
	<b>INDIAN SCHOOL AL WADI AL KABIR</b>		
<b>Class: XI</b>	<b>Department: SCIENCE 2021 – 22</b> <b>SUBJECT : CHEMISTRY</b>		<b>Date of submission:</b> <b>2<sup>nd</sup> week of November</b>
<b>Worksheet</b> <b>No: 07</b> <b>WITH ANS.</b>	<b>Chapter: ORGANIC CHEMISTRY-SOME</b> <b>BASIC PRINCIPLES AND TECHNIQUES</b>		<b>Note:</b> <b>A4 FILE FORMAT</b>
<b>NAME OF THE STUDENT</b>		<b>CLASS &amp; SEC:</b>	<b>ROLL NO.</b>

- Which of the following cannot be represented by resonance structures?
  - Dimethyl ether
  - Nitrate anion
  - Carboxylate anion
  - Nitrobenzene
- Inductive effect involves
  - displacement of  $\sigma$  electrons
  - delocalization of  $\pi$  electrons
  - delocalization of  $\sigma$ -electrons
  - displacement of  $\pi$ -electrons
- Which of the following behaves both as a nucleophile and as an electrophile?
  - $\text{CH}_3\text{C} \equiv \text{N}$
  - $\text{CH}_3\text{OH}$
  - $\text{CH}_2 = \text{CHCH}_3$
  - $\text{CH}_3\text{NH}_2$
- The kind of delocalization involving sigma bond in conjugation with pi electrons is called \_\_\_\_\_ -
  - Inductive effect
  - Hyperconjugation effect
  - Electrometric effect
  - Mesomeric effect
- Which of the following can act as an electrophile?
  - $\text{CN}^-$
  - $\text{OH}^-$

- c. H<sub>2</sub>O
- d. BF<sub>3</sub>

6. The type of isomerism not found in alkenes is \_\_\_\_\_

- a. Chain isomerism
- b. Geometrical isomerism
- c. Metamerism
- d. Position isomerism

7. The correct decreasing order of priority for the functional groups of organic compounds in the IUPAC system of nomenclature is:

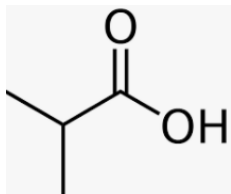
- a. -COOH, -SO<sub>3</sub>H, -CONH<sub>2</sub>, -CHO
- b. -SO<sub>3</sub>H, -COOH, -CONH<sub>2</sub>, -CHO
- c. -CHO, -COOH, -SO<sub>3</sub>H, -CONH<sub>2</sub>
- d. -CONH<sub>2</sub>, -CHO, -SO<sub>3</sub>H, -COOH

8. The displacement of electrons in a multiple bond in the presence of attacking reagent is called \_\_\_\_\_-

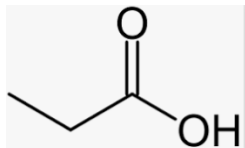
- a. Inductive effect
- b. Electromeric effect
- c. Resonance effect
- d. Hyper conjugation effect

9. The correct bond line formula of propanoic acid is \_\_\_\_\_

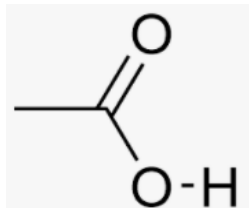
a.



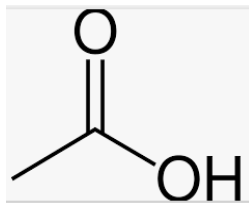
b.



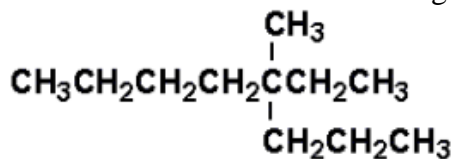
c.



d.



10. Write the IUPAC name of the following compound.



- a. 4-methyl-4-ethyloctane
- b. 4-Ethyl-4-methyloctane
- c. 4-Ethyl-4-n-butylpentane
- d. 2-Ethyl-2-butylpentane

### ASSERTION REASON TYPE

- a. Assertion and reason are both correct statements and reason is correct explanation for assertion.
- b. Assertion and reason are both correct statements but reason is not correct explanation for assertion.
- c. Assertion is correct statement but reason is wrong statement.
- d. Assertion is wrong statement but reason is correct statement.

11. Assertion: But-1-ene and 2-Methylprop-1-ene are position isomers.

Reason: Position isomers have same molecular formula but differ in the position of functional groups.

12. Assertion: Tertiary carbocations are more stable than primary carbocations.

Reason: Hyperconjugation as well as inductive effect due to additional alkyl groups stabilize tertiary carbocations.

13. Assertion: Carbocations are planar in nature.

Reason: Carbocations are  $sp^2$  hybridised.

14. Assertion: IUPAC name of compound  $\text{CH}_3\text{CH}=\text{CH}-\text{CHO}$  is But-2-enal.

Reason: Functional group gets preference over multiple bond in IUPAC name of a compound.

15. Assertion: Energy of resonance hybrid is equal to the average of energies of all canonical forms.

Reason: Resonance hybrid cannot be presented by a single structure.

### 2 Marks

16. Draw the structural formulae of the following compounds:

- a. Ethoxypropane
- b. 3,4,4,5 -Tetramethylheptane
- c. sec-butyl alcohol
- d. But-2-enoic acid

17. Write bond-line formulas for the following.

- a. Isopropyl alcohol
- b. 2,3-Dimethylbutanal

18. What is metamerism? Give example.
19. Give two examples each of the groups exhibiting  $-I$  and  $+I$  effect when attached to a chain of carbon atoms.
20. A tertiary butyl carbocation is more stable than isobutyl carbocation. Justify.

### **3 Marks**

21. Write resonance structures of  $\text{CH}_2=\text{CH}-\text{CHO}$ . Indicate relative stability of the contributing structures.
22. Inductive effect is of permanent nature while electromeric effect is only temporary. Explain.
23. Find the error and write the correct IUPAC names of
- a. 1,6-Hexadiene
  - b. 2-Ethyl-2-pentene
24. What do you understand by  $+R$  and  $-R$  effect?

### **5 Marks**

25. a. Arrange the following in the order of property indicated against each set
- i.  $(\text{CH}_3)_3\text{CCH}_2^+$ ,  $(\text{CH}_3)_3\text{C}^+$ ,  $\text{CH}_3\text{CH}_2\text{CH}^+$ ,  $\text{CH}_3\text{CH}^+\text{CH}_2\text{CH}_3$  (in the order of their increasing stabilities)
  - ii.  $-\text{COOH}$ ,  $-\text{CONH}_2$ ,  $-\text{CHO}$ ,  $-\text{SO}_3\text{H}$  (In the decreasing priority order if present in same molecule)
- b. Draw the resonance structures for the following compounds. Show the electron shift using curved arrow notation.
- i.  $\text{C}_6\text{H}_5\text{NO}_2$
  - ii.  $\text{C}_6\text{H}_5\text{OH}$
- c. What are structural isomers?
26. Write short notes on
- a. Electromeric effect
  - b. Inductive effect
  - c. Hyperconjugation
  - d. Homolytic fission
  - e. Heterolytic fission

### **CASE STUDY TYPE QUESTIONS**

The element carbon has the unique property called catenation due to which it forms covalent bonds with other carbon atoms. It also forms covalent bonds with atoms of other elements like hydrogen, oxygen, nitrogen,

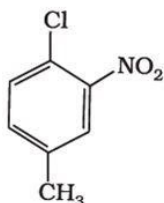
sulphur, phosphorus and halogens. The resulting compounds are studied under a separate branch of chemistry called organic chemistry

The tetravalence of carbon and the formation of covalent bonds by it are explained in terms of its electronic configuration and the hybridisation of s and p orbitals. The formation and the shapes of molecules like methane ( $\text{CH}_4$ ), ethene ( $\text{C}_2\text{H}_4$ ), ethyne ( $\text{C}_2\text{H}_2$ ) are explained in terms of the use of  $\text{sp}^3$ ,  $\text{sp}^2$  and  $\text{sp}$  hybrid orbitals by carbon atoms in the respective molecules. Hybridisation influences the bond length and bond enthalpy (strength) in compounds. The organic compounds are classified based on their structures.

27. Change in hybridisation affects the carbon's \_\_\_\_\_

- a. bond strength
- b. electronegativity
- c. bond length
- d. bond enthalpy

28. The IUPAC name for the following compound is \_\_\_\_\_



- a. 2-Chloro-1-nitro-5-methylbenzene
- b. m-Nitro-p-chlorotoluene
- c. 1-Chloro-4-methyl-2-nitrobenzene
- d. 1-Chloro-2-nitro-4-methylbenzene

29. The below compound is an example of



- a. aliphatic cyclic compound
- b. alicyclic compound
- c. closed chain compound
- d. aliphatic compound

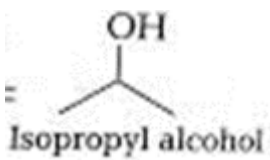
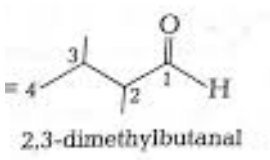
30. \_\_\_\_\_ is an example of heterocyclic aromatic compound.

- a. Tropolone
- b. Pyridine
- c. Tetrahydrofuran
- d. Benzene

31. In the organic compound  $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{C} \equiv \text{CH}$ , the pair of hybridised orbitals involved in the formation of  $\text{C}_2 - \text{C}_3$  bond is \_\_\_\_\_

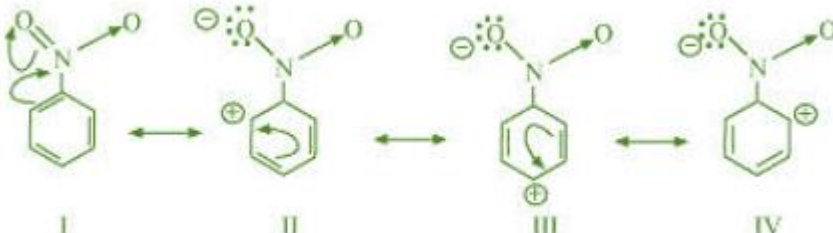
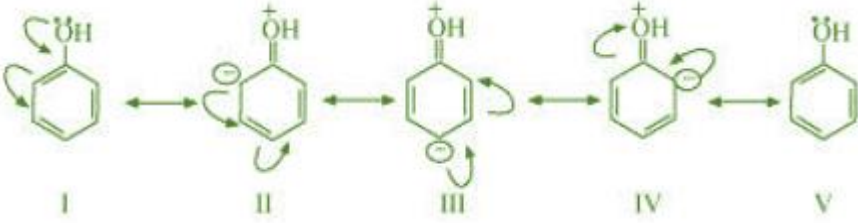
- a.  $sp - sp^2$
- b.  $sp - sp^3$
- c.  $sp^2 - sp^3$
- d.  $sp^3 - sp^3$

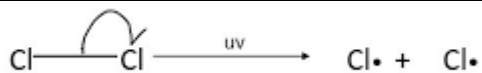
Q.NO	ANSWERS	MARKS
1	a	1
2	a	1
3	a	1
4	B	1
5	d	1
6	c	1
7	a	1
8	b	1
9	b	1
10	b	1
11	d	1
12	a	1
13	a	1
14	A	1
15	D	1
16	<p>a.</p> <pre>       H H   H H H                   H-C-C-O-C-C-C-H                         H H   H H H           </pre> <p>b.</p> <pre>           CH3          /  \         CH3     CH3                   H3C-CH2-CH-C-CH-CH2-CH3   1  2  3  4  5  6  7                    CH3           </pre>	$\frac{1}{2} \times 4$

	<p>c.</p> $\begin{array}{c} \text{CH}_3-\text{CH}-\text{CH}_2-\text{CH}_3 \\   \\ \text{OH} \\ \text{sec-butyl alcohol} \\ \text{2-butanol} \end{array}$ <p>d.</p> $\begin{array}{c} \text{CH}_3-\text{CH}=\text{CH}-\text{COOH} \\ \text{but-2-enoic acid} \end{array}$	
17	<p>a.</p>  <p>Isopropyl alcohol</p> <p>b.</p>  <p>2,3-dimethylbutanal</p>	1 1
18	<p>Metamerism is a type of isomerism in which compounds having the same molecular formula but different alkyl groups on either side of functional groups.</p> <p>Example diethyl ether and methyl propyl ethers are metamers.</p>	1 1
19	<p><math>\text{NO}_2, \text{CN}</math> are electron withdrawing groups -I effect</p> <p>Alkyl groups like methyl (<math>-\text{CH}_3</math>), ethyl etc. and alkoxy (<math>-\text{OR}</math>) are electron donating groups. (+I effect)</p>	1 1
20	<p>Inductive effect, hyperconjugation effect</p>	1 1

21	$\begin{array}{ccc} \ddot{\text{O}}: & & \ddot{\text{O}}: \\    & &   \\ \text{CH}_2=\text{CH}-\text{C}-\text{H} & \longleftrightarrow & \text{CH}_2-\text{CH}=\overset{+}{\text{C}}-\text{H} \\ \text{(I)} & & \text{(II)} \end{array}$ $\longleftrightarrow \overset{-}{\text{C}}\text{H}_2-\text{CH}=\overset{+}{\text{C}}-\text{H}$ $\text{(III)}$ <p>Stability is I &gt; II &gt; III</p>	1 1 1
22	<p>Electromeric effect is a temporary effect and observed only in organic compounds with multiple bonds in the presence of an attacking reagent.</p> <p>Example</p> <p>Inductive Effect is the phenomenon wherein a permanent dipole arises in a given molecule due to the unequal sharing of the bonding electrons in the molecule.</p> <p>Example</p>	1 ½ 1 ½
23	<p>a. Correct IUPAC name 1,5-Hexadiene</p> <p>b. Correct IUPAC name 3-methyl-hex-3-ene</p>	1 1 1
24	<p>Negative resonance or mesomeric effect or -R effect is shown by substituents or groups that withdraw electrons by delocalization mechanism from rest of the molecule. The electron density decreases on the molecule</p> <p>Positive resonance or mesomeric effect +R effect is shown by the groups when they release electrons to the rest of the molecule by delocalization. These groups are denoted by +M or +R. Due to this effect, the electron density on the molecule increases</p> <p>Explain using example.</p>	1 1 1
25	<p>a.</p> <p>i.</p> $\text{CH}_3\text{CH}_2-\text{CH}_2 < \text{CH}_3-\overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}}-\text{CH}_2 < \text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3) < \text{H}_3\text{C}-\overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}}$ <p>ii.</p> <p>-COOH &gt; -SO<sub>3</sub>H &gt; -CONH<sub>2</sub> &gt; -CHO</p> <p>b.</p> <p>i.</p>	1 1

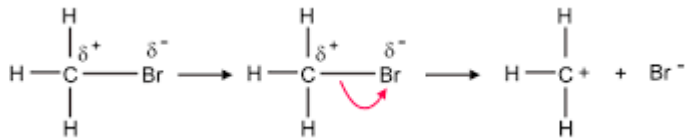


	<p>i.</p>  <p>ii.</p>  <p>c.</p> <p>Structural isomerism is the phenomenon in which the compounds would be having the same molecular formula but different structural formula</p>	1  1  1
26	<p>a.</p> <p>The instantaneous formation of a dipole in the molecule of an organic compound due to the complete transfer of shared pi electron pairs to one of the atoms under the influence of an attacking reagent is referred to as the Electromeric effect. +E effect occurs when the electron pair of the pi bond is moved towards the attacking reagent. -E effect occurs when the electron pair of the pi bond is moved away from the attacking reagent</p> <p>b.</p> <p>The inductive effect is a permanent state of polarization. The electron density in a <math>\sigma</math> bond between two unlike atoms is not uniform. The electron density is denser toward the more electronegative of the two atoms. The inductive effect is a distance-dependent phenomenon: The -I effect is seen around a more electronegative atom or group, and electron density is higher there than elsewhere in the molecule. Electron-withdrawing groups include halogen, nitro, cyano, ester and aryloxy</p> <p>The +I effect is observed among the less electronegative atoms of the molecule by electron-releasing groups like alkyl groups.</p> <p>c.</p> <p>Hyperconjugation effect is a permanent effect in which localization of <math>\sigma</math> electrons of C-H bond of an alkyl group directly attached to an atom of the unsaturated system or to an atom with an unshared p orbital takes place.</p> <p>d.</p> <p>In Homolytic fission, the cleavage of the covalent bond takes place in such a way that each bonded atom retains one electron of the shared pair leading to the formation of free radicals</p>	1   1   1   1



e.

In heterolytic fission, the covalent bond is broken in such a way that one of the fragments takes both the electron of the pair leaving none on the other. This results into two charged particles.



1

27	b	1
28	c	1
29	d	1
30	b	1
31	c	1

**PREPARED BY : MS. JASMIN JOSEPH**

**CHECKED BY : HOD - SCIENCE**