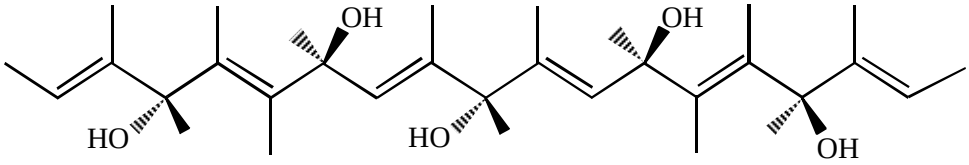
ORGANIC CHEMISTRY

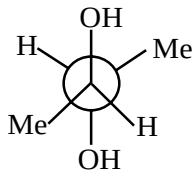
STEREOISOMERISM

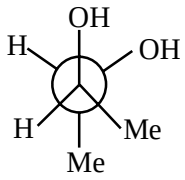
1. The total number of chiral molecules formed from one molecule of **P** on complete ozonolysis (O_3, Zn/H_2O) is _____. **[JEE(Advanced) 2022]**

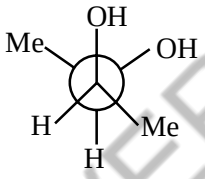


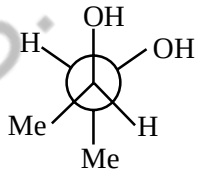
P

2. Among the following, the conformation that corresponds to the most stable conformation of *meso*–butane–2,3–diol is – **[JEE(Advanced) 2021]**

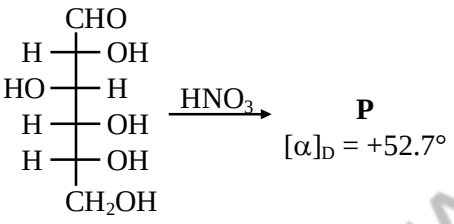
(A) 

(B) 

(C) 

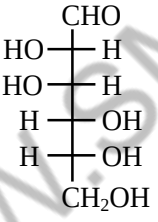
(D) 

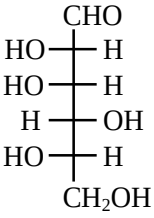
3. Given

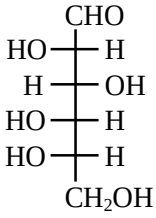


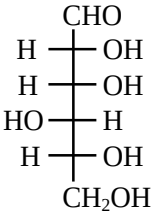
D-Glucose

The compound(s), which on reaction with HNO_3 will give the product having degree of rotation, $[\alpha]_D = -52.7^o$ is (are) **[JEE(Advanced) 2021]**

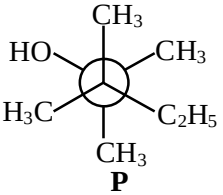
(A) 

(B) 

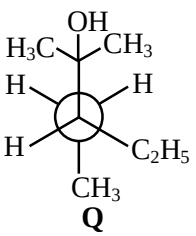
(C) 

(D) 

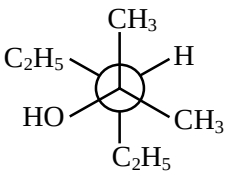
4. Newman projections **P, Q, R** and **S** are shown below :



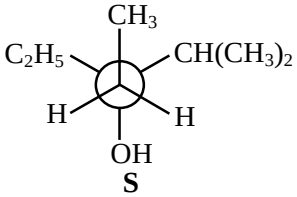
P



Q



R

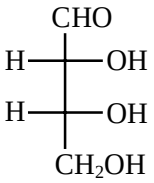


S

Which one of the following options represents identical molecules ? **[JEE(Advanced) 2020]**

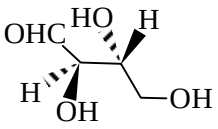
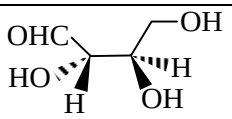
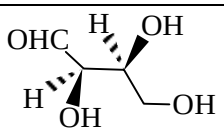
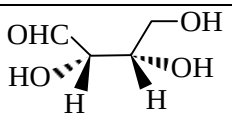
(A) **P** and **Q** (B) **Q** and **S** (C) **Q** and **R** (D) **R** and **S**

5. The Fischer projection of D-erythrose is shown below. **[JEE(Advanced) 2020]**



D-Erythrose

D-Erythrose and its isomers are listed as **P**, **Q**, **R**, and **S** in **Column-I**. Choose the correct relationship of **P**, **Q**, **R**, and **S** with D-erythrose from **Column II**.

Column-I		**Column-II**	
P.		1.	Diastereomer
Q.		2.	Identical
R.		3.	Enantiomer
S.			

(A) P → 2, Q → 3, R → 2, S → 2 (B) P → 3, Q → 1, R → 1, S → 2

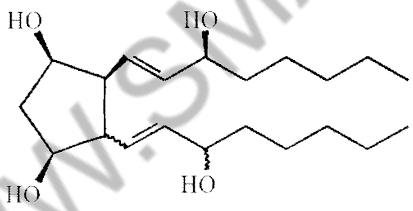
(C) P → 2, Q → 1, R → 1, S → 3 (D) P → 2, Q → 3, R → 3, S → 1

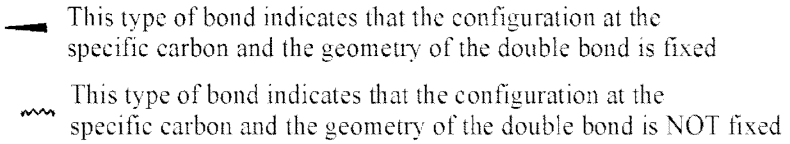
6. An organic compound ($C_8H_{10}O_2$) rotates plane-polarized light. It produces pink color with neutral $FeCl_3$ solution. What is the total number of all the possible isomers for this compound?

[JEE(Advanced) 2020]

7. For the given compound X, the total number of optically active stereoisomers is_____.

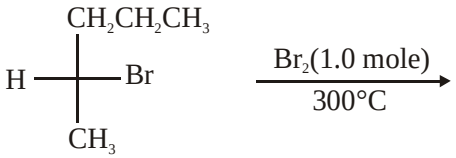
[JEE(Advanced) 2018]





8. In the following monobromination reaction, the number of possible chiral products is

[JEE(Advanced) 2016]



(1.0 mole)

(enantiomerically pure)

9. For 'invert sugar', the correct statement(s) is (are)

(Given : specific rotations of (+)-sucrose, (+)-maltose, L-(–)-glucose and L-(+)-fructose in aqueous solution are + 66°, +140°, –52° and + 92°, respectively) **[JEE(Advanced) 2016]**

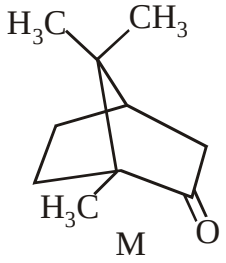
(A) 'invert sugar' is prepared by acid catalyzed hydrolysis of maltose

(B) 'invert sugar' is an equimolar mixture of D-(+) glucose and D-(–)-fructose

(C) specific rotation of 'invert surgar' is –20°

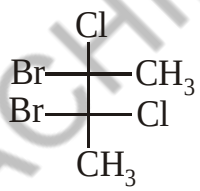
(D) on reaction with Br_2 water, 'invert sugar' forms saccharic acid as one of the products

10. The total number of stereoisomers that can exist for M is : **[JEE(Advanced) 2015]**



M

11. The total number(s) of **stable** conformers with **non-zero** dipole moment for the following compound is (are) **[JEE(Advanced) 2014]**

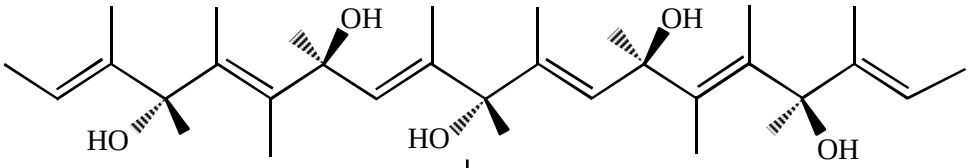


12. Consider all possible isomeric ketones including stereoisomers of MW = 100, All these isomers are independently reacted with $NaBH_4$ (**NOTE :** stereoisomers are also reacted separately). The total number of ketones that give a racemic product(s) is/are **[JEE(Advanced) 2014]**

SOLUTIONS

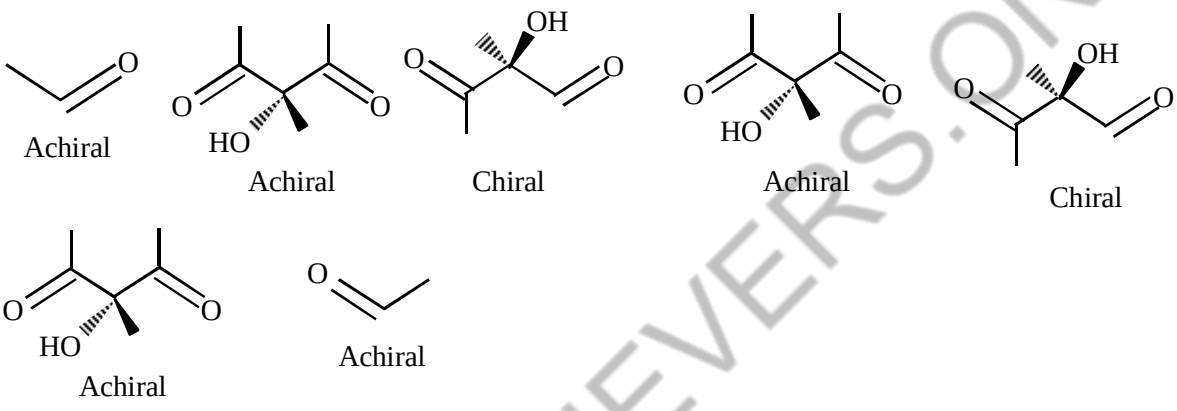
1. Ans. (2)

Sol.



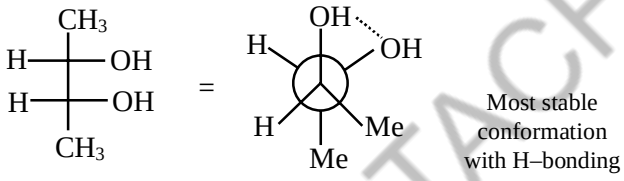
(P)

O_3 / Zn/H_2O



2. Ans. (B)

Sol.

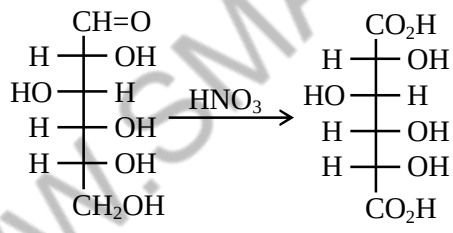


Most stable conformation with H–bonding

Meso butane –2,3,–diol

3. Ans. (C, D)

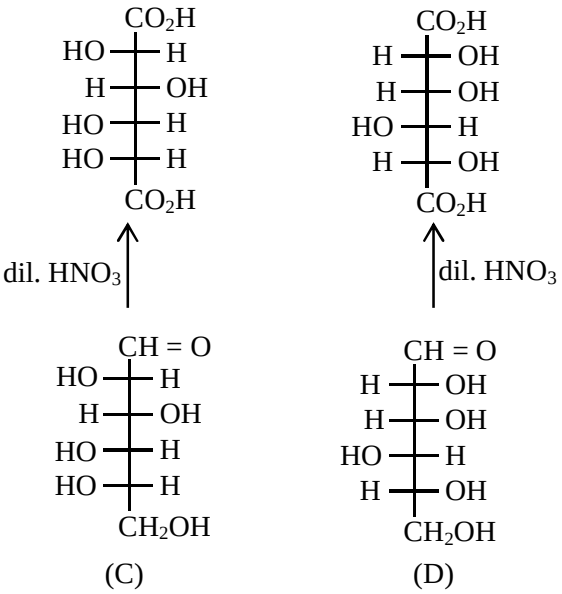
Sol.



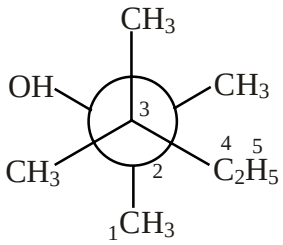
(P)

$[\alpha]_D = 52.7°$

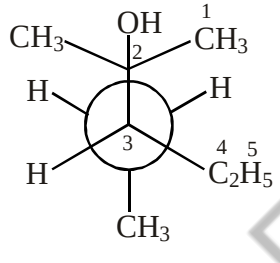
The enantiomer of P has rotation –52.7° is as follows



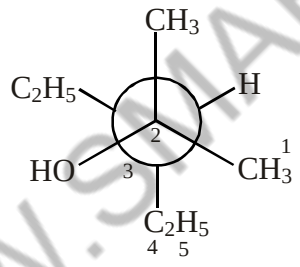
4. Ans. (C)

Sol. P. 

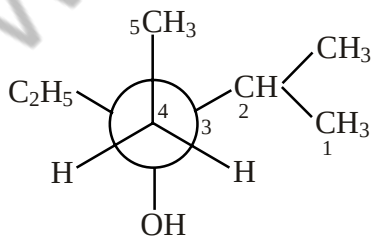
2, 3, 3-trimethyl pentan-2-ol

Q. 

3-ethyl-2-methyl pentan-2-ol

R. 

3-ethyl-2-methyl pentan-2-ol

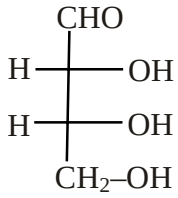
S. 

3-ethyl-2-methyl pentan-3-ol

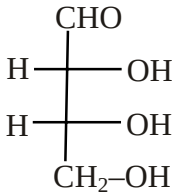
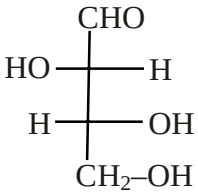
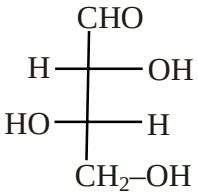
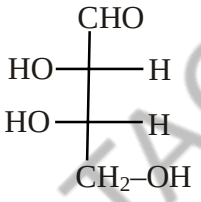
Q and R is same.

5. Ans. (C)

Sol.



D-Erythrose

Compound P		It is Identical	P-2
Compound Q		It is Diastereomer	Q-1
Compound R		It is Diastereomer	R-1
Compound S		It is Enantiomer	S-3

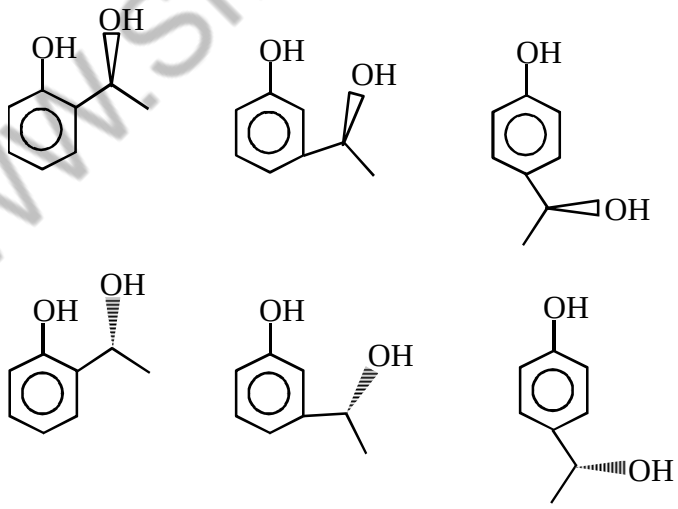
Ans. P-2, Q-1, R-1, S-3

6. Ans. (6)

Sol. $C_8H_{10}O_2 \rightarrow$ Gives $FeCl_3$ test means Phenol derivative

↓

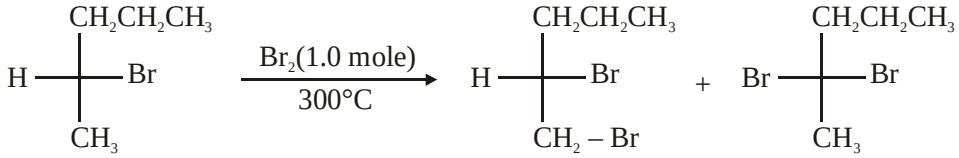
Rotate plane polarized light means optically active



7. Ans. (7)

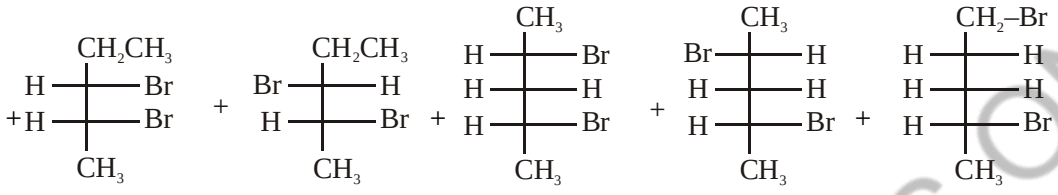
8. Ans. (5)

Sol.



(1.0 mole) (Chiral) (Achiral)

(enantiomerically pure)

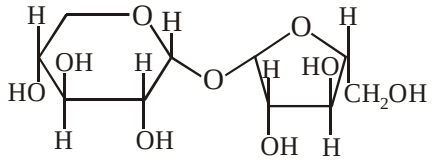


(Chiral) (Chiral) (Achiral) (Chiral) (Chiral)

9. Ans. (B, C)

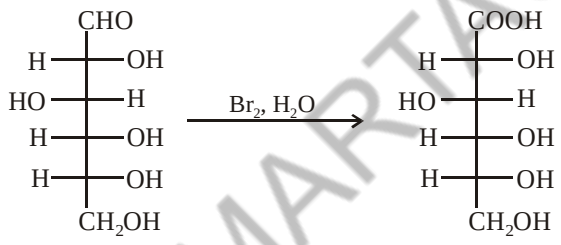
Sol. Invert sugar is equailmolar mixture of D-glucose and D-fructose which is obtained by hydrolysis of sucrose

Specific rotation of mixture is half of sum of sp. rotation of both components $\frac{+52^o+(-92^o)}{2} = -20^o$



$\xrightarrow{H_3O^+}$ D-glucose (sp. rotation +52º) + D-fructose (sp. rotation –92º)

Sucrose sp. rotation + 66º

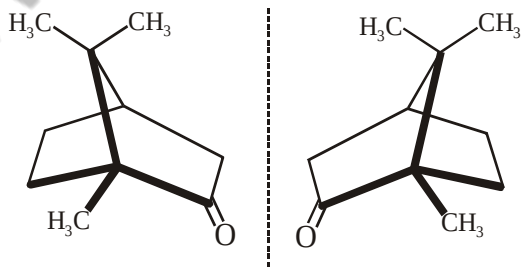


D-glucose D-gluconic acid (not saccharic acid)

D-fructose $\xrightarrow{Br_2, H_2O}$ No reaction

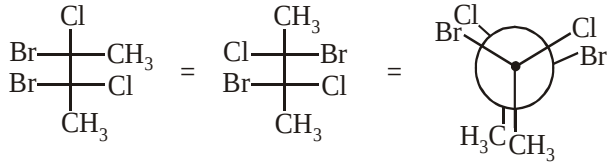
10. Ans. (2)

Sol. M is a organic compound known as camphor. M contains two **<u>rigid</u>** chiral centre so it can exist only in **<u>two</u>** enantiomeric forms.

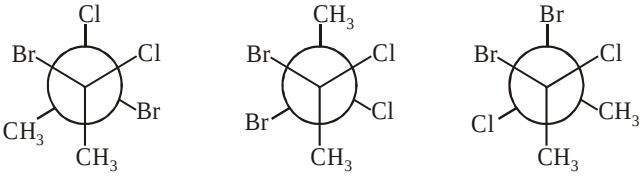


11. Ans. (3)

Sol.



Stable conformer (with $\mu \neq 0$)

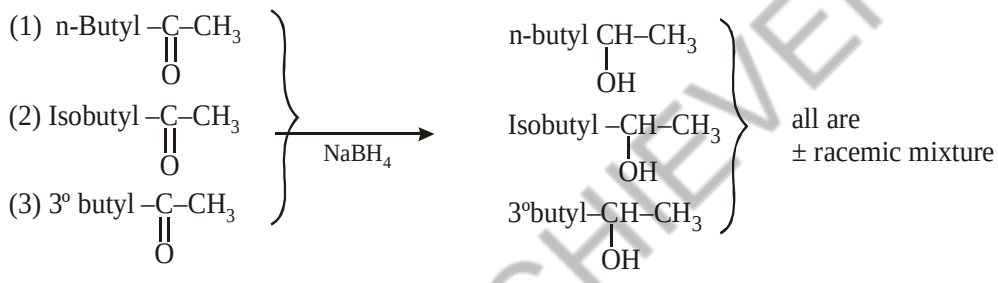


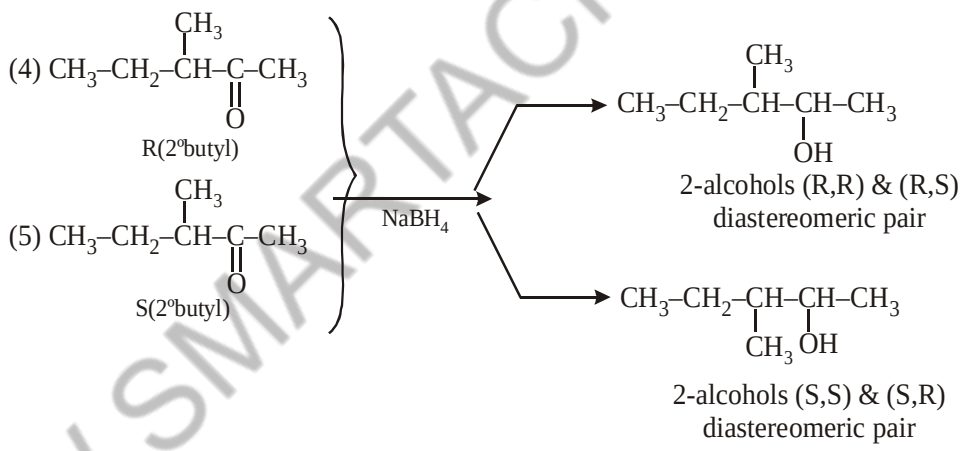
(Me-Me) gauche (Br-Me) gauche (Cl-Me) gauche

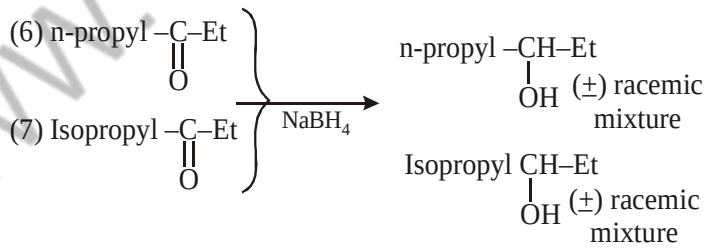
12. Ans. (5)

Sol. M. wt 100 of ketone

So m. formula = $C_6H_{12}O$







(1 ; 2 ; 3 ; 6 ; 7)