



CLASS: XI	DEPARTMENT: SCIENCE (2024-25) SUBJECT: CHEMISTRY	DATE: 17/01/2025
WORKSHEET NO: 7 WITH ANSWERS	TOPIC: HYDROCARBONS	NOTE: A4 FILE FORMAT
CLASS & SEC:	NAME OF THE STUDENT:	ROLL NO.

MULTIPLE CHOICE QUESTIONS (1M)

- Ozonolysis of propene gives _____
 - CH_3CHO and HCHO
 - 2 molecules of CH_3CHO
 - $\text{CH}_3\text{CH}_2\text{CH}_3$
 - 2 molecules of HCHO
- Hydrocarbon which is liquid at room temperature is-
 - Butane
 - Propane
 - Pentane
 - Ethane
- The position of double bond in alkenes can be located by _____
 - Hydrogenation
 - Ozonolysis
 - Photolysis
 - Hydration
- The catalyst used in Friedel – Crafts reaction is
 - Aluminium chloride
 - Anhydrous Aluminium chloride
 - Ferric nitrate
 - Copper
- Which of the following compounds will exhibit cis-trans isomerism?
 - Butanol
 - Propene
 - But-2-enol
 - But-2-ene
- Which of the following is a Bayer's reagent?
 - The neutral solution of HCl .
 - An alcoholic solution of sodium carbonate.
 - An acidic solution of potassium hydroxide.
 - An aqueous solution of potassium permanganate.

7. Benzene reacts with CH_3Cl in the presence of anhydrous AlCl_3 to form
- (a) Chlorobenzene
 - (b) Benzyl chloride
 - (c) Xylene
 - (d) Toluene
8. Benzene molecule has
- (a) 6 σ and 6 π bonds
 - (b) 16 σ and 6 π bonds
 - (c) 12 σ and 3 π bonds
 - (d) 6 σ and 3 π bonds
9. Heating a mixture of sodium benzoate and soda lime gives
- (a) Calcium benzoate
 - (b) Benzene
 - (c) Sodium benzoate
 - (d) Methane
10. Which among the following is most acidic?
- (a) Ethyne
 - (b) Ethene
 - (c) Ethane
 - (d) Propane

ASSERTION REASON TYPE QUESTIONS

Select the most appropriate answer from the options given below:

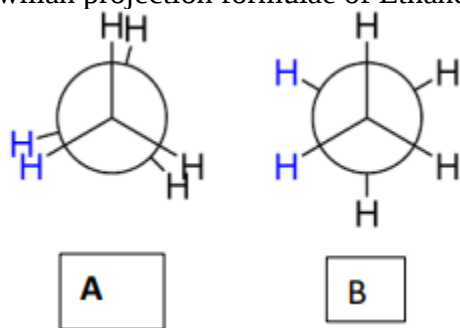
- (a) Both A and R are true and R is the correct explanation of A
 - (b) Both A and R are true but R is not the correct explanation of A.
 - (c) A is true but R is false.
 - (d) A is false but R is true.
11. **Assertion (A):** Isobutane has higher boiling point than n-Butane.
Reason (R): Isobutane has lower surface area than n-Butane.
12. **Assertion (A):** Cis-But-2-ene is more polar than trans-But-2-ene
Reason (R): The dipoles of C- CH_3 bonds cancel out in cis-But-2-ene.
13. **Assertion(A):** Toluene on Friedel Crafts methylation gives m-Xylene.
Reason(R): CH_3 group is electron donating group
14. **Assertion(A):** Cyclopentadienyl anion is aromatic in nature.
Reason(R): It has cyclic, planar structure with 6- π electrons.
15. **Assertion(A):** n- Hexane can be prepared by Wurtz reaction.
Reason(R): Wurtz reaction is not a good method for the preparation of alkane with odd number of carbon atoms.

VERY SHORT ANSWER TYPE QUESTIONS (2M)

16. (a) How will you distinguish between propene and propane?
(b) Which type of isomerism is exhibited by but-1-yne and but-2-yne?
17. Convert
(a) Benzene to Benzene sulphonic acid
(b) Ethyne to Benzene
18. Give reasons for the following.
(a) Lindlar's catalyst is used for the conversion of alkynes to alkenes
(b) In the presence of peroxide, addition of HBr to unsymmetrical alkene takes place contrary to Markovnikov's rule
19. An organic compound (A) with general formula $C_2H_4O_2$ when treated with NaOH forms a compound (B) which on heating with sodalime gives (C). Write the chemical reactions involved.
20. Give reason:
(a) Alkanes are nonpolar molecules.
(b) 2,2-Dimethylpropane has lower boiling point than 2-Methylbutane

SHORT ANSWER TYPE QUESTIONS (3M)

21. (a) Out of benzene, m-dinitrobenzene and toluene which will undergo nitration most easily and why?
(b) Wurtz reaction not preferred for the preparation of alkanes containing odd number of carbon atoms. Justify.
(c) Arrange the following set of compounds in order of their decreasing relative reactivity with an electrophile, E^+
Chlorobenzene, 2,4-dinitrochlorobenzene, p-Nitrochlorobenzene
22. The Newman projection formulae of Ethane is given below



- (a) Identify A and B.
(b) Which of the two forms is more stable. Give reason.
(c) It has not been possible to separate and isolate different conformational isomers of ethane. Give reason.
23. Propanal and pentan-3-one are the ozonolysis products of an alkene?
(a) What is the structural formula of the alkene?
(b) Write the IUPAC name of the alkene.

(c) Write the reaction involved in ozonolysis.

24. (a) Explain the following with reactions.

i. Aromatisation

ii. Pyrolysis

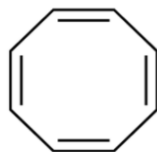
(b) Which among the following is aromatic?



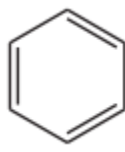
i



ii



iii



iv

25. Account for the following statements.

(a) Trans-But-2-ene has higher melting point than cis-But-2-ene.

(b) Wurtz reaction not preferred for the preparation of alkanes containing odd number of carbon atoms.

(c) Nitration of nitrobenzene results in m-Dinitrobenzene.

PASSAGE BASED QUESTIONS (4M)

26. Benzene is a planar molecule and has $6(4n+2)$ π electrons. In spite of three double bonds, it is extraordinarily stable and does not undergo addition reactions as expected. It undergoes electrophilic substitution reactions in which one or more hydrogen atoms of the ring are replaced by other atoms or groups. Answer the following questions.

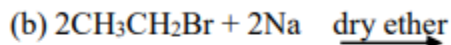
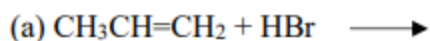
(a) Benzene is aromatic in nature. Explain.

(b) Benzene undergoes electrophilic substitution easily whereas it undergoes nucleophilic substitution with difficulty.

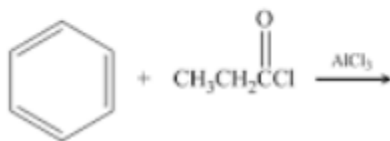
(c) Why is benzene extraordinarily stable in spite of having three double bonds?

LONG ANSWER TYPE QUESTIONS (5 M)

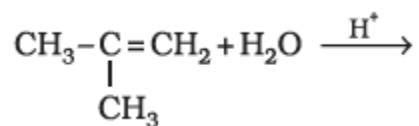
27. Complete the following reaction.



(c)



(d)



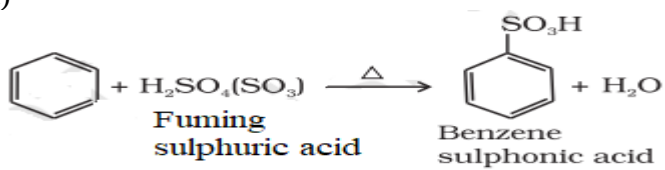
(e)

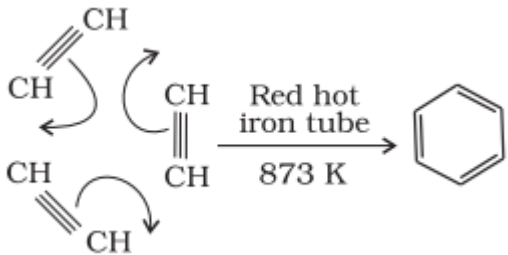


28. What happens when (write equations)

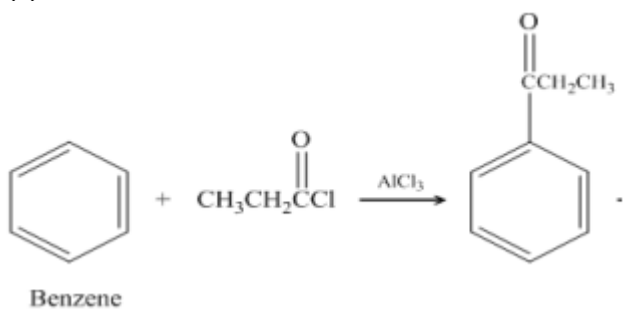
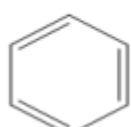
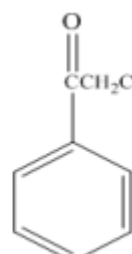
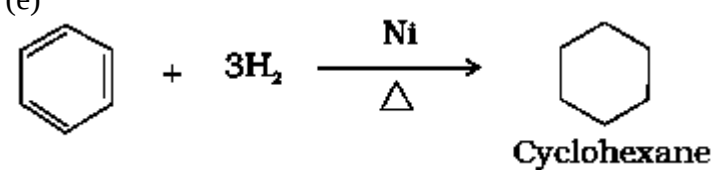
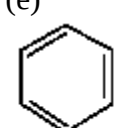
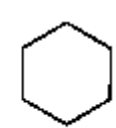
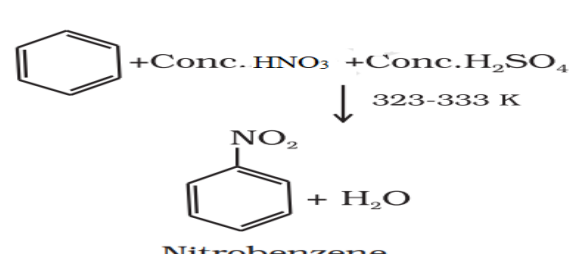
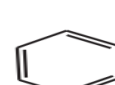
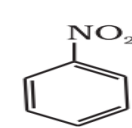
- (a) Ethyne is treated with dil. H_2SO_4 in the presence of Hg^{2+} .
- (b) But-2-ene is treated with Br_2 in CCl_4 .
- (c) Benzene is heated with Nitrating mixture.
- (d) Propene is treated with HBr in the presence of organic peroxide.
- (e) Ethanol is heated with con. H_2SO_4

Answers

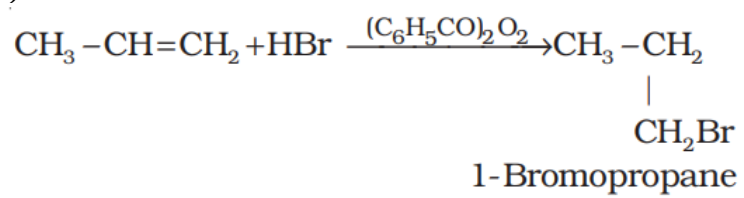
Q. No	Answers
1	(a) CH_3CHO and HCHO
2	(c) Pentane
3	(b) Ozonolysis
4	(b) Anhydrous Aluminium chloride
5	(d) But-2-ene
6	(d) An aqueous solution of potassium permanganate
7	(d) Toluene
8	(c) 12 σ and 3 π bonds
9	(b) Benzene
10	(a) Ethyne
11	(d) A is false but R is true.
12	(c) A is true but R is false
13	(d) A is false but R is true
14	(a) Both A and R are true and R is the correct explanation of A
15	(b) Both A and R are true but R is not the correct explanation of A.
16	(a) Reaction with Baeyer's reagent or Br_2 in CCl_4 . Propene will decolourise both the reagents. (b) Position isomerism
17	(a) 

	(b) 
18	(a) Partially deactivated palladised charcoal (S or quinoline) is known as Lindlar's catalyst. Used for partial reduction of alkynes (b) Free radical mechanism, H free radical gets added to a stable secondary free radical.
19	$\text{CH}_3\text{COOH} + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O}$ A B $\text{CH}_3\text{COO}^- \text{Na}^+ + \text{NaOH} \xrightarrow[\Delta]{\text{CaO}} \text{CH}_4 + \text{Na}_2\text{CO}_3$ B c
20	(a) Alkanes contain only carbon-carbon and carbon-hydrogen bonds. Because carbon and hydrogen have similar electronegativity values, the C—H bonds are essentially nonpolar. (b) As the branching increases boiling point reduces.
21	(a) Toluene has maximum electron density as CH_3 is an electron donating group. Its followed by benzene. m-Dinitrobenzene which has NO_2(electron withdrawing group) has the least electron density. Hence nitration is the most difficult. (b) Mixture of products obtained. Separation is difficult. (c) Chlorobenzene > p-Nitrochlorobenzene > 2,4-dinitrochlorobenzene
22	(a) A- Eclipsed form B- Staggered form (b) Staggered form more stable because torsional strain is less. (c) The energy difference between the two extreme forms is of the order of 12.5 kJ mol^{-1} which is very small. Even at ordinary temperatures, the ethane molecule gains thermal or kinetic energy sufficient enough to overcome this energy barrier of 12.5 kJ mol^{-1} through intermolecular collisions. Thus the rotation about carbon-carbon single bond in ethane is almost free for all practical purposes. Hence difficult to isolate.

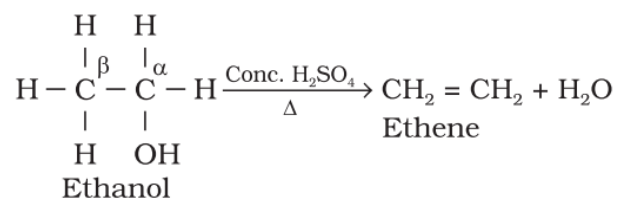
23	(a) $\begin{array}{c} \text{CH}_3 - \text{CH}_2 - \text{C} = \text{CH} - \text{CH}_2 - \text{CH}_3 \\ \\ \text{CH}_2\text{CH}_3 \end{array}$ (b) 3-Ethylhex-3-ene (c) $\begin{array}{c} \text{CH}_3 - \text{CH}_2 - \text{C} = \text{C} \begin{array}{l} \text{CH}_2\text{CH}_3 \\ \text{CH}_2\text{CH}_3 \end{array} \\ \text{3-Ethylhex-3-ene} \end{array} + \text{O}_3 \longrightarrow$ $\begin{array}{c} \text{CH}_3 - \text{CH}_2 - \text{C} \begin{array}{l} \text{H} \\ \text{O} \end{array} \text{C} \begin{array}{l} \text{CH}_2\text{CH}_3 \\ \text{CH}_2\text{CH}_3 \end{array} \\ \text{O} \end{array} \xrightarrow{\text{Zn} + \text{H}_2\text{O}} \text{CH}_3\text{CH}_2\text{CHO} + \text{CH}_3\text{CH}_2\text{COCH}_2\text{CH}_3$
24	a) i. Expln + reaction $\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \end{array} \begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_2 \end{array} \xrightarrow[10-20 \text{ atm}]{\begin{array}{c} \text{Cr}_2\text{O}_3 \text{ or } \text{V}_2\text{O}_5 \\ \text{or } \text{Mo}_2\text{O}_3 \\ 773\text{K} \end{array}} \text{C}_6\text{H}_6 \longleftrightarrow \text{C}_6\text{H}_6$ ii. Expln + reaction $\text{C}_6\text{H}_{14} \xrightarrow{773\text{K}} \begin{cases} \text{C}_6\text{H}_{12} + \text{H}_2 \\ \text{C}_4\text{H}_8 + \text{C}_2\text{H}_6 \\ \text{C}_3\text{H}_6 + \text{C}_2\text{H}_4 + \text{CH}_4 \end{cases}$ (b) i and iv
25	(a) Trans-But-2-ene has a high packing strength due to its symmetric shape. (b) A mixture of products is formed. Separation of products becomes difficult. (c) NO₂ group is electron withdrawing group and will direct the incoming electrophile to m-position.
26	(a) Planar, delocalization of Π electrons, follows Huckel rule where $n=1$ (b) Benzene is electron rich with 3 Π bonds. Hence it attracts an electrophile but not a nucleophile. (c) Resonance, delocalization $\text{C}_6\text{H}_6 \longleftrightarrow \text{C}_6\text{H}_6 \equiv \text{C}_6\text{H}_6 \text{ or } \text{C}_6\text{H}_6$

27	(a) $ \begin{array}{ccccc} \text{CH}_3\text{CH}=\text{CH}_2 & + & \text{HBr} & \longrightarrow & \begin{array}{c} \text{Br} \\ \\ \text{CH}_3-\text{CH}-\text{CH}_3 \end{array} \\ \text{Propene} & & \text{Hydrogen bromide} & & \text{2-bromopropane} \end{array} $ (b) $ 2\text{CH}_3\text{CH}_2 + 2\text{Na} \xrightarrow{\text{Dry ether}} \text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_3 + 2\text{NaBr} $ (c)   + $\text{CH}_3\text{CH}_2\text{COCl}$ $\xrightarrow{\text{AlCl}_3}$  Benzene (d) $ \begin{array}{ccc} \text{CH}_3-\text{C}=\text{CH}_2 + \text{H}_2\text{O} & \xrightarrow{\text{H}^+} & \begin{array}{c} \text{CH}_3 \\ \\ \text{C}-\text{CH}_3 \\ \\ \text{CH}_3 \text{ OH} \end{array} \\ & & \\ \text{CH}_3 & & \text{2-Methylpropan-2-ol} \\ \text{2-Methylpropene} & & \end{array} $ (e)   + 3H_2 $\xrightarrow[\Delta]{\text{Ni}}$  Cyclohexane
28.	(a) $ \text{CH}\equiv\text{CH} + \text{H}_2\text{O} \xrightarrow[\text{HgSO}_4]{\text{H}_2\text{SO}_4} \left[\begin{array}{c} \text{OH} \\ \\ \text{CH}_2=\text{C} \\ \\ \text{H} \end{array} \right] \longrightarrow \begin{array}{c} \text{O} \\ \\ \text{CH}_3-\text{C} \\ \\ \text{H} \end{array} $ ethenol (unstable) ethanal (acetaldehyde) (b) $ \text{CH}_3\text{CH}=\text{CHCH}_3 + \text{Br}_2 \xrightarrow{\text{CCl}_4} \text{CH}_3\text{CHBrCHBrCH}_3 $ (c)   + Conc. HNO_3 + Conc. H_2SO_4 $\xrightarrow{323-333 \text{ K}}$  + H_2O Nitrobenzene

(d)



(e)



*Prepared by
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