

MDCAT MCQS WITH EXPLANATION.

CHAPTER HYDROCARBONS.

PART1 CHEMISTRY.

“MCQ’s”

Q1. Combustion of alkanes in the presence of very limited oxygen produces:

- a. CO
- b. C
- c. CO₂
- d. None of these

Q2. The small angles of cyclopropane indicate that overlap between orbitals is:

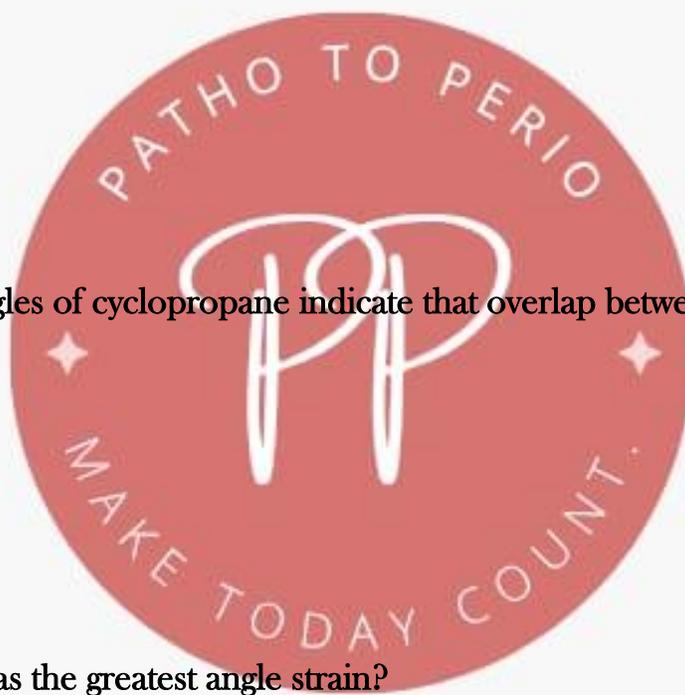
- a. Maximum
- b. Not maximum
- c. Normal
- d. None of these

Q3. Which one has the greatest angle strain?

- a. Cyclopropane
- b. Cyclobutane
- c. Cyclopentane
- d. Cyclohexane

Q4. Which of the following is least reactive?

- a. 1 - butene



- b. Cis-2-butene
- c. Trans-2-butene
- d. All have same reactivity

Q5. Among paraffin's it is found that with an increase in molar masses:

- a. Vapor density decreases
- b. Freezing point decreases
- c. Boiling point increases
- d. Boiling point decreases

Q6. Grignard's reagents react with active-hydrogen compounds to form:

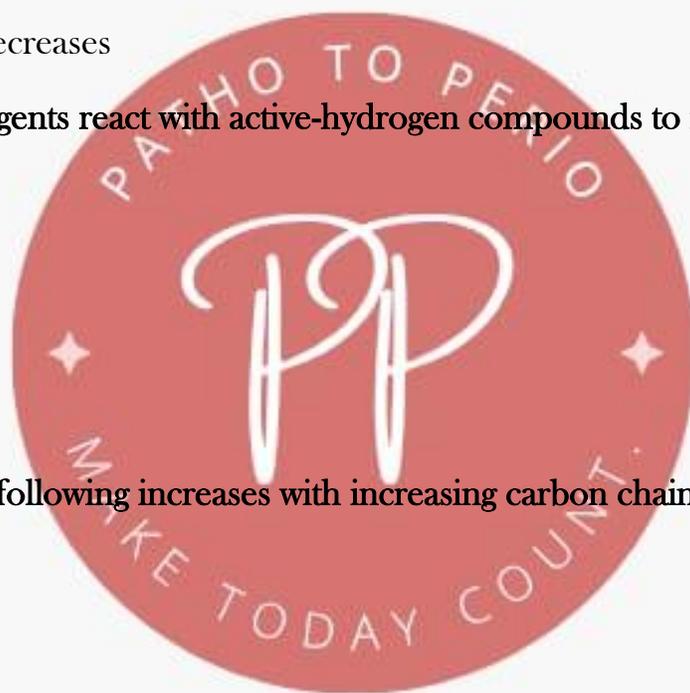
- a. Alkanes
- b. Alkenes
- c. Alkynes
- d. Alcohols

Q7. Which of the following increases with increasing carbon chain?

- a. Melting point
- b. Specific gravity
- c. Viscosity
- d. All of these

Q8. Which of the following has high B.P?

- a. n- pentane
- b. iso - pentane
- c. neo -pentane
- d. Butane



Q9. Which one has maximum angle strain?

- a. Cyclopentane
- b. Cyclobutane
- c. Cyclopropane
- d. Cyclohexane

Q10. Methane, ethane, propane, butane are:

- a. Gases
- b. Solids
- c. Liquids
- d. Only methane is gas

Q11. Furan is _____ organic compound.

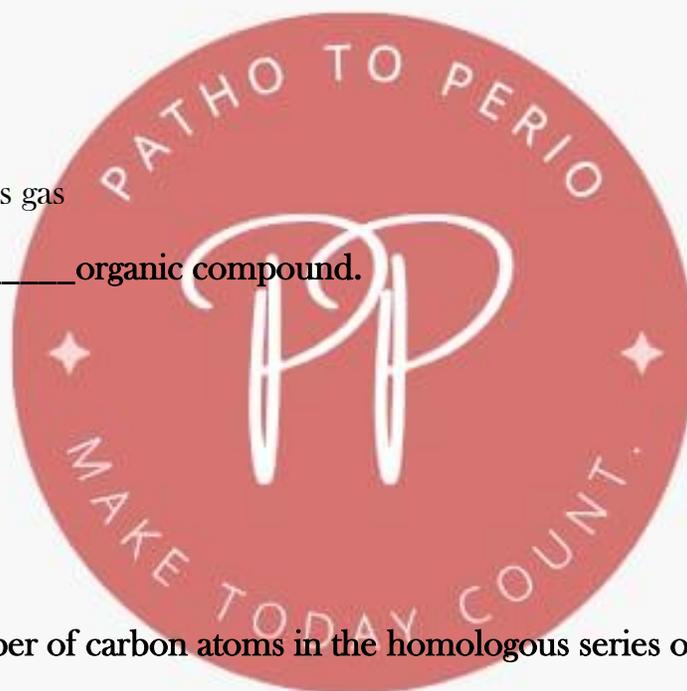
- a. Homocyclic
- b. Aromatic
- c. Heterocyclic
- d. Acyclic

Q12. As the number of carbon atoms in the homologous series of alkane increases, will be decrease?

- a. Density
- b. Enthalpy change of vapourization
- c. Number of isomers
- d. Vapour Pressure

Q13. Which of the following is more stable?

- a. Cyclo propane



- b. Cyclo butane
- c. Cyclo pentane
- d. Cyclo hexane

Q14. A hydrocarbon which is gas at room temperature, decolorizes aqueous bromine. What is the formula;

- a. $C_{10}H_{20}$
- b. $C_{12}H_{26}$
- c. C_7H_{14}
- d. C_2H_4

Q15. Characteristic reactions of alkenes and alkynes are:

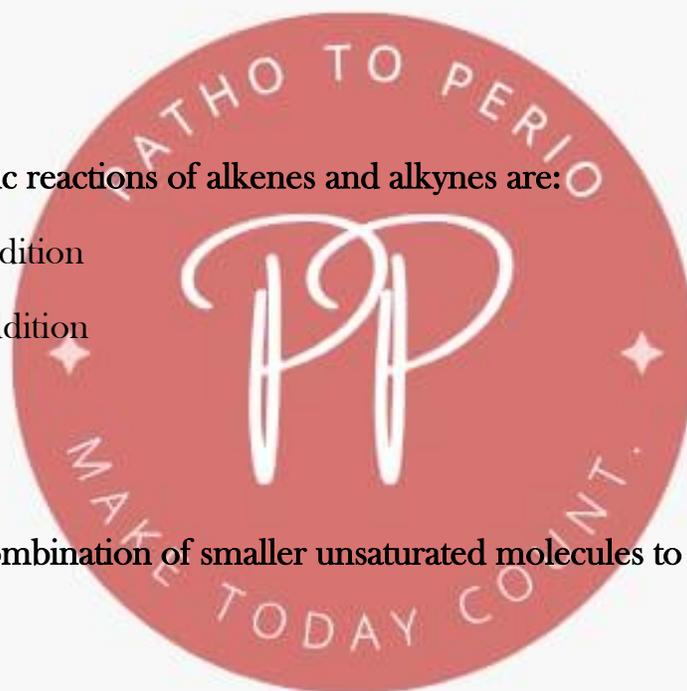
- a. Electrophilic addition
- b. Nucleophilic addition
- c. ES reactions
- d. SN reactions

Q16. Chemical combination of smaller unsaturated molecules to form a huge molecule is:

- a. Catenation
- b. Condensation
- c. Isomerization
- d. Polymerization

Q17. Angle between sp^2 orbitals is usually 120° and each sp^2 orbital has s-character:

- a. 75%
- b. 66.6%



c. 50%

d. 33.3%

Q18) The order in the ease of dehydration of alcohol is:

a. Tertiary > Secondary > Primary

b. Primary Secondary > Tertiary

c. Secondary > Primary > Tertiary

d. Primary > Tertiary > Secondary

Q19. The order of reactivity of halogens towards alkene is:

a. $F_2 > I_2 > Cl_2 > Br_2$

b. $I_2 > Br_2 > Cl_2 > F_2$

c. $F_2 > Cl_2 > Br_2 > I_2$

d. $Cl_2 > Br_2 > I_2 > F_2$ ✨

Q20. Which of the following test is used for location of C = C bond in alkene.

a. Br_2 Test

b. Ozonolysis reaction

c. Both of these

d. None of these

Q21. Point out the most reactive Hydrocarbon:

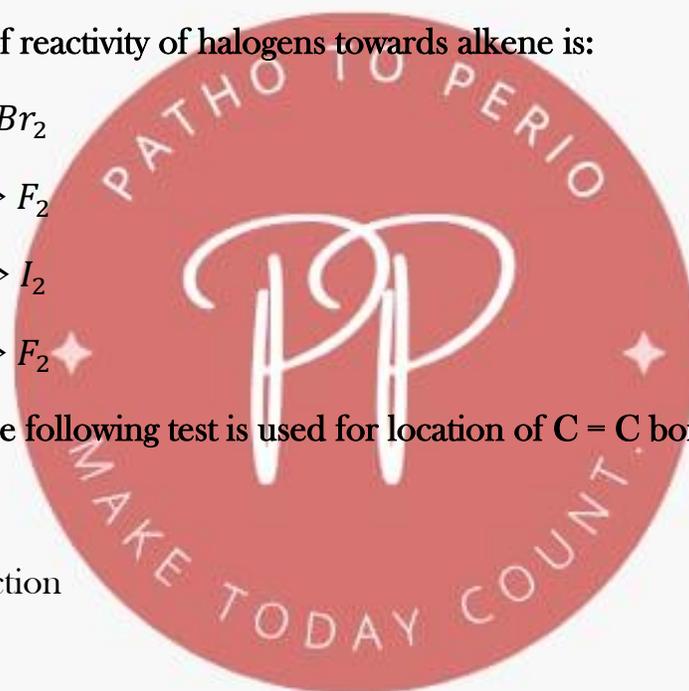
a. Alkane

b. Alkene

6. Alkyne

d. All of them.

Q22. The isomers of a substance must have same:



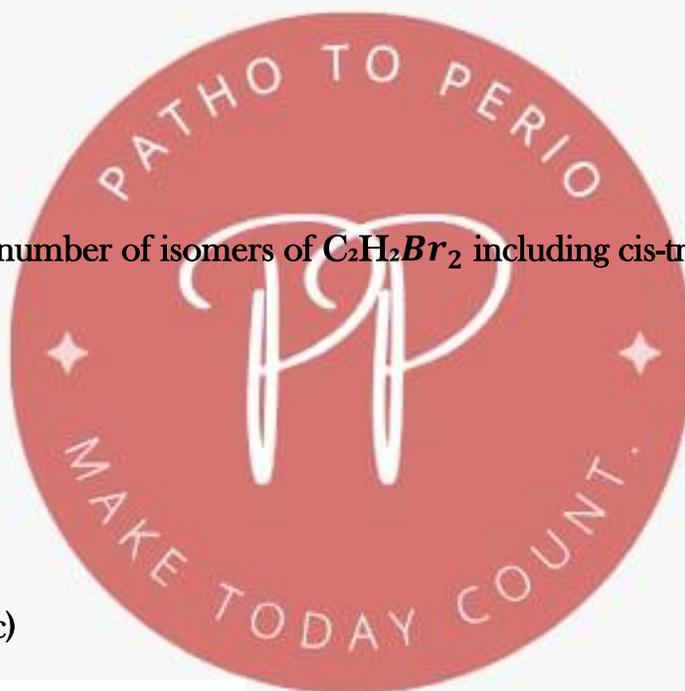
- a. Chemical properties
- b. Molecular mass
- e. Structural formula
- d. Functional groups

Q23. What is the possible number of optical isomers for a compound containing "n" dissimilar asymmetric carbon atoms?

- a. n^2
- b. 2^n
- c. $n+1$
- d. $n+2$

Q24. What is the number of isomers of $C_2H_2Br_2$ including cis-trans isomers?

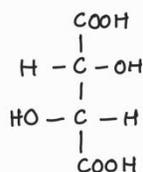
- a. L
- b. 2
- c. 3
- d. 4



Q25. (See the pic)

25.

Tartaric acid has the structure



Number of optical isomers of tartaric acid will be:

- (A) 2
- (B) 4
- (C) 5
- (D) 8

Q26. Formula represent a compound which has cis-trans isomer is ?

- a. C_2H_6O
- b. $C_2H_2O_4$
- c. $C_2H_2Cl_2$
- d. C_2H_3Cl

Q27. The compound of molecular formula $CH_3CH(NH_2)COOH$ exists in two forms. What are these forms called?

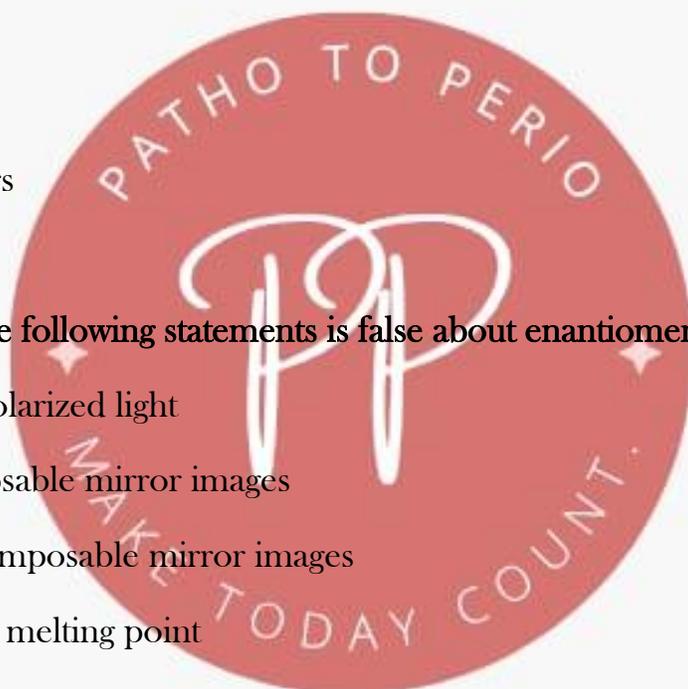
- a. Isotopes
- b. Optical isomers
- c. Cis-trans isomers
- d. Metamers

Q28. Which of the following statements is false about enantiomers?

- (a. Rotate plane polarized light
- (b. Are superimposable mirror images
- (c. Are non-superimposable mirror images
- (d. Have the same melting point

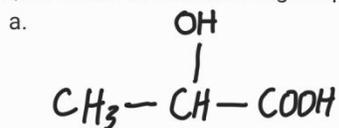
Q29. What is the possible number of optical isomers for a compound containing two chiral carbon atoms?

- a. 2
- b. 4
- c. 6
- d. 8



Q30. (See the pic)

Q30. Which of the following is optically active?



Q31. Isomerism exhibited by acetic acid and HCOOCH_3 is:

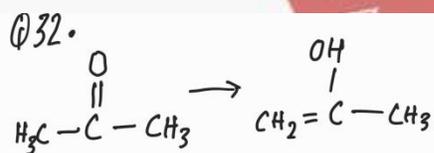
a. Positional

b. Geometrical

c. Chain

d. Functional

Q32. (See the pic)



are example of

a. Optical isomerism

b. Metamerism

c. Tautomerism

d. Geometric isomerism

Q33. The molecule of acetylene possess which hybridization?

a. sp

b. sp^2

c. sp^3

d. dsp^2

Q34. The geometry of acetylene is:

a. Angular

b. Bent

c. Linear

d. Trigonal

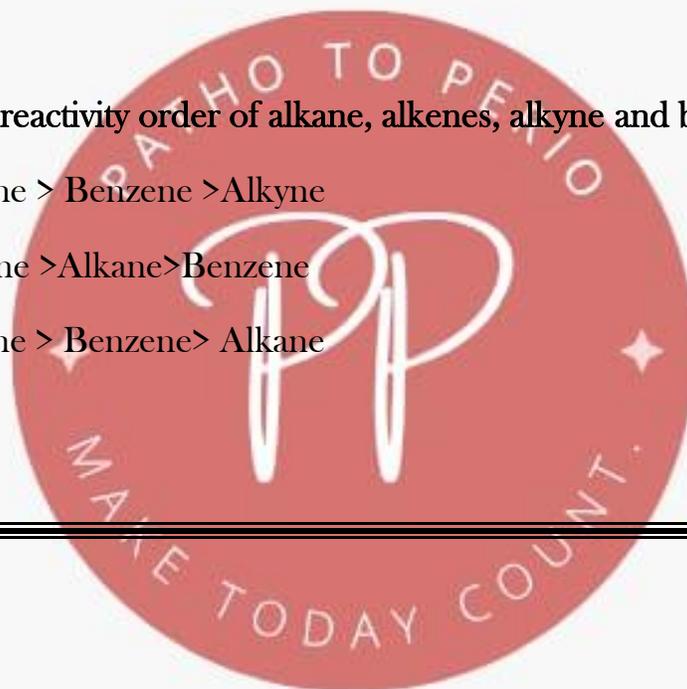
Q35. The correct reactivity order of alkane, alkenes, alkyne and benzene is:

(a) Alkane > Alkene > Benzene > Alkyne

(b) Alkyne > Alkene > Alkane > Benzene

(c) Alkene > Alkyne > Benzene > Alkane

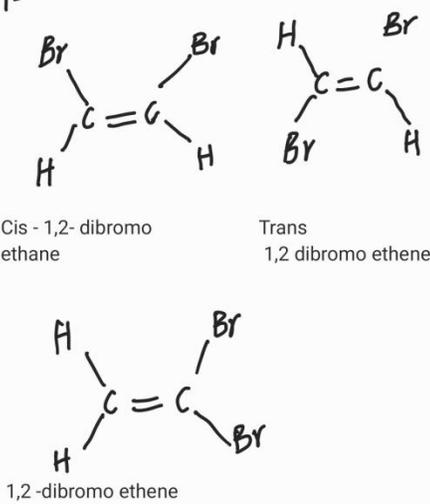
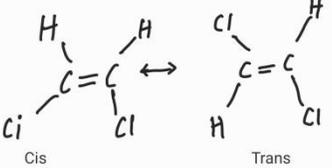
(d) All are correct

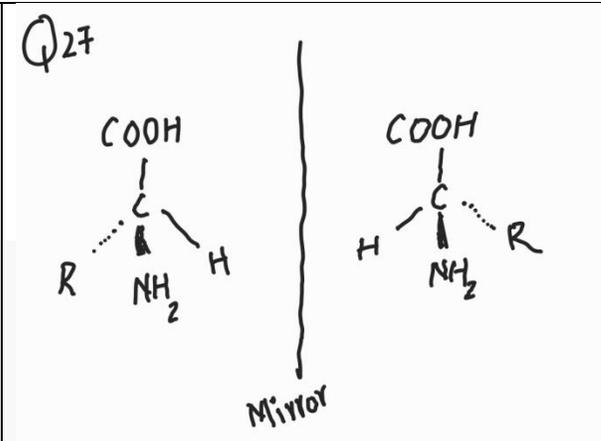
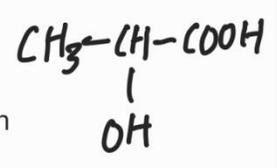


“EXPLANATION OF MCQ’s”

MCQ's No	Correct Option	<u>EXPLANATION</u>
1.	B	Combustion of alkane in very limited supply of oxygen produces carbon paste, H ₂ O and heat. Alkane + O ₂ C → H ₂ O + heat.
2.	B	Small angle in cyclopropane means large angle strain. Due to large angle strain orbitals do not overlap effectively and cyclopropane molecule is unstable.
3.	A	Cyclopropane has maximum angle strain.
4.	C	Trans-2-butene is more stable and least reactive. It produces the least heat of combustion.
5.	C	As the molar masses increase, the length of the chain increases and more attractive forces develop in them thus its boiling point increases. Straight chain paraffins have higher boiling point than branched.
6.	A	
7.	D	With the increase of carbon chain, the molecule weight as well as force of attraction increase therefore melting point, specific gravity and viscosity are regularly increased.
8.	A	n-alkane has higher boiling point as compared to iso-alkane and neo-alkane because in n-alkane the area of contact is very high due to which the force of attraction is very high and hence have high boiling point as compared to iso and neo-alkane.
9.	C	Due to small ring size the deviation of angle value is more than the normal angle value (109.5°) therefore it shows maximum angle strain.
10.	A	The first four members of alkanes are gaseous in nature. C ₄ to C ₁₈ are liquids and C ₁₈ onwards are solids.
11.	C	It is a heterocyclic compound because it contains one hetero atom (oxygen) in the ring. 
12.	A	Vapor pressure decreases as the number of carbon atoms increased in alkane molecules due to increase in molecular

		weight greater attractive forces develop between them and vapour pressure $\propto \frac{1}{\text{intermolecular covalent forces}}$
13.	C	Due to very small ring strain in cyclohexane, it is very stable. As the ring size increases the angle strain decreases.
14.	D	The first three members of hydrocarbons belonging to alkene family are gaseous in nature while higher are liquids and solids. So, in the given hydrocarbons only C_2H_4 , is gaseous in nature and decolorized bromine water due to presence of double bond.
15.	A	Unsaturated compounds like alkenes and alkynes undergo electrophilic.
16.	D	The process in which the monomer molecules reacting together to form polymer chain or three-dimensional network is called polymerization.
17.	D	sp^2 orbital has 33.3% s character.
18.	A	The rate of dehydration is related to the ease of formation of carbocation the ease of formation of carbocation is Tertiary > Secondary > Primary, so the alcohol which produces tertiary carbocation undergo dehydration easily then secondary and then tertiary, So the ease of dehydration of alcohol is 3° alcohol > 2° alcohol > 1° alcohol.
19.	C	The reactivity of halogen towards alkene decreases down the group. Fluorine is the most reactive and iodine is least reactive.
20.	B	By studying the product of ozonolysis we can determine the position of double bond in alkene.
21.	B	Alkene is most reactive due to the presence of weak localized π -bond as compared to π -bond of alkyne and strong sigma bond in alkane.
22.	B	Isomers must have same molecular mass due to presence of same number of atoms, same nature of atoms.
23.	B	The total number of possible optical isomers containing "n" dissimilar asymmetric carbon atoms can be determined by formula 2^n .

24.	C	<p>24-</p>  <p>Cis - 1,2- dibromo ethane Trans 1,2 dibromo ethene</p> <p>1,2- dibromo ethene</p>
25.	B	<p>According to the "2^n" rule it form four isomers because in tartanic acid there are two chiral carbon so $n = 2$ according to formula $2^n = 2^2 = 4$ isomers.</p>
26.	C	<p>For cis-trans isomerism two conditions must be satisfied (i) There must be restricted rotation about double bond - (ii) there must be two non-identical groups on each double bonded carbon atom. These two conditions only satisfied by $C_2H_2Cl_2$.</p> <p>Q26-</p>  <p>Cis Trans</p>
27.	B	<p>The compound $CH_3CH(NH_2)COO$ contain an asymmetric carbon and hence will show optical isomerism</p>

		<p>Q27</p> 
28.	B	Enantiomers are stereo isomers that are mirror images of each other which are non-superimposable.
29.	B	According to the formula 2^n total number of optical isomers having number of chiral carbon two is $2^n = 2^2 = 4$.
30.	A	<p>Q 30.</p> <p>Due to the presence of chiral carbon in</p> <p>It is optically active.</p> 
31.	D	<p>Q 31. Explanation -</p> <p>Acetic acid has $\text{-}\overset{\text{O}}{\parallel}\text{C-OH}$ functional group and ester has $\text{-}\overset{\text{O}}{\parallel}\text{C-O-R}$ functional group. They have same molecular but different functional group.</p>
32.	C	It is keto-enol isomerism in which the two isomers are in dynamic equilibrium.
33.	A	<p>The molecule of acetylene undergo sp hybridization according to the formula.</p> <p>Hybridization Lone pair number of atoms attach to the central atom $=2+0=2$. The correct option is sp.</p>
34.	C	As in acetylene the carbon atom is sp hybridized. So the geometry of acetylene is linear $\text{H-C}\equiv\text{C-H}$.

35.	C	Among alkane, alkyne, alkene and benzene, alkane is less reactive because it contains only sigma bond which is stronger and difficult to break. While alkene and alkyne contains localized pi-bond. Benzene contains delocalized pi-bond, that makes it least reactive. The bond of alkyne is stronger than the pi-bond of alkene. So the correct order of reactivity is Alkyne > Alkene > Benzene > Alkane.
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