



Ramashray Baleshwar College

Dalsingsarai, Samastipur(Bihar)

A Constituent Unit of L. N. Mithila University, Darbhanga

AFFILIATED TO L.N. MITHILA UNIVERSITY, DARBHANGA

Assignment

STUDENT'S NAME : RAHUL KUMAR
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FATHER'S NAME : YOGENDRA PANDIT
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SUBMISSION DATE

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STUDENT SIGNATURE

R B
C O L L E G E

Department of Chemistry.

MIC-III-Sem - Assignment (2024-28)

Note: Attempt any three questions

- ① Write a short note on free radical substitution reaction of alkenes.
- ② Differentiate between Markovnikov's and anti-Markovnikov's addition reaction of alkene.
- ③ Explain the term (a) oxy-mercuration and anti-de-mercuration (b) ozonolysis of alkane.
- ④ Describe the preparation and properties of alkynes and explain its uses.
- ⑤ What are the main sources and causes of Air Pollution?

Answers of Question number (1.)

* free Radical Substitution Reaction of Alkene
free radical substitution reactions of alkenes occur when an alkene reacts with a reagent under free radical conditions (such as heat, light, or peroxide initiators), leading to the replacement of a hydrogen atom by another atom or group via a radical mechanism.

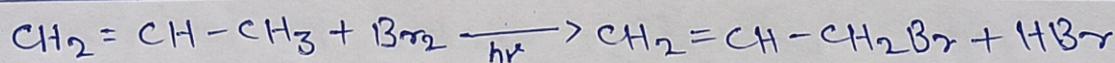
Although alkenes are more commonly known for addition reactions, substitution reactions can take place mainly at the allylic position (carbon adjacent to the double bond).

* Key features.

- > Takes place in the presence of UV light, heat, or peroxides.
- > Involves free radicals as reactive intermediates.
- > Occurs preferentially at the allylic hydrogen due to greater radical stability.

* Example: Allylic Bromination

When propene reacts with bromine in the presence of light:



* Mechanism

1. Initiation - Homolytic cleavage of Br_2 to form bromine radicals
2. Propagation - Abstraction of allylic hydrogen forming an allyl radical
3. Termination - Combination of radicals to form stable products.

* Importance :

- Allylic radicals are resonance-stabilized, making substitution favorable.
- Used in organic synthesis for selective functionalization of alkenes.

* Conclusion :

Free radical substitution reactions of alkenes mainly occur at the allylic position under radical-forming conditions and proceed through a chain mechanism involving initiation, propagation and termination steps.

Answer of Question number. 2.

Differentiation between Markovnikov's and Anti-Markovnikov's Addition.

Feature	Markovnikov's Addition	Anti-Markovnikov's Addition
Basic Rule	The negative part of the addendum (e.g. Br^-) attaches to the carbon with fewer hydrogen atoms.	The negative part of the addendum (e.g. Br^+) attaches to the carbon with more hydrogen atoms.
Reagent Condition	Occurs in the absence of peroxides.	Occurs only in the presence of peroxides (e.g. Benzoyl Peroxide)

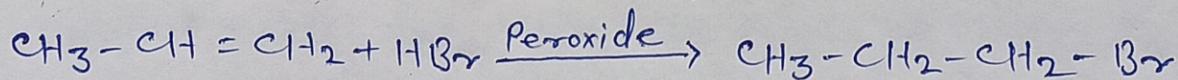
Feature	Markovnikov's Addition	Anti-Markovnikov's Addition
Applicability	Applicable to HCl, HBr, and HI.	Applicable only to HBr (Peroxide Effect/Kharasch Effect.)
Reaction Mechanism	Electrophilic Addition (Ionic Mechanism).	Free Radical Addition Mechanism.
Attacking Species	Electrophile (H^+) attacks first.	Free radical (Br^{\cdot}) attacks first.
Intermediate	formation of the most stable Carbocation.	formation of the most stable carbon free Radical.
orientation	follows "The rich get richer" (H adds to C with more H).	Reverse orientation.

* Markovnikov's Addition



2-Bromopropane.

* Anti-Markovnikov's Addition



1-Bromopropane.

Answer of Question number 5.

Main Sources and Causes of Air Pollution
 Air pollution refers to the contamination of the atmosphere by harmful gases,

particulate matter, and biological molecules that cause adverse effects on human health, plants, animals, and the environment. It arises mainly due to human activities, though natural processes also contribute significantly.

Major Sources and Causes of Air Pollution

1. Industrial Sources.

Industries are among the largest contributors to air pollution.

➤ Emission of sulphur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and particulate matter ($\text{PM}_{2.5}$ & PM_{10})

➤ Burning of coal, petroleum, and other fossil fuels in factories and power plants.

2. Vehicular Emissions.

Automobiles release a large amount of pollutants due to fuel combustion.

➤ Major pollutants: carbon monoxide (CO), nitrogen oxides (NO_x), hydrocarbons, and lead.

➤ Causes urban smog and respiratory diseases

Main reasons. Increase in vehicles, traffic congestion poor fuel quality.

3. Agricultural Activities.

farming practices also pollute the air.

- Burning of crop residues (stubble burning)
 - Use of fertilizers and pesticides releasing ammonia (NH_3)
 - Methane (CH_4) emission from livestock
- Effect: formation of secondary pollutants and haze

* Conclusion.

Air pollution is major environmental challenge caused by both anthropogenic and natural sources. Rapid industrialization, urbanization, and increased use of fossil fuels have intensified the problem. Effective pollution control laws, cleaner energy sources, and public awareness are essential to reduce air pollution.

Rahul Kumar

Web developer and
WordPress specialist.
→ rahul.wp-fixhub.com
→ wp-fixhub.com.