula for alkynes.

b) Write down the IUPAC name and structures of all alkynes having the molecular formula C_5H_8 .

Answer: a) The general formula for alkynes is $\text{C}_n\text{H}_{2n-2}$, where n represents the number of carbon atoms.

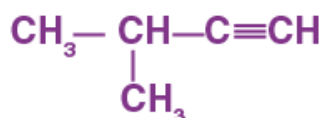
b) Following is a list of the several alkyne structures with the IUPAC name and chemical formula C_5H_8 :



pent-1-yne



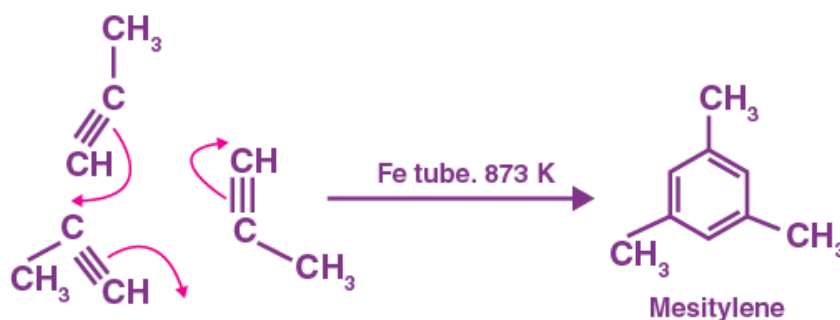
pent-2-yne



3-methyl-1-butyne

Q-10: What is the end result of passing propyne through a hot iron tube at 873 K?

Answer: Mesitylene is formed when propyne is passed through a hot iron tube at 873 K. The following is the reaction to the same:



Q-11: Which of the following is aromatic in nature?



Answer: 4) All of these

Explanation: To be aromatic, a compound must follow the Huckel rule. It states that a compound must have $(4n+2)\pi$ electrons in the ring, where n is the whole number ($n=0,1,2,3,\dots$).

There are two π -electrons in compound a), so when we equate it to $4n+2$, we get $n = 0$.

Similarly, the number of π -electrons in compounds b) and c) are 6. When we equate it to $4n+2$, we get $n = 1$.

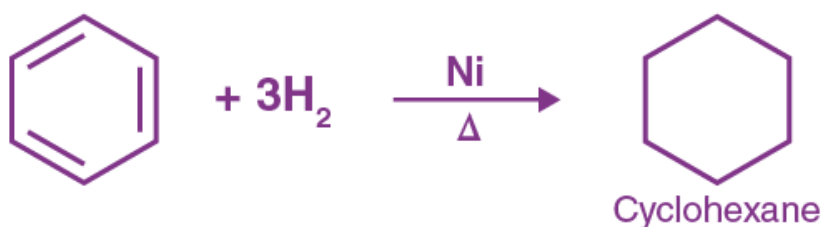
Because we are getting a whole number value for n , each of the compounds given follows the Huckel rule, and thus they are aromatic in nature.

Q-12: Write the products of the following reaction.

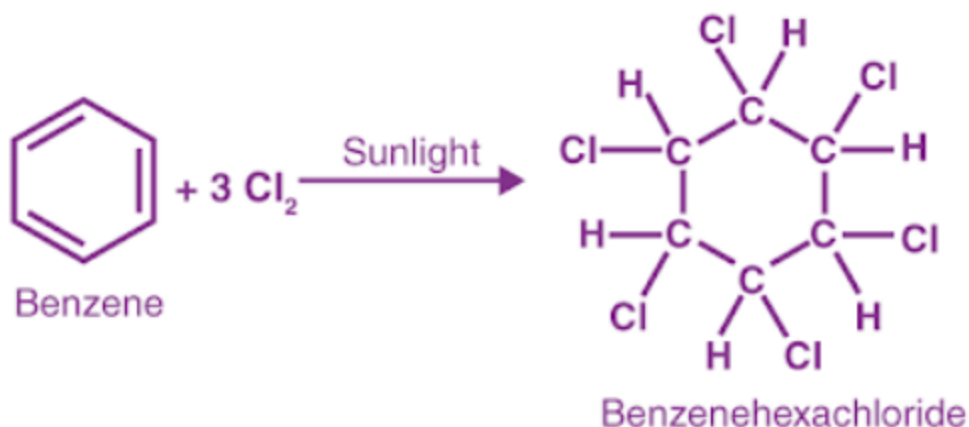
- a) Hydrogenation of benzene at high temperatures and pressures in the presence of a Ni catalyst.
- b) Chlorination of benzene in the presence of ultraviolet light.
- c) Chlorination of benzene in the dark.

Answer:

a) Hydrogenation of benzene gives cyclohexane at high temperatures and pressures in the presence of Ni catalyst.



b) Under ultraviolet light, three chlorine molecules add to benzene to produce benzene hexachloride, $\text{C}_6\text{H}_6\text{Cl}_6$.

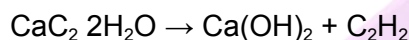


c) No reaction takes place since reaction will take place only in the presence of Lewis acids.

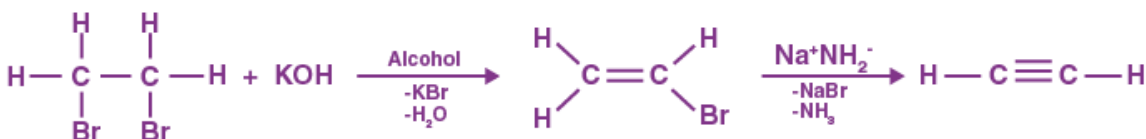
Q-13: Give any two methods for preparing ethyne.

Answer: The two methods for preparing ethyne are stated below:

1. From calcium carbide: On the industrial scale, ethyne is prepared by reacting calcium carbide with water.



2. From vicinal dihalides: Vicinal dihalides are dehydrohalogenated after being treated with alcoholic potassium hydroxide. One molecule of hydrogen halide is removed to form alkenyl halide, which is then treated with sodamide to yield ethyne.



Q-14: How do structural isomers and stereoisomers differ from each other?

Answer:

Structural Isomers	Stereoisomers
Structural isomers are those isomers that differ in a molecule's structure, or in how atoms or groups	Stereoisomers are those isomers which exist when molecules with identical molecular formula

are bonded together.

and pattern of linked atoms have different three-dimensional spatial orientations.

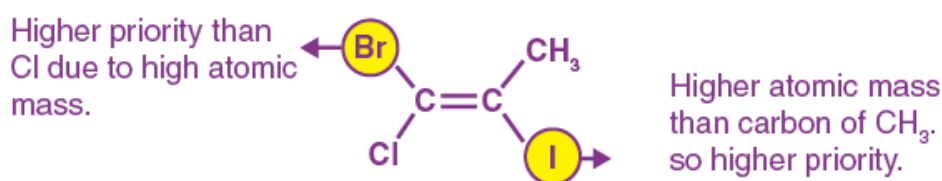
Q-15: Why does cis isomer have a lower melting point than trans isomer?

Answer: This is because trans isomers have higher symmetry and can fit closer together in crystals. Because of this, the trans isomer melts at a higher temperature than the cis isomer.

Q-16: How can we discuss geometrical isomerism in the compounds where distinct atoms or groups of atoms are bound to the double-bonded carbon atoms?

Answer: In these circumstances, a new nomenclature based on the atomic number of the atom immediately connected to the carbon atom with a double bond is taken into account. The term "E-Z notation" refers to this kind of notation. Here, E stands for Entgegen, meaning opposite, and Z stands for Zusammen, meaning together.

For example:

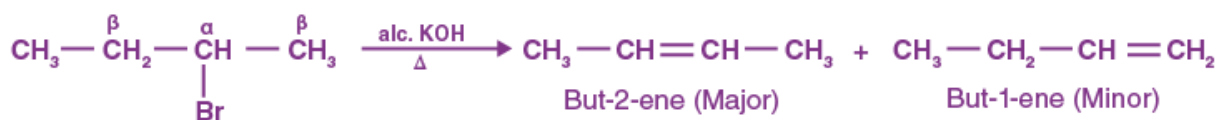


Since groups of higher priorities are on the opposite side, it is (E)-1-bromo-1-chloro-2-iodopropene.

Q-17: State the Saytzeff rule.

Answer: When two alkenes are formed, the alkene that is more substituted is the major product, according to the Saytzeff rule. This is due to the fact that the more substituted alkene is more stable than the less substituted alkene. The stability is proportional to the number of hyperconjugative structures; the greater the number of hyperconjugative structures, the greater the stability.

For example:

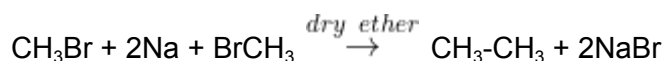


As previously stated, the preferred alkene is one that is more alkylated, that is, one that has more alkyl groups attached to the double-bonded carbon atoms.

Q-18: What is Wurtz reaction? Give an example of the reaction.

Answer: Higher alkanes are produced when alkyl halides are treated with sodium metal in dry ether. This is known as the Wurtz reaction. The product of this reaction is an alkane with a new carbon-carbon bond.

The following reaction is an example of a Wurtz reaction.



Q-19: Define aromaticity using a few examples.

Answer: Aromaticity in aromatic compounds is due to the presence of cyclic, planar, and delocalised system of $(4n+2)\pi$ electrons.

Some examples of aromatic species are given below:

- 1) Benzene: It is a planar cyclic system with 6π electrons.
- 2) Naphthalene: A cyclic planar system with 10π electrons.
- 3) Anthracene: A cyclic planar system with 14π electrons.

Q-20: a) Which polymer can be used as electrodes in batteries? And why?

b) What happens when acetylene is passed through dil. H_2SO_4 in the presence of HgSO_4 ?

Answer:

a) Batteries use polymer polyacetylene films as electrodes. These films are used as electrodes in batteries because they are good conductors, lighter, and less expensive than metal conductors.

b) When acetylene is passed through dil. H_2SO_4 in the presence of HgSO_4 , ethanol is formed. The following is the reaction that take place:

