	INDIAN SCHOOL AL WADI AL KABIR	
Class: XI	**Department: SCIENCE 2023 – 24** **SUBJECT: CHEMISTRY**	**Date: 15/11/2023**
Worksheet No: 07 **WITH ANSWERS**	**CHAPTER / UNIT: HYDROCARBONS**	**Note:** **A4 FILE FORMAT**
NAME OF THE STUDENT	**CLASS & SEC:**	**ROLL NO.**

MULTIPLE CHOICE QUESTIONS

1. Benzene reacts with CH_3Cl in the presence of anhydrous $AlCl_3$ to form
   (a) Chlorobenzene
   (b) Benzyl chloride
   (c) Xylene
   (d) Toluene

2. 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

3. Heating a mixture of sodium benzoate and soda lime gives
   (a) Calcium benzoate
   (b) Benzene
   (c) Sodium benzoate
   (d) Methane

4. An alkene on ozonolysis gives ethanal. Name the alkene.
   (a) But-1-ene
   (b) Propene
   (c) Ethene
   (d) But-2-ene

5. Which among the following is most acidic?
   (a) Ethyne

(b) Ethene
(c) Ethane
(d) Propane

6. Isomerization of n-hexane on heating with anhydrous $AICI_3$ and HCl gas gives _____
(a) 2-Methylpentane
(b) 3-Methylpentane
(c) 2-Methylhexane
(d) mixture of 2-Methylpentane and 3-Methylpentane

7. Which among the following has the highest boiling point?
(a) n-Octane
(b) Isooctane
(c) 2,2-Dimethylpentane
(d) n-Pentane

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.

8. **Assertion(A)**: Boiling point of alkanes increases with increase in molecular weight.
Reason(R): van der Waal's forces increase with increase in molecular weight.

9. **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.

10. **Assertion(A)**: Toluene on Friedel Crafts methylation gives m-Xylene.
Reason(R): CH_3 group is electron donating group

VERY SHORT ANSWER TYPE (2 M)

11. 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

12. Convert
(a) Benzene to Benzene sulphonic acid
(b) Ethyne to Benzene

13. Write the IUPAC names of the products obtained when
(a) HBr is added to Butene.
(b) H_2O is added to Butene in the presence of H^+.

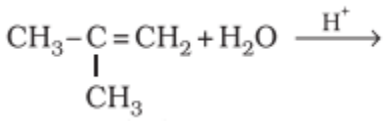
14. An organic compound (A) with general formula $C_2H_4O_2$ when treated with NaOH forms a compound (B)

which on heating with sodalime gives (C). Write the chemical reactions involved.

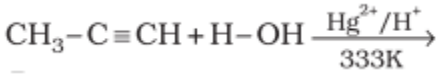
SHORT ANSWER TYPE (3 M)

15. Predict the products.

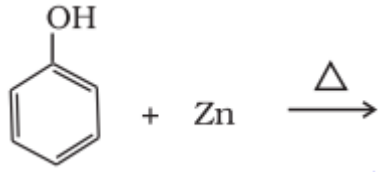
(a)



(b)



(c)



16. (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

17. Write the mechanism for the halogenation of CH_4

18. 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.

PASSAGE BASED QUESTIONS (4 M)

19.

The rotation of carbon-carbon single bond (s-bond), due to cylindrical symmetry of s-MOs (molecular orbitals) long internuclear axis, in alkanes results into different spatial arrangements of atoms in space, that are interconvertible. These arrangements are called conformations.
However, weak repulsive interaction are present between the adjacent bonds in alkanes so the rotation of C—C single bond is not completely free and is hindered by a small energy barriers of 1-20 kJ mol^{-1}. The repulsive interaction between the adjacent bond is due to electron cloud. The two types of conformations are very common, i.e., staggered and eclipsed.
The conformation in which the hydrogen atoms attached to the two carbon atoms are as far apart as possible is called the staggered conformation. The conformations in which the hydrogen atoms attached to the two carbon atoms are as closed as possible is called eclipsed conformation. Any intermediate conformation between the above two is called skew or gauche conformation.

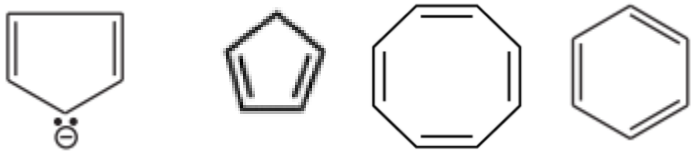
(a) The different conformers of ethane cannot be separated from each other. Give reason.
(b) What is meant by torsional strain?

(c) Draw the staggered and eclipsed conformers of ethane in Sawhorse projection.

LONG ANSWER TYPE (5 M)

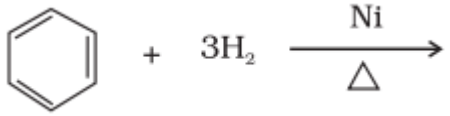
20. What happens when (write equations)
    (a) Ethyne is treated with dil. H_2SO_4 in the presence of Hg^{2+}.
    (b) But-2-ene is treated with Br_2 in CCl_4.
    (c) Benzene is heated with Nitrating mixture.
    (d) Propene is treated with HBr in the presence of organic peroxide.
    (e) Ethanol is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

21. (a) Explain the following with reactions.
    i. Aromatisation
    ii. Pyrolysis
    (b) Which among the following is aromatic?

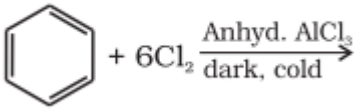


i ii iii iv

(c) Complete the reactions.
i.

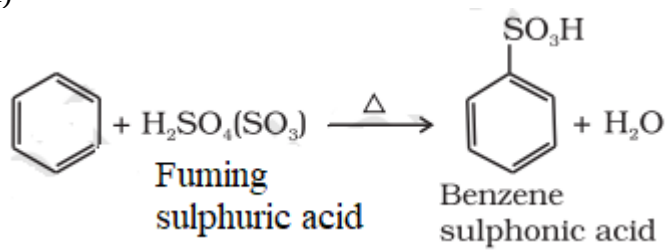
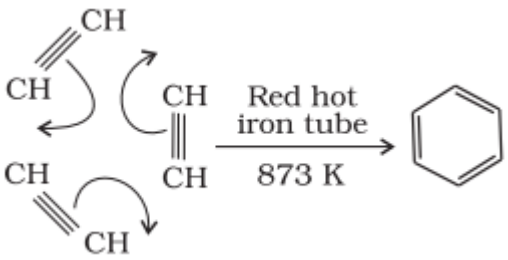
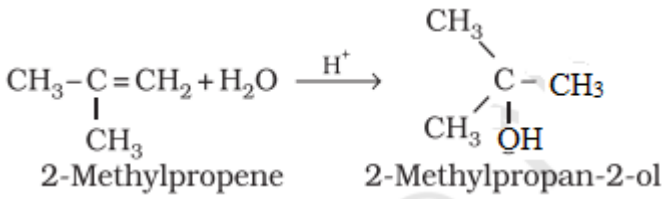
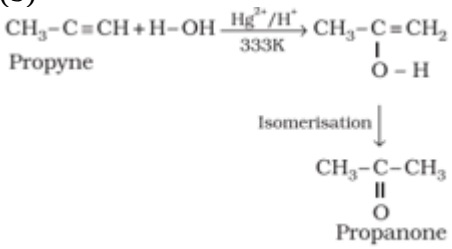


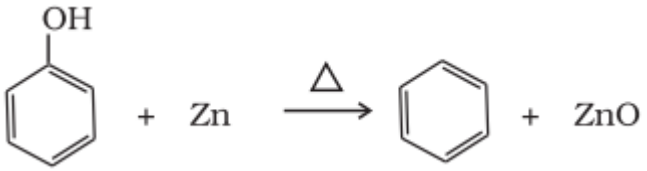
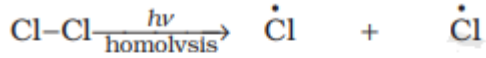
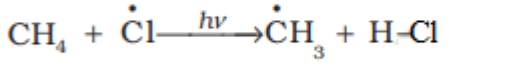
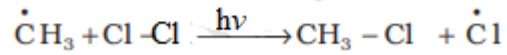
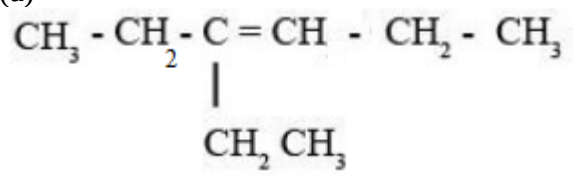
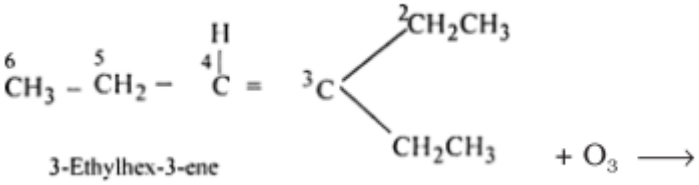
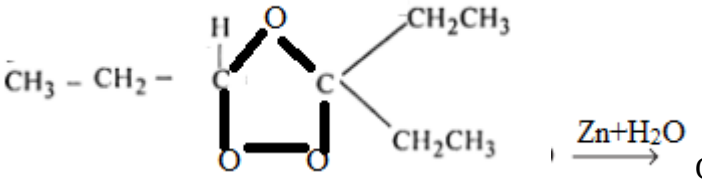
ii.

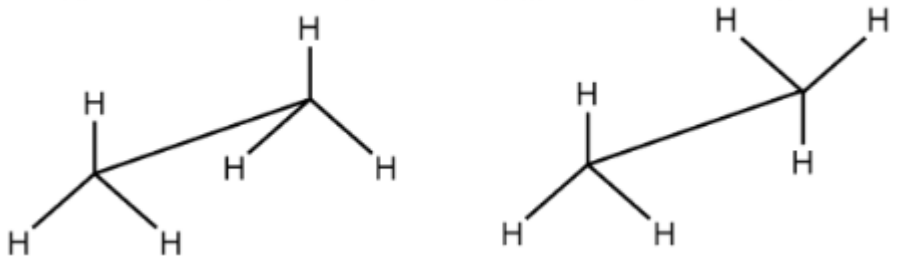
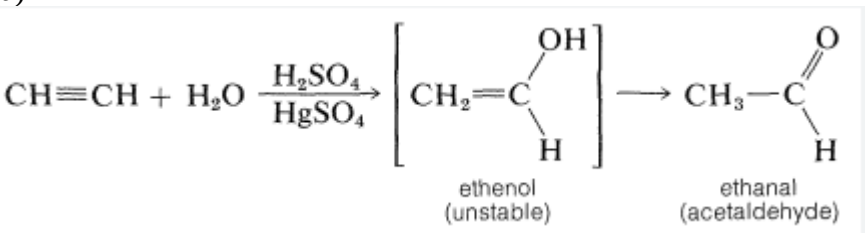
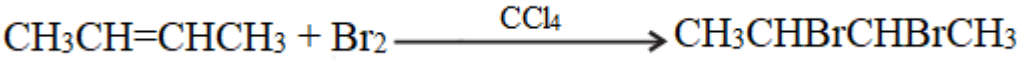
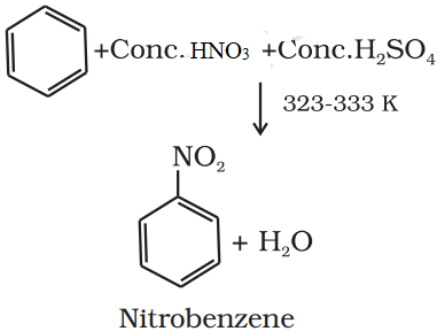
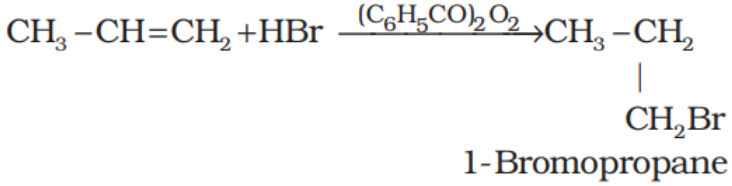
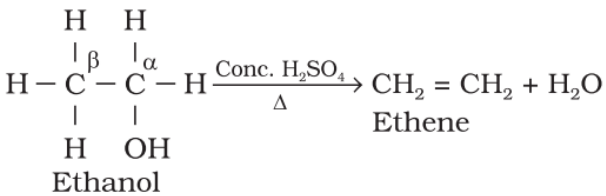


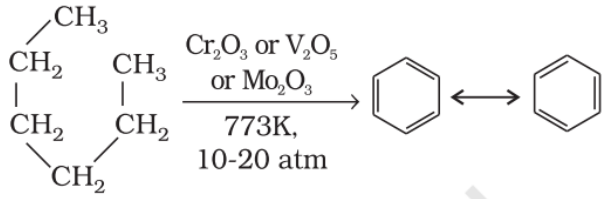
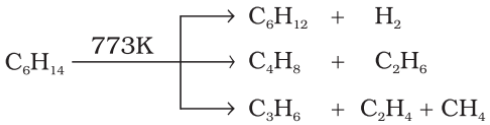
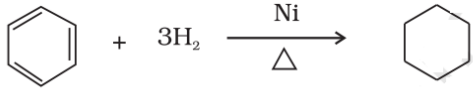
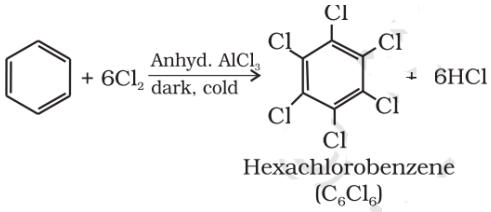
ANSWERS

Q. No	Answers/Hints	Marks
1	(d) Toluene	1
2	(c) 12 σ and 3 π bonds	1
3	(b) Benzene	1
4	(d) But-2-ene	1
5	(a) Ethyne	1
6	(d) mixture of 2-Methylpentane and 3-Methylpentane	1
7	(a) n-Octane	1
8	(a) Both A and R are true and R is the correct explanation of A	1

9	(c) A is true but R is false.	1
10	(d) A is false but R is true.	1
11	(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.	1 1
12	(a)  (b)  	1 1
13	(a) 2-Bromobutane (b) Butan-2-ol	1 1
14	$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$ A B $CH_3COO^-Na^+ + NaOH \xrightarrow[\Delta]{CaO} CH_4 + Na_2CO_3$ B c	½ ½ 1
15	(a)  (b)  	 1 1

	(c)  	1
16	(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	1 1 1
17	Mechanism Initiation  Propagation   Termination (a) $Cl^{\bullet} + Cl^{\bullet} \rightarrow Cl-Cl$ (b) $H_3C^{\bullet} + {}^{\bullet}CH_3 \rightarrow H_3C-CH_3$ (c) $H_3C^{\bullet} + Cl^{\bullet} \rightarrow H_3C-Cl$	3
18	(a)  (b) 3-Ethylhex-3-ene (c)   $CH_3CH_2CHO + CH_3CH_2COCH_2CH_3$	1 1 1

19	(a) It is because of very small energy difference between these two conformations. At room temperature, these conformations easily change into one another. (b) The weak repulsive interaction between the adjacent bonds in conformers. (c) 	1 1 2
20	(a)  (b)  (c)  (d)  (e)  	1 1 1 1 1

21	(a) i. Expln + reaction  ii. Expln + reaction  (b) i and iv (c) i.  ii.  	1 1 ½ ½ 1 1

PREPARED BY Ms JASMIN JOSEPH