CHEMISTRY

BOOKS - NCERT CHEMISTRY (ENGLISH)

HYDROCARBONS

Multiple Choice Questions Mcqs

1. Arrange the following in decreasing order of their boiling points.

(A). N-butane

(B). 2-methylbutane

(C). N-pentane

(D). 2,2-dimethylpropane

A. $A > B > C > D$

B. $B > C > D > A$

C. $D > C > B > A$

D. $C > B > D > A$

Answer: D

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2. Arrange the halogens F_2, Cl_2, Br_2, I_2, in order of their increasing reactivity with alkanes.

A. $I_2 < Br_2 < Cl_2 < F_2$

B. $Br_2 < Cl_2 < F_2 < I_2$

C. $F_2 < Cl_2 < Br_2 < I_2$

D. $Br_2 < I_2 < Br_2 < I_2$

Answer: A

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3. The increasing order of reduction of alkyl halides with zinc and dilute HCl is

A. $R - Cl < R - I < R - Br$

B. $R - Cl < R - Br < R - I$

C. $R - I < R - Br < RCl$

D. $R - Br < R - I < R - Cl$

Answer: B

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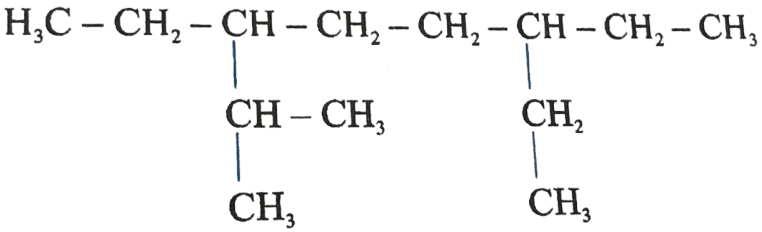
4. The correct IUPAC name of the following alkane is



A. 3, 6-diethyl-2-methyloctane

B. 5-isopropyl -3-ethyloctane

C. 3-ethyl-5-isopropyloctane

D. 3-isopropyl-6-ethyloctane

Answer: A

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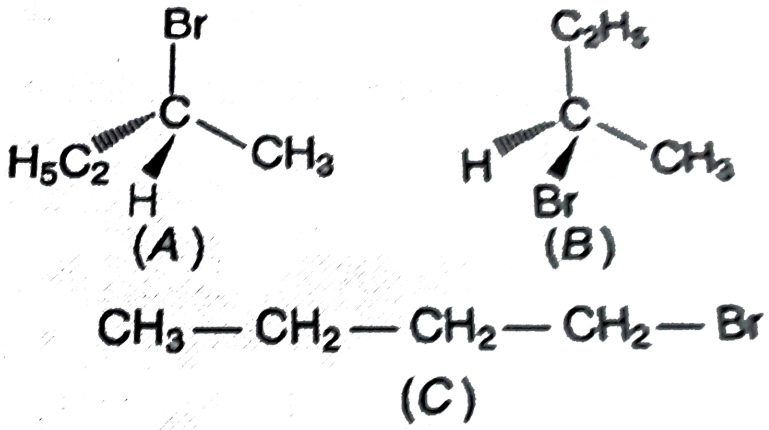
5. The addition of HBr of 1-butene gives a mixture of products

A,B and C



(C) $CH_3 - CH_2 - CH_2 - CH_2 - Br$

The mixture consists of

A. A and B as major and C as minor products

B. B as major, A and C as major products

C. B as minor , A and C as major products

D. A and B as minor and C as major products

Answer: A

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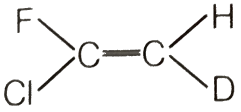
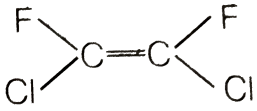
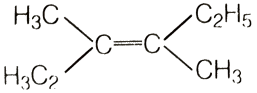
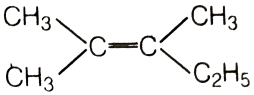
6. Which of the following will not show geometrical isomerism ?

A. 

B. 

C. 

D. 

Answer: D

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7. Arrange the following hydrogen halides in order of their decreasing reactivity with propene.

A. $HCl > HBr > HI$

B. $HBr > HI > NCl$

C. $HI > NBr > HCl$

D. $HCl > HI > HBr$

Answer: C

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8. Arrange the carbanions, $(CH_3)_3\overline{C}, \overline{C}Cl_3, (CH_3)_2\overline{C}H, C_6H_5\overline{C}H_2$, in order of their decreasing stability

A. `

B.

C.

D.

Answer: B

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9. Arrange the following alkyl halides in decreasing order of the rate or β-elimination reaction alcoholic KOH.

A. $CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{H}{|}}{C}} - CH_2Br$

B. $CH_3 - CH_2 - Br$

C. $CH_3 - CH_2 - CH_2 - Br$

A. $A > B > C$

B. $C > B > A$

C. $B > C > A$

D. $A > C > B$

Answer: D

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10. Which of the following reactions of methane is incomplete combustion:

A. $2CH_4 + O_2 \xrightarrow{\text{Cu/523K/100atm}} 2CH_3OH$

B. $CH_4 + O_2 \xrightarrow{Mo_2O_3} HCHO + H_2O$

C. $CH_4 + O_2 \rightarrow C(S) + 2H_2O(l)$

D. $CH_2 + 2O_2 \rightarrow CO_2(g) + 2H_2O(l)$

Answer: C

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Multiple Choice Questions More Than One Options

1. Some oxidation reactions of methane are given below. Which of them is/are controlled oxidation reactions?

A. $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$

B. $CH_4(g) + O_2(g) \rightarrow C(s) + 2H_2O(l)$

C. $CH_4(g) + O_2(g) \xrightarrow{Mo_2O_3} HCHO + H_2O$

$2CH_4(g) + O_2(g) \xrightarrow{\text{Cu//523//100atm}} 2CH_3OH$

D. $2CH_4(g) + O_2(g) \xrightarrow{\text{Cu//523//100atm}} 2CH_3OH$

Answer: C::D

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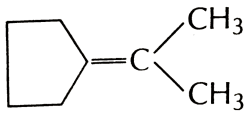
2. Which of the following alkenes on ozonolysis give a mixture of ketones only?

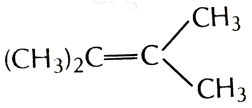
A. $CH_3 - CH = CH - CH_3$

B. $CH_3 - \underset{\underset{CH_3}{|}}{C} - CH = CH_3$

C.



D.



Answer: C::D

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3. Which are the correct IUPAC names of the following compound?

A. 5-Butyl-4-isopropyldecane

B. 5-Ethyl-4-propyldecane

C. 5-sec-Butyl-4-iso-propyldecane

D. 4-(1-methylethyl)-5-(1-methylpropyl)-decane

Answer: C::D

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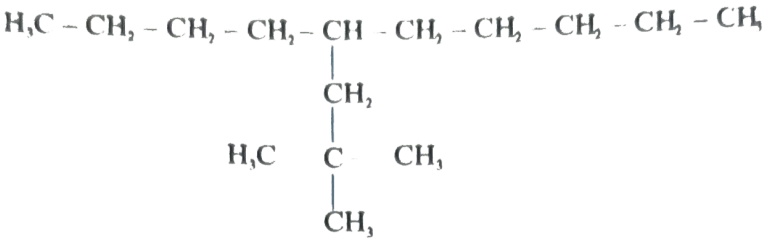
4.



Which are the correct IUPAC names of the following compound?

A. 5-(2', 2'-Dimethylpropyl)-decane

B. 4-Butly-2'2-dimethylnonane

C. 2'2-Dimethyl-4-pentlyoctane

D. 5-neo-Pentyldecane

Answer: A::D

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5. For an electrophilic substitution reaction , the presence of a halogen atom in the benzene ring .....

A. deactivates the ring by inductive effect

B. deactivates the ring by reasonance

C. increases the charge density at ortho and para position relative to meta position by resonance.

D. directs the incoming electrophile to meta position by increasing the charge density relative to ortho and para position.

Answer: A::C

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6. In an electrophilic substitution reactitution reaction of nitrobenzene, the presence of nitro group.....

A. deactivates the ring by inductive effect

B. activates the ring by inductive effect

C. decreases the charge density at ortho and para position of the ring relative to meta position by resonance

D. increases the charge density at meta position relative to the ortho and para positions of the ring by resonance

Answer: A::C

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7. Which of the following are correct ?

A. $CH_3 - O - CH_2^{\oplus}$ is more stable than $CH_3 - CH_2^{\oplus}$

B. $(CH_3)_2CH^{\oplus}$ is less stable than $CH_3 - CH_2 - CH_2^{\oplus}$

C.

$C_2 = CH - CH_2^{\oplus}$ is more stable than $CH_3 - CH_2 - CH_2^{\oplus}$

D. $CH_2 = CH^{\oplus}$ is more stable than $CH_3 - CH_2^{\oplus}$

Answer: A::C

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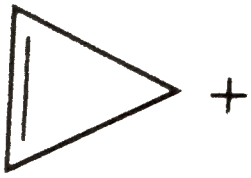
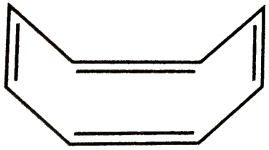
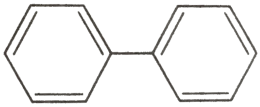
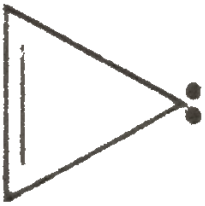
8. Four structures are given in options (a) to (d) . Examine them and select the aromatic structures.

A. 

B. 

C. 

D. 

Answer: A::C

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9. The molecules having dipole moment are :

A. 2,2-Dimethylpropane

B. trans-Pent-2-ene

C. cis-Hex-3-ene

D. 2,2,3,3-Tetramethylbutane

Answer: B::C

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Short Answer Type Questions

1. Why do alkenes prefer to undergo electrophilec addition reaction while arenes prefer electrophilic substitution reactions ? Explain.

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2. 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 ?

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3. Rotation around carbon-carbon single bond of ethane is not completely free. Justify the statement

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4. Draw Newman and sawhorse projections for the eclipsed and staggered conformations of ethane. Which of these conformations is more stable and why ?

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5. The intermediate carbocation formed in the reactions of HI,HBr, and HCl with propene is the same and the bond energy of HCl, HBr, and HI is $430.5KJmol^{-1}$, $363.7KJmol^{-1}$ and $296.8KJmol^{-1}$ respectively. What will be the order of reactivity of these halogen acids?

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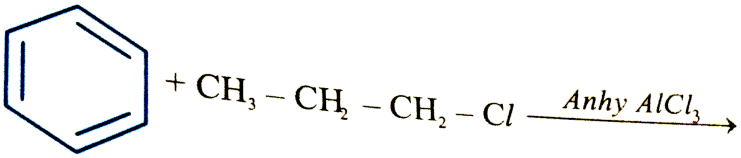
6. What will be the product obtain as a result of the following reaction?



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7. How will you convert benzene into (a) p-nitrobromobenzene (b) m-nitrobromobenzene

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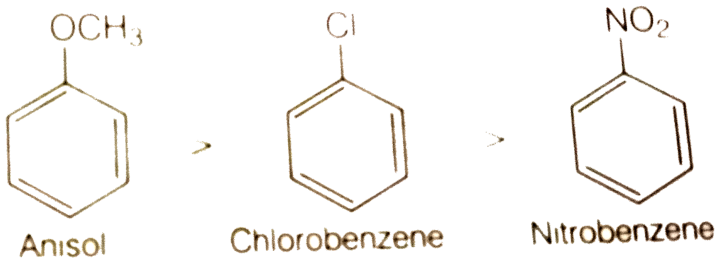
8. Arrange the following set of compounds in the order of their decreasing relative reactivity with an electrophile . Give reason.

following order



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9. Despite their-I effect, halogens are o- and p- directing in haloarenes. Explain .

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10. Why does presence of a nifro group make the benzene ring less reactive in comparison to the unsubstituted benzene ring . Explain .

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11. Suggest a route for the preparation of nitrobenzene starting from acetylene ?

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12. Predict the major product(S) of the following reactions and explain their formation .

$$H_3C - CH = CH_2 \xrightarrow[HBr]{(Ph-CO-0)_2} H_3C - CH = CH_2 \xrightarrow{HBr}$$

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13. Nucleophiles and electrophiles are reaction intermediates having electron rich and electron deficient centres respectively . Hence, they tend to attack electron deficient and electron rich centres respectively. Classify the following species as electrophiles and uncheophiles.

(i) H_3CO^-

(ii) $H_3C - \overset{\overset{O}{||}}{C} - O^-$

(iii)Cl

(iv)Cl_2C:

(v) $(H_3C)_3C^+$

(vi) Br^-

(vii) H_3COH

(viii) R-NH-R

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14. The relative reactivity of $1^\circ, 2^\circ$ and 3° hybrogen's towards chlorination is $1:3.8:5$. Calculate the percentages of all monochlorinated products obtained from 2-methylbutane.

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15. Write the structures and names of products obtained in the reactions of sodium with a mixture of 1-iodo-2-methylpropane and 2-iodopropane.

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16. Write hydrocarbon radicals that can be formed as intermediates during monochlorination of 2-methylpropane ? Which of them is more stable? Give reasons.

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17. An alkane C_8H_{18} is obtained as the only product on subjectiog a primary alkyl halide to wurtz reaction. On monobromination this alkane yieles a single isomer of a tertiary bromide . Write the structure of alkane and the tertiary bromide.

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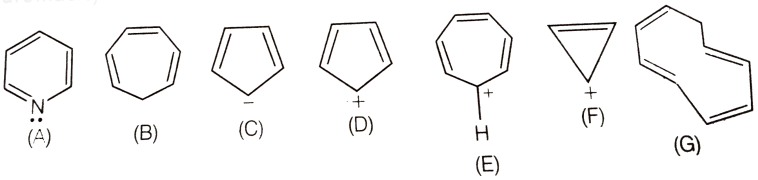
18. The ring systems having following characteristics are aromatic.

(i) Planar ring containing conjugated π bonds .

(ii) complete dolocalisation of the π -electron in ring system i.e. , each atom in the ring has unbybridised p-orbital , and

(iii) Presence of $(4n+2)\pi$-electrons in the ring where n is an integer(n = 0, 1, 2, ...) [Huckel rule]. Using this information classify the following compounds as aromatic/non-aromatic.



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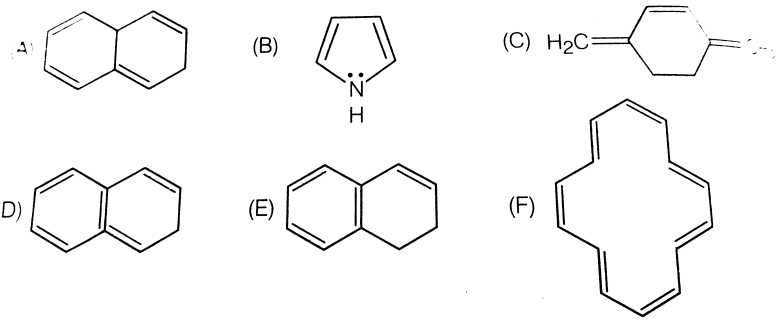
19. Which of the following compounds are aromatic according to Huckel's rule?



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20. Suggest a route to prepare ethyl hydrogensulphate $(CH_3 - CH_2 - OSO_2 - OH)$ starting from ethanol (C_2H_5OH) .

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Matching The Columns

1. Match the reagent from Column I which on reaction with $CH_3 - CH = CH_2$ gives some product given in Column II as per the codes given below

	Column I		Column II
A.	O_3 / Zn + H_2O	1.	Acetic acid and CO_2
B.	$KMnO_4$ / H^+	2.	Propan-1-ol
C.	$KMnO_4$ / OH^-	3.	Propan-2-ol
D.	H_2O / H^+	4.	Acetaldehyde and formaldehyde
E.	B_2H_6 / $NaOH^+$ and H_2O_2	5.	Propane-1, 2-diol

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2. Match the hydrocarbons in column I with the boiling points given in column II.

Column I	Column II
(i). n-Pentane	(a). 282.5 K
(ii). iso-Pentane	(b). 309 K
(iii). neo-Pentane	(c). 301 K

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3. Match the follwing reactants in Column I with the corresponding reaction products in Column II.

	Column I		Column II
A.	Benzene + $Cl_2 \xrightarrow{AlCl_3}$	1.	Benzoic acid
B.	Benzene + $CH_3Cl \xrightarrow{AlCl_3}$	2.	Methyl phenyl ketone
C.	Benzene + $CH_3COCl \xrightarrow{AlCl_3}$	3.	Toluene
D.	Toluene $\xrightarrow{KMnO_4 / NaOH}$	4.	Chlorobenzene
		5.	Benzene hexachloride

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4. Match the reactions given in Column I with the reaction types in Column II.

	Column I		Column II
A.	$CH_2 = CH_2 + H_2O \xrightarrow{H^+} CH_3CH_2OH$	1.	Hydrogenation
B.	$CH_2 = CH_2 + H_2 \xrightarrow{Pd} CH_3 - CH_3$	2.	Halogenation
C.	$CH_2 = CH_2 + Cl_2 \longrightarrow Cl - CH_2 - CH_2 - Cl$	3.	Polymerisation
D.	$3\,CH \equiv CH \xrightarrow[Heat]{Cu\ tube} C_6H_6$	4.	Hydration
		5.	Condensation

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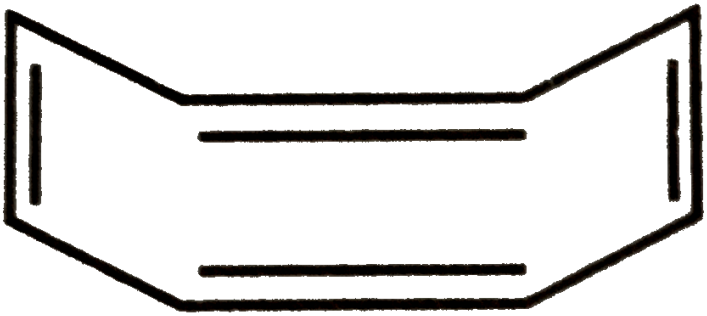
Assertion And Reason

1. Assertion (A) The compound tetraene has the following structural formula.



It is cyclic and has conjugated 8π-electron system but it is not an aromatic compound.

Reason (R) $(4n+2)\pi$ electrons rule does not hold good and ring is not planar.

A. Both A and B are correct and R is the correct explanation of A

B. Both A and R are not correct

C. Both A and R are not correct

D. A is not correct but R is correct

Answer: a

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2. Assertion (A) Toluene on Friedal Crafts methylation gives o - and p-xylene.

Reason (R) CH_3-group bonded to benzene ring increases density at o - and p- position.

A. Both A and B are correct and R is the correct explanation of A

B. Both A and R are not correct

C. Both A and R are not correct

D. A is not correct but R is correct

Answer: a

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3. S-I: Nitration of benzene with nitric acid requires the use of concentrated sulphuric acid

S-II: The mixture of concentrated sulphuric acid and concentrated nitric acid produces the electrophile, nitronium ion.

A. Both A and B are correct and R is the correct explanation of A

B. Both A and R are not correct

C. Both A and R are not correct

D. A is not correct but R is correct

Answer: a

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4. Assertion (A) Among isomeric pentanes, 2, 2-dimethylpentane has highest boiling point.

Reason (R) Branching does not affect the boiling point.

A. Both A and B are correct and R is the correct explanation of A

B. Both A and R are not correct

C. Both A and R are not correct

D. A is not correct but R is correct

Answer: c

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Long Answer Type Questions

1. An alkyl halide C_5H_{11} (A) reacts with ethanolic KOH to give an alkene 'B' which reacts with Br_2 to give a compound 'C' which on dehydromination gives an alkyne 'D' . On treatment with sodium metal in liquid ammonia one mole of 'D' give 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 the reactions involved.

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2. 896 mL vapour of a hydrocarbon 'A' having carbon 87.80% and hydrogen 12.19% weighs 3.28 g at STP. Hydrotion of 'A' gives 2-methylpentane . Also 'A' on hydration in the presnce of H_2SO_4 and $HgSO_4$ gives a katone 'B' having molecular formula $C_6H_{12}O$. The ketone 'B' gives a positive iodoform test. Find the structure of 'A' and give the reactions involved.

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3. An unsaturated hydrocarbon 'A' adds two molecules of H_2 and on reductive ozonolysis gives butane-1, 4-dial, ethanal and

propanone. Give the structure of 'A' , write its IUPAC name and explain the reactions involved.

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4. In the presence of peroxide addition of HBr to propene takes place according to anti Markownikoff's rule but peroxide effect is not seen in the case of HCl and HI. Explain.

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