Alkene Chemistry Questions with Solutions

Q1. The general formula of Alkene is-

a.) C_nH_{2n+2}
b.) C_nH_{2n}
c.) C_nH_{2n-2}
d.) None of the above

Correct Answer– (b.) C_nH_{2n}

Q2. Alkenes have which type of bond between them?

a.) single
b.) double
c.) triple
d.) None of the above

Correct Answer– (b.) double

Q3. Identify the incorrect statement regarding the synthesis of alkenes.

a.) Cracking of a hydrocarbon yields alkenes
b.) The reactions are exothermic
c.) Zeolite catalyst helps in the synthesis of alkenes
d.) The synthesis of alkenes is otherwise known as reforming

Correct Answer– (b.) The reactions are exothermic.
Explanation– The reactions that take place occur at high temperatures, and hence, they are endothermic.

Q4. Which of the following alkenes are used in the production of plastics?

a.) 1, 2 – butadiene
b.) 1, 3 – butadiene
c.) 2 – butadiene
d.) Butadiene

Correct Answer– (b.) 1, 3 – butadiene
Explanation– 1, 3 – butadiene is a widely used monomer as it has a very good electrical resistivity.

Q5. How do you test for an alkene?

a.) They turn universal indicator purple
b.) They turn bromine water colourless
c.) They turn limewater cloudy
d.) All of the above

Correct Answer– (b.) They turn bromine water colourless.

Q6. Differentiate between Alkene and Alkyne

Answer. Alkenes have atleast one double bond between them, and they have a general formula C_nH_{2n}, whereas alkynes have atleast one triple bond between them and have a general formula C_nH_{2n-2}.

Q7. Which test is used to distinguish between alkane and alkenes?

Answer. Romine reaction test can be used to distinguish an alkene from an alkane. Bromine water is commonly used to detect the presence of alkenes. When an alkene is added to a sample of bromine water and shaken, the solution changes from light orange to colourless.
Alkanes, on the other hand, cannot decolourize bromine water.

Q8. Give the alkene structure (C_4H_8), which adds on HBr in the presence and the absence of peroxide, to give the same product, C_4H_9Br.

Answer. 2-Butene with structure $CH_3 – CH = CH — CH_3$ being symmetrical gives the same product, i.e., 2-bromobutane $CH_3 – CH(Br) – CH_2CH_3$.

Q9. Arrange the following: HCl, HBr, HI, HF in order of decreasing reactivity towards alkenes

Answer. In the order of decreasing reactivity towards alkenes, compounds can be arranged as follows- HF, HCl, HBr, HI.

Q10. What is the decreasing order of reactivity of $H_2C = CH_2$, $(CH_3)_2$, $H_2C = CH_2$, $CH_3 – CH = CH_2$, $CH_3 – CH = CH – CH_3$, $(CH_3)_2 C = C (CH_3)_2$, $(CH_3)_2 C = CH CH_3$ towards electrophilic addition reactions?

Answer.
The order of reactivity of the given alkenes towards electrophilic addition reactions decreases in the following order–
$(CH_3)_2 C = C (CH_3)_2 > (CH_3)_2 C = CH CH_3 > (CH_3)_2 C = CH_2 > CH_3 CH – CH – CH_3 > CH_3 – CH = CH, > CH_2 = CH_2$.

Q11. How vicinal dihalide can be used in the preparation of alkene?

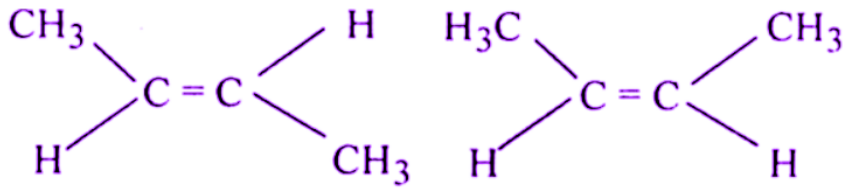
Answer. On treatment with Zn metal, Vicinal dihalide loses a molecule of ZnX_2 from an alkene. This reaction is known as dehalogenation.
$CH_2Br\text{-}CH_2Br + Zn \rightarrow CH_2 = CH_2 + ZnBr_2$.

Q12. Fill in the blank.
Alkenes are also called ___.

Answer. Alkenes are also called olefins. This is because the lower members form oily products on treatment with chlorine or bromine.

Q13. Alkynes on reduction with sodium in liquid ammonia form trans alkenes. Will the butene thus formed on reduction of 2-butyne show the geometrical isomerism?

Answer. But-2-ene is formed when but-2-yne is reduced, with both methyl groups on the same or opposite side to show geometrical isomers.



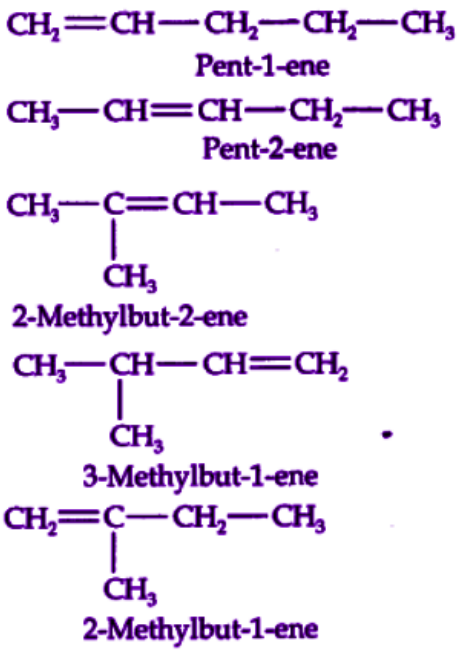
trans-But-2-ene

cis-But-2-ene

Q14. Write the structure and IUPAC names of different structural isomers of alkenes corresponding to C_5H_{10}.

Answer. The structure and IUPAC names of different structural isomers of Pentene are as follows-

BYJU'S The Learning App



Q15. Why are addition reactions more common in alkenes and alkynes than in aromatic hydrocarbons?

Answer. Unsaturated alkenes and alkynes have -bonds and thus do not have the full amount of hydrogen that they could have.
Since π-bonds are not as strong as σ-bonds, they are more unstable than alkanes. Even though alkenes and alkynes want to form more σ-bonds and have a more alkane-like structure, they undergo addition reactions.
Addition reactions occur when more atoms are added to the molecule rather than being removed. This means that the π—bonds must be removed and replaced with new atoms, rather than the existing σ-bonds being reattached - it is easier to break π- bond than to reattach σ - bond.
Alkanes do not undergo this reaction because they already have single σ-bonds and thus cannot become more structurally stable or stronger - they are already at the peak and can only swap things around in substitution reactions.
Alkanes do not undergo this reaction because they already have single σ-bonds and thus cannot become more structurally stable or stronger - they are already at the peak. They can only replace things around in substitution reactions.

Practise Questions on Alkene

Q1. The addition of bromine to 1. 3 –butadiene gives–

a.) 1, 2 addition product only
b.) 1, 4 addition product only
c.) Both (a) and (b)
d.) None of the above

Correct Answer– (c.) Both (a) and (b)

Q2. Alkenes usually show ___ type of reaction.

a.) Addition
b.) Substitution
c.) Elimination
d.) Superposition

Correct Answer– (a.) Addition
Explanation– Alkenes have a double bond and are, therefore, unsaturated hydrocarbons, so generally, they give an addition reaction.

Q3. What is the order of reactivity of alkyl groups and halogens in the dehydrohalogenation of alkyl halides to give alkenes?

Answer. The reactivity of alkyl groups and halogens in the dehydrohalogenation of alkyl halides to give alkenes is–
Alkyl group: Tert > secondary > primary.
Halogens: Iodine > Bromine > Chlorine.

Q4. An alkyl halide $C_5H_{11}Br$ (A) reacts with ethanolic KOH to give an alkene 'B', which reacts with Br_2 to give a compound 'C', which on dehydrobromination, gives an alkyne 'D'. On treatment with sodium metal in liquid ammonia, one mole of 'D' gives one mole of the sodium salt of 'D' and half a mole of hydrogen gas. Complete hydrogenation of 'D' yields a straight-chain alkane. Identify A, B, C and D. Give the reactions involved.

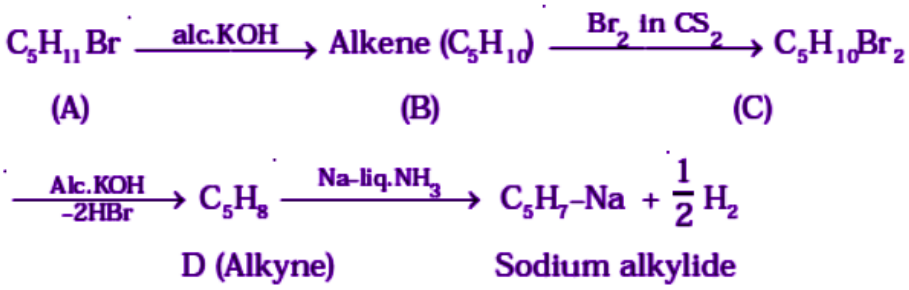
Answer. Identification of A, B, C and D

- $C_5H_{11}Br$ (A) + alc. KOH $\rightarrow$ C_5H_{10} (B)
- C_5H_{10} +Br_2 $\rightarrow$ $C_5H_{10}Br_2$ (C)
- $C_5H_{10}Br_2$ + alc. KOH $\rightarrow$ C_5H_8 (D)

On treatment with sodium metal in liquid ammonia, one mole of 'D' gives one mole of the sodium salt of 'D' and half a mole of hydrogen gas–

$2C_5H_8 + 2Na \rightarrow 2C_5H_7Na + ½H_2$

Complete hydrogenation of D–
$C_5H_8 + H_2 \rightarrow C_5H_{12}$



Q5. Answer the following-
(a) Why are alkenes called unsaturated hydrocarbons?
(b) How will you test the presence of a double bond in an alkene?
(c) Name the products formed when propene is subjected to ozonolysis.

Answer. (a) Alkenes contain two hydrogen atoms less than alkanes, and thus, they contain atleast a double bond (C=C) in their molecule. Thus, they are called unsaturated hydrocarbons.
(b) Alkenes react with cold dilute $KMnO_4$ solution to form glycols. Since the bright purple colour of $KMnO_4$ disappears during the reaction, it is used as a test for the presence of the double bond.
(c) When propene is subjected to ozonolysis, a mixture of acetaldehyde and formaldehyde is formed.