Resonance
Educating for better tomorrow

TARGET : JEE (ADVANCED) 2015

Course : VIJETA & VIJAY (ADP & ADR) Date : 05-05-2015

ORGANIC CHEMISTRY
DPP
DAILY PRACTICE PROBLEMS
NO. 09

TEST INFORMATION

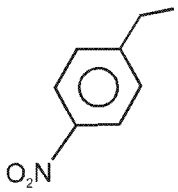
DATE : 06.05.2015 PART TEST (PT) - 04

Syllabus : Physical : Atomic Structure, Nuclear chemistry, Chemical Kinetics, **Inorganic :** Qualitative Analysis, Metallurgy, d & f-block Elements.

DPP No. # 09 (JEE-ADVANCED)

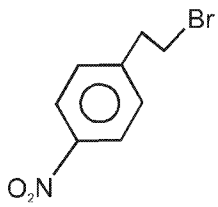
Total Marks : 169 **Max. Time : 137 min.**

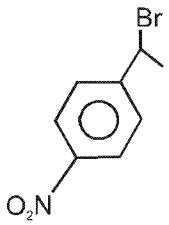
Single choice Objective (–1 negative marking) Q.1 to Q.15	(3 marks 2½ min.)	[45, 37½]
Multiple choice objective (–1 negative marking) Q.16 to Q.20	(4 marks, 3 min.)	[20, 15]
Assertion and Reason ('–1' negative marking) Q.21 to Q.23	(3 marks 2½ min.)	[09, 7½]
Comprehension (–1 negative marking) Q.24 to Q.32	(3 marks 2½ min.)	[27, 22½]
Single Digit Subjective Questions (no negative marking) Q.33 to Q.38	(4 marks 2½ min.)	[24, 15]
Double Digit Subjective Questions (no negative marking) Q.39 to Q.41	(4 marks 2½ min.)	[12, 7.5]
Match the column (4 vs 4) (no negative marking) Q.42	(8 marks, 8 min.)	[08, 08]
Match the column (4 vs 5) (no negative marking) Q.43 to Q.45	(8 marks, 8 min.)	[24, 24]

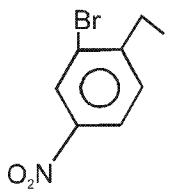
1. 

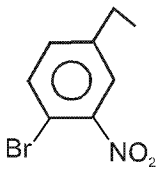
$\xrightarrow[\text{UV light}]{Br_2\text{ ,heat or}}$ major product

Major product is

(A) 

(B) 

(C) 

(D) 

2. In the reactions given below :

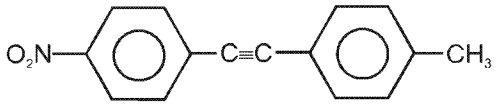
$CH_3–CH_2Cl \xrightarrow{\text{(i) KCN (ii) LiAlH}_4}$ Product A

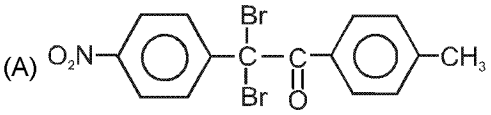
$CH_3–CH_2Cl \xrightarrow{\text{(i) AgCN (ii) LiAlH}_4}$ Product B

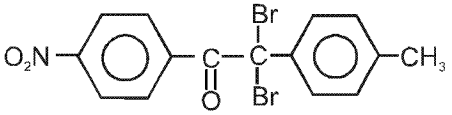
The compound A and B are :

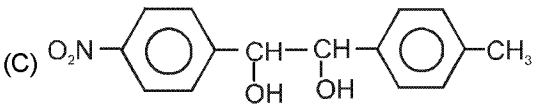
(A) Chain isomers (B) Position isomers

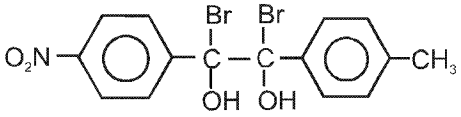
(C) Functional isomers (D) Metamers

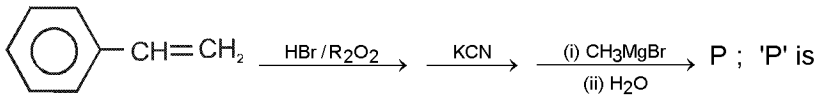
3.  ; The major product is:

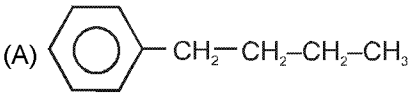
(A) 

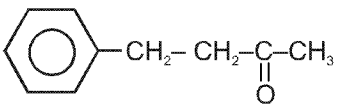
(B) 

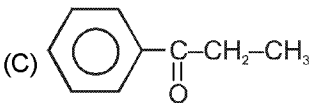
(C) 

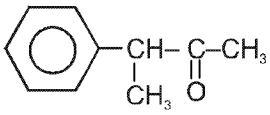
(D) 

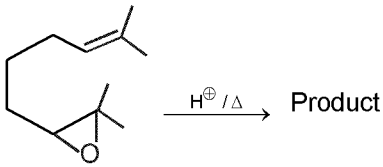
4. 

(A) 

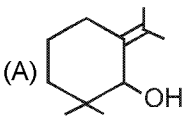
(B) 

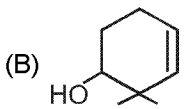
(C) 

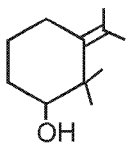
(D) 

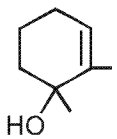
5. 

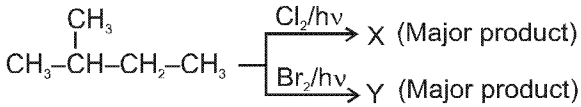
Product is:

(A) 

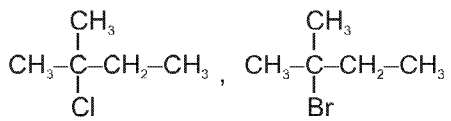
(B) 

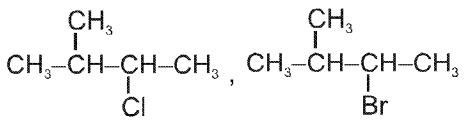
(C) 

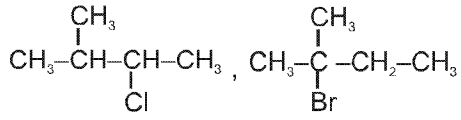
(D) 

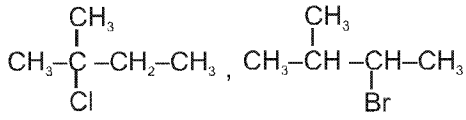
6. 

X and Y are respectively :

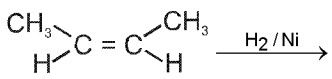
(A) 

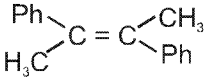
(B) 

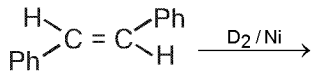
(C) 

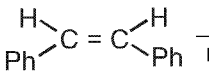
(D) 

7. Which of these reaction gives meso compound as product ?

(A)  $\xrightarrow{H_2/Ni}$

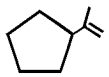
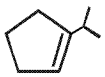
(B)  $\xrightarrow{\text{Bayer's reagent}}$

(C)  $\xrightarrow{D_2/Ni}$

(D)  $\xrightarrow[\text{Meta chlorperbenzoic acid}]{\text{MCPBA}}$

8. Identify the major product(P) of the following sequence of reaction.

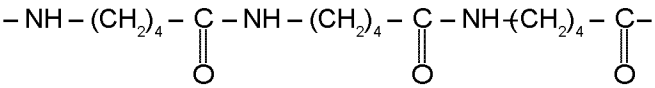
$C_5H_{10} \xrightarrow{Br_2/h\nu} \underset{\text{(Only one isomer)}}{C_5H_9Br} \xrightarrow[\text{Ether}]{Mg} \xrightarrow[\text{(ii) } NH_4Cl]{\text{(i) Acetone}} \xrightarrow[\Delta]{H_2SO_4} P$

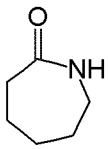
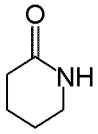
(A)  (B)  (C)  (D) 

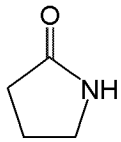
9. The pair of compounds in which both the compounds give positive test with Tollen's reagent and Fehling solution is

(A) Glucose and Sucrose
(B) Propanal and Benzaldehyde
(C) Propanal and 2-Phenylethanal
(D) Benzaldehyde and 1-Hydroxypropanone

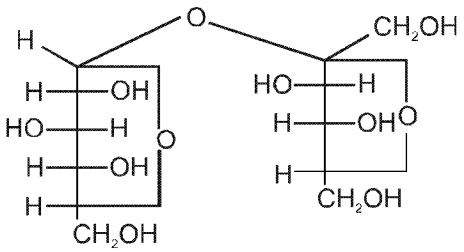
10. Which of the following is monomeric unit of the polymer Nylon-5 ?



(A)  (B) 

(C)  (D) $NH_2\text{-}(CH_2)_4 - NH_2 + HOOC\text{-}(CH_2)_3 - COOH$

11. Select the correct statements about the following



$\xrightarrow[\text{Acylation}]{Ac_2O/H_2SO_4}$

(i) sucrose forms an octaacetate
(ii) sucrose is nonreducing sugar.
(iii) sucrose is a polysaccharide

(A) (i), (ii) (B) (i), (ii), (iii) (C) (i), (iii) (D) only (i)

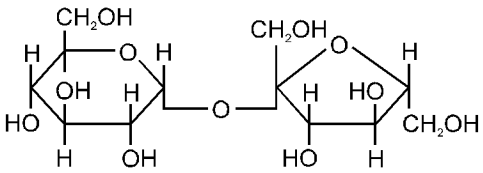
12. A polypeptide contains five type of α-amino acids. It gives following dipeptides only on hydrolysis.

(Asp, Glu, His, Phe, Val) $\xrightarrow{\text{hydrolysis}}$ (Val-Asp + Glu-His + Phe-Val + Asp-Glu)

The correct sequence of amino acids in the polypeptide is :

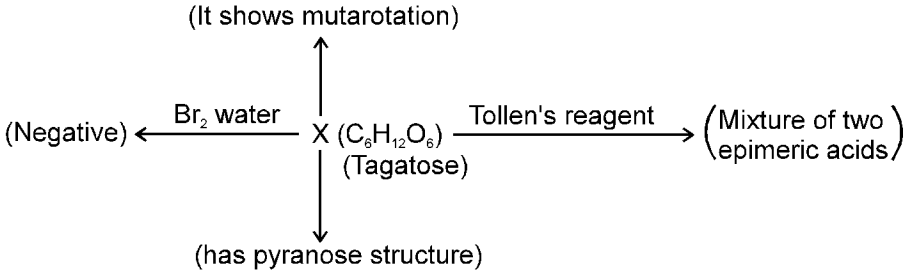
(A) Asp-Glu-His-Phe-Val
(B) Phe-Val-Asp-Glu-His
(C) Val-Asp-Glu-His-Phe
(D) Glu-His-Phe-Val-Asp-Glu-Val-Asp

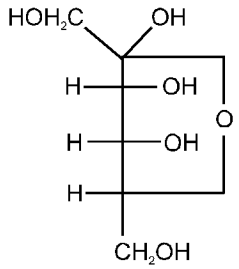
13. The following compound on hydrolysis will give

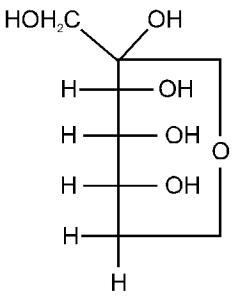


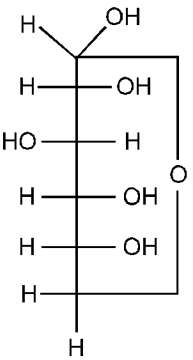
(A) A pair of anomers
(B) A pair of enantiomers
(C) A pair of epimers
(D) A pair of functional isomers

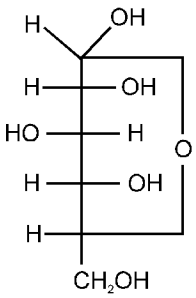
14. Observe the following road map and identify the carbohydrate 'X' (Tagatose)

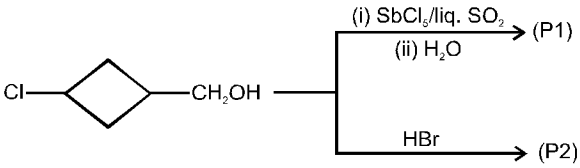


(A) 

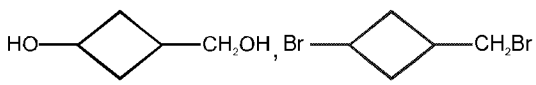
(B) 

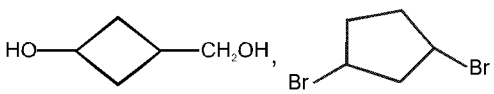
(C) 

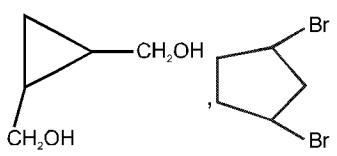
(D) 

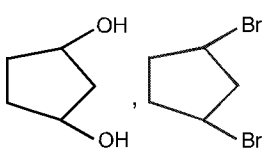
15. 

P1 and P2 are respectively :

(A) 

(B) 

(C) 

(D) 

16. $R-\underset{\underset{O}{\|}}{C}-OR' \xrightarrow[2.\ H_3O^{\oplus}]{1.\ MeMgBr}$ acetone as the sole organic product.

which is/are correctly matched with R and R′.

(A) R = – H (B) R' = $-\underset{\underset{CH_2}{\|}}{C}-CH_3$ (C) R' = $-\underset{\underset{CH_3}{|}}{CH}-CH_3$ (D) R = – CH_3

17. Which of the following would be the significant product/s of the given reaction?

$$H-C\equiv C-\underset{\underset{OH}{|}}{CH}-CH=CH_2 \xrightarrow{H^{\oplus}(traces)}$$

(A) $CH_2=CH-\underset{\underset{O}{\|}}{C}-CH=CH_2$

(B) $CH_2=CH-CH=CH-CHO$

(C) $H-C\equiv C-\underset{\underset{O}{\|}}{C}-CH_2-CH_3$

(D) $CH_2-CH=CH-C\equiv CH$ with OH

18. Select the chain propagation steps in the free radical chlorination of methane ?

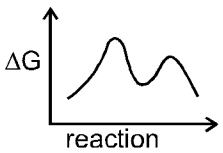
(A) $Cl_2 \longrightarrow 2\dot{C}l$

(B) $\dot{C}H_3 + Cl_2 \longrightarrow CH_3Cl + \dot{C}l$

(C) $\dot{C}H_3 + \dot{C}l \longrightarrow CH_3-Cl$

(D) $R\dot{O} + CH_4 \longrightarrow ROH + \dot{C}H_3$

19. Following graph between ΔG and reaction progress represented by which of the following reaction ?

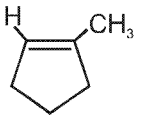


(A) S_N1 reaction

(B) E_1 reaction

(C) Aromatic electrophilic substiution

(D) Electrophilic addition reaction

20. 

$\xrightarrow[(ii)\ H_2O_2\ /\ OH]{(i)\ B_2H_6\ /\ THF}$

True statement about above reaction

(A) Reagent involve stereospecific SYN addition of H and OH species

(B) Product obtained is trans isomer

(C) BH_3 acts as electrophile

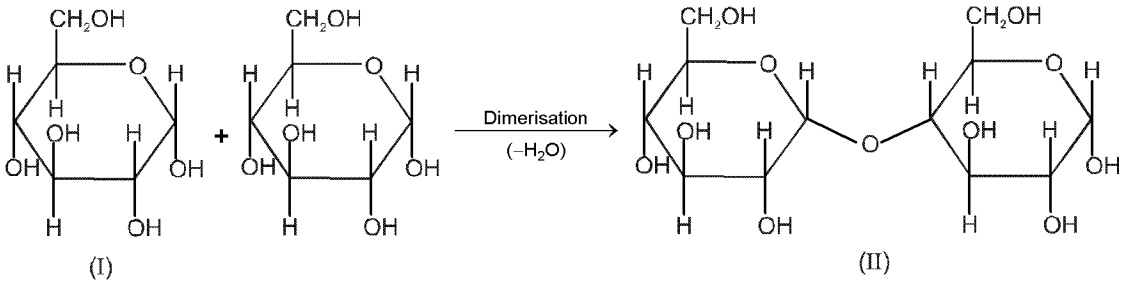
(D) two stereoisomers are obtained as product.

21. **STATEMENT-1 :** 2–Bromobutane on heating with alcoholic KOH gives 3 isomeric alkenes which on treatment with Br_2/CCl_4 give 5 products.
STATEMENT-2 : Stereochemical nature of elimination by alcoholic KOH and addition of Br_2 is ANTI and SYN respectively.
(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-1.
(C) Statement-1 is True, Statement-2 is False.
(D) Statement-1 is False, Statement-2 is True.

22. **STATEMENT-1 :** The rate of catalytic hydrogenation of ethyne at raney nickel (finelly divided Ni) is faster than that of ethene.
STATEMENT-2 : Catalytic hydrogenation of ethyne to ethane is less exothermic than that of ethene to ethane.
(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-1.
(C) Statement-1 is True, Statement-2 is False.
(D) Statement-1 is False, Statement-2 is True.

23. **STATEMENT -1 :** Hydrolysis of sucrose brings a change in sign of rotation towards plane polarised light.
STATEMENT -2 : Fructose has specific rotation –92.4 and glucose has +52.5°
(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-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

Comprehension # 1

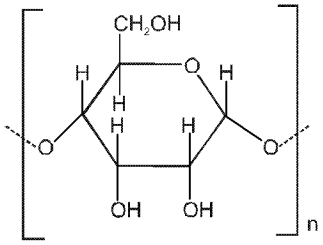


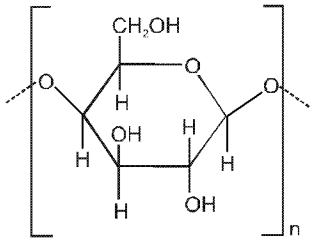
Polymerisa tion → **Starch (polymer) (III)**

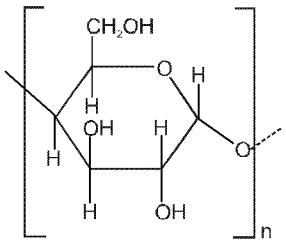
24. What is true about compound (I)
(A) It has an acetal structure
(B) It has tertiary hydroxy group
(C) It has a hemiacetal structure
(D) It's degree of unsaturation is two

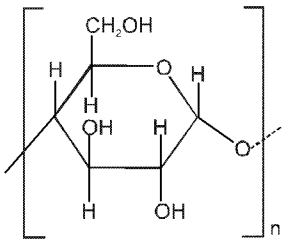
25. Compound (II) is/has
(A) A polysaccharide
(B) Oligosaccharide
(C) Monosaccharide
(D) Hydrogen deficiency index is three

26. Assuming that polymerisation of (I) takes place in the manner similar to its dimerisation, then the structure of polymer (III) can be correctly represented as

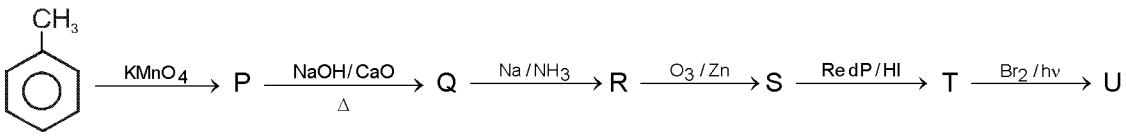
(A) 

(B) 

(C) 

(D) 

Comprehension # 2



(Major product) $\xrightarrow{Et_2CuLi}$ V

27. When ' S ' reacted with PhMgBr the product formed is

(A) Ph – CH(OH) – CH_2 – CH(OH) – Ph

(B) Ph – CH(OH) – CH_2 – CHO

(C) 

(D) Ph – CH(OH) – Ph

28. The total number of monochloro products of compound 'V' and the fractional distillation of product mixture respectively are :

(A) 4 , 4 (B) 6, 5

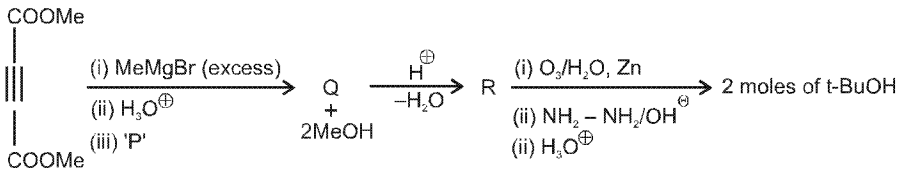
(C) 6, 4 (D) 4, 2

29. Compounds which liberate H_2 gas with Na metal are:

(A) P, S (B) P

(C) P , R , S (D) S , V

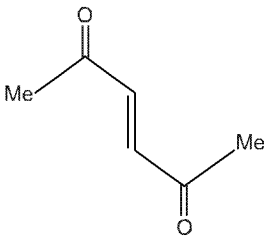
Comprehension # 3

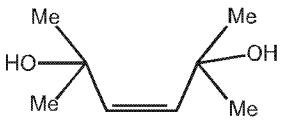


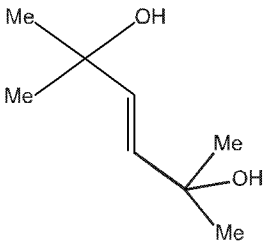
30. Reagent 'P' is :

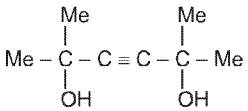
(A) Na/NH_3 (ℓ)
(B) H_2 , $Pd–BaSO_4$ (quinoline)
(C) H_2/Ni
(D) $NaBH_4$

31. The structure of the product Q is :

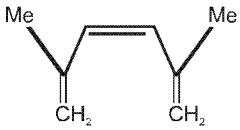
(A) 

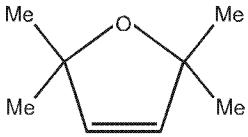
(B) 

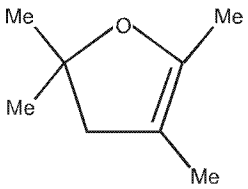
(C) 

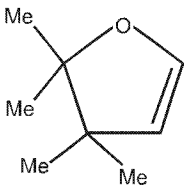
(D) 

32. The struture of R is :

(A) 

(B) 

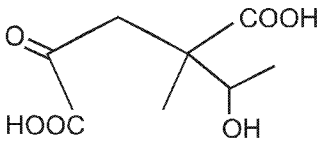
(C) 

(D) 

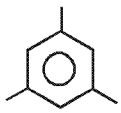
33. The sum of structural and diastereomers of a hydroxy compound C_4H_8O, formed by the substituion reaction of 3-chlorobut-1-ene with $AgNO_3$ solution.

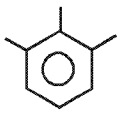
34. How many alkenes (be sure to consider the stereochemistry of the alkene) can be hydrogenated to form methyl cyclohexane.

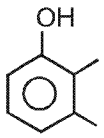
35. An optically active compound (M) on ozonlysis gives following structure in absence of zinc.

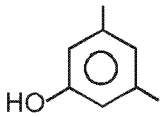


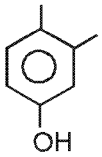
if (M) does not responds to $NaHCO_3$ test, what product is obtained when (M) is heated in presence of conc. H_2SO_4 as catalyst. Fill the number against product in key :

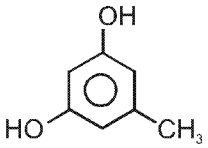
(1) 

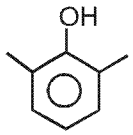
(2) 

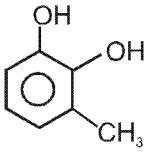
(3) 

(4) 

(5) 

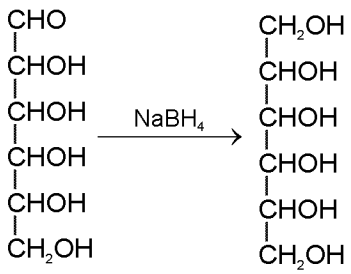
(6) 

(7) 

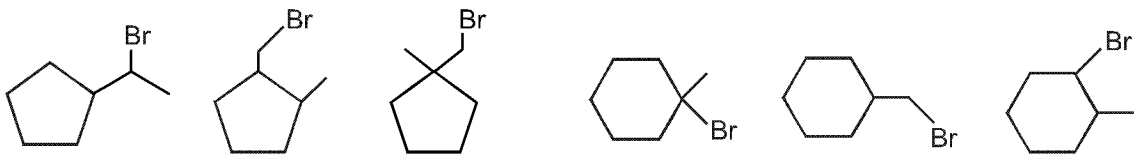
(8) 

36. Lithium di(3-pentyl) cuperate on reaction with an alkyl bromide produces (X) C_7H_{16}. The mixture of all monochloro isomers formed from (X) are subjected to fractional distillation. Find the number of fractions obtained.

37. Observe the following reaction and find out that how many number of reactant stereoisomers can be reduced to optically inactive meso products.



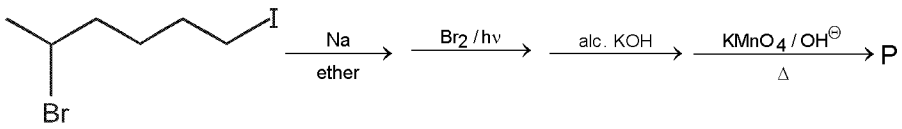
38. Among the 6, how many cyclic isomers of molecular formula $C_7H_{13}Br$ can form 1-methylcyclohexane-1-ol on reaction with H_2O/acetone/Ag^+.



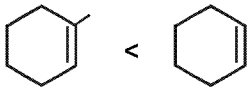
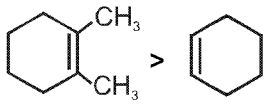
39. An undergraduate student heated 2–Cyclopentylethyl ethanoate at 300°C to obtain an unsaturated hydrocarbon "K" which was then treated with mercuric acetate followed by water then sodium Borohydride to give "L" which is dehydrated by concentrated H_2SO_4 at 180° C to give "M" as major product. Find molecular mass of compound "M"

40. Ozonolysis of next higher homolog of simplest alkene in presence of zinc yields (A) and (B). (A) gives positive iodoform test while (B) does not. (A) when treated with excess of (B) in NaOH solution gives (C) and (D) as final product after acidification. If "C" gives positive $NaHCO_3$ test then calculate molecular mass of (D). Report your answer as molecular mass divided by 4.

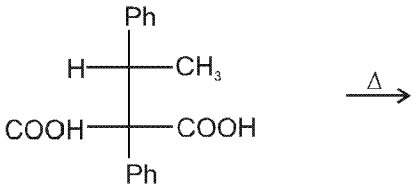
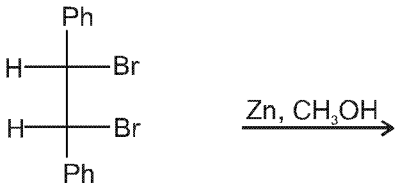
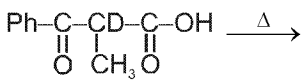
41. Observe the following sequence of reactions and report your answer as molecular weight/10.



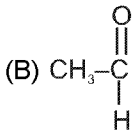
42.

Column – I	**Column – II**
(A) $CH_3–C\equiv C–CH_3$ > $CH_3–CH=CH–CH_3$	(p) Rate of HBr addition
(B) 	(q) Rate of H_2 addition
(C) $CH_3–CH=CH_2$ > $CH_3–C\equiv CH$	(r) ΔH of hydrogenation
(D) 	(s) ΔH of combustion

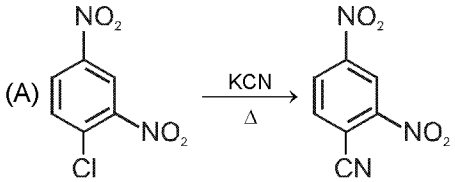
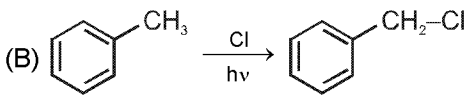
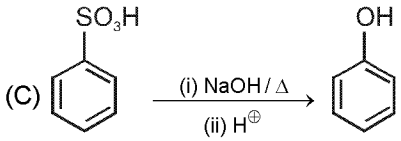
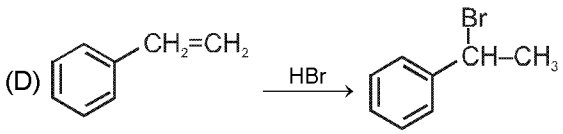
43. Match the reactions given in column I with their properties listed in column II.

Column – I	**Column – II**
(A) 	(p) Anti elimination
(B) $Ph–C\equiv C–Ph \xrightarrow[\text{poisoned}]{H_2,Pd–BaSO_4}$	(q) stereoselective
(C) 	(r) Optical diastereomers
(D) 	(s) CO_2 will evolve
	(t) Racemic mixture

44.

Column-I	Column-II
(A) $CH_3–C\equiv CH$	(p) Undergoes oxidation
(B) 	(q) Undergoes reduction
(C) HCOOH	(r) Gives ppt. with $AgNO_3/NH_4OH$
(D) $CH_3–CH=CH_2$	(s) Can be reduced with help of H_2/Pt (catalytic hydrogenation)
	(t) more acidic than water

45.

Column-I	Column-II
(A) 	(p) Substitution reaction
(B) 	(q) Free radical reaction
(C) 	(r) Nucleophile is the attacking species.
(D) 	(s) Electrophile is the attacking species.
	(t) Addition reaction.

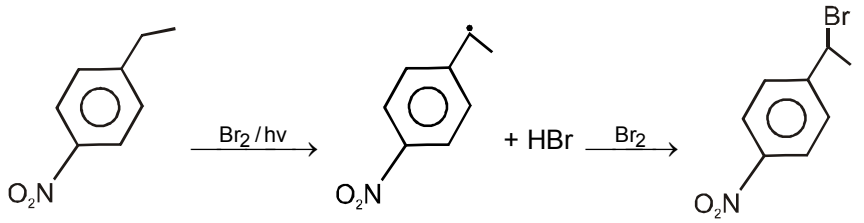
Solution of DPP # 9

TARGET : JEE (ADVANCED) 2015

Course : VIJETA & VIJAY (ADP & ADR)

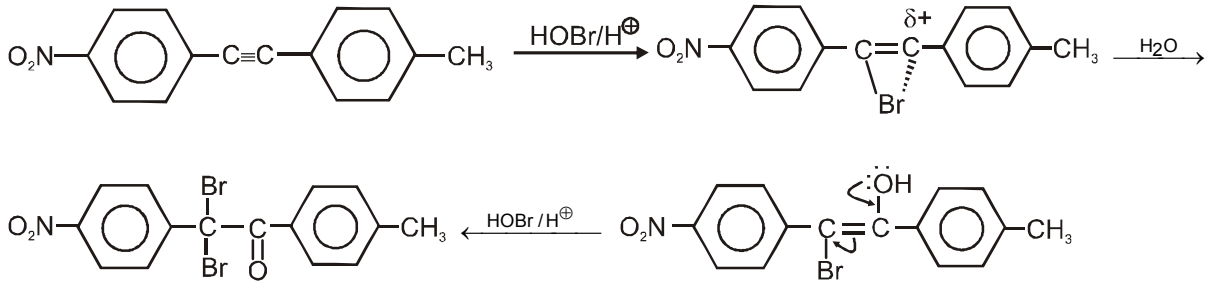
CHEMISTRY

1.

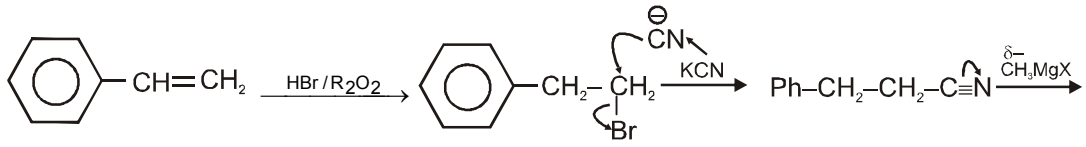


2. $CH_3–CH_2Cl \xrightarrow[(ii)\ LiAlH_4]{(i)\ KCN} CH_3CH_2CH_2NH_2$; $CH_3–CH_2Cl \xrightarrow[(ii)\ LiAlH_4]{(i)\ AgCN} CH_3CH_2–NH–CH_3$

3.

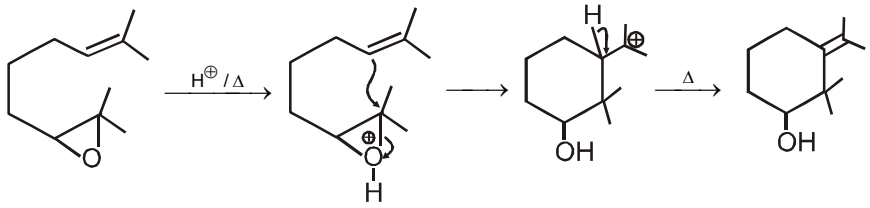


4.



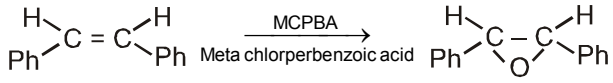
$Ph–CH_2–CH_2–\underset{\displaystyle O}{\overset{\displaystyle CH_3}{\overset{|}{C}}}=N–MgX \xrightarrow{H_2O} Ph–CH_2–CH_2–\underset{\displaystyle O}{\overset{\displaystyle CH_3}{\overset{|}{C}}}–CH_3$

5.



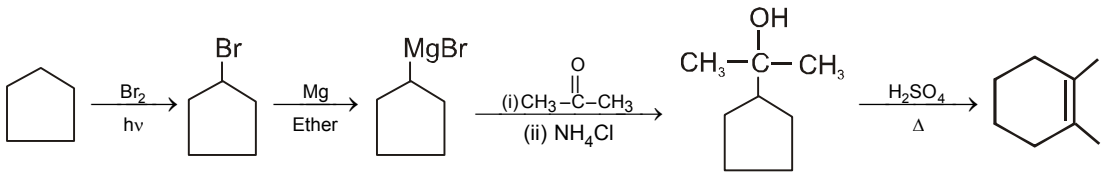
6. Chlorination is less reactive so 2° chloroproduct is major as per calculation
Bromination is more selective so 3° bromo product is major.

7.



(Meso)

8.

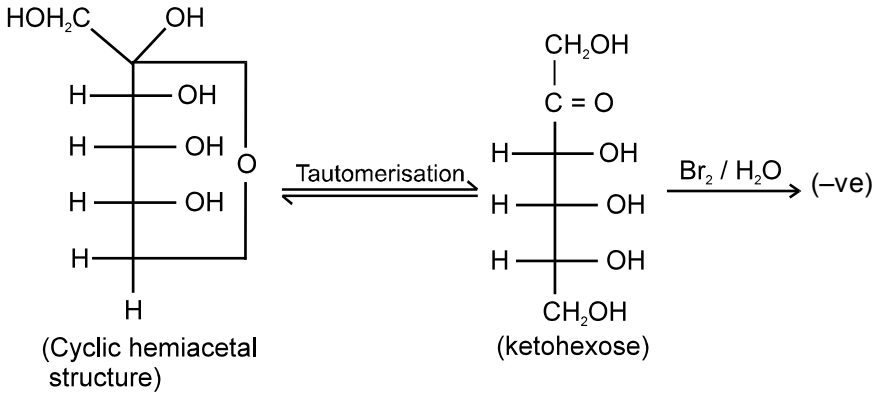


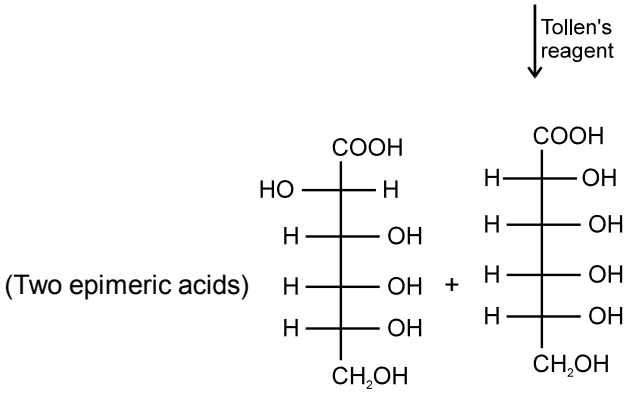
11. Sucrose has 8 –OH groups so forms octaacetate.

12. (B) Phe—Val—Asp—Glu—His $\xrightarrow{H_3O^{\oplus}}$ Phe—Val + Val—Asp + Asp—Glu + Glu—His

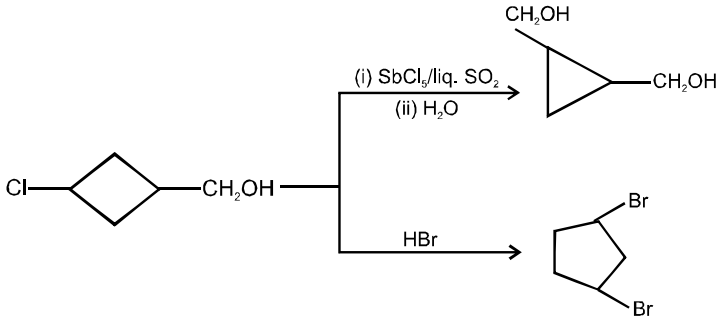
13. The compound is sucrose which on hydrolysis gives equimolar mixture of glucose and fructose.

14. (X) = Tagatose =



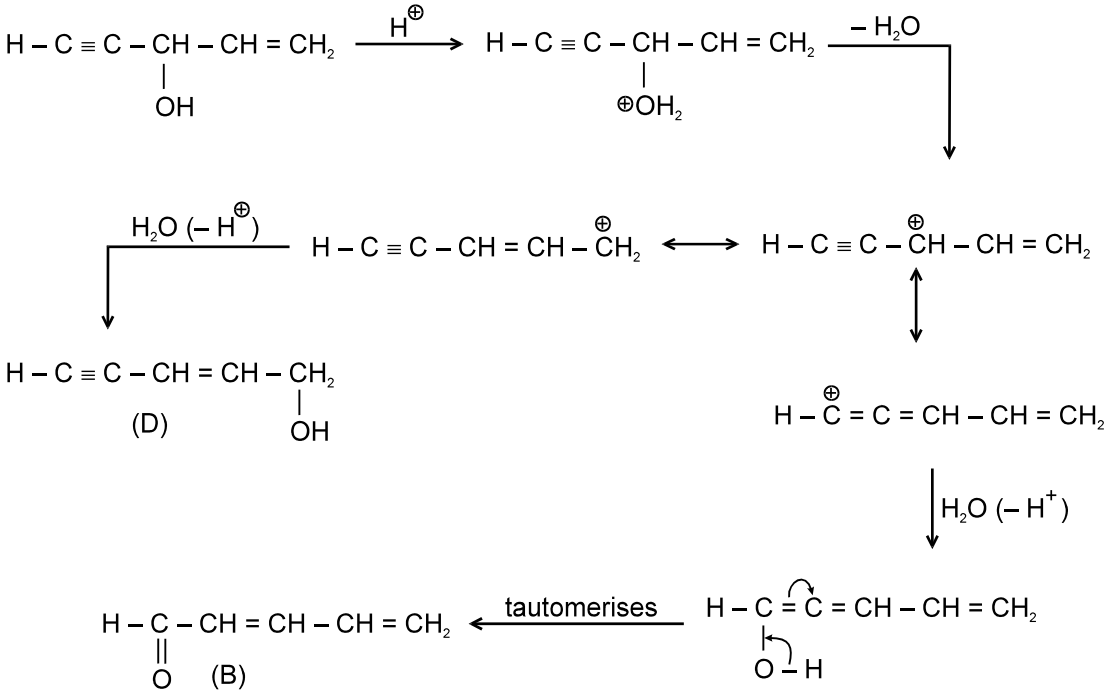


15.



16. $CH_3-C(=O)-O-C(CH_3)=CH_2 \xrightarrow[2.\ H_3O^{\oplus}]{1.\ MeMgBr} CH_3-C(=O)-CH_3 + HO-C(CH_3)=CH_2 \longrightarrow CH_3-C(=O)-CH_3$

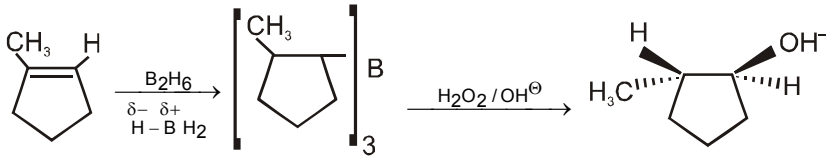
17.



18. chain propagation steps are

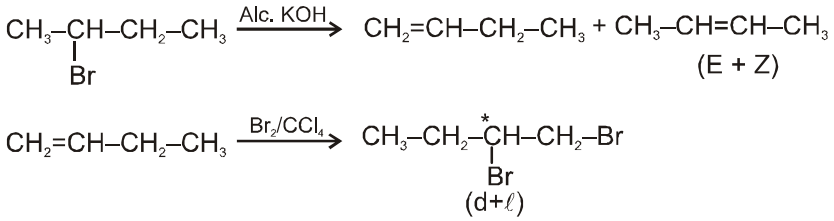
$R\dot{O} + CH_4 \longrightarrow ROH + \dot{C}H_3$; $\dot{C}H_3 + Cl_2 \longrightarrow CH_3Cl + \dot{C}l$

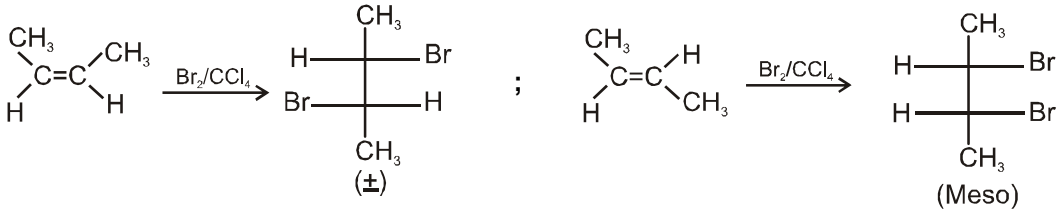
20.



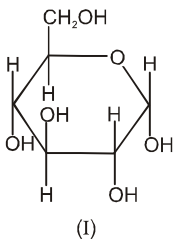
Stereospecific **syn** addition ; BH_3 act as electrophile

21.



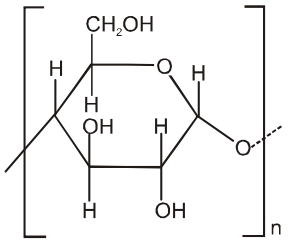


24.

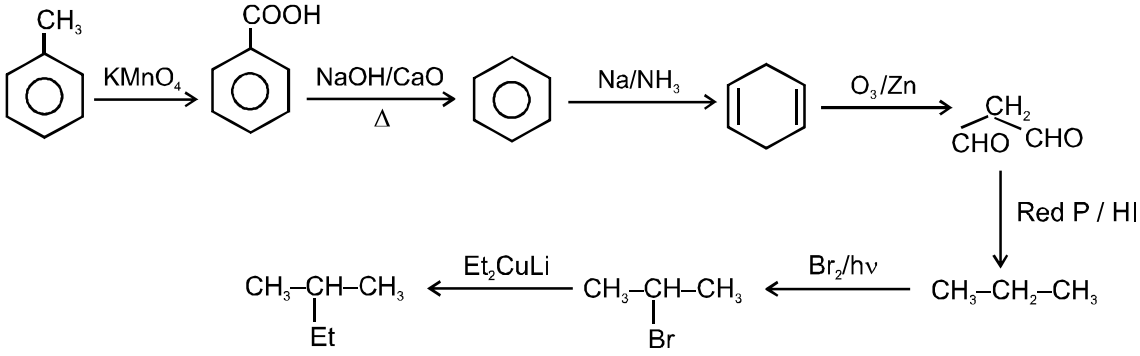


It has a hemiacetal structure

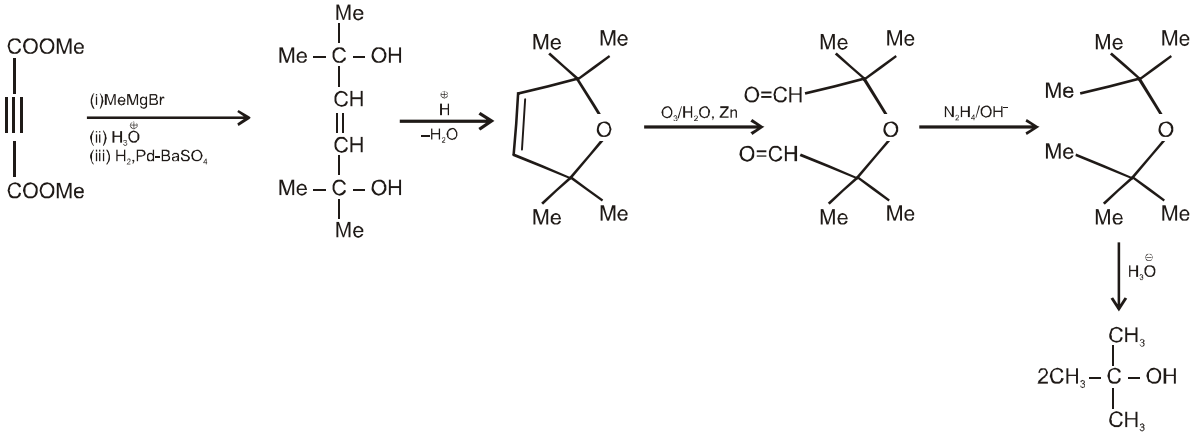
26.



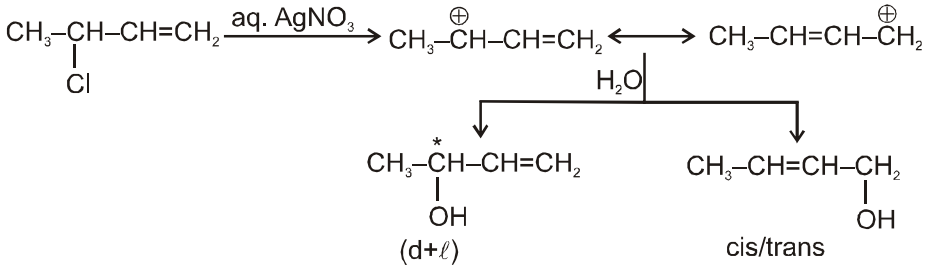
29.



32.

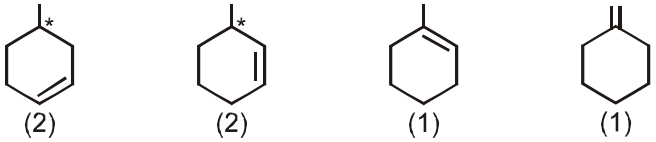


33.

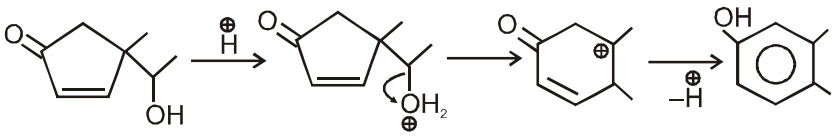


Structural = 2
diastereomers = 2

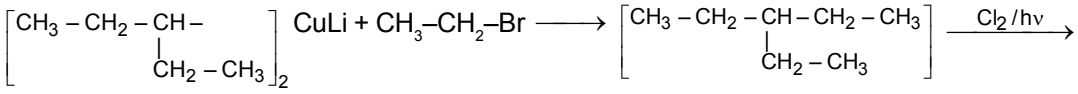
34.



35.



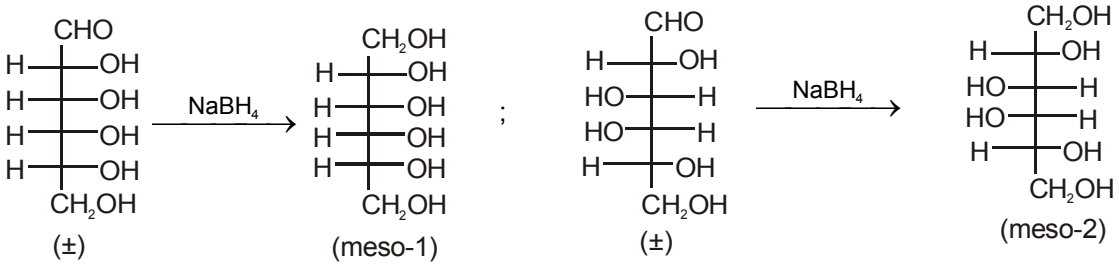
36.



(X)

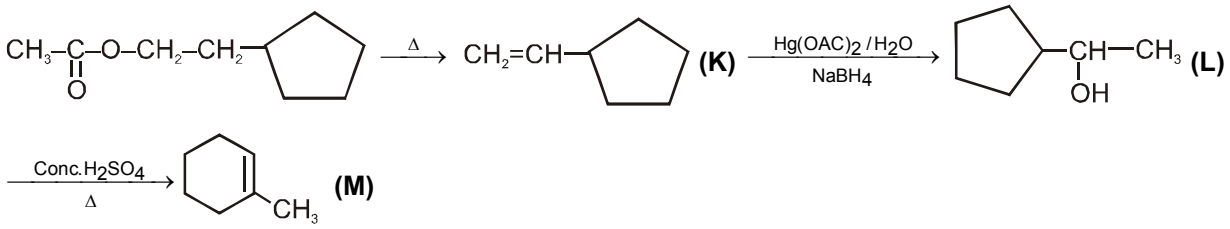
4 isomers (with one dℓ pair) $\xrightarrow{\text{Fractional distillation}}$ 3 fractions

37.



so in total 4 stereoisomers are reduced to meso products.

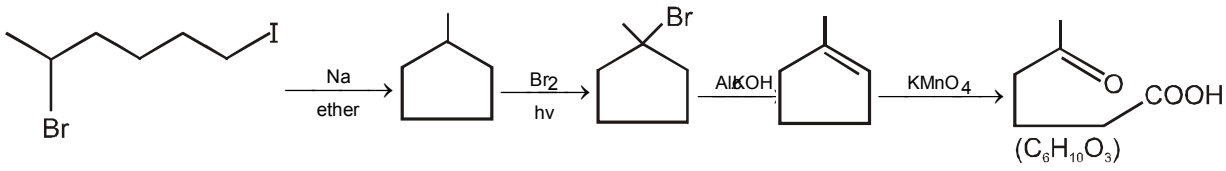
39.



40. $CH_3–CH=CH_2 \longrightarrow \underset{(A)}{CH_3-CH=O} + \underset{(B)}{CH_2=O} \xrightarrow[2.H^{\oplus}]{1.\ NaOH} (D)\ C(CH_2OH)_4 + HCOOH$

Answer : 136/4 = 34

41.



Mol. wt. of $C_6H_{10}O_3$ = 72 + 10 + 48 = 130/10 = 13