

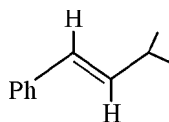
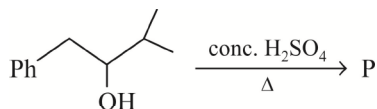
Advanced Problem Package

Oxygen Containing Organic Compound-I

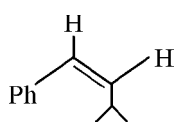
SINGLE CORRECT ANSWER TYPE

Each of the following Question has 4 choices A, B, C & D, out of which ONLY ONE Choice is Correct.

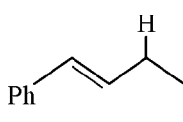
1. Identify the major product P in the following reaction.



(A)



(B)



(C)

(D)

All are formed in equal amount

2. Where P and Q are respectively :

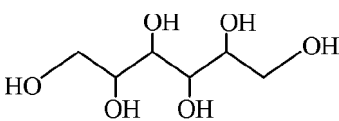
(A) HCOOH + HCHO

(B) CO<sub>2</sub> + HCHO

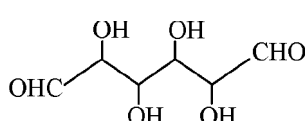
(C) HCHO + HCOOH

(D) CO<sub>2</sub> + HCOOH

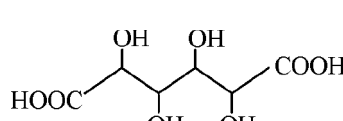
3.  $A + 6HIO_4 \rightarrow 6HCOOH$ . The compound A is :



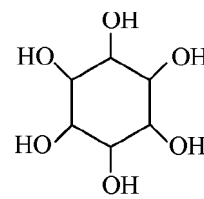
(A)



(B)

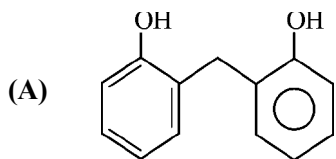


(C)

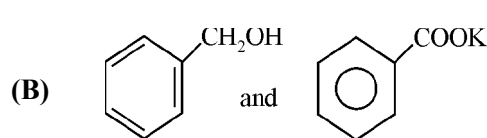


(D)

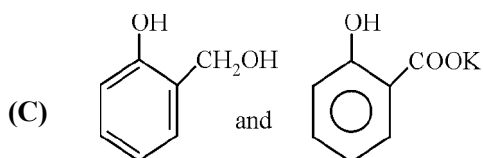
4. The end products of the reaction: (Y) and (Z) are:



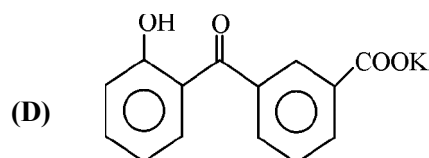
(A)



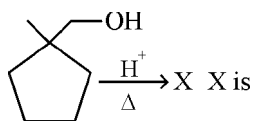
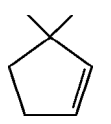
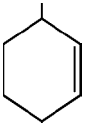
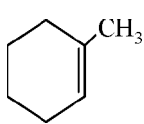
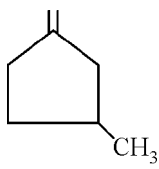
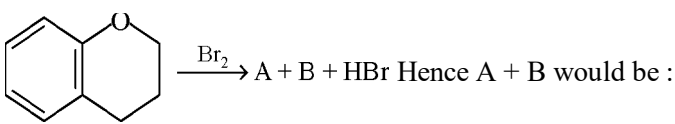
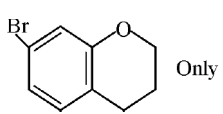
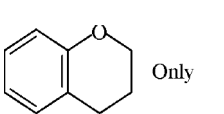
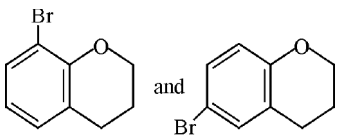
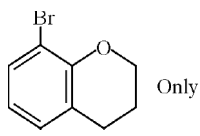
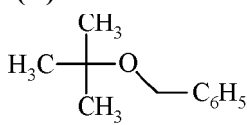
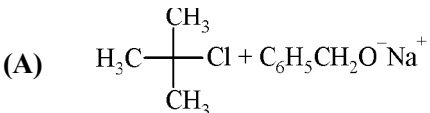
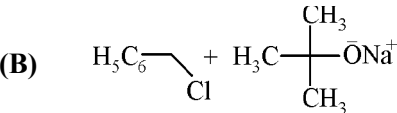
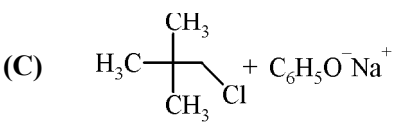
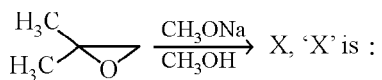
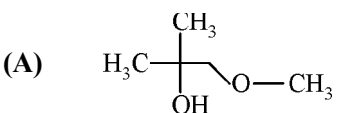
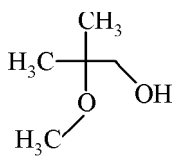
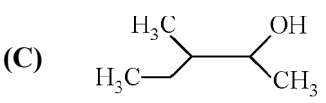
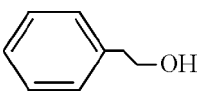
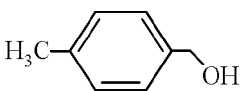
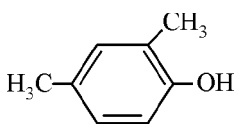
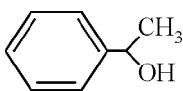
(B)



(C)



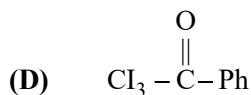
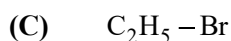
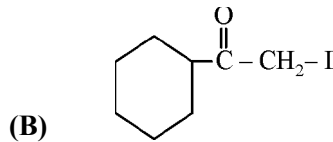
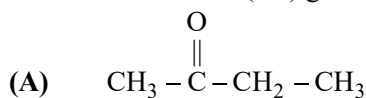
(D)

5. The product of the reaction:  X is
- (A)  (B)  (C)  (D) 
6. When  Hence A + B would be :
- (A)  Only (B)  Only (C)  and (D)  Only
7. Which of the following reaction is useful for the synthesis of 
- (A)  (B) 
- (C)  (D) None of these
8.  X, 'X' is :
- (A)  (B) 
- (C)  (D) None of these
9. An organic compound of molecular formula  $C_8H_{10}O$  on reaction with iodine and sodium hydroxide gives a yellow precipitate. The most likely structure of the compound should be :
- (A)  (B)  (C)  (D) 

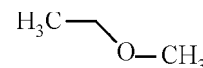
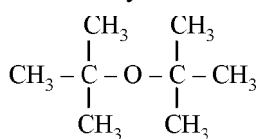
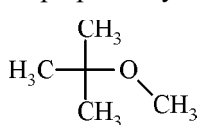
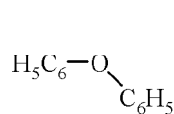
## MULTIPLE CORRECT ANSWERS TYPE

This Section contains Multiple Choice Questions. Each Question has 4 choices A, B, C & D, out of which One or More Choices may be Correct :

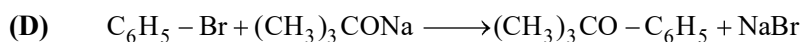
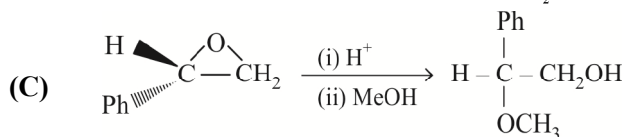
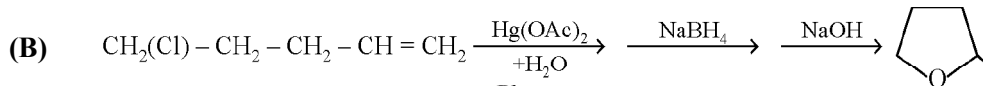
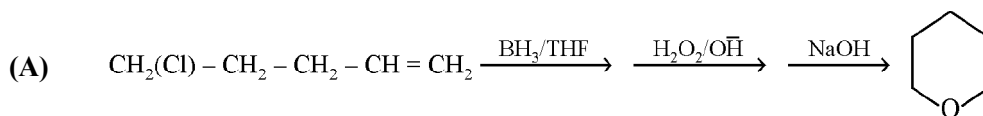
10. Haloform reaction is(are) given by:



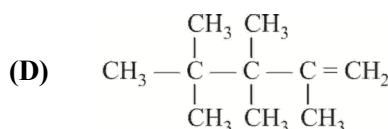
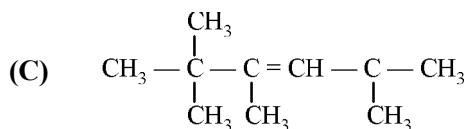
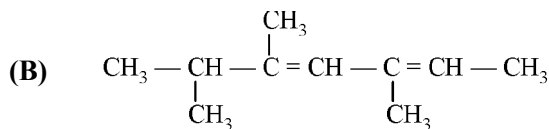
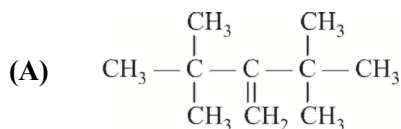
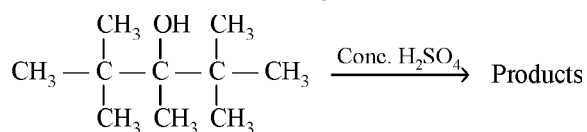
11. Which of these cannot be prepared by Williamson ether synthesis?



12. Identify the reactions giving correct product.



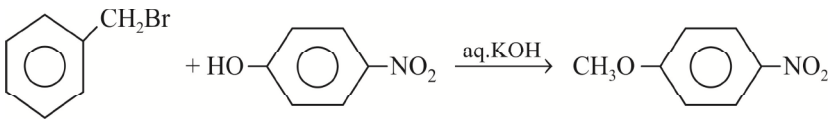
13. Predict the products formed in the following reaction :



14. Which of the following compound gives positive haloform test?

- (A)  $\text{CH}_3 - \overset{\text{O}}{\parallel} \text{C} - \text{CH}_2 - \text{COOC}_2\text{H}_5$       (B)  $\text{Ph} - \overset{\text{OH}}{\text{C}} = \text{CH} - \overset{\text{O}}{\parallel} \text{C} - \text{CH}_3$
- (C)  $\text{CH}_3 - \overset{\text{O}}{\parallel} \text{C} - \text{Ph}$       (D) All of these

15. Which of the following methods are useful for the synthesis of ether?

- (A)  $(\text{CH}_3)_3\text{CBr} + \text{CH}_3\text{CH}_2\text{ONa} \longrightarrow (\text{CH}_3)_3\text{COCH}_2\text{CH}_3$
- (B)   $\text{C}_6\text{H}_5\text{CH}_2\text{Br} + \text{HO}-\text{C}_6\text{H}_4-\text{NO}_2 \xrightarrow{\text{aq.KOH}} \text{CH}_3\text{O}-\text{C}_6\text{H}_4-\text{NO}_2$
- (C)  $\text{CH}_3\text{ONa} + \text{CH}_3\text{CH}_2\text{OSO}_2-\text{C}_6\text{H}_4-\text{CH}_3 \longrightarrow \text{CH}_3\text{CH}_2\text{OCH}_3$
- (D)  $\text{CH}_3 - \text{CH}_2\text{OH} + \text{CH}_2\text{N}_2 \xrightarrow{\text{BF}_3} \text{CH}_3\text{CH}_2\text{OCH}_3 + \text{N}_2$

16.  $\text{CH}_3 - \underset{\text{OH}}{\text{CH}} - \text{CH}_3$  is detected by the following test(s)

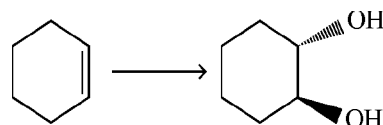
- (A) Lucas test      (B) Victor Meyer's test  
(C) Iodoform test      (D)  $\text{FeCl}_3$  solution

17.  $2\text{C}_2\text{H}_5\text{OH} \xrightarrow{[\text{X}]} \underset{\text{(major)}}{\text{C}_2\text{H}_5 - \text{O} - \text{C}_2\text{H}_5}$ . [X] should be :

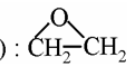
- (A) conc.  $\text{H}_2\text{SO}_4/140^\circ\text{C}$       (B)  $\text{Al}_2\text{O}_3/250^\circ\text{C}$   
(C) conc.  $\text{H}_2\text{SO}_4/170^\circ\text{C}$       (D) Dil.  $\text{H}_2\text{SO}_4/300^\circ\text{C}$

18. Which of the following reagents can be used to carry out the following transformation?

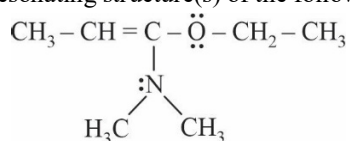
- (A)  $\text{OsO}_4/\text{NaHSO}_3$   
(B) Cold alkaline  $\text{KMnO}_4$   
(C)  $\text{CH}_3\text{COOH}/\text{H}_2\text{O}_2/\text{H}_3\text{O}^+$   
(D) *m*-chloroperbenzoic acid /  $\text{H}_3\text{O}^+$



19.  $(\text{X}) + \text{Mg} \xrightarrow[\text{ether}]{\text{dry}} (\text{Y}) \xrightarrow[\text{(ii)H}_3\text{O}^+]{\text{(i)(Z)}} \text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ . Identify (X) and (Z) in the above sequence of reaction :

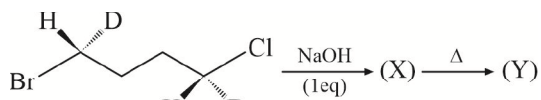
- (A) (X) :  $\text{CH}_3\text{CH}_2\text{Br}$  ; (Z) :  $\text{HCHO}$       (B) (X)  $\text{CH}_3\text{Br}$  ; (Z) : 
- (C) (X) :  $\text{CH}_3\text{Br}$  ; (Z) :  $\text{CH}_3\text{CH}_2\text{CHO}$       (D) (X) :  $\text{CH}_3\text{Br}$  ; (Z) :  $\text{CH}_3\text{CHO}$

20. The acceptable resonating structure(s) of the following molecule is/are:

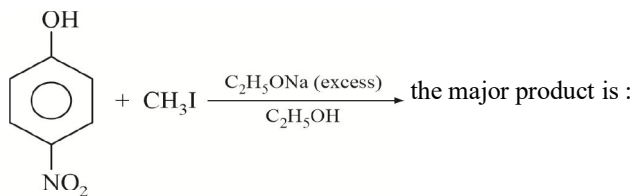


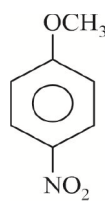
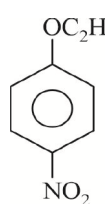
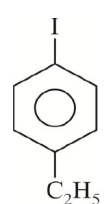
- (A)  $\text{CH}_3 - \overset{\ominus}{\text{C}}\text{H} - \overset{\oplus}{\text{C}} = \overset{\ominus}{\text{O}} - \text{CH}_2 - \text{CH}_3$   
 $\quad \quad \quad ||$   
 $\quad \quad \quad \text{N}^{\oplus}$   
 $\quad \quad \quad / \quad \backslash$   
 $\quad \quad \quad \text{H}_3\text{C} \quad \text{CH}_3$
- (B)  $\text{CH}_3 - \overset{\ominus}{\text{C}}\text{H} - \overset{\oplus}{\text{C}} = \overset{\oplus}{\text{O}} - \text{CH}_2 - \text{CH}_3$   
 $\quad \quad \quad |$   
 $\quad \quad \quad \text{:N}$   
 $\quad \quad \quad / \quad \backslash$   
 $\quad \quad \quad \text{H}_3\text{C} \quad \text{CH}_3$
- (C)  $\text{CH}_3 - \overset{\oplus}{\text{C}}\text{H} - \overset{\ominus}{\text{C}} = \overset{\ominus}{\text{O}} - \text{CH}_2 - \text{CH}_3$   
 $\quad \quad \quad ||$   
 $\quad \quad \quad \text{N}^{\ominus}$   
 $\quad \quad \quad / \quad \backslash$   
 $\quad \quad \quad \text{H}_3\text{C} \quad \text{CH}_3$
- (D)  $\text{CH}_3 - \overset{\oplus}{\text{C}}\text{H} - \overset{\ominus}{\text{C}} = \overset{\ominus}{\text{O}} - \text{CH}_2 - \text{CH}_3$   
 $\quad \quad \quad |$   
 $\quad \quad \quad \text{:N}$   
 $\quad \quad \quad / \quad \backslash$   
 $\quad \quad \quad \text{H}_3\text{C} \quad \text{CH}_3$

21. The products X and Y of the following reaction can be :

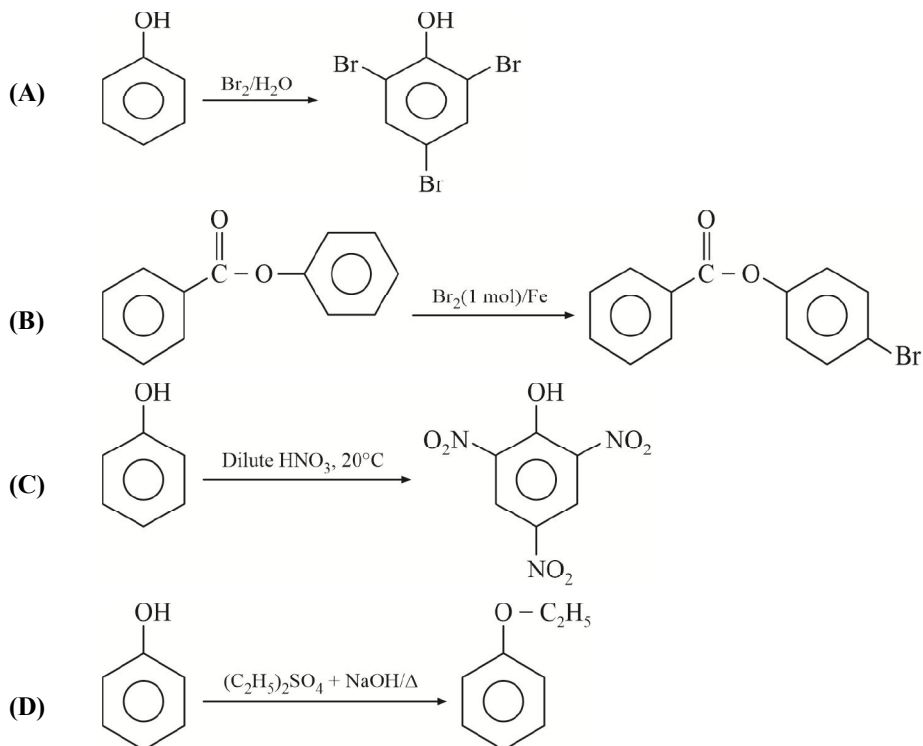


- (A) X is  $\text{HO} - \text{CH}(\text{H}, \text{D}) - \text{CH}_2 - \text{CH}_2 - \text{CH}(\text{H}, \text{D}) - \text{Cl}$
- (B) X is  $\text{HO} - \text{CH}(\text{D}, \text{H}) - \text{CH}_2 - \text{CH}_2 - \text{CH}(\text{H}, \text{D}) - \text{Cl}$
- (C) Y is  $\text{HO} - \text{CH}(\text{D}, \text{H}) - \text{CH}_2 - \text{CH}_2 - \text{CH}(\text{H}, \text{D}) - \text{OH}$
- (D) Y is  $\text{HO} - \text{CH}(\text{D}, \text{H}) - \text{CH}_2 - \text{CH}_2 - \text{CH}(\text{H}, \text{D}) - \text{OH}$

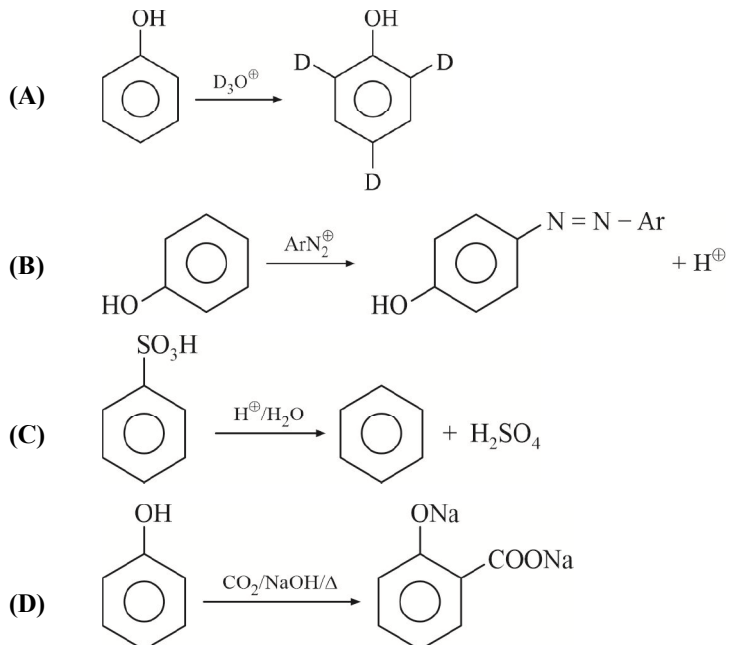
22.  The major product is :

- (A) 
- (B)  $\text{C}_2\text{H}_5\text{O} - \text{CH}_3$
- (C) 
- (D) 

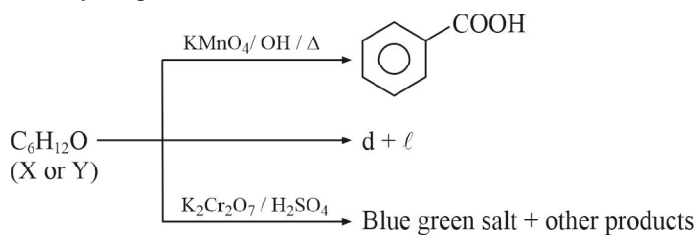
23. Identify the options in which the correct products have been reported in the reaction ?

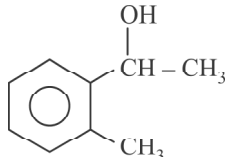


24. Select the electrophilic substitution reaction(s) :



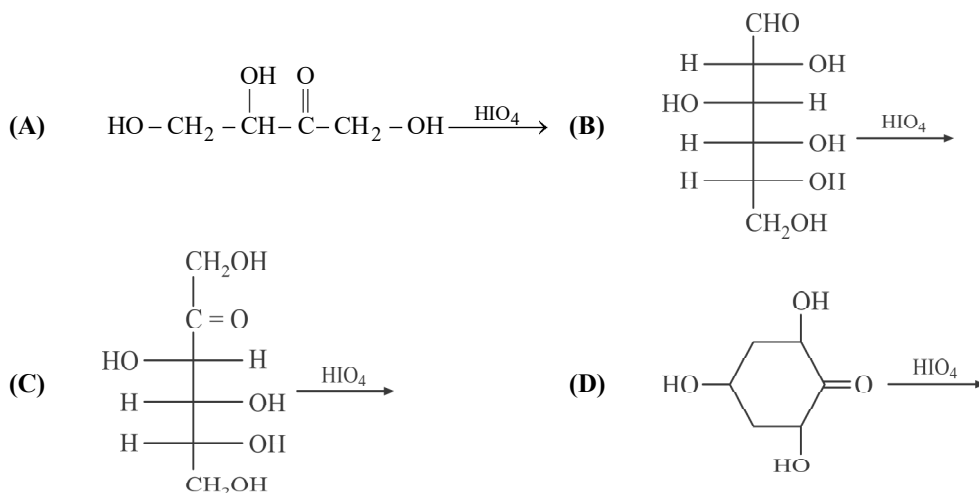
25. Identify the possible structure of X and Y



- X** **Y**
- (A)  $\text{Ph}-\underset{\text{OH}}{\text{CH}}-\text{CH}_2-\text{CH}_3$        $\text{Ph}-\text{CH}_2-\underset{\text{OH}}{\text{CH}}-\text{CH}_3$
- (B)  $\text{Ph}-\underset{\text{CH}_3}{\text{CH}}-\text{CH}_2-\text{OH}$        $\text{Ph}-\underset{\text{OH}}{\underset{\text{CH}_3}{\text{C}}}-\text{CH}_3$
- (C)        $\text{Ph}-\underset{\text{OH}}{\text{CH}_2}-\text{CH}-\text{CH}_3$
- (D)  $\text{Ph}-\underset{\text{H}}{\underset{\text{CH}_3}{\text{C}}}-\text{CH}_2-\text{OH}$        $\text{Ph}-\underset{\text{OH}}{\text{CH}}-\text{CH}_2-\text{CH}_3$

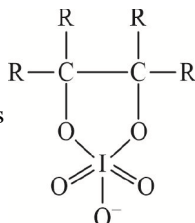
26. Propan-1-ol and Propan-2-ol can be best distinguished by :

- (A) oxidation with alkaline  $\text{KMnO}_4$  followed by reaction with  $\text{H}_2\text{O}$   
 (B) oxidation with PCC followed by reaction with Tollen's reagent  
 (C) oxidation by heating with copper followed by reaction with iodoform test  
 (D) reaction with conc.  $\text{H}_2\text{SO}_4$  followed by reaction with Fehling solution
27. Which of the following reaction involve formation of  $\text{CO}_2$  as one of the product ?



28. Per-iodic acid is generally used for the oxidation of vicinal diols or  $\alpha$ -hydroxycarboxyl compounds. Which of the following statements are correct for this reaction ?

- (A) Oxidative cleavage takes place in this reaction  
 (B) Final products are generally carbonyl compounds or carboxylic acids  
 (C)  $\text{HIO}_4$  reduced into  $\text{HIO}_3$



- (D) Intermediate of this reaction for a vicinal diol is

### MATRIX MATCH TYPE

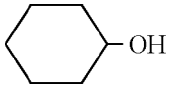
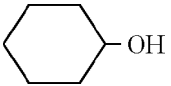
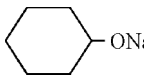
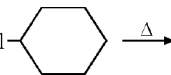
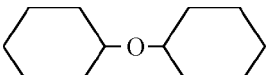



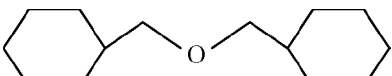
Each of the following question contains statements given in two columns, which have to be matched. Statements in Column 1 are labelled as (A), (B), (C) & (D) whereas statements in Column 2 are labeled as p, q, r, s & t. More than one choice from Column 2 can be matched with Column 1.

29. MATCH THE FOLLOWING:

	Column 1 (Reactant and product)		Column 2 (Reagent)
(A)		(p)	$\text{H}_2\text{O}_2 + \text{OH}^-/\text{H}_3\text{O}^+$
(B)		(q)	$\text{Zn-Hg} + \text{conc.HCl}$
(C)		(r)	$\text{K}_2\text{S}_2\text{O}_8 + \text{OH}^-/\text{H}_3\text{O}^+$
(D)		(s)	$\text{NH}_2-\text{NH}_2/\text{OH}^-$
		(t)	$\text{Ag}_2\text{O}(\text{moist})$

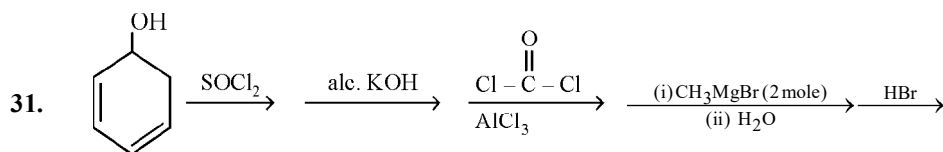


30. MATCH THE FOLLOWING LISTS:

Column 1		Column 1 [Major Product]	
(A)	 $\xrightarrow[443\text{ K}]{\text{conc H}_2\text{SO}_4}$	(p)	
(B)	 + Cl-  $\xrightarrow{\Delta}$	(q)	
(C)	 $\xrightarrow[2. \text{NaBH}_4/\text{OH}^-]{1. \text{Hg}(\text{OAc})_2 / \text{H}_2\text{O}}$	(r)	
(D)	 $\xrightarrow[413\text{ K}]{\text{conc H}_2\text{SO}_4}$	(s)	

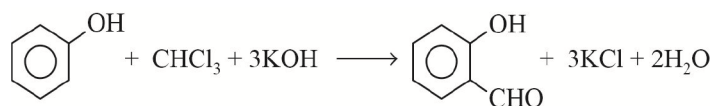
### Numerical Value Type

The Answer to the following questions are positive integers of 1/2/3 digits and zero



In the above sequence of reaction how many nucleophilic substitution taking place?

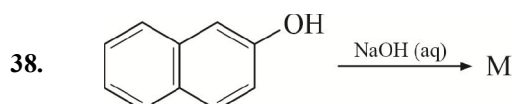
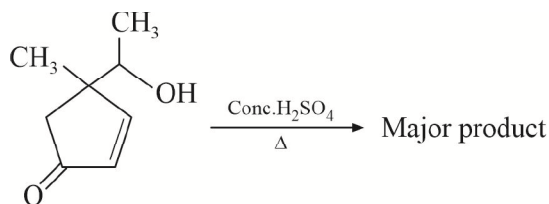
32. How many constitutional isomers exist for formula  $\text{C}_5\text{H}_{12}\text{O}$  that contain an ether as a functional group.
33. Synthesis of salicylaldehyde from phenol involved chlorine containing reactive species.



Find out sum of number of bond pairs and lone pairs of electrons of this reactive species.

34. Three moles of salicylic acid reacts quantitatively with excess of bromine dissolved in water to form a white precipitate of brominated organic compound [P] having 72.5 % of bromine by mass. If reaction proceed by 100 % yield then find out number of moles of  $\text{Br}_2$  used. [Atomic mass of Br = 80]
35. Consider the following reaction :
- $$\text{HO}-\text{CH}_2-\text{CH}(\text{OH})-\text{CH}_3 \xrightarrow[\text{Cat.}]{\text{H}_2\text{SO}_4} [\text{P}]$$
- Organic product
- Find out total number of  $\sigma$  bonds in the organic product [P].
36. How many alcohols having molecular formula  $\text{C}_5\text{H}_{12}\text{O}$  can't be oxidised by PCC ?

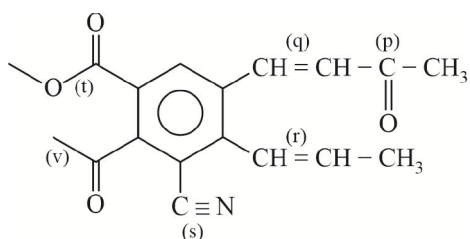
37. What is the sum of locants of all groups or substituents in IUPAC name of major product of the following reaction ?



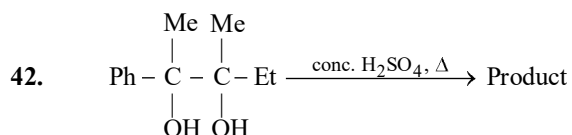
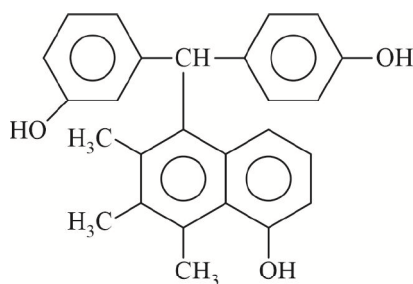
How many resonating structures are possible for organic salt M ?

39. How many carbonyl compounds will give secondary alcohol with molecular formula  $\text{C}_5\text{H}_{12}\text{O}$  after reaction with  $\text{LiAlH}_4$ .

40. How many groups can be reduced by  $\text{NaBH}_4$  in given compound.

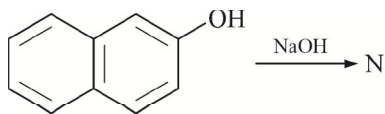


41. The following compound is treated with excess of  $\text{Br}_2/\text{H}_2\text{O}$ . Find the total number of positions, where bromination will occur significantly :

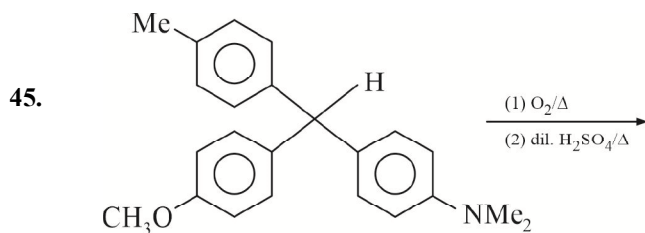


How many number of different type of carbonyl products (only structural isomers) can be formed (major or minor) in this reaction, (considering all types of possible migrations).

43. The number of resonance structures for N is :

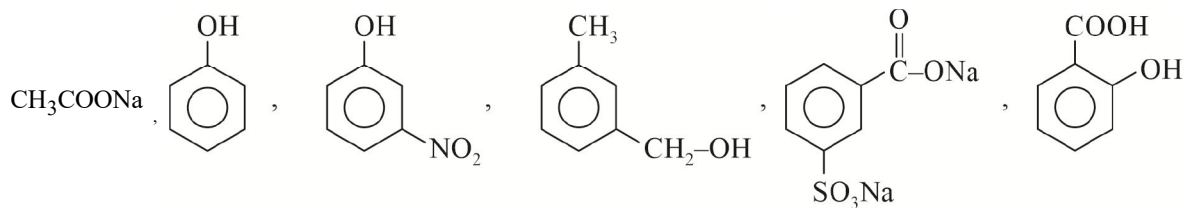


44. Many aromatic compounds can be drawn with molecular formula  $C_8H_8O_2$ . Find out the no. of aromatic compounds which can be drawn with this molecular formula and which also contains an – O – (ether) linkage.



Total number of organic products formed (major, minor all).

46. How many of the following produce a characteristic coloration/ppt with neutral  $FeCl_3$  ?



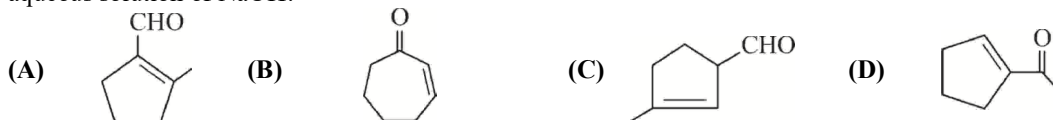
## Advanced Problem Package

## Oxygen Containing Organic Compound-II

## SINGLE CORRECT ANSWER TYPE

Each of the following Question has 4 choices A, B, C & D, out of which ONLY ONE Choice is Correct.

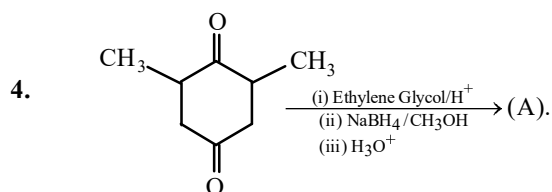
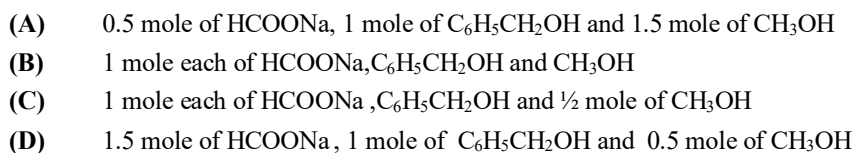
1. Which of the following will not be formed on intramolecular aldol reaction of 6-oxoheptanal when treated with aqueous solution of NaOH?



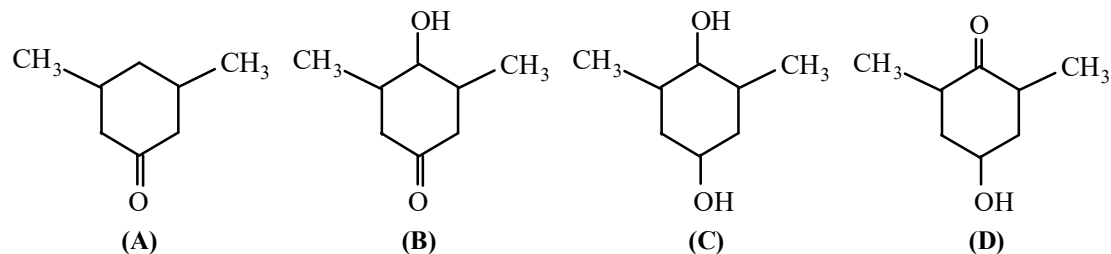
2. The product formed in the following reaction could be: *trans*-2-chlorocyclohexan-1-ol  $\xrightarrow{\text{OH}^\ominus/\Delta}$



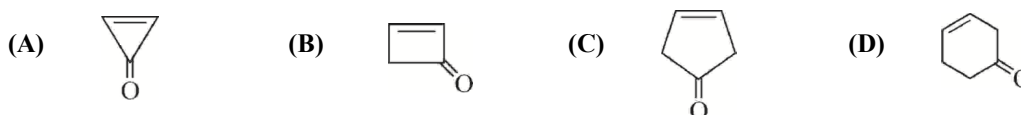
3. When two moles of HCHO and 1 mole  $\text{C}_6\text{H}_5\text{CHO}$  react with NaOH, quantitatively the products formed are :



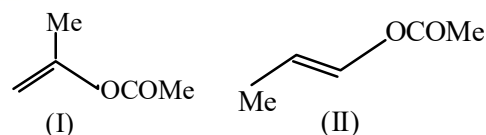
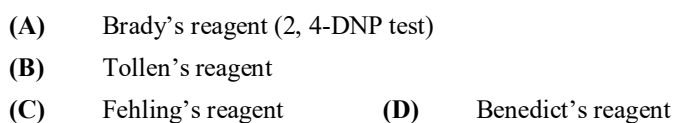
Product (A) in above sequence of reaction is:



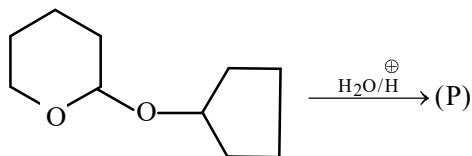
5. Dipole moment of which ketone is maximum?



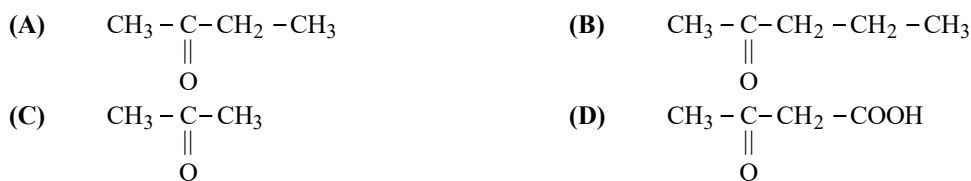
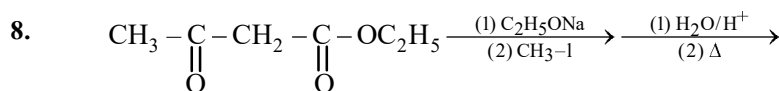
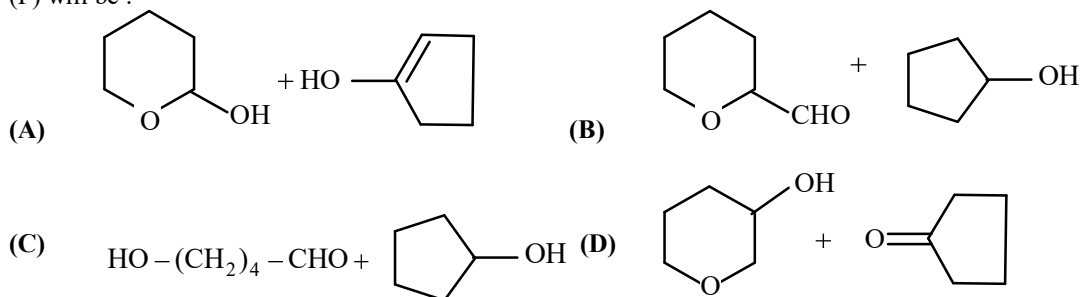
6. Which of the following reagent cannot be used to distinguish the products obtained by acidic hydrolysis of (I) and (II) ?



7. In the given reaction :



(P) will be :



### Paragraph for Questions 9 - 10

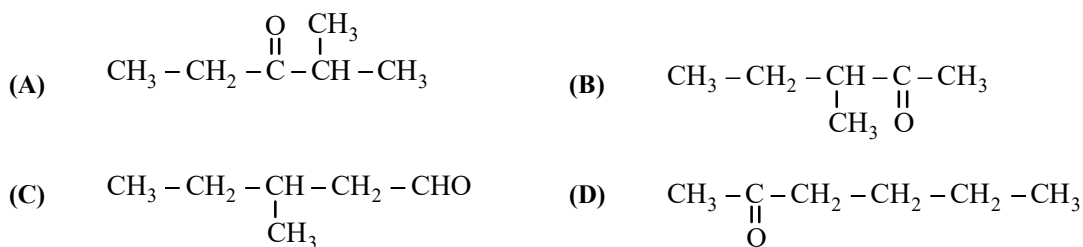
Labels of two bottles (X) and (Y) were missing in the lab, as result scientist was not able to know the names of compounds present in those bottles. By quantitative analysis he found that compounds in both the bottles have molecular formula  $\text{C}_6\text{H}_{12}\text{O}$ . Now to know the structure and name of compounds, he did some qualitative test for identification of these compounds present in bottles (X) and (Y). Compound in bottle (X) was found to meet following criterion:

- (i) It gives iodoform test.                      (ii) It gives DNP test.  
 (iii) It shows optical rotation.              (iv) On vigorous oxidation it gives only acetic acid.

On the other hand, compound in bottle (Y) was found to meet following criterion:

- (i) It gives Tollen's reagent test              (ii) It gives DNP test  
 (iii) It shows optical rotation                  (iv) On aldol condensation it goes upto  $\alpha$ - $\beta$  unsaturated carbonyl  
 (v) It forms crystals with  $\text{NaHSO}_3$

9. The structure of compound in bottle (X) using above information would be :



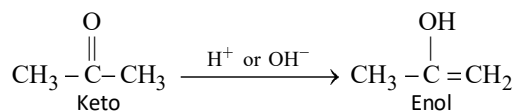
10. Structure of compound in bottle (Y) would be:

- (A)  $\text{CH}_3 - \text{CH}_2 - \underset{\text{CH}_3}{\underset{|}{\text{CH}}} - \overset{\text{O}}{\parallel}{\text{C}} - \text{CH}_3$       (B)  $\text{CH}_3 - \text{CH}_2 - \underset{\text{CH}_3}{\underset{|}{\text{CH}}} - \text{CH}_2 - \text{CHO}$
- (C)  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \underset{\text{CH}_3}{\underset{|}{\text{CH}}} - \text{CHO}$       (D)  $\text{CH}_3 - \underset{\text{CH}_3}{\underset{|}{\text{CH}}} - \text{CH}_2 - \text{CH}_2 - \text{CHO}$

### MULTIPLE CORRECT ANSWERS TYPE

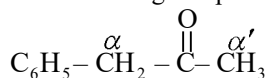
Each of the following Questions has 4 choices A, B, C & D, out of which ONE or MORE Choices may be Correct:

11. Tautomerization, the process of converting one tautomer into another, is catalysed by both acid as well as with base.



Which of the following statement(s) is(are) correct?

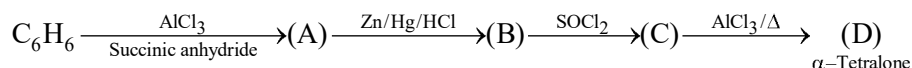
- (A) Enol is generally less stable than keto since C = O bond in latter is stronger than C = C of former  
 (B) In acid catalysed tautomerism, protonation precedes deprotonation  
 (C) In base catalysed tautomerism, deprotonation precedes protonation  
 (D) In the following compound, enol formed from  $\alpha$ -H is more than the enol formed from  $\alpha'$ -H



12. Which of following method(s) is(are) suitable for the formation of methylene cyclohexane in major quantity?

- (A) 1-chloro-1-methyl cyclohexane  $\xrightarrow{\text{Me}_3\text{CO}^-\text{K}^+/\text{Me}_3\text{COH}}$   
 (B) Cyclohexylchloromethane  $\xrightarrow{\text{alco KOH}/\Delta}$       (C) Cyclohexanone  $\xrightarrow{[\text{Ph}_3\text{PCH}_2]^+\text{I}^-}$   
 (D) Cyclohexylcarbinol  $\xrightarrow{\text{Conc H}_2\text{SO}_4/\Delta}$

13. Following sequence of reactions show the formation of a compound named as  $\alpha$ -Tetralone.



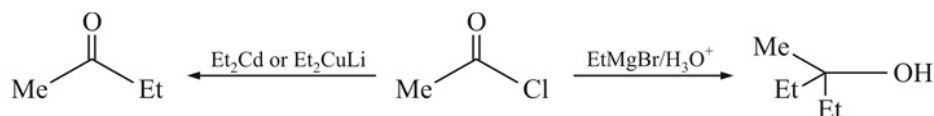
Select the correct option(s) for above sequence of reaction.

- (A) (A) is a  $\gamma$ -keto acid compound  
 (B) (D) is an aromatic compound  
 (C) (B) is  $\text{C}_6\text{H}_5(\text{CH}_2)_3\text{CO}_2\text{H}$   
 (D) (D) can also be formed by reacting 4-phenyl butanoyl chloride with  $\text{AlCl}_3$

14. Select the correct statement(s):

- (A)  $\text{PhCHO}$  and  $\text{CH}_3\text{COCH}_2\text{CH}_3$  gives  $\text{PhCH}=\text{CHCOCH}_2\text{CH}_3$  in basic medium  
 (B)  $\text{PhCHO}$  and  $(\text{CH}_3\text{CO})_2\text{O}$  gives cinnamic acid in aqueous solution of sodium acetate  
 (C) 5 chloropentan-2-one in aq NaOH gives cyclopentanone as well as cyclopropylmethyl ketone in unequal quantities  
 (D) Only (A) and (B) are correct

15. Which of the statements are correct about the following reaction?

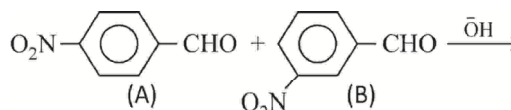


- (A) Ketones are more reactive than  $\text{RCOCl}$ , therefore ketones further react with  $\text{RMgX}$  to give  $3^\circ$  alcohols  
 (B)  $(\text{C}-\text{Mg})$  bond is more ionic than  $(\text{C}-\text{Cu})$  or  $(\text{C}-\text{Cd})$  bond  
 (C)  $\text{EtMgBr}$ ,  $\text{Et}_2\text{Cd}$  or  $\text{Et}_2\text{CuLi}$ , all are the source of ethyl carbanion but their reactivity with same substrate is different  
 (D)  $\text{R-COCl}$  can show Nucleophilic addition-elimination reaction whereas carbonyl show only addition
16. Which of the statement are correct about the following reactions?



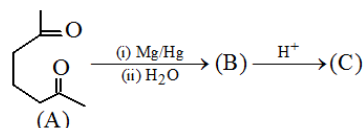
- (A) The equivalent weight of  $\text{CH}_3\text{CHO}$  is 22  
 (B) Three moles of  $\text{OH}^-$  are required for 2 mole of  $[\text{Ag}(\text{NH}_3)_2]^\oplus$  and 1 mole of  $\text{CH}_3\text{CHO}$   
 (C)  $\text{Ag}$  formed in the product appear as silver mirror  
 (D)  $\alpha$ -hydroxyacetone cannot reduce  $[\text{Ag}(\text{NH}_3)_2]^\oplus$

17. Which of the following statement(s) is(are) correct for Crossed Canizzaro reaction?

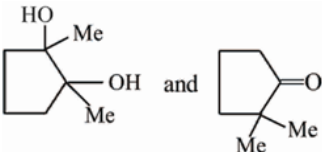
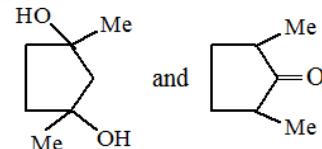
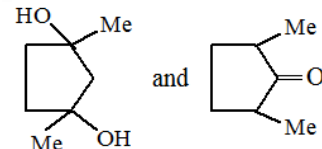


- (A)  $\text{OH}^-$  attacks at the  $(\text{C}=\text{O})$  group of (A)      (B)  $\text{OH}^-$  attacks at  $(\text{C}=\text{O})$  group of (B)  
 (C) The  $\text{H}^-$  ion transfer takes place from  $\left( \text{O}_2\text{N}-\text{C}_6\text{H}_4-\text{C}(\text{H})(\text{O}^-)-\text{O}^- \right)$   
 (D) The  $\text{H}^\ominus$  ion transfer takes place from  $\left( \text{C}_6\text{H}_4-\text{C}(\text{H})(\text{O}^-)-\text{O}^- \right)$

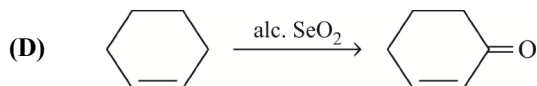
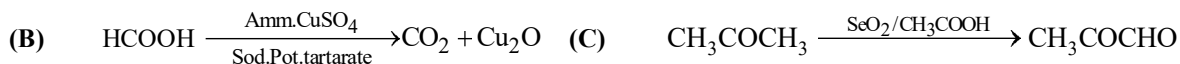
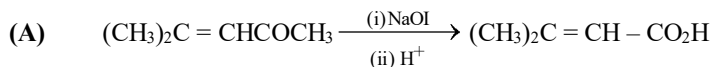
18. Which of the following statement(s) is(are) wrong about the given reaction?



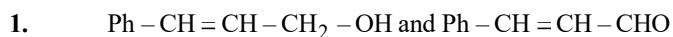
- (A) Formation of (B) from (A) is called bimolecular reduction and takes place by radical anion mechanism  
 (B) Formation of (B) from (A) takes place by free radical mechanism.

- (C) Product (B) and (C) respectively are  and   
 (D) Product (B) and (C), respectively, are 

19. Which of the following sequence of reaction is(are) correct?



20. Go through the list of following pair of compounds



Which of the following statement(s) is(are) correct for while distinguishing above pair of compounds?

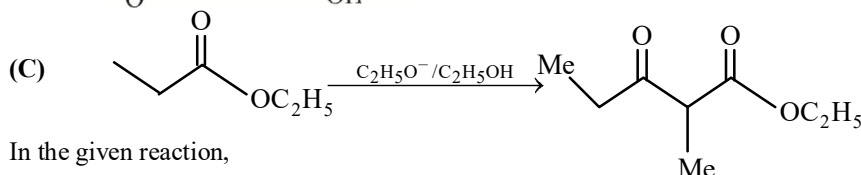
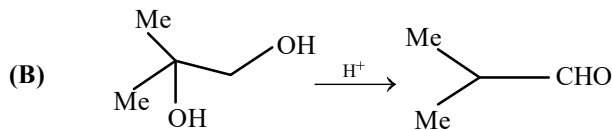
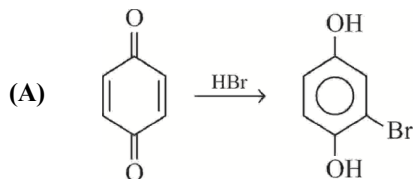
(A) All pairs can be distinguished by iodoform test

(B) All pairs can be distinguished by Tollen reagent test

(C) Pair 1, 2, 3 can be distinguished by Tollen reagent test whereas pair 4 by DNP test

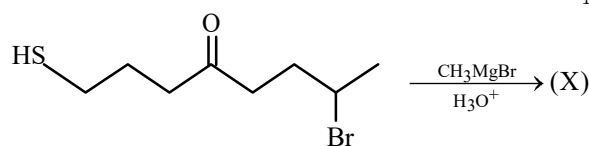
(D) Pair 3 can also be distinguished by iodoform test

21. Which of the following reaction(s) is(are) correct?

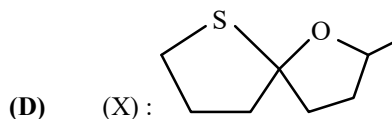
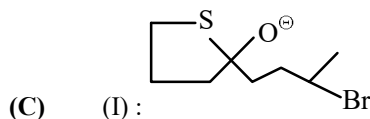
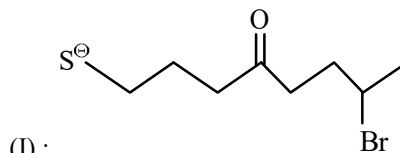
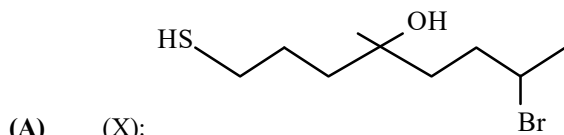


(D) None of these

22. In the given reaction,



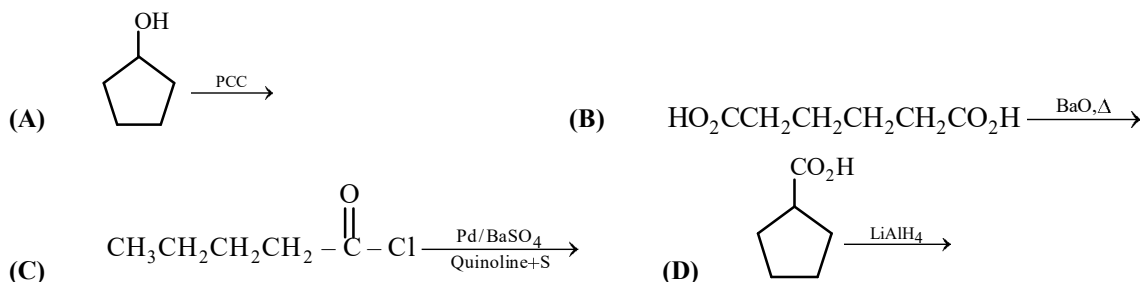
The product (X) and the intermediate(s) (I) involved is(are)





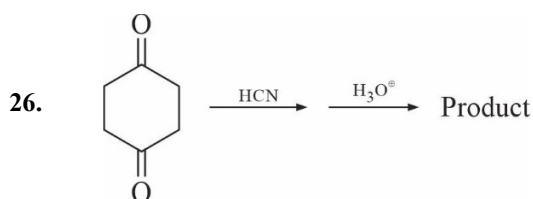
23. Which of following is true for 3-methyl butan-2-one?  
 (A) This compound is an isomer of 4-penten-1-ol  
 (B) It may be prepared by acidic  $\text{Hg}^{+2}$  catalysed hydration of 3-methyl-1-butyne  
 (C) This compound on oxidation with  $\text{I}_2/\text{NaOH}$  followed by acidic hydrolysis gives propionic acid  
 (D) It can be prepared by treating ethyl acetoacetate with two mole  $(\text{C}_2\text{H}_5\text{ONa}/\text{CH}_3\text{I})$  and then followed by hydrolysis and heat.

24. Which of the following is(are) method(s) to prepare cyclopentanone?



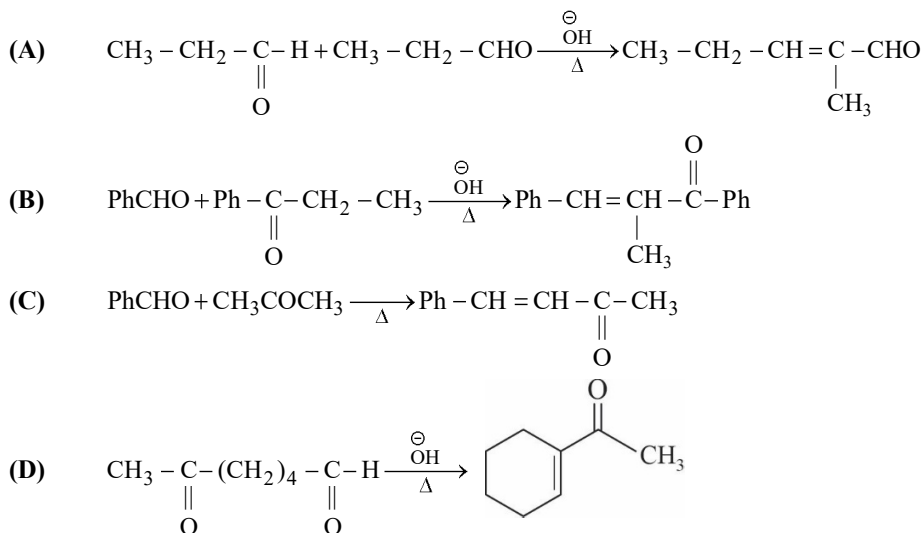
25. Which of the following reagent will give similar type of reaction with formaldehyde, acetaldehyde, benzaldehyde and acetone?

- (A) HCN (B)  $\text{NH}_2\text{NH}_2$  (C)  $\text{NaHSO}_3$  (D)  $\text{NH}_3$

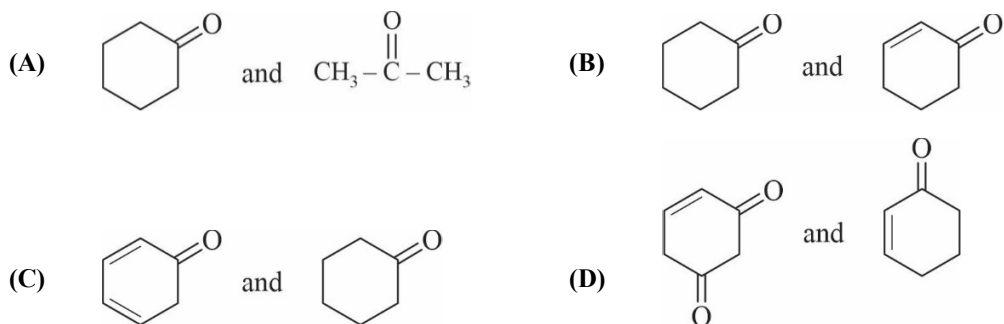


The correct statements about products is/are

- (A) The product are optical inactive (B) The product is meso compound  
 (C) The product is mixture of two enantiomers (D) Product exist in two diastereomeric forms
27. Which of the following aldol reaction product is correctly mentioned ?



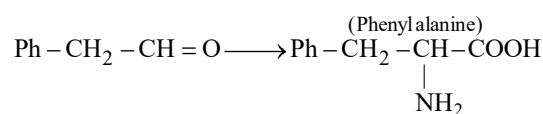
28. Among the given pairs, in which pair second compound has less enol content :



29. Observe the following reaction  $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3 \xrightarrow{\text{HCN}(\text{excess})} \xrightarrow{\text{H}_3\text{O}^{\oplus}/\Delta} \text{Products}$ .

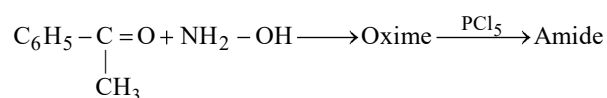
The correct statement is

- (A) The product is a mixture of two compounds  
 (B) The product is optically inactive  
 (C) The product is a mixture of two chiral and one achiral stereoisomer  
 (D) The product is a mixture of three stereoisomers
30. The following conversion is/are possible by



- (A)  $\xrightarrow{\text{KCN}/\text{H}_2\text{O}} \xrightarrow{\text{NH}_3, \Delta} \xrightarrow{\text{H}_3\text{O}^{\oplus}, \Delta}$   
 (B)  $\xrightarrow{\text{KCN}/\text{NH}_4\text{Cl}} \xrightarrow{\text{H}_3\text{O}^{\oplus}, \Delta}$   
 (C)  $\xrightarrow{\text{HCN}/\text{NaOH}} \xrightarrow{\text{SOCl}_2} \xrightarrow{\text{NH}_3} \xrightarrow{\text{H}_3\text{O}^{\oplus}, \Delta}$   
 (D)  $\xrightarrow{\text{Br}_2/\text{CH}_3\text{COOH}} \xrightarrow{\text{NH}_3} \xrightarrow{\text{CrO}_3/\text{H}^{\oplus}}$

31. In the given reaction which one of the following statement is correct-

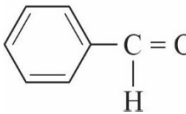
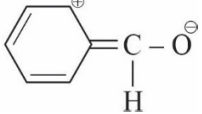


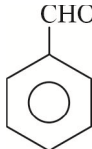
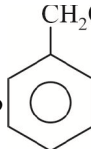
- (A) Oxime may be E/Z  
 (B) Amide on hydrolysis gives a mixture of acetic acid, benzoic acid, Aniline and methylamine  
 (C) Preparation of oxime is nucleophilic addition followed by elimination reaction  
 (D) Oxime and amides are isomers

32. Which of the following will give 3-pentanone

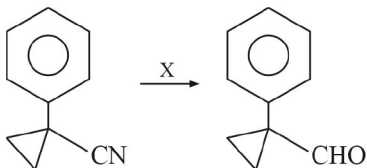
- (A)  $(\text{CH}_3 - \text{CH}_2\text{COO})_2\text{Ca} \xrightarrow{\Delta}$
- (B)  $\text{CH}_3 - \text{CH}_2 - \text{C} \equiv \text{N} \xrightarrow[(2) \text{H}_3\text{O}^+]{(1) \text{CH}_3 - \text{CH}_2 - \text{MgBr}}$
- (C)  $\text{CH}_3 - \overset{\text{O}}{\parallel}{\text{C}} - \text{CH}_2 - \text{CH}_2 - \overset{\text{O}}{\parallel}{\text{C}} - \text{OC}_2\text{H}_5 \xrightarrow[(2) \text{NaOH}(\text{CaO})]{(1) \text{H}_2\text{O}/\text{H}^+}$
- (D)  $\text{CH}_3 - \text{CH}_2 - \overset{\text{O}}{\parallel}{\text{C}} - \underset{\text{CH}_3}{\text{CH}} - \overset{\text{O}}{\parallel}{\text{C}} - \text{OH} \xrightarrow{\Delta}$

33. The tautomeric pairs are

- (A)  $\text{Me}_2\text{C} = \text{NOH}$  and  $\text{Me}_2\text{CH} - \text{N} = \text{O}$
- (B)  $\text{CH}_2 = \text{CH} - \text{NHCH}_3$  and  $\text{CH}_3 - \text{CH} = \text{N} - \text{CH}_3$
- (C)  and 
- (D)  $\text{CH}_2 = \underset{\text{OH}}{\text{CH}} - \text{CH} - \text{CH}_3$  and  $\text{CH}_3 - \text{CH}_2 - \underset{\text{O}}{\parallel}{\text{C}} - \text{CH}_3$

34.  can be reduced to  by the reagents :

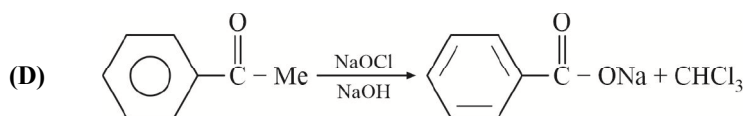
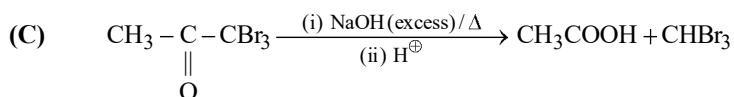
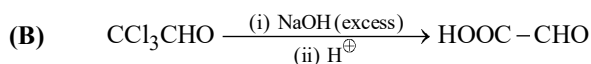
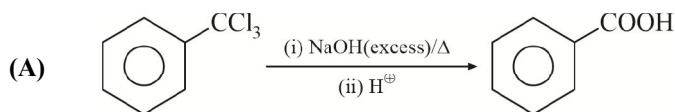
- (A)  $\text{LiAlH}_4$  (B)  $\text{NaBH}_4$
- (C) Red P + HI (D)  $\text{H}_2 / \text{Pd}$

35. 

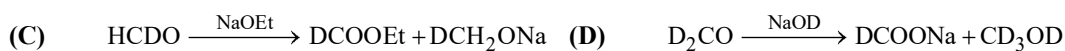
X can be :

- (A)  $\text{LiAlH}_4 / \text{ether} / \text{H}_2\text{O}$  (B)  $\text{NaBH}_4 / \text{C}_2\text{H}_5\text{OH}$
- (C) DIBAL - H (D)  $\text{SnCl}_2 / \text{HCl}$

36. Identify the reactions having correct products :



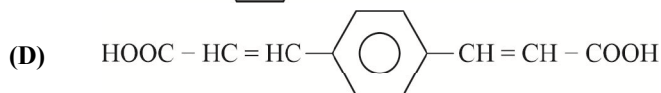
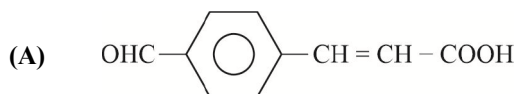
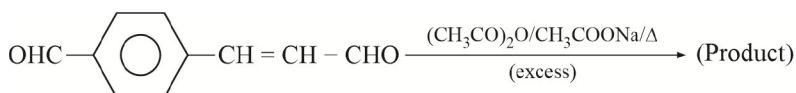
37. Which of the following products is/are correctly mentioned in the following reactions ?

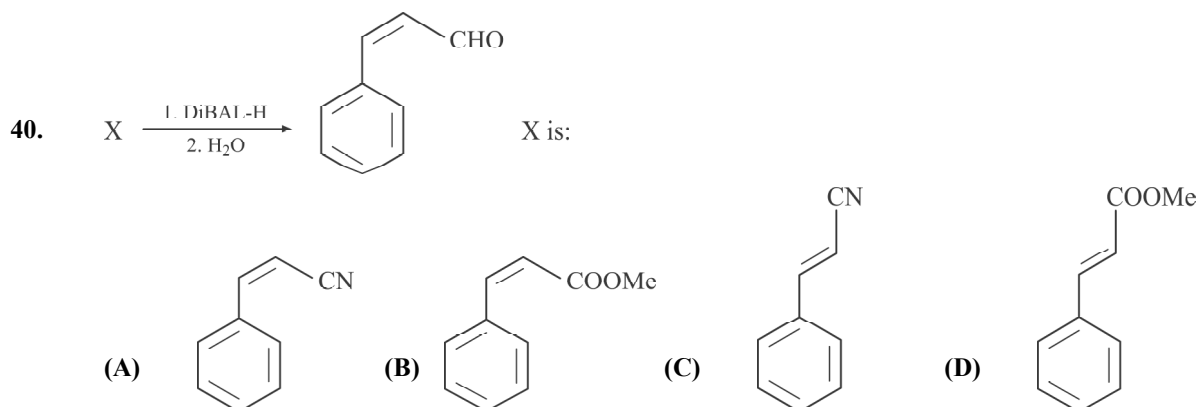


38. The true statement about the major product of  $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$  in reaction with aq. NaOH are :

- (A) It gives yellow ppt with  $\text{I}_2 / \overset{\ominus}{\text{O}}\text{H}$       (B) It gives silver mirror with Tollen's reagent  
 (C) It shows stereoisomerism      (D) It does not give yellow ppt with 2, 4 DNP

39. The product of following reaction is :



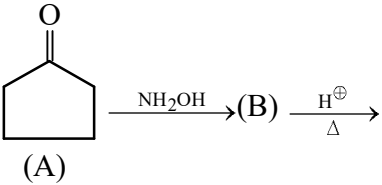
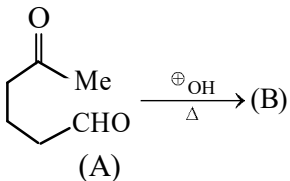
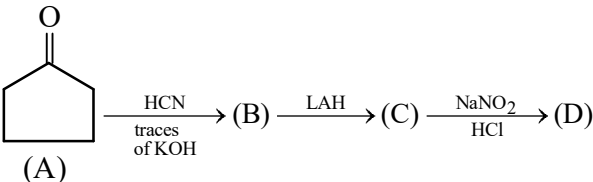
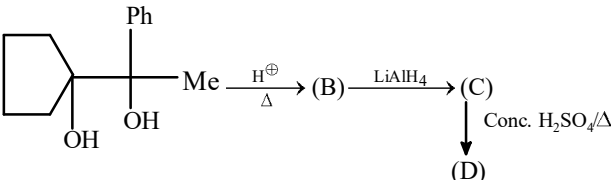

**MATRIX MATCH TYPE**

Each of the following question contains statements given in two columns, which have to be matched. Statements in Column 1 are labelled as (A), (B), (C) & (D) whereas statements in Column 2 are labeled as p, q, r, s & t. More than one choice from Column 2 can be matched with Column 1.

41. MATCH THE FOLLOWING LISTS :

List 1		List 2	
(A)		(p)	Intermolecular migration.
(B)		(q)	Intramolecular migration.
(C)		(r)	Carbocation intermediate.
(D)		(s)	Rearrangement by phenyl shift.
		(t)	Free radical mechanism

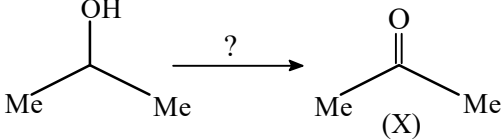
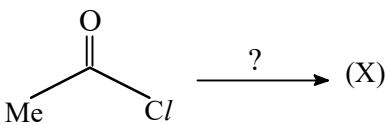
## 42. MATCH THE FOLLOWING :

	Column 1		Column 2
(P)	 <p>(A)</p>	(1)	Final product is $\alpha, \beta$ -unsaturated ketone.
(Q)	 <p>(A)</p>	(2)	Final product may further undergo polymerisation to give nylon type product.
(R)	 <p>(A)</p>	(3)	Final Product do not have carbonyl group.
(S)	 <p>(A)</p>	(4)	Sequence of reaction proceeded through formation of diazonium salt.

Codes :

	<b>P</b>	<b>Q</b>	<b>R</b>	<b>S</b>		<b>P</b>	<b>Q</b>	<b>R</b>	<b>S</b>
(A)	4	3	1	2	(B)	2	1	3	4
(C)	3	2	1	4	(D)	2	1	4	3

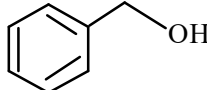
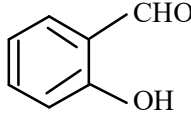
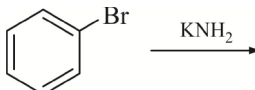
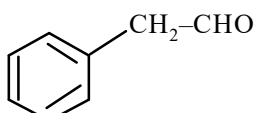
43. MATCH THE FOLLOWING :

	Column 1 [Reaction]		Column 2 [Reagent]
(P)	 <p> <chem>CC(C)(C)O &gt;&gt; CC(C)(C)C=O</chem>                       (X)                 </p>	(1)	$\text{Me}_2\text{Cd}$
(Q)	<chem>Me-C#C-H &gt;&gt; (X)</chem>	(2)	$\text{CH}_3\text{MgBr}/\text{H}_3\text{O}^{\oplus}$
(R)	 <p> <chem>CC(=O)Cl &gt;&gt; (X)</chem> </p>	(3)	$(\text{C}_5\text{H}_5\text{NH})_2\text{Cr}_2\text{O}_7/\text{H}^+$
(S)	<chem>Me-C#N &gt;&gt; (X)</chem>	(4)	$\text{HgSO}_4 + \text{H}_2\text{SO}_4$

Codes

	<b>P</b>	<b>Q</b>	<b>R</b>	<b>S</b>		<b>P</b>	<b>Q</b>	<b>R</b>	<b>S</b>
(A)	3	4	2	1	(B)	2	3	1	4
(C)	3	4	1	2	(D)	4	1	3	2

44. MATCH THE COLUMN :

	Column 1 [Substrate]		Column 2 [Substrate could undergo]
(P)		(1)	Nucleophilic Addition.
(Q)		(2)	Substitution by benzyne mechanism.
(R)		(3)	Self condensation reaction in presence of alkali.
(S)		(4)	Dehydrogenation.

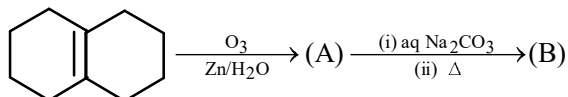
Codes :

	<b>P</b>	<b>Q</b>	<b>R</b>	<b>S</b>		<b>P</b>	<b>Q</b>	<b>R</b>	<b>S</b>
(A)	1	3	2	4	(B)	4	1	3	2
(C)	4	1	2	3	(D)	1	2	4	3

## Numerical Value Type

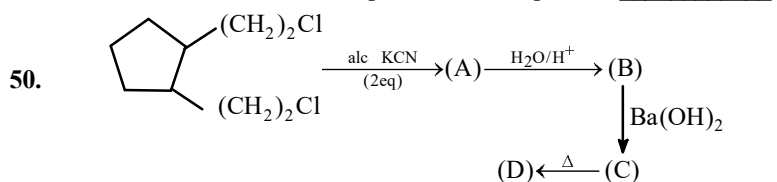
The Answer to the following questions are positive integers of 1/2/3 digits and zero

45. Go through the following sequence of reactions:



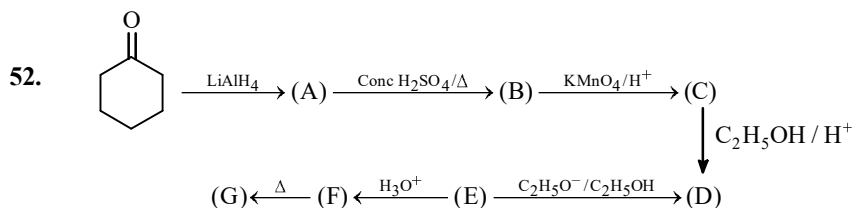
Ratio of degree of unsaturation of (B) to number of  $\pi$ -bonds in (B) is \_\_\_\_\_.

46. During ozonolysis of mixture of 2 mol each of m-xylene and o-xylene, maximum no of moles of methyl glyoxal generated is/are \_\_\_\_\_.
47. The number of product(s) formed when smallest ketone and its next homologue are reacted with  $\text{NH}_2\text{OH}$  in acidic medium is/are \_\_\_\_\_.
48. Acetone and butan-2-one undergoes both self and cross aldol(ketol)condensation to give aldol(ketol) products which on heating loses water to give  $\alpha, \beta$  unsaturated ketones. The number of  $\alpha, \beta$  unsaturated products formed (excluding stereoisomers) \_\_\_\_\_.
49. Number of N-C-N bonds present in urotropine are \_\_\_\_\_.



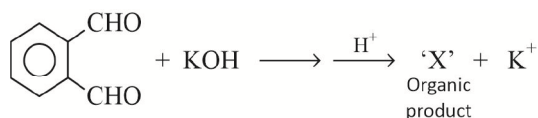
Degree of unsaturation in final product (D) is \_\_\_\_\_.

51. In the following list of compounds, how many will give negative Iodoform test?  
 Acetamide, Methyl acetate, Acetone, Acetic acid, 2,2-dichloropropane, Isopropyl alcohol, Acetic anhydride, Benzaldehyde, Diethyl ketone, t-butyl alcohol, Benzyl alcohol.



In the above sequence of reactions from (A) to (G), how many compound(s) is(are) cyclic?

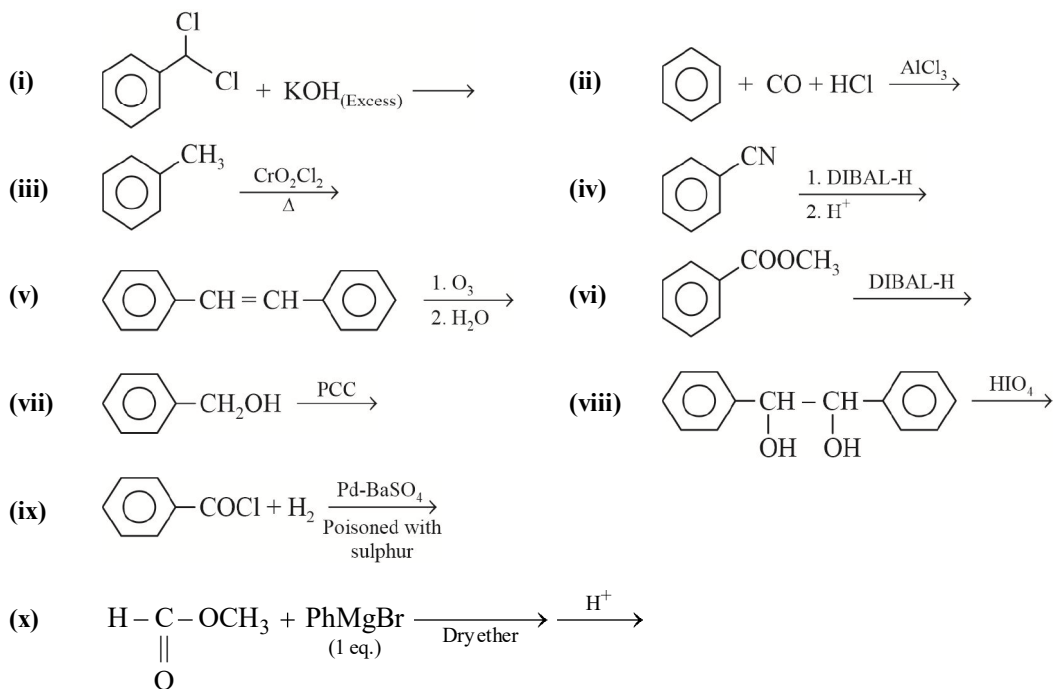
53. Consider the following reaction.



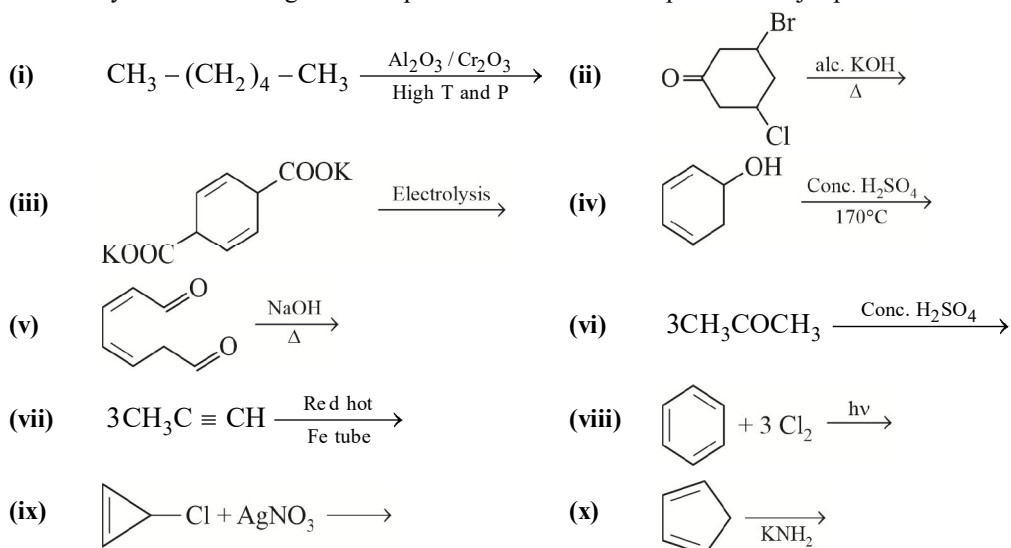
What is the value of half of difference of molecular mass of organic product 'X' and molecular mass of reactant? [Given : Atomic mass H = 1, C = 12, O = 16, K = 39]



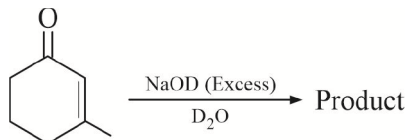
54. How many isomeric products are obtained on reaction of 2-butanone with hydroxyl amine in acidic medium ?
55. Formaldehyde on reaction with 50% KOH by mass undergoes disproportionation. What is order of disproportionation reaction of formaldehyde with KOH ?
56. How many of the following reactions produce benzaldehyde ?



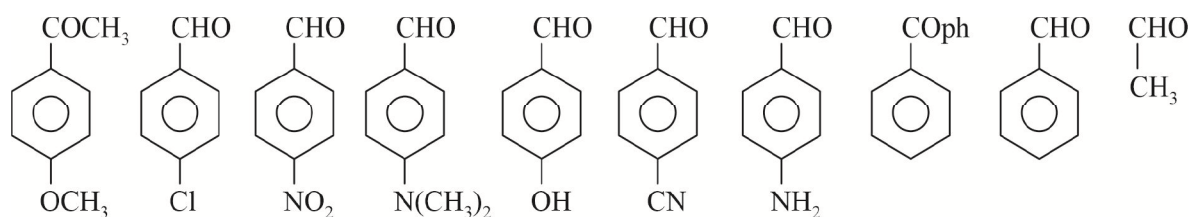
57. How many of the following reactions produce an aromatic compound as major product ?



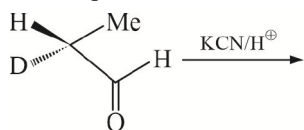
58. How many aldol products may be formed by the reaction of  $\text{CH}_3\text{CH}_2\text{CHO}$  and  $\text{CH}_3\text{COCH}_2\text{CH}_3$  ?  
 59. How many deuterium atoms are present in product of the following reaction ?



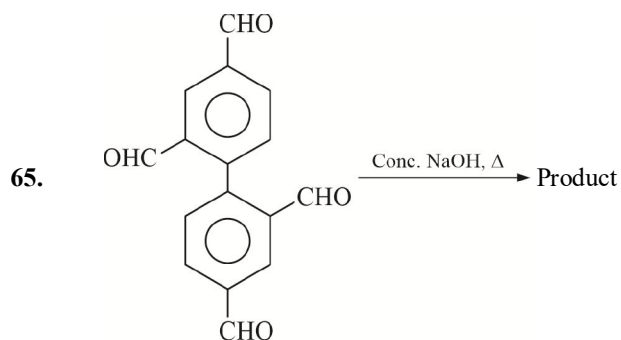
60. How many of the following compounds are more reactive toward nucleophilic addition reaction than p-methyl benzaldehyde ?



61. How many isomeric ketone having molecular mass equal to 100 on reaction with methyl magnesium bromide followed by acidification produce mixture of diastereomeric alcohols ?  
 62. How many substituted phenols are possible with the molecular formula  $\text{C}_8\text{H}_{10}\text{O}$ .  
 63. Total number of products formed in the following reaction is :

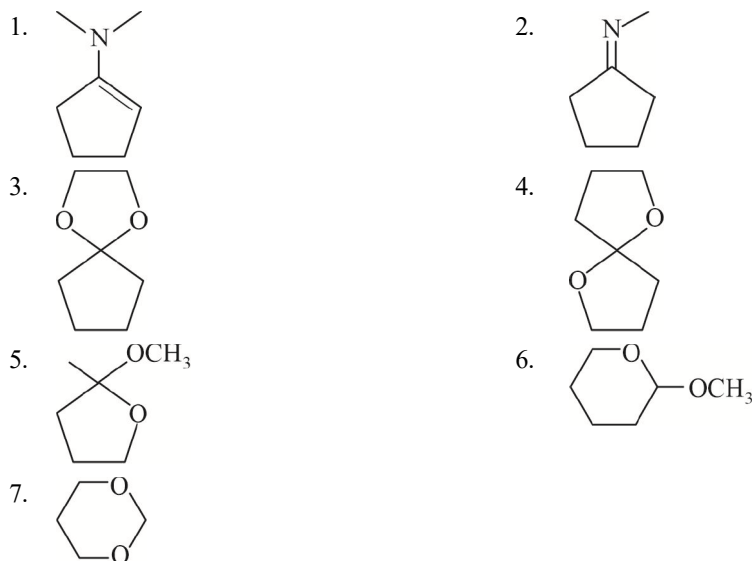


64.  $\text{CH}_3 - \text{CH} = \text{O} + \text{CH}_3\text{CH}_2 - \text{CH} = \text{O} \xrightarrow{\text{HO}^- / \Delta}$  mixture of aldols  
 The number of aldols including stereoisomers are :

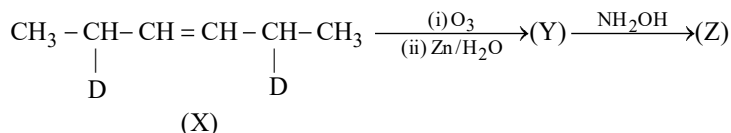


Find the total number of possible products formed in the above reaction.

66. How many of the following on hydrolysis produce hydroxy carbonyl compound?



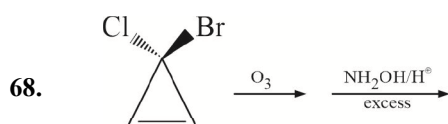
67. In the following sequence of reactions all stereoisomers of (X) have been taken.



Here P = Total number of stereoisomers of X

Q = Total number of stereoisomers of Y

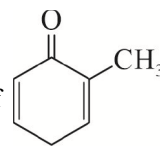
R = total number of stereoisomers of Z



The total number of isomeric products (including stereoisomers) formed at the end of the reaction is :

69. How many aldol products are possible (structural only) when mixture of HCHO, CH<sub>3</sub>CHO and CH<sub>3</sub>-C(=O)-CH<sub>3</sub> are reacted in dilute NaOH?

70. How many enol forms are possible for CH<sub>3</sub>-C(=O)-CH<sub>2</sub>-C(=O)-CH<sub>2</sub>-CH<sub>3</sub>?

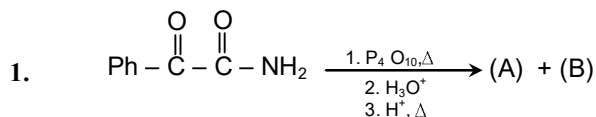
71. The number of deuterium atoms found in the tautomer of  when it is kept in OD<sup>⊖</sup> / D<sub>2</sub>O for a long period of time?

## Advanced Problem Package

## Oxygen Containing Organic Compounds-III

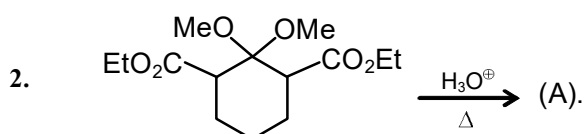
## SINGLE CORRECT ANSWER TYPE

Each of the following Question has 4 choices A, B, C &amp; D, out of which ONLY ONE Choice is Correct.

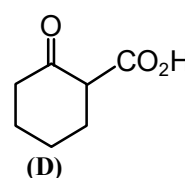
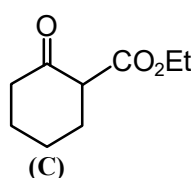
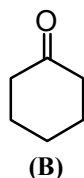
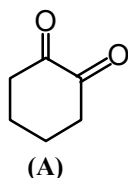


The products of the given reaction are :

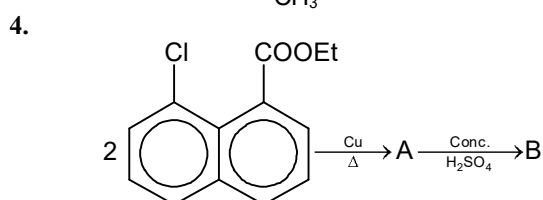
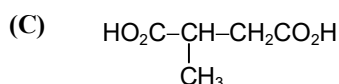
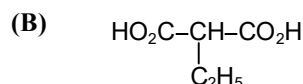
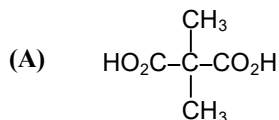
- (A)  $\text{PhCOCO}_2\text{H} + \text{NH}_3$  (B)  $\text{PhCO}_2\text{H} + \text{CO}$   
 (C)  $\text{PhCOCH}_3 + \text{CO}_2$  (D)  $\text{PhCO}_2\text{H} + \text{CO}_2$



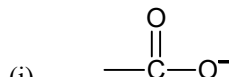
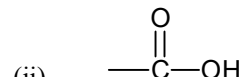
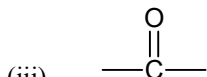

Product (A) obtained is :



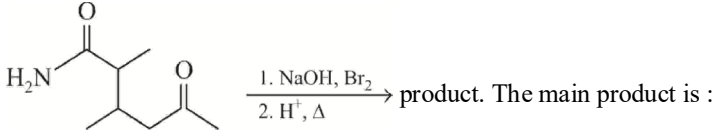
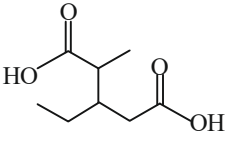
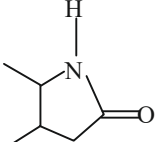
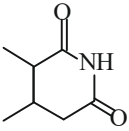
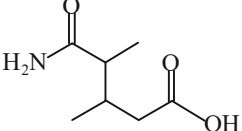
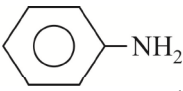
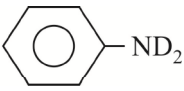
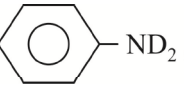
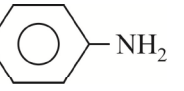
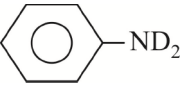
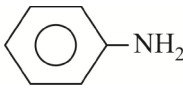
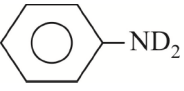
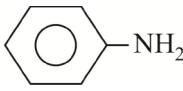
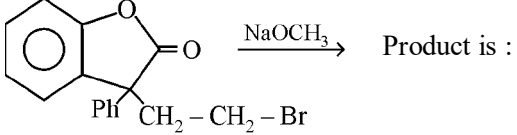
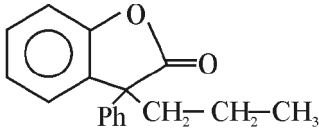
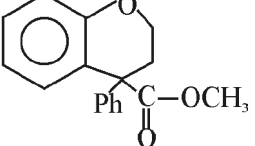
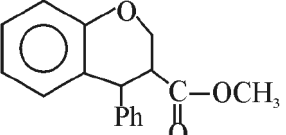
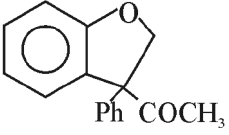
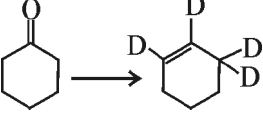
3. Identify the dicarboxylic acid having molecular formula  $\text{C}_5\text{H}_8\text{O}_4$ , which is chiral, form cyclic anhydride and does not decarboxylate.



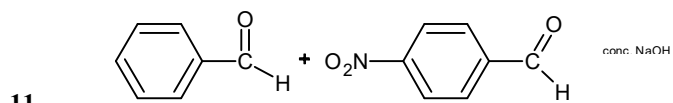
The functional group present in B is/are :

- (i)  (ii)  (iii)  (iv)   
 (A) (i) and (iii) (B) (ii) only (C) (iii) only (D) (i) and (iv)

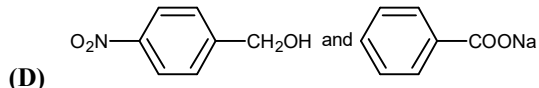
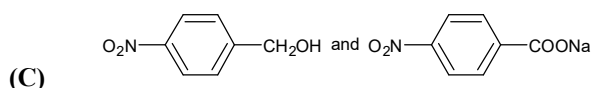
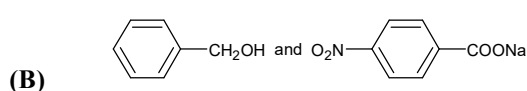
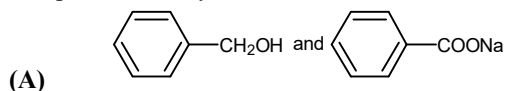
5. A compound A when reacted with  $\text{PCl}_5$  and then with ammonia gave B. B when treated with bromine and caustic potash produced C. C on treatment with  $\text{NaNO}_2$  and  $\text{HCl}$  at  $0^\circ\text{C}$  and then boiling produced ortho cresol. Compound A is :  
 (A) o-toluic acid (B) o-chlorotoluene (C) o-bromotoluene (D) m-toluic acid

6.  The main product is :  
 (A)  (B)  (C)  (D) 
7.  $\text{Y} \xleftarrow[2. \text{KOH, Br}_2/\text{H}_2\text{O}, \Delta]{1. \text{NH}_3, \Delta} \text{C}_6\text{H}_5\text{COOH} \xrightarrow[2. \text{KOH, Br}_2/\text{H}_2\text{O}, \Delta]{1. \text{ND}_3, \Delta} \text{X}$ . What are X and Y :  
 X is  ; Y is  X is  ; Y is   
 (A) Both  (B) Both   
 (C) Both  (D) Both 
8.  Product is :  
 (A)  (B)  (C)  (D) 
9.   
 Arrange the following reagents in the correct order in which above transformation is carried out :  
 (A) KOD/D<sub>2</sub>O, LiAlD<sub>4</sub>/Ether, H<sub>2</sub>O/H<sup>+</sup>/Δ (B) H<sub>2</sub>O/H<sup>+</sup>/Δ, KOD/D<sub>2</sub>O, LiAlD<sub>4</sub>/Ether  
 (C) KOD/D<sub>2</sub>O, H<sub>2</sub>O/H<sup>+</sup>/Δ, LiAlD<sub>4</sub>/Ether (D) LiAlD<sub>4</sub>/Ether, H<sub>2</sub>O/H<sup>+</sup>/Δ, KOD/D<sub>2</sub>O
10. Which of the following order are correct?  
 I. Acidity order: *o*-nitrobenzoic acid > *p*-nitrobenzoic acid > *m*-nitrobenzoic acid  
 II. Basicity order: NH<sub>2</sub><sup>-</sup> > EtO<sup>-</sup> > OH<sup>-</sup> > RCOO<sup>-</sup> > Cl<sup>-</sup>  
 III. Heat of hydrogenation: *cis*-2-butene > *trans*-2-butene  
 IV. Ease of decarboxylation :  

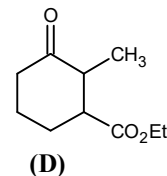
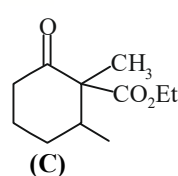
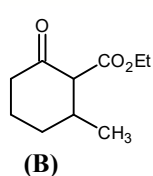
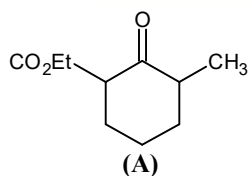
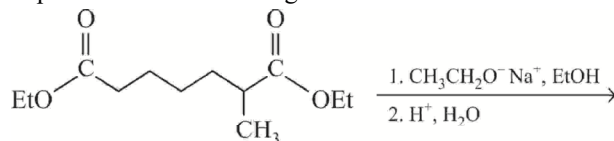
$$\text{C}_6\text{H}_5\text{COCO}_2\text{H} > \text{Ph}-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\text{CO}_2\text{H} > \text{Ph}-\overset{\text{OH}}{\text{C}}-\text{CO}_2\text{H} > \text{Ph}-\overset{\text{NH}_2}{\text{C}}-\text{CO}_2\text{H}$$
  
 (A) I and II (B) I and III (C) I and IV (D) I, II and III



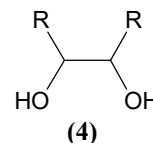
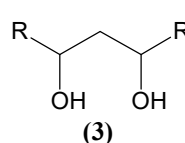
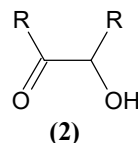
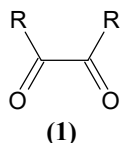
The products likely to be obtained are :



12. Predict the product for the following reaction:



13. Which of the following will be oxidized by  $\text{HIO}_4$ ?



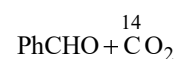
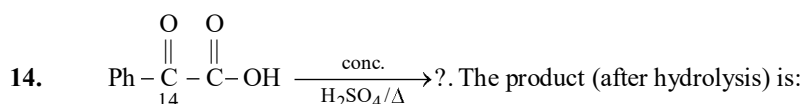
Select the correct answer using the codes below :

(A) 1, 2 and 3

(B) 1, 3 and 4

(C) 1, 2 and 4

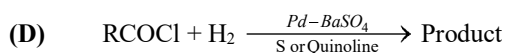
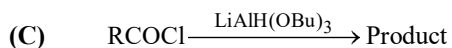
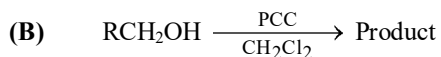
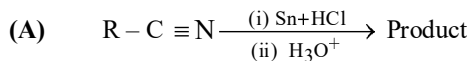
(D) 2, 3 and 4

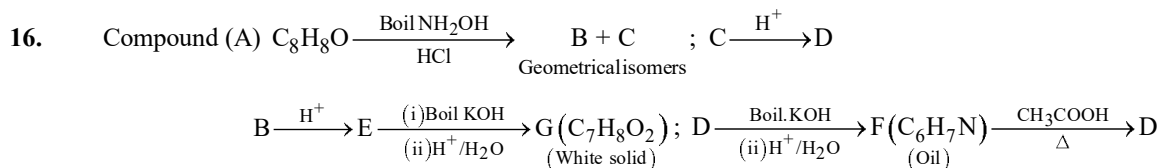


### MULTIPLE CORRECT ANSWERS TYPE

Each of the following Question has 4 choices A, B, C & D, out of which ONE or MORE Choices may be Correct:

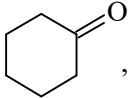
15. Which of the following reactions are used for the preparation of aldehyde only :

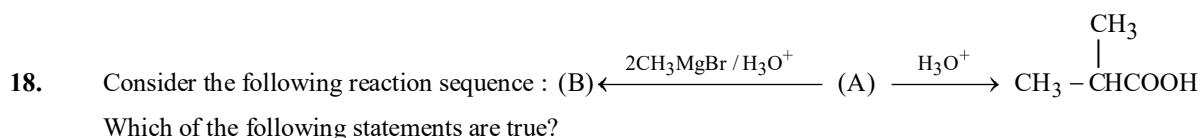




[B, C, D and E are isomeric having molecular formula  $C_8H_9NO$  ] :

- (A) Compound (A) is an aldehyde and can give (+ve) Tollen's test.  
 (B) Compound (D) and (E) can show geometrical isomerism.  
 (C) Compound (A) is an aromatic ketone having structure  $PhCOCH_3$   
 (D) Compound (G) is more acidic than  $CH_3COOH$ .
17.  $CH_2 = CH - CHO \longrightarrow CH_2 = CH - COOH$ . Which of the following reagents can be used to carry out the above reactions?

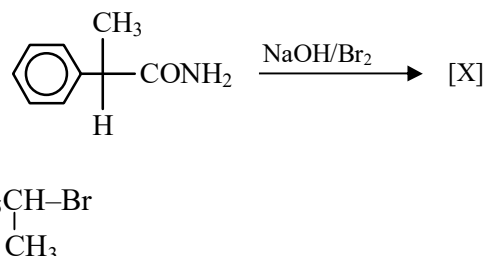
- (A) Tollen's reagent (B) Fehling Solution  
 (C)  ,  $Al(OCHMe_2)_3$  (D)  $KMnO_4 / H_2SO_4 / \Delta$



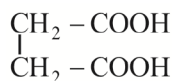
- (A) Compound (A) can be  $CH_3 - \overset{CH_3}{\underset{|}{C}} - COOC_2H_5$   
 (B) Compound (A) can be  $CH_3 - \overset{CH_3}{\underset{|}{C}} - COOC_6H_5$   
 (C) Compound (B) can be  $CH_3 - \overset{OH}{\underset{|}{C}} - \overset{CH_3}{\underset{|}{C}} - CH_3$   
 (D) Compound (B) can be  $CH_3 - \overset{CH_3}{\underset{|}{C}} - COOC_6H_5$   
 $\quad \quad \quad |$   
 $\quad \quad \quad MgBr$

19. Which of the following statements are true about the major product (X) in the reaction?

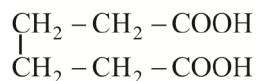
- (A) (X) is a cyclic amide  
 (B) (X) has an asymmetric centre  
 (C) (X) is a primary amine  
 (D) (X) can also be obtained by treatment of  $NH_3$  with  $C_6H_5 - \overset{CH_3}{\underset{|}{C}} - Br$



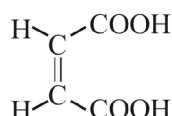
20. Which of the following compounds form anhydrides on heating?



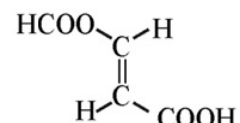
(A)



(B)



(C)



(D)

21. Acetophenone is oxidised by peroxyacetic acid followed by acid catalysed hydrolysis to give two products (I) and (II). Identify the products (I) and (II).

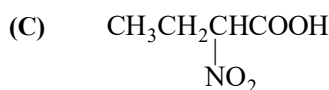
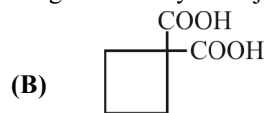
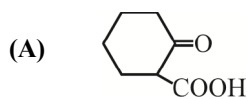
(A) (I) is benzoic acid

(B) (II) is phenol

(C) (I) is acetic acid

(D) (II) is methanol

22. Which of the following compounds are expected to undergo decarboxylation just by heating?



23. Which of the following compounds undergo cyclisation on heating?

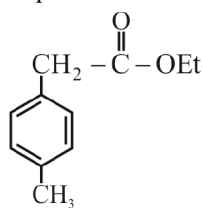
(A) Lactic acid

(B) Fumaric acid

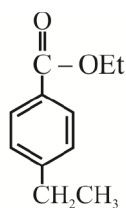
(C) Alanine

(D) Pyruvic acid

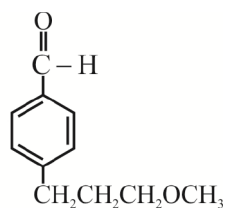
24. A compound (M. F  $\text{C}_{11}\text{H}_{14}\text{O}_2$ ) on hydrolysis gives a product, which on oxidation with acidified  $\text{KMnO}_4$  gives terephthalic acid. The compound could be :



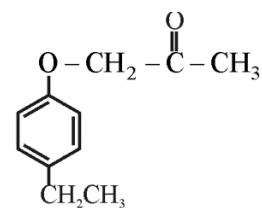
(A)



(B)

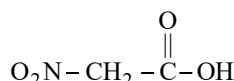


(C)

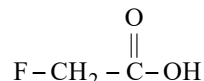


(D)

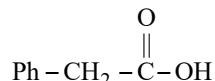
25. Consider the following compounds



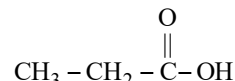
(I)



(II)



(III)



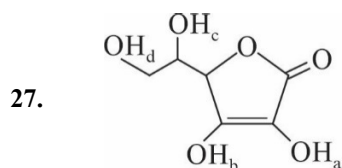
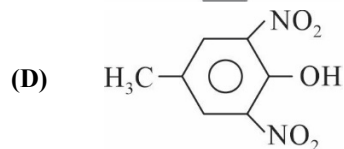
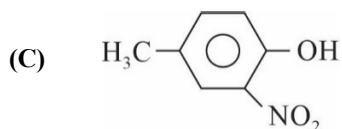
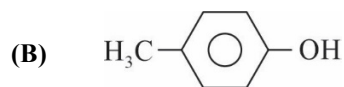
(IV)

Which statement is/are correct :

- (A)  $\text{I} > \text{II} > \text{III} > \text{IV}$  (Acidic strength order)  
 (B) I is most acidic because of -M effect of  $-\text{NO}_2$  group  
 (C) I is most acidic because of -I effect of  $-\text{NO}_2$  group  
 (D) IV is least acidic because of +I effect



26. Carboic acid is less acidic than :



Observe the compound and choose correct statement :

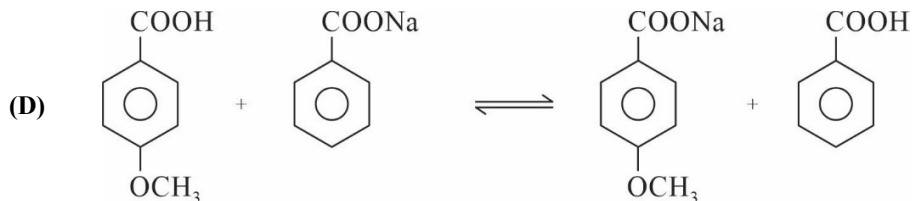
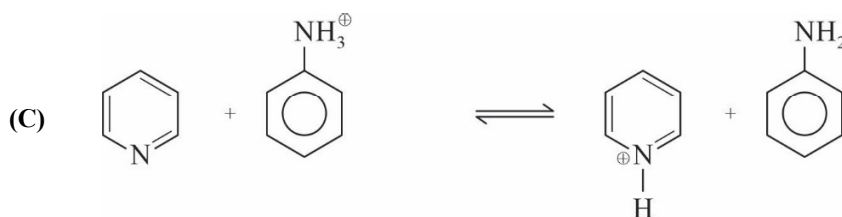
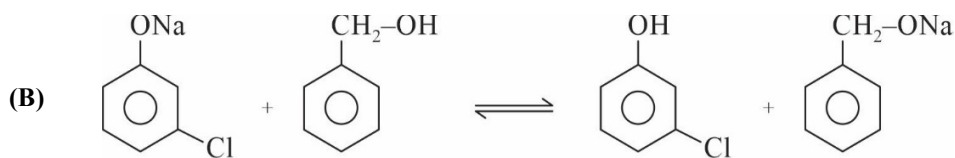
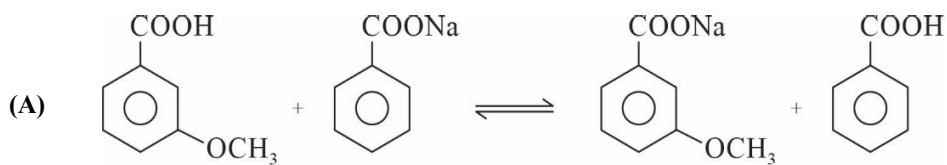
(A) It has carboxylic acid group

(B) It is Ascorbic acid

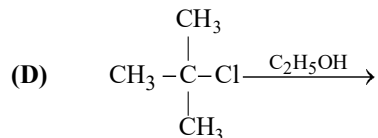
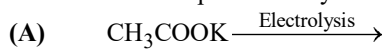
(C)  $\text{H}_b$  is most acidic Hydrogen atom

(D)  $\text{H}_a$  is least acidic Hydrogen atom

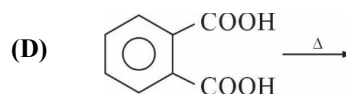
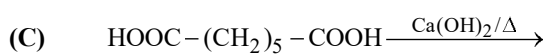
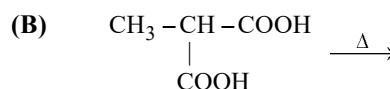
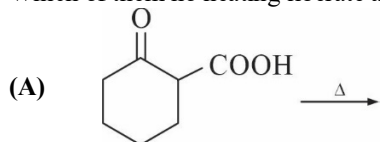
28. Which of the following reactions favour backward direction ?



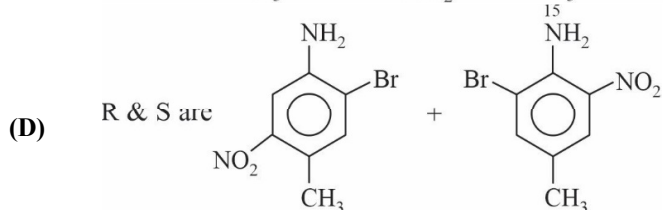
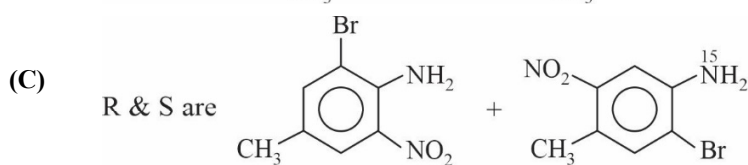
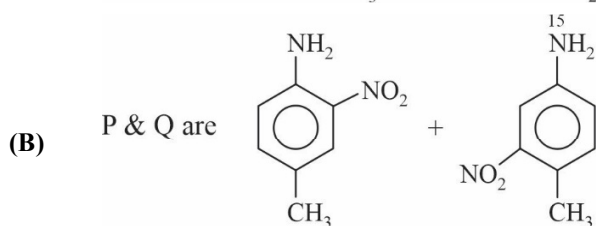
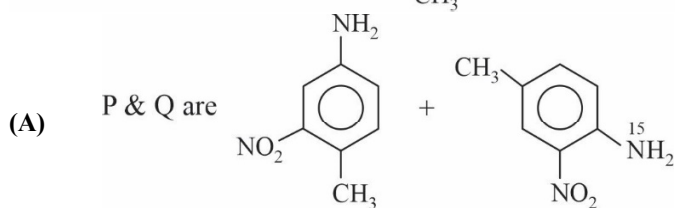
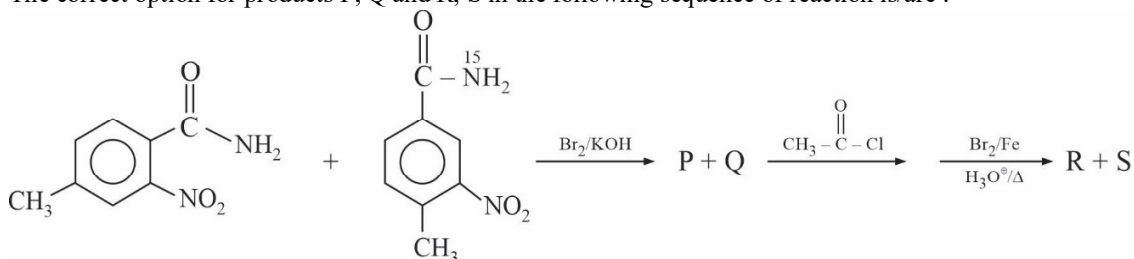
29. In which reaction product is hydrocarbon ?



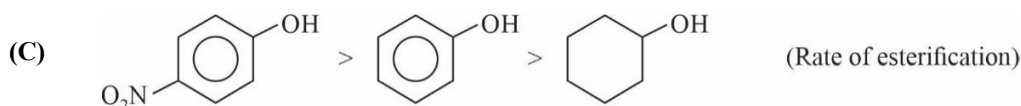
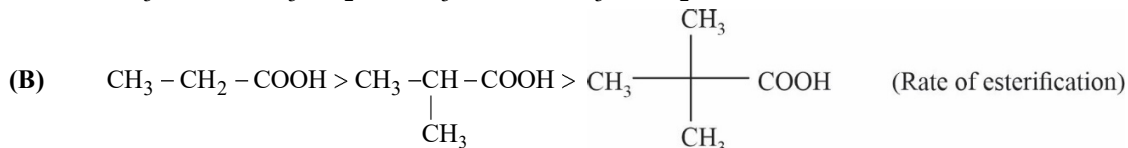
30. Which of them no heating liberate a gas which turns lime water milky?



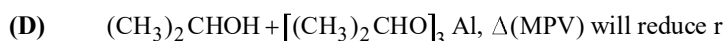
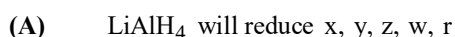
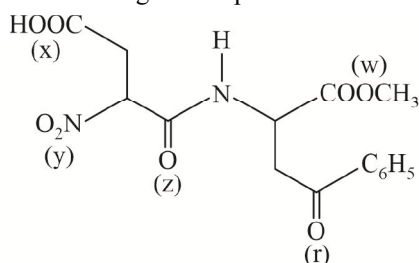
31. The correct option for products P, Q and R, S in the following sequence of reaction is/are :



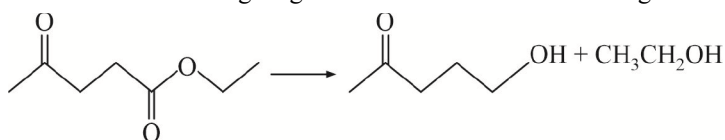
32. Which are correct against property mentioned ?



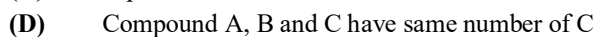
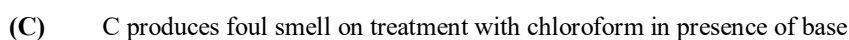
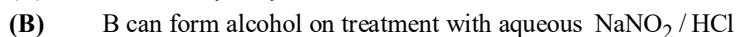
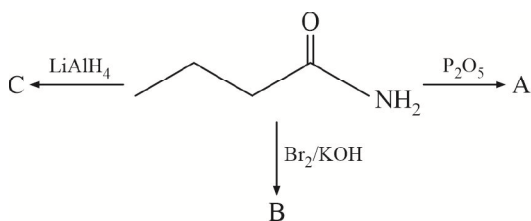
33. Observe the following natural product and choose the correct statement(s) :

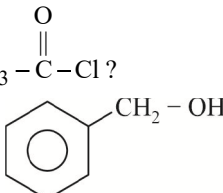
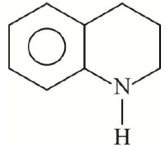
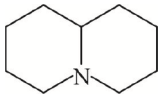
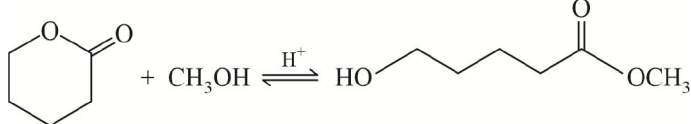
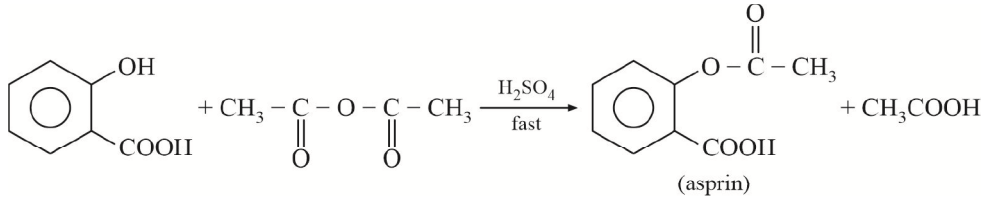
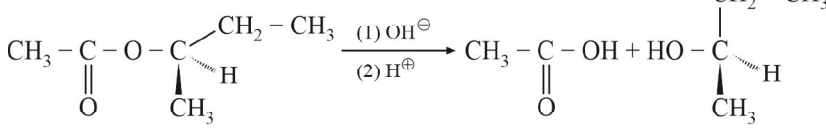
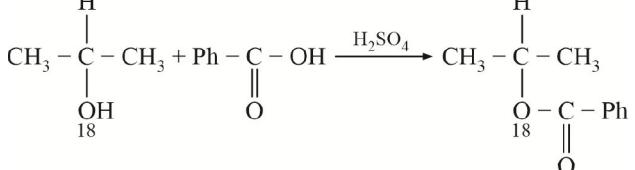
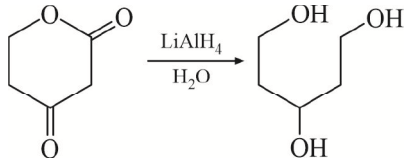
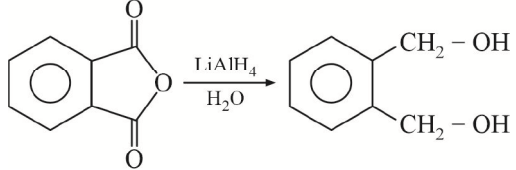
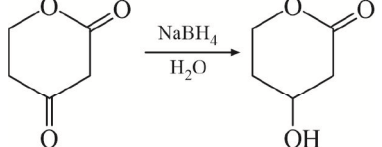


34. Which of the following reagents are involved in the following transformation ?



35. Correct statement about A, B and C is/are :



36. Which of the following will not react with acetyl chloride  $\text{CH}_3\text{-C(=O)-Cl}$ ?
- (A)  $\text{H}_2\text{O}$
- (B) 
- (C) 
- (D) 
37. In which of the following reactions correct major product is mentioned?
- (A) 
- (B) 
- (C) 
- (D) 
38. Which of the following reaction is are correct?
- (A) 
- (B)  $\text{CH}_3\text{-C}\equiv\text{N} \xrightarrow[\text{H}_2\text{O}]{\text{LiAlH}_4} \text{CH}_3\text{-CH}_2\text{-NH}_2$
- (C) 
- (D) 

**MATRIX MATCH TYPE**

Each of the following question contains statements given in two columns, which have to be matched. Statements in Column 1 are labelled as (A), (B), (C) & (D) whereas statements in Column 2 are labeled as p, q, r, s & t. More than one choice from Column 2 can be matched with Column 1.

39. Match the compounds in Column 1 with their experimental observation listed in column 2. Indicate your answer by darkening the appropriate bubbles of the  $4 \times 4$  matrix given in the ORS:

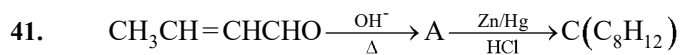
Column-1	Column-2
(A) Acetic acid	(p) Effervescence of $\text{CO}_2$ with $\text{NaHCO}_3$
(B) Cinnamic acid	(q) Decolourises $\text{Br}_2$ water
(C) Formic acid	(r) Colour with $\text{FeCl}_3$
(D) 2, 4, 6-Trinitro phenol	(s) Silver mirror with Tollen's reagent

40. MATCH THE FOLLOWING:

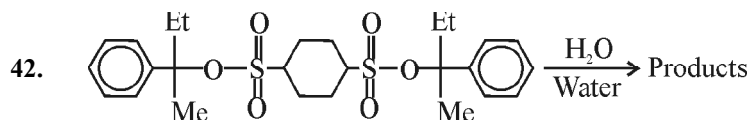
Column 1 (Reactions)		Column 2 (Reagents)	
(A)	$\text{C}_6\text{H}_5 - \overset{\text{O}}{\parallel} \text{C} - \text{Cl} \longrightarrow \text{C}_6\text{H}_5 - \overset{\text{O}}{\parallel} \text{C} - \text{H}$	(p)	$\text{HI} + \text{red P}$
(B)	$\text{C}_6\text{H}_5 - \overset{\text{O}}{\parallel} \text{C} - \text{Cl} \longrightarrow \text{C}_6\text{H}_5 - \overset{\text{O}}{\parallel} \text{C} - \text{CH}_3$	(q)	$\text{CH}_3\text{Li}$
(C)	$\text{C}_6\text{H}_5 - \overset{\text{O}}{\parallel} \text{C} - \text{OH} \longrightarrow \text{C}_6\text{H}_5 - \overset{\text{O}}{\parallel} \text{C} - \text{CH}_3$	(r)	$\text{H}_2 + (\text{Pd} - \text{BaSO}_4)$
(D)	$\text{C}_6\text{H}_5 - \overset{\text{O}}{\parallel} \text{C} - \text{OH} \longrightarrow \text{C}_6\text{H}_5 - \text{CH}_3$	(s)	$(\text{CH}_3)_2\text{Cd}$
		(t)	$(\text{Zn} - \text{Hg}) + \text{HCl}$

**Numerical Value Type**

The Answer to the following questions are positive integers of 1/2/3 digits and zero

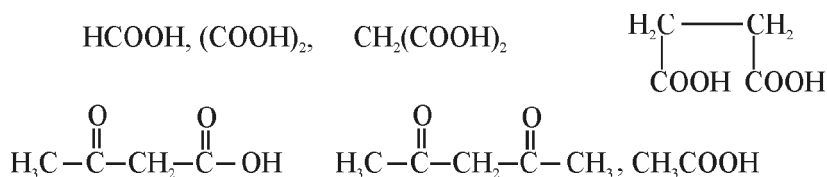


No. of stereo isomers possible for compound (C) are:



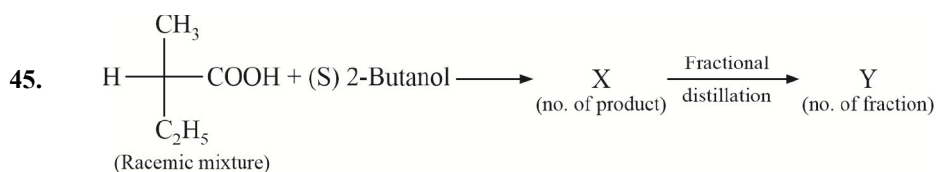
The total number of possible products (including stereoisomers) obtained in above reaction is:

43. How many of following compound will evolve CO<sub>2</sub> on heating?



44. How many of the following contain carboxylic acid functional group ?

Picric acid, Styphnic acid, Aspirin, Ascorbic acid, Penicillin, Valeric acid, Anthranilic acid, Carboic acid



Report your answer as XY :

46.  $\text{CH}_3\text{CHClCOOH} + \text{CH}_3-\text{CH}_2-\text{OH} \xrightarrow{\text{H}^+} \text{Total number of ester 'M'} \xrightarrow{\text{Fractional Distillation}} \text{Number of Fractions 'N'}$

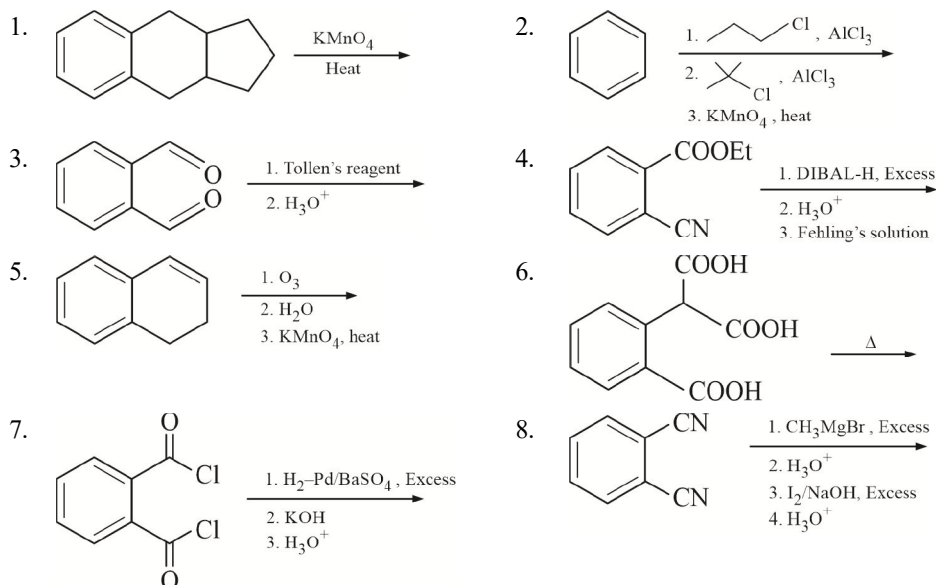
(±)

Report your answer as MN.

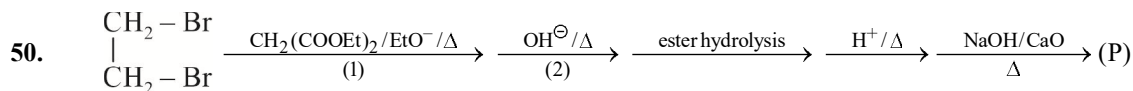
47.  $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}(\text{CH}_2)_2\text{COOCH}_3 \xrightarrow[\text{(ii) Zn/H}_2\text{O}]{\text{(i) O}_3} [(\text{X}) + (\text{Y})] \xrightarrow[\text{H}_2\text{O}]{\text{LiAlH}_4} \text{product mixture}$ .

How many moles of ethanoic acid are required for complete esterification of the compounds present in the product mixture.

48. How many of the following reactions results in formation of phthalic acid?



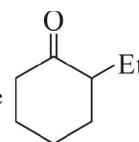
49. An aromatic tetracarboxylic acid ( $C_{10}H_6O_8$ ) can form two type of monoanhydrides on heating with  $P_4O_{10}$ . The sum of locants of all carboxylic groups in this compound will be :



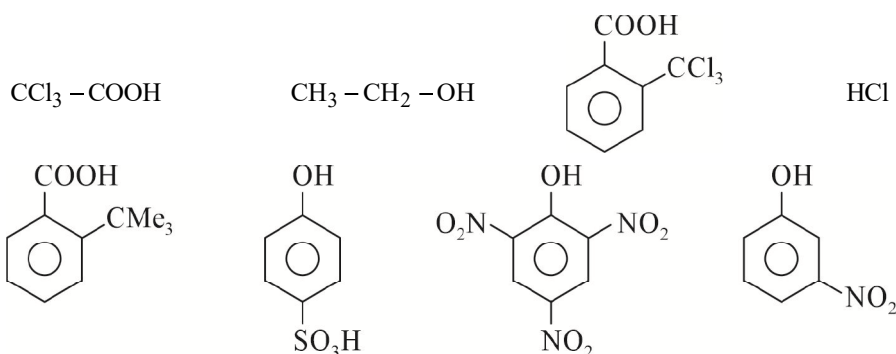
Find out the molecular weight of end product (P).

51. A compound(P) with formula  $C_4H_6O_2$  has a fruity smell. It produces no color with phenolphthalein. On adding NaOH to (P) and phenolphthalein mixture, a pink color is seen. But this color of phenolphthalein fades away slowly on reaction with (P). Number of possible structural isomers for (P) is:
52. The compound 'X' is composed of carbon, hydrogen and oxygen. It has 2 geometrical isomers. It has 4 stereoisomers. All 4 stereoisomers are optically active. If X is the smallest alkenoic acid which satisfies all these conditions then find number of carbon present in compound X.

53. Total number of  $\beta$ -Keto monocarboxylic acids (including stereoisomers) which on heating give



54. How many acids (given below) react with  $\text{NaHCO}_3$  and liberate  $\text{CO}_2$  ?



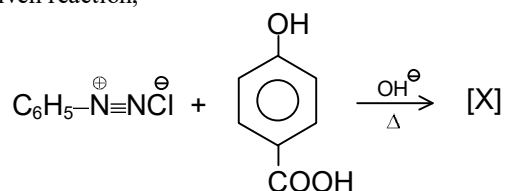
Advanced Problem Package

Nitrogen Containing Organic Compounds

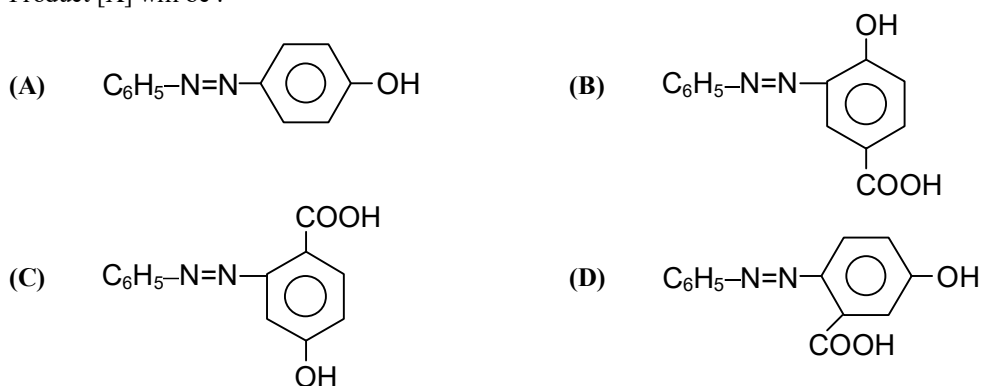
SINGLE CORRECT ANSWER TYPE

Each of the following Question has 4 choices A, B, C & D, out of which ONLY ONE Choice is Correct.

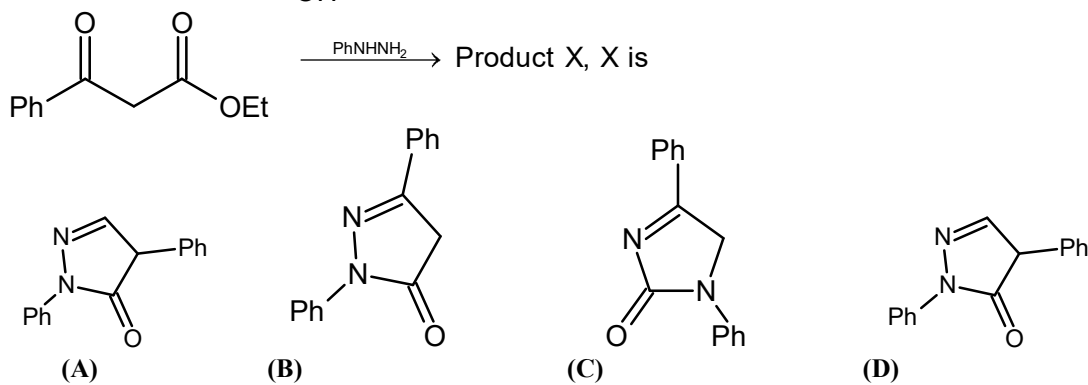
1. In the given reaction,



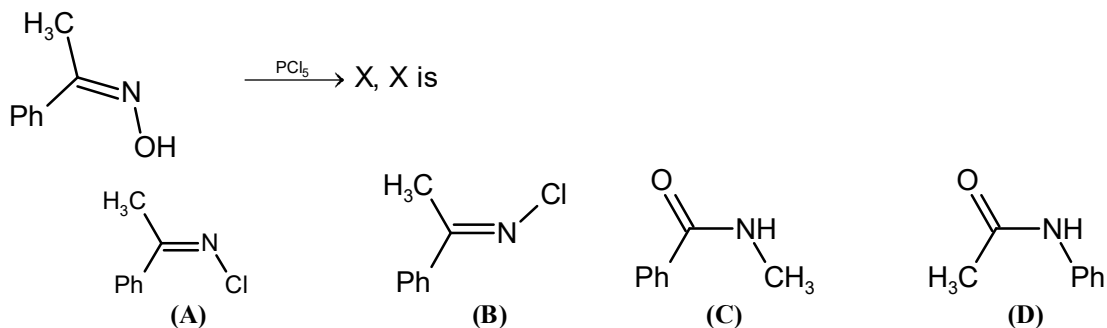
Product [X] will be :



2. Product X, X is

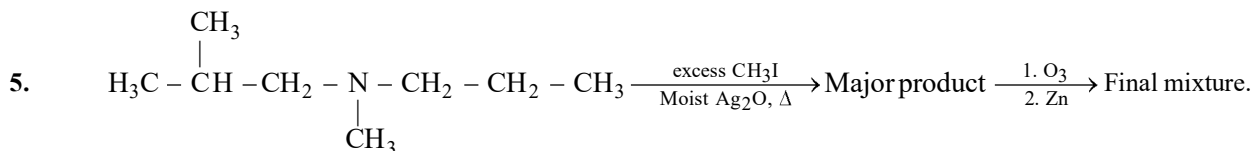


3. X, X is





4. Benzene diazonium chloride on reaction with phenol in weakly basic medium gives \_\_\_\_\_ and the reaction is :  
 (A) diphenyl ether, nucleophilic addition  
 (B) p-hydroxy azobenzene, electrophilic substitution  
 (C) chlorobenzene, electrophilic addition  
 (D) benzene, elimination

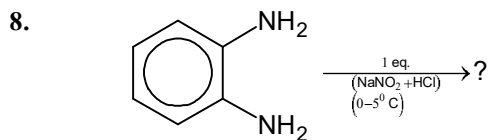
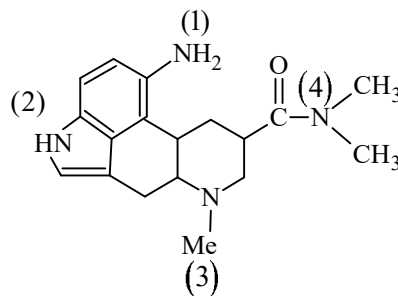


The final product mixture contains :

- (A)  $\text{CH}_3\text{CHO} + \text{CH}_3\text{COCH}_3$   
 (B)  $2\text{CH}_2\text{CHO} + \text{CH}_3\text{COCH}_3 + \text{HCHO}$   
 (C)  $\text{CH}_3\text{CHO} + \text{HCHO}$   
 (D)  $\text{CH}_3\text{CHO} + \text{CH}_3\text{COCH}_3 + 2\text{HCHO}$
6. All the molecules drawn below are natural compounds, which does not contain a formal positive charge and formal negative charge?  
 (A)  $(\text{CH}_3)_3\text{N} - \text{B}(\text{CH}_3)_3$  (B)  $(\text{CH}_3)_2\text{N} - \text{OCH}_3$   
 (C)  $\text{CH}_2 = \text{N} = \text{N}$  (D)  $(\text{CH}_3)_3\text{N} - \text{O}$

7. In the given compound, arrange the nitrogen according to their decreasing basic strength

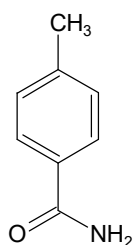
- (A)  $1 > 2 > 3 > 4$   
 (B)  $4 > 3 > 1 > 2$   
 (C)  $2 > 4 > 1 > 3$   
 (D)  $3 > 4 > 1 > 2$



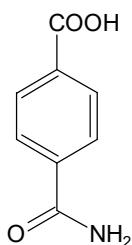
The product formed is

- (A) (B)   
 (C) (D) None of these

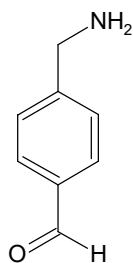
9. An organic compound  $C_8H_9NO$  is found to be insoluble in dilute acid and base. On treatment with  $KMnO_4/H_2SO_4$ , the compound formed is devoid of nitrogen and is soluble in  $NaHCO_3$  and on nitration produces mono nitrosubstituted product, the organic compound  $C_8H_9NO$  is :



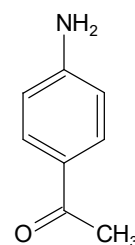
(A)



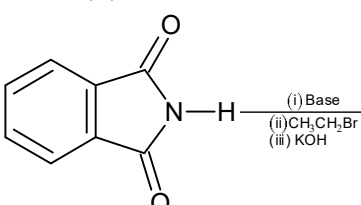
(B)

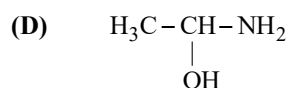
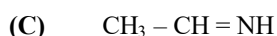
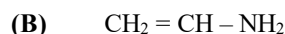


(C)



(D)

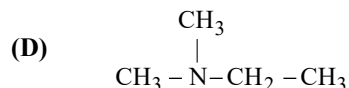
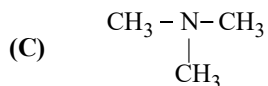
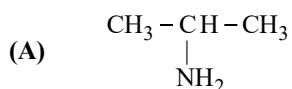
10.  The final major product is



11.  $PhNH_2 \xrightarrow[\text{KOH}/\Delta]{CHCl_3} \xrightarrow[(ii) H_2O]{(i) LiAlH_4} ?$

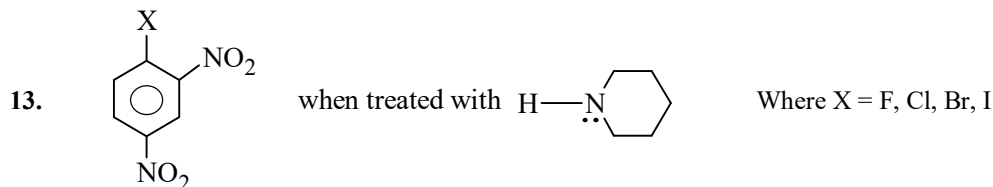


12. A basic volatile nitrogen compound (M.wt-59) gave a foul smelling gas when treated with chloroform and alcoholic potash. A sample of the substance dissolved in aqueous  $HCl$  and treated with  $HCl$  and  $NaNO_2$  solution at  $0^\circ C$  liberated a colourless gas. After the evolution of gas was complete the aqueous solution was distilled to give an organic compound which does not contain nitrogen and which on warming with alkali and Iodine gave a yellow precipitate. Identify the original substance. Assume that it contains one N atom per molecule.



## MULTIPLE CORRECT ANSWERS TYPE

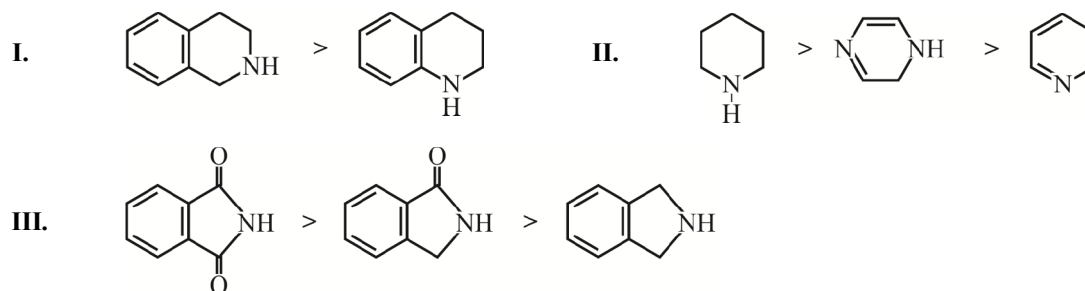
Each of the following Question has 4 choices A, B, C &amp; D, out of which ONE or MORE Choices may be Correct:



Which of the following statements are true:

- (A) The order of reactivity is  $\text{I} > \text{Br} > \text{Cl} > \text{F}$   
 (B) The order of reactivity is  $\text{F} > \text{Cl} > \text{Br} > \text{I}$   
 (C) The rate limiting step of the reaction does not involve the cleavage of C - X bond  
 (D) When X = F, the rate of nucleophilic attack is maximum
14. (A)  $\xrightarrow[\text{[H]}]{\text{Reduction}}$  Primary amine. The compound (A) may be :  
 (A) alkyl isocyanide (B) alkyl cyanide  
 (C) acid amide (D) 1°-nitroalkane

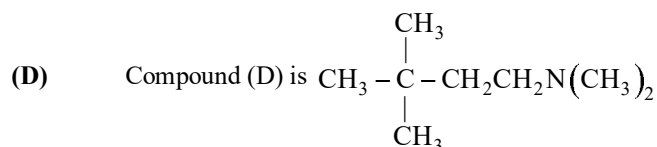
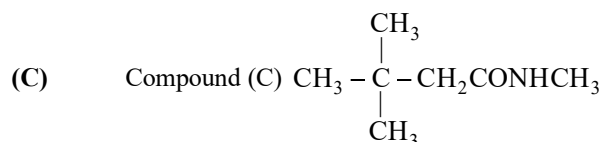
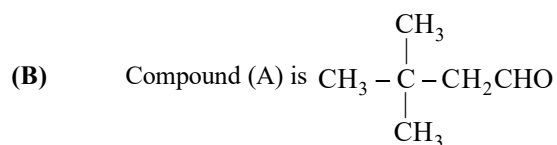
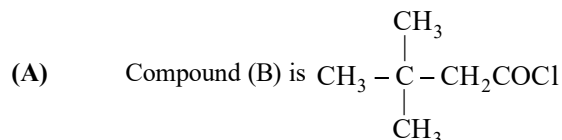
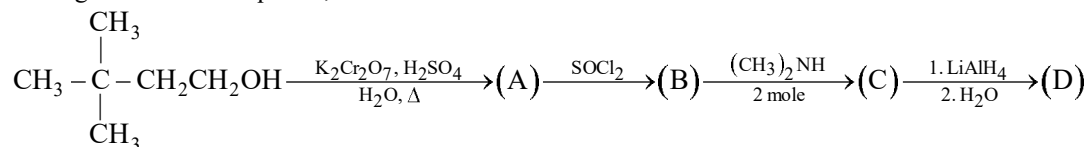
15. Consider the following comparison of basic nature of amines



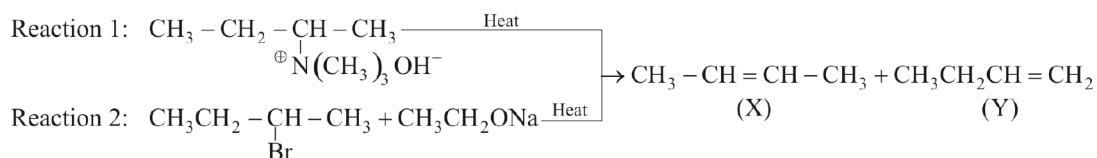
Correct comparisons are :

- (A) I (B) II  
 (C) I and III (D) II and III
16. A compound (A) having molecular formula  $\text{C}_9\text{H}_{13}\text{N}$  dissolved in dilute HCl and releases  $\text{N}_2$  on treatment with  $\text{HNO}_2$  the probable structure of (A) is  
 (A)  $\text{PhCH}_2\text{CH}_2\text{NHCH}_3$  (B)  $\text{PhCH}_2-\underset{\text{NH}_2}{\text{CH}}-\text{CH}_3$   
 (C)  $\text{PhCH}-\text{CH}_2\text{CH}_3$  (D)  $\text{Ph}-\overset{\text{CH}_3}{\underset{\text{NH}_2}{\text{C}}}-\text{CH}_3$
17. Which of the following aryl amines will not form a diazonium salt on reaction with sodium nitrite in hydrochloric acid?  
 (A) m-Ethyl aniline (B) p-Amino acetophenone  
 (C) 4-Chloro-N-Methyl aniline (D) N-Ethyl-2-Methyl aniline

18. In the given reaction sequence,

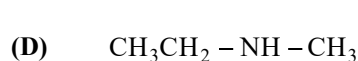
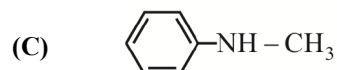
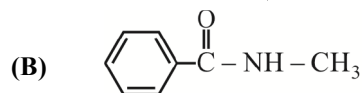
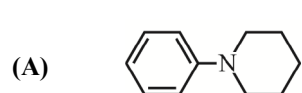


19. In the given reactions,



- (A) The major product in reaction 1 is (X)  
 (B) The major product in reaction 1 is (Y)  
 (C) The major product in reaction 2 is (X)  
 (D) The major product in reaction 2 is (Y)

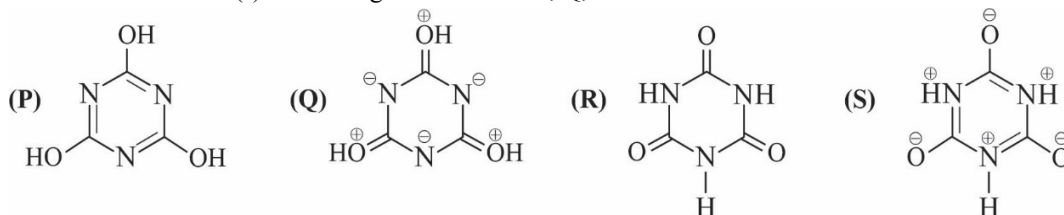
20. Which compound yields an N-nitroso amine after treatment with nitrous acid ( $\text{NaNO}_2 + \text{HCl}$ )?



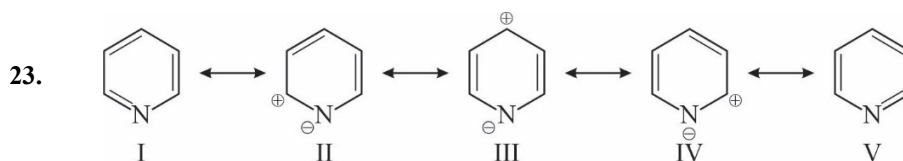
21.  $\text{PhCOCH}_2\text{CH}_2\text{NH}_2$  and  $\text{PhNHCH}_2\text{COCH}_3$  can be distinguished by

- (A) Carbylamine test  
 (B) Tollen's test  
 (C) Hinsberg's test  
 (D) Iodoform test

22. The correct statement(s) concerning the structures P, Q, R & S is/are



- (A) Q & S are not resonating structures  
 (B) R & S are resonating structures  
 (C) P & R are tautomers  
 (D) P & Q are resonating structures



Among these canonical structures of pyridine, the correct order of stability is/are:

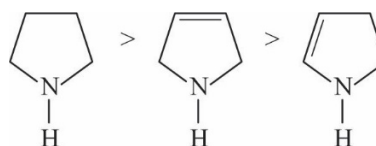
- (A)  $(II = IV) > (I = V)$   
 (B)  $(I = V) > (II = IV)$   
 (C)  $III > (II = IV)$   
 (D)  $(II = IV) > III$

24. Which of the following is/are correct for basic strength:

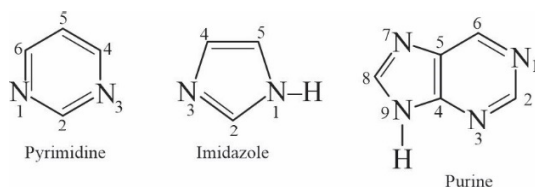
- (A)  $(CH_3)_2NH > (CH_3)_3N > CH_3NH_2 > NH_3$   
 (B)  $(C_2H_5)_2NH > (C_2H_5)_3N > C_2H_5NH_2 > NH_3$

- (C)  $PhNH_2 > Ph_2NH > Ph_3N$

(D)



25.



Among the following which statement(s) is/are correct :

- (A) Both N of pyrimidine are same basic strength  
 (B) In imidazole protonation take places on N-3  
 (C) In purine only lp of N is delocalised  
 (D) Pyrimidine, imidazole and purine all are aromatic

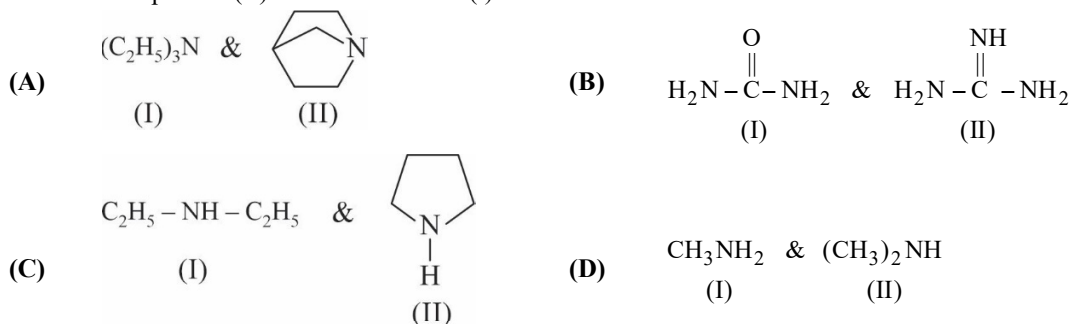
26. Which of the following is/are correct statement/statements?

- (A) Guanidine  $\left[ \begin{array}{c} NH_2 - C - NH_2 \\ || \\ NH \end{array} \right]$  is more basic than pyridine because conjugate acid of guanidine has

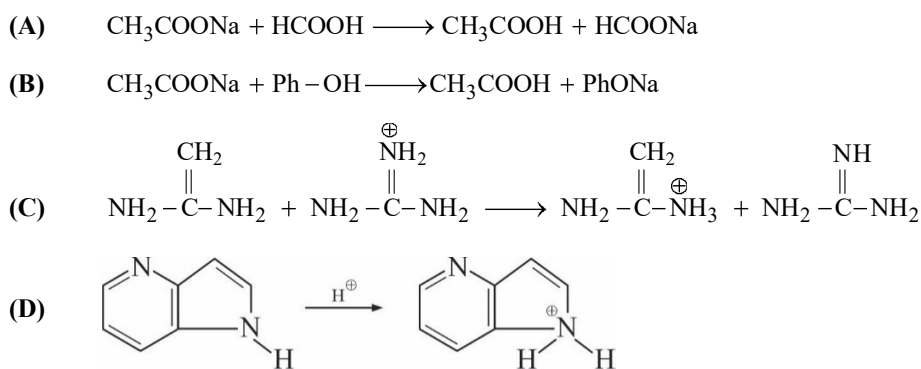
three equal contributing resonating structure

- (B) Diethylamine is stronger base than triethylamine in aqueous medium  
 (C) Ortho-methyl aniline is weaker base than para-methyl aniline  
 (D) 2, 4, 6-Trinitro-N, N-dimethyl aniline is stronger base than 2, 4, 6-Trinitro aniline

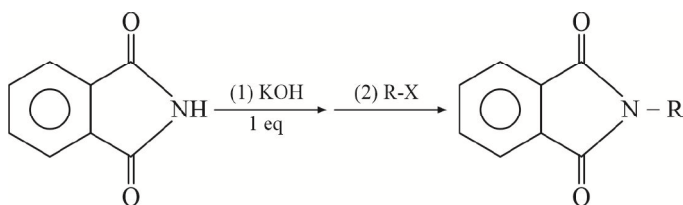
27. In which compounds (II) is more basic than (I)



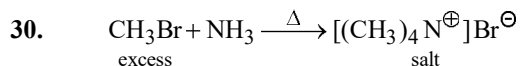
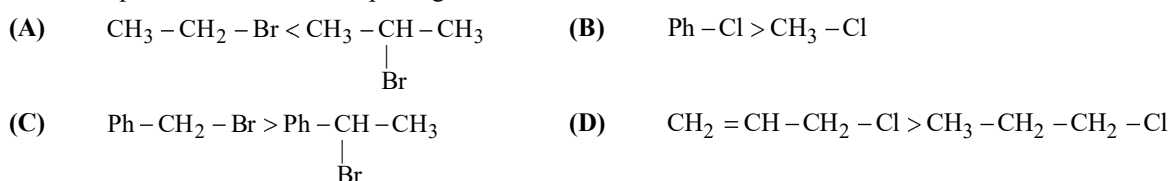
28. Which of the following reactions is/are not feasible:



29.



In which option correct rate for step 2 is given for the different R-X ?



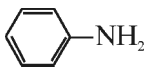
Correct statement for above reaction is/are :

- (A) Obtained by  $\text{S}_{\text{N}}2$  mechanism  
 (B)  $\text{NH}_3$  is nucleophile  
 (C) Reaction is through  $\text{S}_{\text{N}}1$  mechanism  
 (D) 4 equivalent of  $\text{NH}_3$  is used during reaction

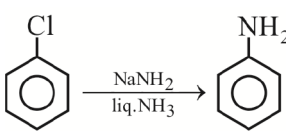
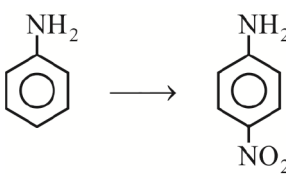
**MATRIX MATCH TYPE**

Each of the following question contains statements given in two columns, which have to be matched. Statements in Column 1 are labelled as (A), (B), (C) & (D) whereas statements in Column 2 are labeled as p, q, r, s & t. More than one choice from Column 2 can be matched with Column 1.

31. MATCH THE FOLLOWING:

Column 1		Column 2	
(A)	$\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$	(p)	Treatment of $\text{NaNO}_2$ , $\text{HCl}$ gives nitroso compound
(B)	$\text{CH}_3\text{CH}_2\text{NHCH}_3$	(q)	Treatment of $\text{NaNO}_2$ , $\text{HCl}$ gives stable diazonium chloride at lower temperature
(C)	$\text{H}_3\text{C}-\underset{\text{CH}_3}{\text{N}}-\text{CH}_3$	(r)	Treatment of $\text{CH}_3\text{I}$ (excess) followed by $\text{AgOH}$ , heat gives out alkene
(D)		(s)	Treatment with $\text{HCl}$ and on heating gives dealkylation.
		(t)	Treatment of benzene sulphonyl chloride produces the compound soluble in alkali

32. MATCH THE FOLLOWING:

Column I		Column II	
(A)		(p)	Elimination
(B)		(q)	Oxidation
(C)	$\text{R}-\text{CH}_2\text{NH}_2 \rightarrow \text{R}-\text{COOH}$	(r)	Electrophilic substitution
(D)	$\text{R}-\underset{\text{NH}_2}{\text{CH}}-\text{OH} \rightarrow \text{R}-\text{CH}=\text{NH}$	(s)	Nucleophilic substitution

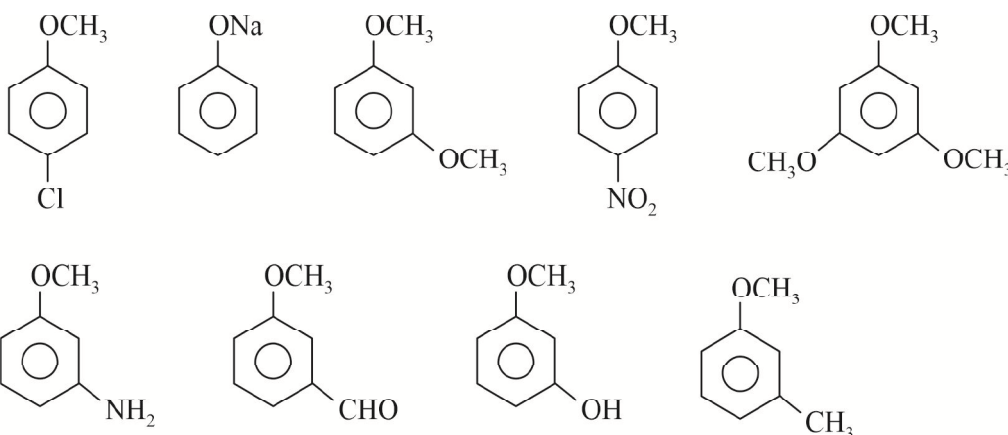
## Numerical Value Type

The Answer to the following questions are positive integers of 1/2/3 digits and zero

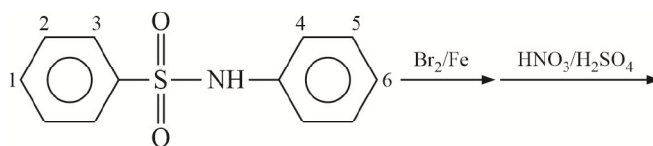
33. When  $\text{H}-\underset{\text{D}}{\overset{\text{Ph}}{\text{C}}}-\overset{\text{O}}{\parallel}{\text{C}}-\text{NH}_2$ ,  $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{NH}_2$  and  $\text{H}-\underset{\text{D}}{\overset{\text{CH}_3}{\text{C}}}-\text{CONH}_2$  are mixed and reacted with  $\text{Br}_2/\text{KOH}$  than how many products are obtained.

34.  $\text{H}_3\text{C}-\text{C}(\text{H})=\text{C}(\text{H})-\text{CH}_3 + \text{CH}_2\text{N}_2 \xrightarrow{h\nu}$  Total no. of possible products are


35. Nitrobenzene undergoes electrolytic reduction in acidic medium to produce phenylhydroxyl amine. How many electrons are involved in cathode half cell reaction per mole of nitrobenzene ?
36. How many of the following compounds are more reactive toward coupling reaction with diazonium salt than anisole ?



37. What is the percent of o-nitroaniline formed during nitration of aniline using nitrating mixture ?
38. Complete the following reaction



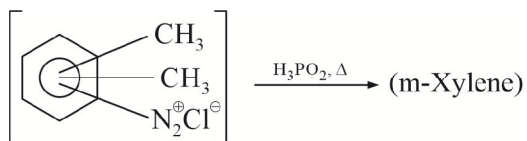
At which position nitration takes place ?

39.   $\xrightarrow{\begin{matrix} \text{(i) Conc. HNO}_3 + \text{Conc. H}_2\text{SO}_4 \\ \text{(ii) Sn/HCl} \\ \text{(iii) Br}_2/\text{H}_2\text{O} \\ \text{(iv) NaNO}_2 + \text{HCl}(0-5^\circ\text{C}) \\ \text{(v) Cu}_2\text{Br}_2 + \text{HBr} \end{matrix}}$  Product

What is the number of halogen atoms in final product ?



40. How many aromatic diazonium chlorides of xylene can be reduced to meta-xylene by  $\text{H}_3\text{PO}_2$ ?



41. A mixture of  $1^\circ$  amides (benzenoid) having molecular formula  $(\text{C}_8\text{H}_9\text{NO})$  reacted with  $\text{Br}_2 / \text{NaOH}$ . The number of  $1^\circ$  amines products formed will be :
42. How many p-orbitals are parallel to each other in the following conjugated system ?



43. Identify reaction correctly matched with their major products.

