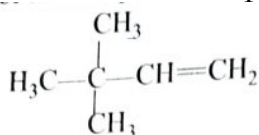


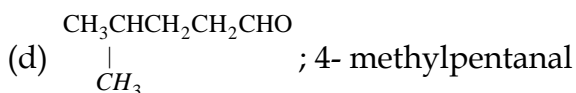
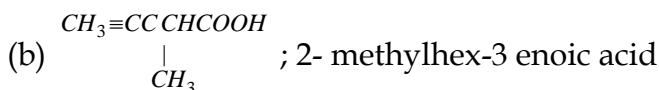
SRIGAYATRI EDUCATIONAL INSTITUTIONS
INDIA

NOMENCLATURE, REACTION MECHANISMS (UT-05 QB)

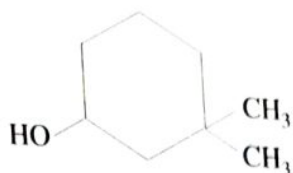
- In the compound $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{C} \equiv \text{CH}$, the ${}^2\text{C} - {}^3\text{C}$ bond is of the type
 a) $sp - sp^2$ (b) $sp^3 - sp^3$ (c) $sp - sp^3$ (d) $sp^2 - sp^3$
- Which of the following orders regarding the size of hybrid orbital of carbon is correct?
 (a) $sp > sp^2 > sp^3$ (b) $sp < sp^2 < sp^3$ (c) $sp > sp^2 < sp^3$ (d) $sp < sp^2 > sp^3$
- Which of the following orders regarding the C-H bond distance in CH_4 , C_2H_4 and C_2H_2 is correct ?
 (a) $\text{CH}_4 > \text{C}_2\text{H}_4 > \text{C}_2\text{H}_2$ (b) $\text{CH}_4 < \text{C}_2\text{H}_4 < \text{C}_2\text{H}_2$
 (c) $\text{CH}_4 > \text{C}_2\text{H}_4 < \text{C}_2\text{H}_2$ (d) $\text{CH}_4 < \text{C}_2\text{H}_4 > \text{C}_2\text{H}_2$
- The compound with no dipole moment is
 (a) Methyl chloride (b) carbon tetrachloride
 (c) Methylene chloride (d) chloroform
- The compound which has one isopropyl group is
 (a) 2, 2,3,3-tetramethylpentane (b) 2,2 -dimethylpentane
 (c) 2,2, 3 -trimethylpentane (d) 2 -methylpentane
- The IUPAC name of the compound having the formula is



- (a) 3,3,3 - trimethyl- 1 - propene (b) 1,1,1- trimethyl -2- propene
 (c) 3,3 -dimethylbut- 1 -ene (d) 2,2- dimethyl 1-3 -butene
- The IUPAC name of the compound $\text{CH}_2 = \text{CH} - \text{CH}(\text{CH}_3)_2$ is
 (a) 1, 1-dimethyl-2-propene (b) 2 -vinylpropane
 (c) 3 -methylbutl- 1 -ene (d) 1 -isopropylethene
- Which of the following compounds is wrongly named?
 (a) $\text{CH}_3\text{CH}_2\text{CH}_2\underset{\text{Cl}}{\text{CHCOOH}}$; 2- chloropentanoic acid



- The IUPAC name of the compound is



- a) 1,1-dimethyl -3- hydroxycyclohexane b) 3,3-dimethyl -1- hydroxycyclohexane
 c) 3,3 dimethyl -1- cyclohexanol d) 1,1-dimethyl -3- cyclohexanol

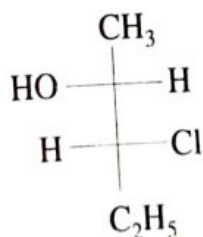
10. Which of the following represents neopentyl alcohol?

- a) $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{OH}$ b) $(\text{CH}_3)_3\text{CCH}_2\text{OH}$
 c) $\text{CH}_3(\text{CH}_2)_3\text{OH}$ d) $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_3$

11. The IUPAC name of $(\text{C}_2\text{H}_5)_2\text{NCH}_2\text{CHClCOOH}$ is

- a) 2-chloro-4-N-ethylpentanoic acid
 b) 2-chloro-3-(N,N-diethylamino)propanoic acid
 c) 2-chloro-2-oxodiethylamine
 d) 2-chloro-2-carboxy-N-ethylethane

12. The full name of the compound is



- a) (2 R, 3 R)-3-chloro-2-pentanol b) (2 R, 3 S)-3-chloro-2-pentanol
 c) (2 S, 3 R)-3-chloro-2-pentanol d) (2 S, 3 S)-3-chloro-2-pentanol

13. The number of isomers of C_6H_{14} is

- a) 4 b) 5 c) 6 d) 7

14. Which of the following compounds will exhibit cis-trans (geometrical) isomerism?

- a) 2-Butene b) 2-Butyne c) 2-Butanol d) Butanal

15. Keto-enol tautomerism is observed in

- a) $\text{H}_5\text{C}_6-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$ b) $\text{H}_5\text{C}_6-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$ c) $\text{H}_5\text{C}_6-\overset{\text{O}}{\parallel}{\text{C}}-\text{C}_6\text{H}_5$ d) $\text{H}_5\text{C}_6-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$

16. Isomers are the compounds having the

- a) same molecular formula but different structural formulae
 b) same structural formula but different molecular formulae
 c) same chemical properties but different physical properties
 d) same physical properties but different chemical properties

17. The number of isomers of $\text{C}_3\text{H}_5\text{Br}_3$ is

- a) 2 b) 3 c) 4 d) 5

18. The compounds $\text{CH}_3-\text{CH}=\text{CH}-\text{CH}_3$ and $\text{CH}_3-\text{CH}_2-\text{CH}=\text{CH}_2$

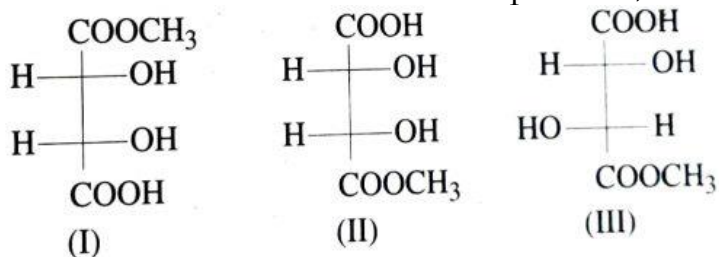
- (a) are tautomers

(b) are position isomers

c) contain same number of sp^3-sp^3 , sp^3-sp^2 and sp^2-sp^2 carbon-carbon bonds

d) exist together in dynamic equilibrium

19. The correct statements about the compounds I, II and III is



(a) I and II are identical

(b) I and II are diastereomers

(c) I and III are enantiomers

(d) I and II are enantiomers

20. Which of the following compounds will show geometrical isomerism ?

a) 2-Butene

b) Propene

c) Ethylene

d) 2-Methyl-2-butene

21. For an optically active compound, which of the following requirements is necessary?

(a) A double bond

(b) Presence of one chiral atom

(c) Presence of two chiral atoms

(d) Presence of plane of symmetry

22. A molecule is said to be chiral if

(a) Contains a centre of symmetry

(b) contains a plane of symmetry

(c) Cannot be superimposed on its mirror images

(d) exists as cis and trans-forms

23. The compound 2,3-dichlorobutane has

(a) four stereoisomers

(b) two pairs of enantiomers

(c) one pair of enantiomers and one meso compound

(d) one pair of enantiomers and two meso compounds

24. Which of the following compounds shows optical isomerism?

(a) $\text{CH}_3\text{CHOHCOOH}$

(b) $\text{CH}_3\text{CH}(\text{CH}_3)\text{COOH}$

(c) $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{OH}$

(d) $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{Cl}$

25. Racemic tartaric acid is optically inactive due to

a) internal compensation

b) external compensation

c) loss of asymmetric centre

d) a steric hindrance

26. The correct decreasing priority of ligands $-\text{CH}(\text{OH})\text{CH}_3$, $-\text{OH}$, $-\text{COOH}$ and $-\text{CH}_2\text{OH}$ in absolute configuration of an enantiomer is

a) $\text{CH}(\text{OH})\text{CH}_3 > \text{OH} > \text{COOH} > \text{CH}_2\text{OH}$

b) $\text{OH} > \text{CH}(\text{OH})\text{CH}_3 > \text{CH}_2\text{OH} > \text{COOH}$

c) $\text{OH} > \text{COOH} > \text{CH}(\text{OH})\text{CH}_3 > \text{CH}_2\text{OH}$

d) $\text{COOH} > \text{OH} > \text{CH}(\text{OH})\text{CH}_3 > \text{CH}_2\text{OH}$

27. The number of stereoisomers for a compound having four different chiral centres is

a) 2

(b) 4

(c) 8

(d) 6

28. The free radical monochlorination of (S)-2-chlorobutane gives

(a) (S)-1,2-dichlorobutane

(b) (R)-1,2-dichlorobutane

(c) (R)-1,3-dichlorobutane

(d) (2R,3R)-2,3-dichlorobutane

29. Which of the following belongs to +I group?

a) $-\text{OH}$

b) $-\text{OCH}_3$

c) $-\text{COOH}$

d) $-\text{CH}_3$

30. Which of the following is the most stable carbocation?

a) CH_3^+

(b) RCH_2^+

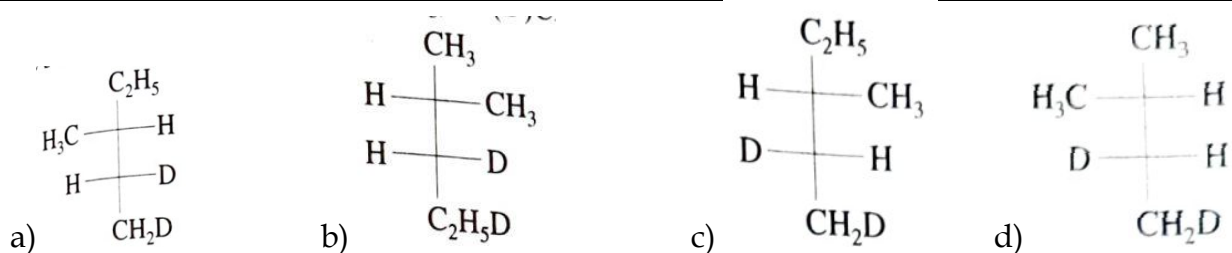
(c) R_2CH^+

(d) R_3C^+

31. Which of the following is the most stable radical?



32. Resonating structures of a molecule do not have
 (a) identical arrangement of atoms
 (b) nearly the same energy content
 (c) the same number of paired electrons
 (d) identical bonding
33. Which of the following orders is correct regarding the basicity of NH_2 group?
 (a) $\text{CH}_3\text{NH}_2 > (\text{CH}_3)_2\text{NH} > (\text{CH}_3)_3\text{N}$
 (b) $\text{CH}_3\text{NH}_2 < (\text{CH}_3)_2\text{NH} < (\text{CH}_3)_3\text{N}$
 (c) $\text{CH}_3\text{NH}_2 > (\text{CH}_3)_2\text{NH} < (\text{CH}_3)_3\text{N}$
 (d) $\text{CH}_3\text{NH}_2 < (\text{CH}_3)_2\text{NH} > (\text{CH}_3)_3\text{N}$
34. Which of the following orders is correct regarding the acidity of carboxylic group?
 (a) $\text{CH}_3\text{CH}_2\text{CH}(\text{Cl})\text{COOH} > \text{CH}_3\text{CH}(\text{Cl})\text{CH}_2\text{COOH} > \text{ClCH}_2\text{CH}_2\text{CH}_2\text{COOH}$
 (b) $\text{CH}_3\text{CH}_2\text{CH}(\text{Cl})\text{COOH} < \text{CH}_2\text{CH}(\text{Cl})\text{CH}_2\text{COOH} < \text{ClCH}_2\text{CH}_2\text{CH}_2\text{COOH}$
 (c) $\text{CH}_3\text{CH}_2\text{CH}(\text{Cl})\text{COOH} > \text{CH}_3\text{CH}(\text{Cl})\text{CH}_2\text{COOH} < \text{ClCH}_2\text{CH}_2\text{CH}_2\text{COOH}$
 (d) $\text{CH}_3\text{CH}_2\text{CH}(\text{Cl})\text{COOH} < \text{CH}_3\text{CH}(\text{Cl})\text{CH}_2\text{COOH} > \text{ClCH}_2\text{CH}_2\text{CH}_2\text{COOH}$
35. Which of the following is not a nucleophile?
 a) BF_3 b) CN^- c) OH^- d) NH_3
36. Which of the following is an electrophile?
 a) BF_3 b) CO_2 c) H_2O d) NH_3
37. The reaction $\text{C}_6\text{H}_6 + \text{Br}_2 \xrightarrow{\text{FeBr}_3} \text{C}_6\text{H}_5\text{Br} + \text{HBr}$ is
 (a) an electrophilic addition reaction
 (b) a nucleophilic substitution reaction
 (c) an electrophilic substitution reaction
 (d) a free radical substitution reaction
38. Which of the following statements is correct?
 (a) In $\text{S}_\text{N}2$ mechanism, the rate determining step involves more than two species
 (b) The $\text{S}_\text{N}2$ mechanism involves the formation of intermediate carbocation
 (c) The $\text{S}_\text{N}2$ mechanism is accompanied with Walden inversion.
 (d) The $\text{S}_\text{N}2$ mechanisms may involve intramolecular rearrangement
39. Which of the following statement is not correct ?
 a) The addition across $\text{C}=\text{O}$ group is an electrophilic addition reaction
 b) Aryl halides are less reactive than alkyl halides towards nucleophilic reagents
 c) In acylium ion, the structure $\text{R}-\text{C}\equiv\text{O}^+$ is more stable than $\text{R}-\overset{+}{\text{C}}=\text{O}$
 d) $\text{S}_\text{N}2$ reactions follow second-order kinetics
40. The structure of (2R,3R), $\text{C}_2\text{H}_5\text{CH}(\text{CH}_3)\text{CH}(\text{D})\text{CH}_2\text{D}$ is



INTEGER QUESTIONS

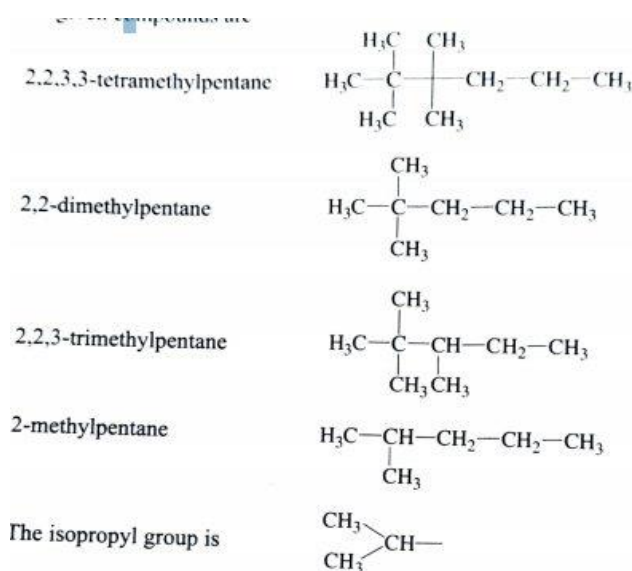
41. The number of stereo isomers obtained by bromination of trans 2 butane is _____
42. The number of unhybridized orbitals present in vinyl acetylene is _____

KEY

1) 4	2) 2	3) 1	4) 2	5) 4	6) 3	7) 3	8) 2	9) 3	10) 2
11) 2	12) 1	13) 2	14) 1	15) 4	16) 1	17) 4	18) 2	19) 4	20) 1
21) 2	22) 3	23) 3	24) 1	25) 2	26) 3	27) 4	28) 2	29) 4	30) 4
31) 4	32) 4	33) 2	34) 1	35) 1	36) 1	37) 3	38) 3	39) 1	40) 1
41) 1. Stereo isomer					42) Hybridized orbitals '6'				

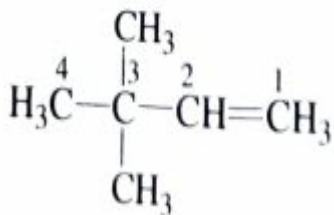
SOLUTIONS

- The atom C_2 is sp^2 hybridized while C_3 is sp^3 hybridized
- The larger percentage contribution from s orbital makes the orbital size smaller
- The larger percentage of s orbital in the hybrid orbital of carbon, the lesser the C-H bond distance.
- The carbon tetrachloride involves tetrahedral arrangement of C-Cl bonds.
- The given compounds are



6. The numbering in the given compound goes as follows .

Its name is

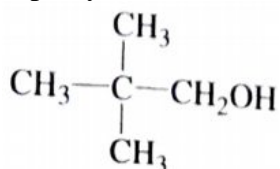


3,3-dimethylbut-1-ene.

7. The numbering in the given compound goes as follows $\overset{1}{\text{C}}\text{H}_2=\overset{2}{\text{C}}\text{H}-\overset{3}{\text{C}}\text{H}-\text{CH}_3$ Its name is 3 - methylbut- 1 -ene.

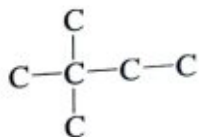
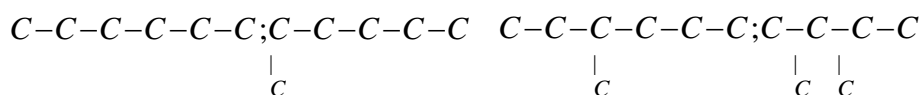
8. The correct name of the compound be is 2 -methylene -3-pent- acid.

10. The neopentyl alcohol is



12. The configuration of C2 and C3 are R and R, respectively. Thus the full name is (2 R, 3 R)-3-Chloro-2-pentanol.

13. The skeleton of carbon atoms are



14. The structure of 2-butene is $\text{CH}_3-\text{CH}=\text{CH}-\text{CH}_3$. It can show cis-trans isomerism.

15. The keto-enol tautomers will be $\text{H}_5\text{C}_6-\overset{\text{O}}{\parallel}{\text{C}}-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\text{C}-\text{CH}_3 \leftrightarrow \text{H}_5\text{C}_6-\overset{\text{OH}}{\text{C}}=\overset{\text{O}}{\parallel}{\text{C}}-\text{C}-\text{CH}_3$

16. The isomers have same molecular formula but different structural formulae.

18. Two isomers differs in the placement of double bonds. Hence, these are position isomers.

19. Rotating structure I by 180° in the plane of paper produces mirror image of II or vice versa. Hence, the structural I and II are enantiomers.

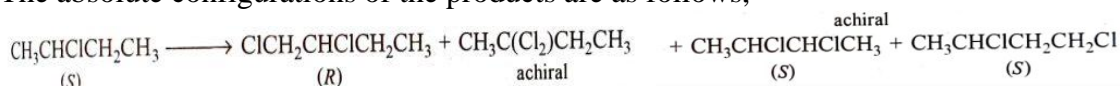
21. An optically active compound at least has one chiral atom.

22. Molecule and its mirror image are not superimposable

24. Only $\text{CH}_3\overset{*}{\text{C}}\text{HOHCOOH}$ has one chiral carbon atom.

27. The number of stereoisomers is equal to 2^n , where n is the number of chiral centres.

28. The absolute configurations of the products are as follows,



29. + / Group is electron releasing.

30. 3^0 carbocation is the most stable

31. 3^0 radical is the most stable

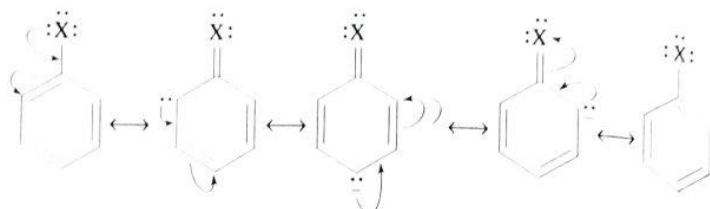
34. The farther away chlorine from $-\text{COOH}$ group, the weaker the acid .

35. BF_3 is electron-seaking group.

39. (a) The addition across $\text{C} = \text{O}$ group is a nucleophilic addition reaction

(b) This is due to the following two factors.

(i) Delocalization of electrons



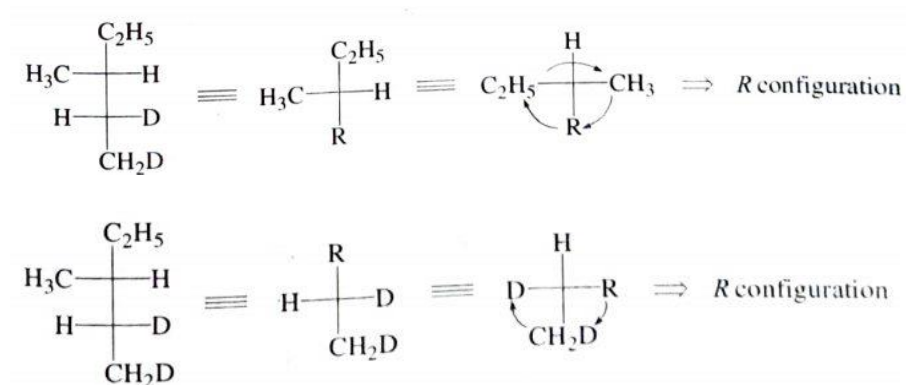
The delocalization imparts a partial double bond character to C-X bond making it stronger than C-X bond in alkyl halide.

(ii) Difference in hybridization of carbon

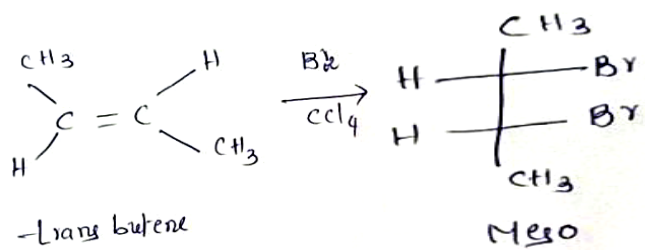
In alkyl halides, the carbon to which the halogen is attached is sp^3 hybridized while in aryl halide it is sp^2 hybridized. Therefore, the C-X bond in an aryl halide is shorter than in an alkyl halide.

(c) The acylium ion $\text{R}-\text{C} \equiv \overset{+}{\text{O}}$ is more stable than $\text{R}-\overset{+}{\text{C}} = \text{O}$, the ordinary carbonium ion. In the former, every atom is complete while in the latter it is not so, as in the case of C atom which has only 6 electrons.

40.



41.



42.

