DPP - Daily Practice Problems

Name : _____ Date : _____

Start Time : _____ End Time : _____

CHEMISTRY 22

SYLLABUS : General Organic Chemistry-2 (Isomerism)

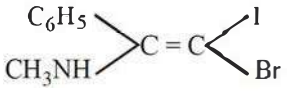
Max. Marks : 120 **Time : 60 min.**

GENERAL INSTRUCTIONS

- The Daily Practice Problem Sheet contains 30 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.
- You have to evaluate your Response Grids yourself with the help of solution booklet.
- Each correct answer will get you 4 marks and 1 mark shall be deduced for each incorrect answer. No mark will be given/ deducted if no bubble is filled. Keep a timer in front of you and stop immediately at the end of 60 min.
- The sheet follows a particular syllabus. Do not attempt the sheet before you have completed your preparation for that syllabus. Refer syllabus sheet in the starting of the book for the syllabus of all the DPP sheets.
- After completing the sheet check your answers with the solution booklet and complete the Result Grid. Finally spend time to analyse your performance and revise the areas which emerge out as weak in your evaluation.

DIRECTIONS (Q.1-Q.21) : There are 21 multiple choice questions. Each question has 4 choices (a), (b), (c) and (d), out of which ONLY ONE choice is correct.

Q.1 Give the E-Z designation of the following compound -



(a) E (b) Z (c) E-Z (d) E-E

Q.2 Keto-enol tautomerism is observed in :

(a) $C_6H_5 - CHO$

(b) $C_6H_5COCH_3$

(c) $C_6H_5COCH_2COCH_3$

(d) Both (b) and (c)

Q.3 Aldehydes and ketones are

(a) Chain isomers

(b) Position isomers

(c) Functional isomers

(d) Both (a) & (b)

Q.4 Compound $C_4H_{10}O$ can show -

(a) Metamerism (b) Functional isomers

(c) Positional isomers (d) All the above

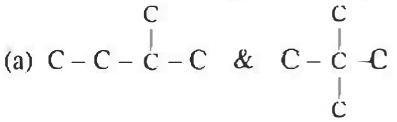
Q.5 Esters are functional isomers of -

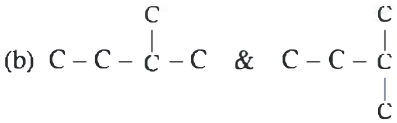
(a) Hydroxyaldehydes (b) Ketones

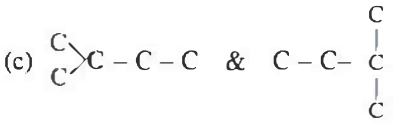
(c) Diketones (d) Diols

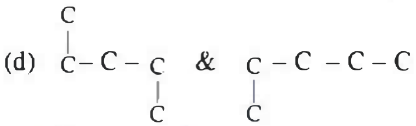
RESPONSE GRID	1. ⓐⓑⓒⓓ	2. ⓐⓑⓒⓓ	3. ⓐⓑⓒⓓ	4. ⓐⓑⓒⓓ	5. ⓐⓑⓒⓓ

Q.6 Which of the following is an example of isomerism?

(a) 

(b) 

(c) 

(d) 

Q.7 Which of the following compounds exhibits geometrical isomerism?

(a) C_2H_5Br (b) $(CH)_2(COOH)_2$

(c) CH_3CHO (d) $(CH_2)_2(COOH)_2$

Q.8 The number of geometrical isomers of $CH_3CH = CH- CH = CH- CH = CHCl$ is -

(a) 2 (b) 4 (c) 6 (d) 8

Q.9 Which of the following is an isomer of diethyl ether ?

(a) $(CH_3)_3COH$ (b) $(CH_3)_2CHOH$

(c) C_3H_7OH (d) $(C_2H_5)_2CHOH$

Q.10 How many isomers of $C_5H_{11}OH$ will be primary alcohols ?

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

Q.11 How many chain isomers can be obtained from the alkane C_6H_{14}?

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

Q.12 CH_3CHCl_2 and $CH_2Cl.\ CH_2Cl$ show which type of isomerism ?

(a) Functional (b) Chain

(c) Position (d) Metamerism

Q.13 Which of the following is an example of position isomerism ?

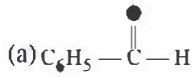
(a) Isopentaneand neopentane

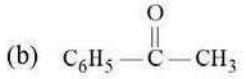
(b) Glucose and fructose

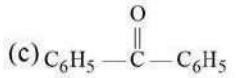
(c) Ethanol and dimethyl ether

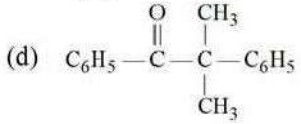
(d) α- Naphthol and β - naphthol

Q.14 Keto-enol tautomerism is observed in–

(a) 

(b) 

(c) 

(d) 

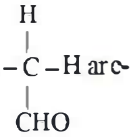
Q.15 The enolic form of acetone contains –

(a) 9 σ bonds, 1π bond and 2 lone pairs

(b) 8 σ bonds, 2 π bonds and 2 lone pairs

(c) 10 σ bonds, 1 π bond and 1 lone pair

(d) 9 σ bonds, 2 π bonds and 1 lone pair

Q.16 The compounds CH_3-CH_2-COOH and  are-

(a) Chain isomers (b) Position isomers

(c) Functional isomers (d) None

Q.17 An alkane can show structural isomerism if it has ..... number of minimum carbon atoms –

(a) 1 (b) 2 (c) 3 (d) 4

Q.18 How many structural formulae are possible for $C_5H_{11}Cl$?

(a) 6 (b) 8 (c) 10 (d) 12

Q.19 Which of the following can exhibit cis-trans isomerism ?

(a) $HC \equiv CH$ (b) $ClCH = CHCl$

(c) $CH_3.CHCl.COOH$ (d) $ClCH_2 - CH_2Cl$

Q.20 $C_4H_6O_2$ does not represent –

(a) A diketone

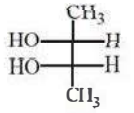
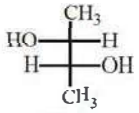
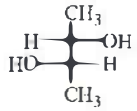
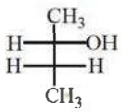
(b) A compound with two aldehydes

(c) An alkenoic acid

(d) An alkanoic acid

RESPONSE GRID					
	6. ⓐⓑⓒⓓ	**7.** ⓐⓑⓒⓓ	**8.** ⓐⓑⓒⓓ	**9.** ⓐⓑⓒⓓ	**10.** ⓐⓑⓒⓓ
	11. ⓐⓑⓒⓓ	**12.** ⓐⓑⓒⓓ	**13.** ⓐⓑⓒⓓ	**14.** ⓐⓑⓒⓓ	**15.** ⓐⓑⓒⓓ
	16. ⓐⓑⓒⓓ	**17.** ⓐⓑⓒⓓ	**18.** ⓐⓑⓒⓓ	**19.** ⓐⓑⓒⓓ	**20.** ⓐⓑⓒⓓ

Q.21 Fischer projection of (2R, 3S)-2,3-butanediol is :-

(a) 
(b) 
(c) 
(d) 

DIRECTIONS (Q.22-Q.24) : In the following questions, more than one of the answers given are correct. Select the correct answers and mark it according to the following codes:

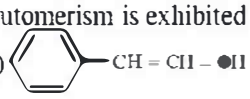
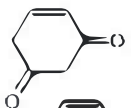
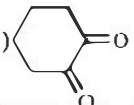
Codes :

(a) 1, 2 and 3 are correct **(b)** 1 and 2 are correct
(c) 2 and 4 are correct **(d)** 1 and 3 are correct

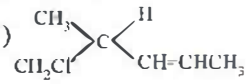
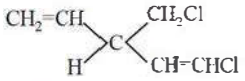
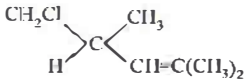
Q.22 Which of the following statements are not correct ?

(1) A racemic mixture is optically inactive because of two equal and opposite rotation of same molecules in mixture.
(2) A meso compound has molecules which are superimposable on their mirror images even though they contain chiral centres.
(3) A meso compound has chiral centres but exhibits no optical activity.
(4) A meso compound is optically inactive because the rotation caused by any molecule is cancelled by an equal and opposite rotation caused by another molecule that is the mirror image of the first.

Q.23 Tautomerism is exhibited by–

(1)  (2) 
(3)  (4) 

Q.24 Which one of the following will show geometrical isomerism?

(1)  (2) 
(3) $CH_3CH_2CH{=}CHCH_2CH_3$ (4) 

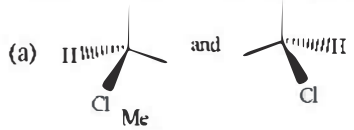
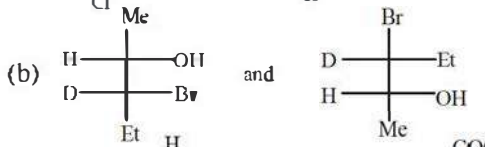
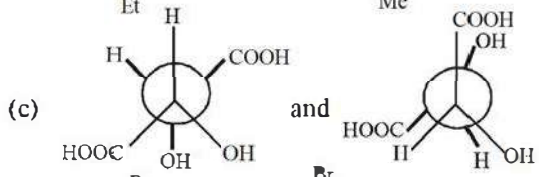
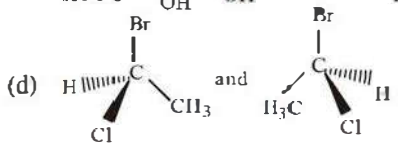
DIRECTIONS (Q.25-Q.27) : Read the passage given below and answer the questions that follows :

Structural isomers have different covalent linkage of atoms. Stereoisomers are compounds that have same sequence of covalent bonds but differ in the relative dispositions of their atoms in space. Geometrical and optical isomers are the two important types of configurational isomers.

The compound with double bond or ring structure has restricted rotation, so can exist in two geometrical forms. The double bond in larger rings (ring size 10 carbon or large) can also cause geometrical isomerism. The optical isomers rotate the plane of plane-polarised light. A sp^3-hybridised carbon atom bearing four different types of substituents is called an asymmetric centre or chiral centre. A chiral object or molecule cannot be superimposed on its mirror image. Stereoisomers that are mirror images of each other are called enantiomers. The stereoisomers that are not mirror images of each other are called diastereomers. Diastereomers have different physical properties.

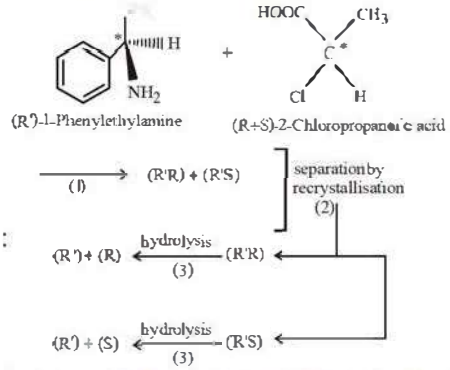
A racemic mixture is optically inactive and contains equal amounts of both the enantiomers. Resolution refers to method of separating a racemic mixture into two pure enantiomers. A meso compound is an optically inactive stereoisomer, which is achiral due to the presence of an internal plane of symmetry or centre of symmetry within the molecule.

Q.25 The pair showing identical species is

(a) 
(b) 
(c) 
(d) 

RESPONSE GRID	21. ⓐⓑⓒⓓ	22. ⓐⓑⓒⓓ	23. ⓐⓑⓒⓓ	24. ⓐⓑⓒⓓ	25. ⓐⓑⓒⓓ

Q.26 Observe the following reaction



Which statement is not correct about the above observation?

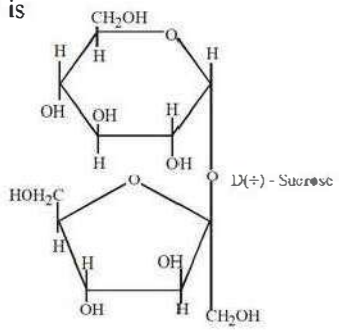
(a) The product mixture of step-1 is optically active

(b) The product R'R and R'S have identical structural formula

(c) R'R is nonsuperimposable on R'S

(d) R'R and R'S have same solubility in water

Q.27 The number of chiral centres present in the following compound is



(a)

(b) 8

(c) 9

(d) 10

DIRECTIONS (Q. 28-Q.30) : Each of these questions contains two statements: Statement-1 (Assertion) and Statement-2 (Reason). Each of these questions has four alternative choices, only one of which is the correct answer. You have to select the correct choice.

(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.

(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-I.

(c) Statement -1 is False, Statement-2 is True.

(d) Statement -1 is True, Statement-2 is False.

Q.28 Statement 1 : Staggered conformation (anti) is always more stable than gauche.

Statement 2 : Staggered form has minimum steric crowding.

Q.29 Statement 1 : Cyclohexanone exhibits keto-enol tautomerism.

Statement 2 : In cyclohexanone, one form contains the keto group (C = O) while other contains enolic group (–C = C – OH)

Q.30 Statement 1 : trans isomers are more stable than cis isomers.

Statement 2 : The cis isomer is the one in which two similar groups are on the same side of the double bond.

RESPONSE GRID	26.ⓐⓑⓒⓓ	27.ⓐⓑⓒⓓ	28.ⓐⓑⓒⓓ	29.ⓐⓑⓒⓓ	30. ⓐⓑⓒⓓ

DAILY PRACTICE PROBLEM SHEET 22 - CHEMISTRY			
Total Questions	30	Total Marks	120
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	32	Qualifying Score	52
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

(1) **(b)**

(2) **(d)**

(3) **(c)** Aldehydes possess — CHO functional group while ketones have — CO — group, so these are functional isomers, eg.

CH_3-CH_2-CHO & $CH_3-\overset{\overset{O}{\|}}{C}-CH_3$

(4) **(d)**

(a) Metamers:

$CH_3-CH_2-O-CH_2-CH_3$

&

$CH_3-O-CH_2-CH_2-CH_3$

(b) Functional isomers:

$CH_3-CH_2-CH_2-CH_2-OH$

&

$CH_3-O-CH_2-CH_2-CH_3$

(c) Positional isomers:

$CH_3-CH_2-CH_2-CH_2-OH$

&

$CH_3-CH_2-\underset{\underset{OH}{|}}{CH}-CH_3$

(5) **(a)** Esters are functional isomers of hydroxyaldehydes.

$CH_3-\overset{\overset{O}{\|}}{C}-O-CH_3$ & $CH_3-\underset{\underset{OH}{|}}{CH}-CHO$

methyl ethanoate 2-hydroxypropanal

(6) **(a)** In the (a) option the compounds are 2-methylbutane and 2,2- dimethylpropane respectively. In (b) & (c) options, all the compounds are same i.e. 2-methylbutane. In (d) both are *n*-pentane.

(7) **(b)** $(CH)_2(COOH)_2$ in fact represents

$HOOC-CH=CH-COOH$

and hence shows geometrical isomerism.

(8) **(d)** Since both the carbon atoms of each of the three double bonds are differently substituted.

Therefore, $2^3 = 8$ geometrical isomers are possible.

(9) **(a)** Diethyl ether has 4 carbon atoms, among different alternative alochols, only $(CH_3)_3COH$ has 4 carbon atoms.

(10) **(c)** (i) $CH_3CH_2CH_2CH_2CH_2OH$

(ii) $CH_3\underset{\underset{CH_3}{|}}{CH}CH_2CH_2OH$

(iii) $HOCH_2-\underset{\underset{CH_3}{|}}{CH}CH_2CH_3$

(iv) $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_2OH$

(11) **(b)** (i) $CH_3CH_2CH_2CH_2CH_2CH_3$

(ii) $CH_3\underset{\underset{CH_3}{|}}{CH}.CH_2.CH_2CH_3$

(iii) $CH_3\underset{\underset{CH_3}{|}}{CH}.\underset{\underset{CH_3}{|}}{CH}.CH_3$

(iv) $CH_3CH_2\underset{\underset{CH_3}{|}}{CH}CH_2CH_3$

(v) $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_2CH_3$

(12) **(c)** The two isomers have same functional group, but at different positions.

(13) **(d)** As the name indicates α - naphthol and β -naphthol differ in the position of the alcoholic group.

(14) **(b)** The compound must contain α -hydrogen atom w.r.t. the – CHO or $>C=O$ group for showing keto-enol tautomerism.

(15) **(a)** $CH_3-\overset{\overset{O}{\|}}{C}-CH_3 \rightleftharpoons CH_3-\overset{\overset{\ddot{O}H}{|}}{C}=CH_2$

keto form enolic form

No. of σ bonds in enolic form:

$3+1+1+1+1+2=9$

No. of π bonds in enolic form = 1

No. of lone pairs of electrons in enolic form = 2

(16) **(d)** The molecular formulas are different so they do not exhibit isomerism.

(17) **(d)** CH_4, CH_3CH_3, $CH_3CH_2CH_3$ exist only in one structural form, while $CH_3CH_2CH_2CH_3$ can exist in more than one structural forms.

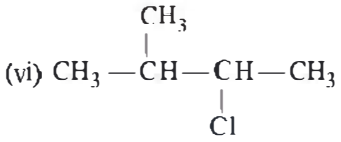
(18) **(b)** (i) $CH_3CH_2CH_2CH_2CH_2Cl$

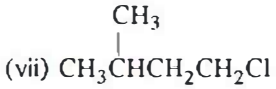
(ii) $CH_3CH_2CH_2\underset{\underset{Cl}{|}}{CH}CH_3$

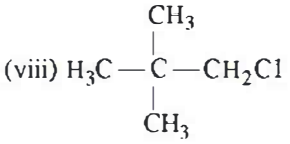
(iii) $CH_3CH_2\underset{\underset{Cl}{|}}{CH}CH_2CH_3$

(iv) $ClCH_2.\underset{\underset{CH_3}{|}}{CH}.CH_2CH_3$

(v) $CH_3\underset{\underset{Cl}{|}}{\overset{\overset{CH_3}{|}}{C}}CH_2CH_3$

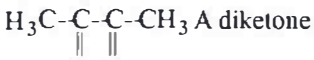
(vi) 

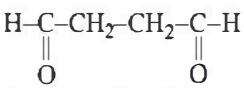
(vii) 

(viii) 

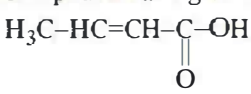
(19) **(b)** Remember that cis-tans geometrical isomerism is possible only in alkenes and further only in those alkenes in which each of the doubly bonded carbon atoms individually has different atoms/groups.

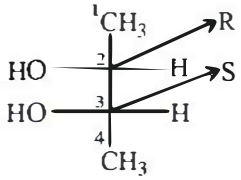
(20) **(d)** $C_4H_6O_2$ represents


A diketone



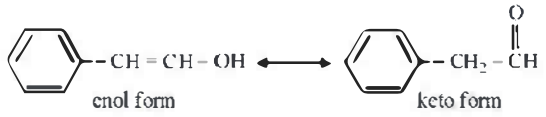
Compound having two aldehydes

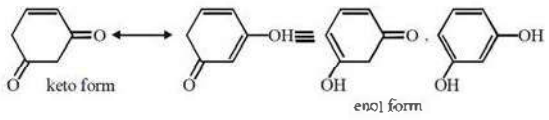

Alkenoic acid

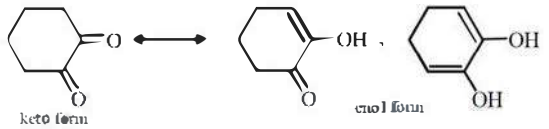
(21) **(a)** 

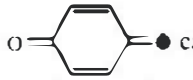
(22) **(a)** A meso compound has minimum two chiral centres and it has a plane of symmetry and it is optically inactive.

(23) **(a)**

(1) 

(2) 

(3) 

(4)  cannot tautomerise

(24) **(a)** In (4) two similar groups (CH_3) are present on one of the doubly bonded carbon atom: while in others the two doubly bonded carbon atoms have different atoms (groups).

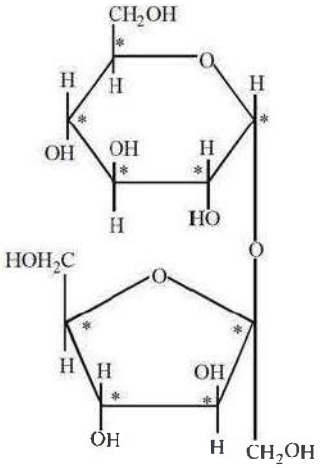
(25) **(a)** In option (a)


Both are identical species $H_3C-CH-Cl$, there is no asymmetric 'C' atom present.

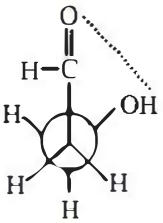
B, C, D have pairs of compounds which have chiral carbon and are non-superimposable on each other.

(26) **(d)** R'R and R'S are diastereomers and have different physical properties like water solubility, B.P., M.P. etc.

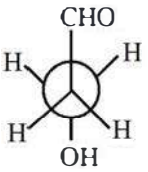
Mixture of diastereomers is optically active hence the product mixture in step 1 is optically active.

(27) **(c)** 

The star shown indicates chiral centre.

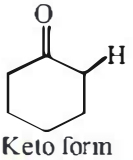
(28) **(c)** 

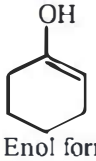
In some cases, gauche is more stable due to H-bonding.



Staggered has minimun steric crowding

(29) **(a)** In cyclohexanone keto enol tautomerism is as follows.


Keto form


Enol form

(30) **(b)** Trans isomer is more stable than cis isomer because in cis isomer, the bulky groups are on the same sides of the double bod. The steric repulsion of the groups makes the cis isomer less stable than the trans isomer in which the bulky groups are far apart because they are on the opposite sides of the double bond.