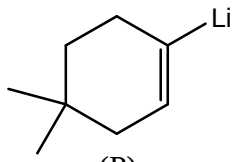
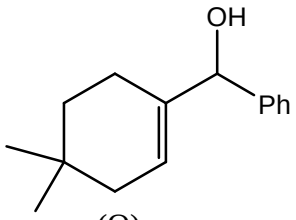
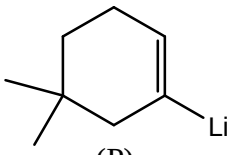
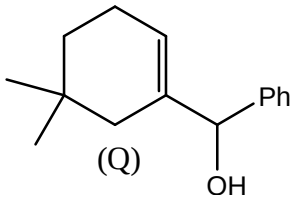
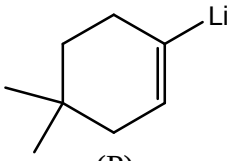
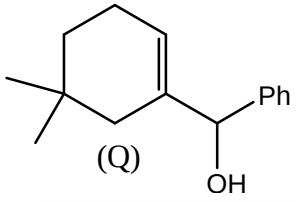
(b)  and 

(P) (Q)

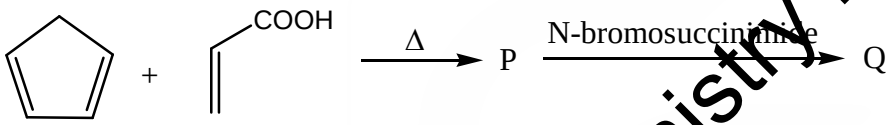
(c)  and 

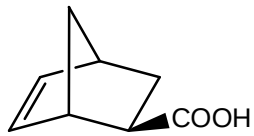
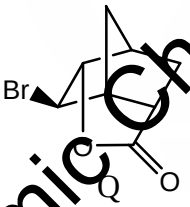
(P) (Q)

(d)  and 

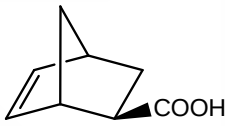
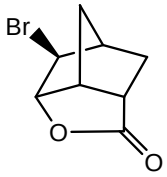
(P) (Q)

70. In the two step reaction shown below, identify the correct combination of products P and Q.

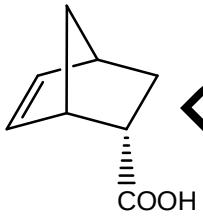
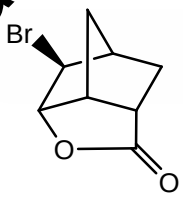


(a)  and 

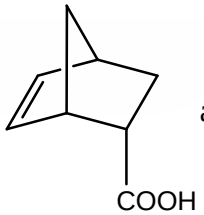
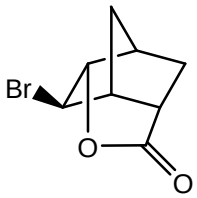
P Q

(b)  and 

P Q

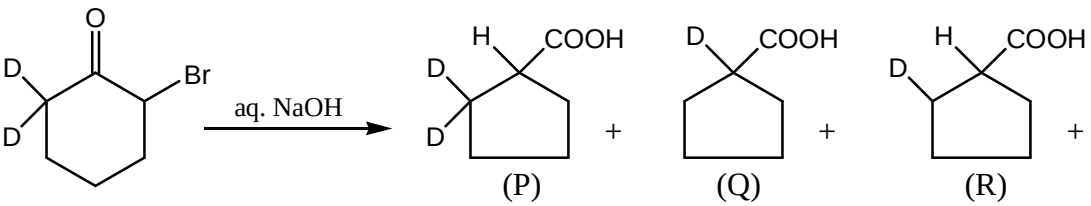
(c)  and 

P Q

(d)  and 

P Q

71. On the basis of Favorskii rearrangement mechanism, the ratio of the products P, Q and R given below, will be, respectively.

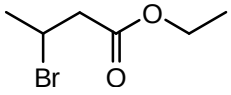


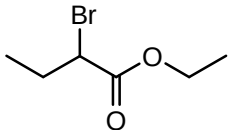
(P) (Q) (R)

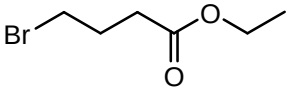
(a) 2 : 1 : 1 (b) 1 : 1 : 1 (c) 1 : 0 : 1 (d) 0 : 1 : 1

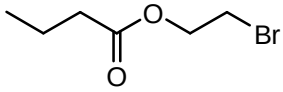
72. An organic compound having molecular formula $C_6H_{11}BrO_2$ exhibits the following peaks in ^1H NMR spectrum. δ $4.1\,(2H, q, J = 7.5\ Hz)$, $4.0\,(2H, t, J = 7.5\ Hz)$, $1.5 - 2.2\,(4H, m)$, $1.25\,(3H, t, J = 7.5\ Hz)$

The structure of the compound is:

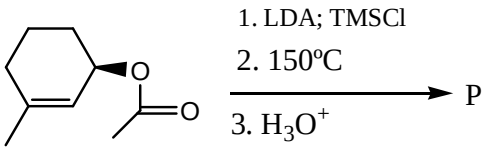
(a) 

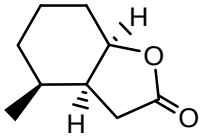
(b) 

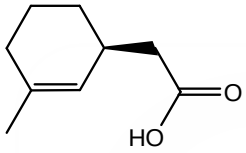
(c) 

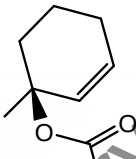
(d) 

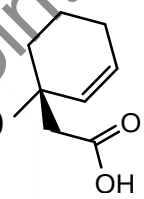
73. The product P formed in the following three steps reaction is:



(a) 

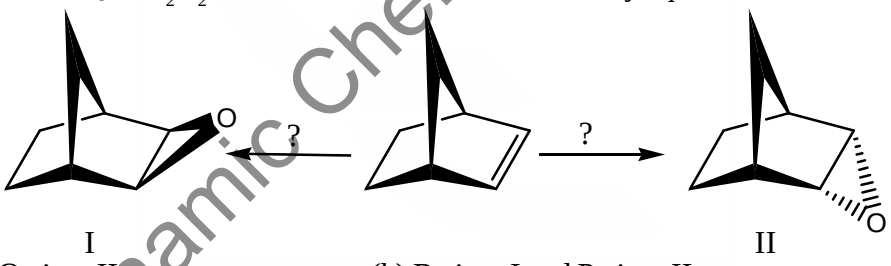
(b) 

(c) 

(d) 

74. Identify the correct choice of reagents, among P, Q and R, for the transformation of norbornene into the epoxides I and II

P=H_2O_2–AcOH Q = H_2O_2–NaOH R=HOBr followed by aq. NaOH.

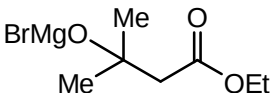


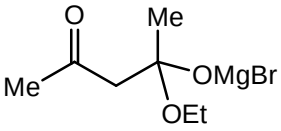
I II

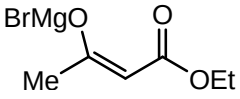
(a) P gives I and Q gives II (b) R gives I and P gives II

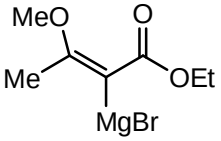
(c) Q gives I and R gives II (d) P gives I and R gives II

75. Reaction of ethyl acetoacetate with one equivalent of methylmagnesium bromide gives

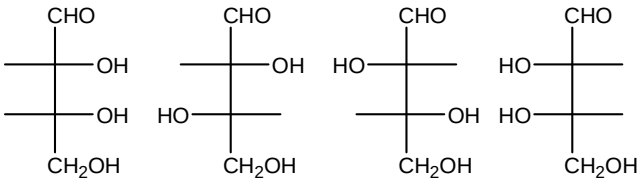
(a) 

(b) 

(c) 

(d) 

76. For the aldotetroses I-IV, the combination of TRUE statements, among P-T, is:



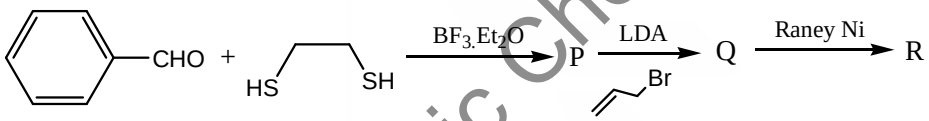
P=I and II are diastereomers and II and III are enantiomers.
Q=I and IV are mesomers and are optically inactive.
R=I and III can be interconverted by a base catalysed isomerisation.
S=only I and IV are HIO_4 cleavable.
T=I and III are D-sugars and II and IV are L-sugars.
(a) Q, R, T (b) P, R, T (c) Q, S, T (d) P, Q, S

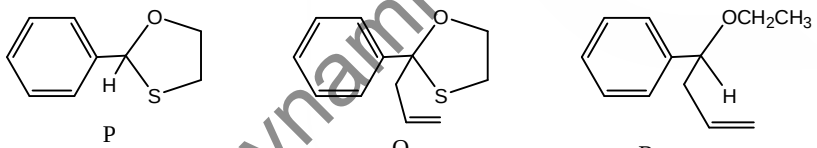
77. Match the compounds P-S with their carbonyl stretching frequencies (cm^{-1}) I–VI in IR spectroscopy.

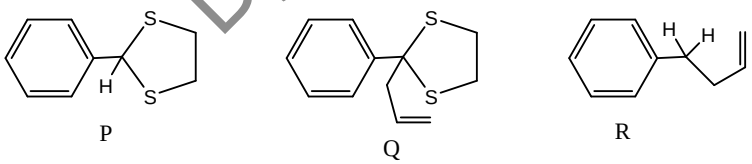
P. acetone	I. 1870
Q. ethyl acetate	II. 1800
R. acetamide	III. 1740
S. acetyl chloride	IV. 1700
	V. 1660
	VI. 1600

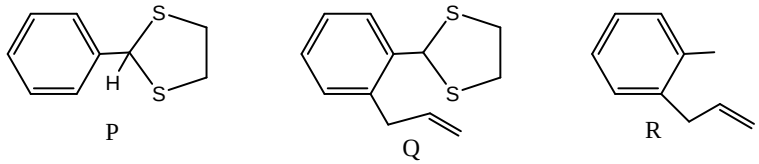
(a) P-IV, Q-III, R-I, S-VI (b) P-III, Q-VI, R-V, S-II
(c) P-IV, Q-III, R-V, S-II (d) P-II, Q-V, R-III, S-VI

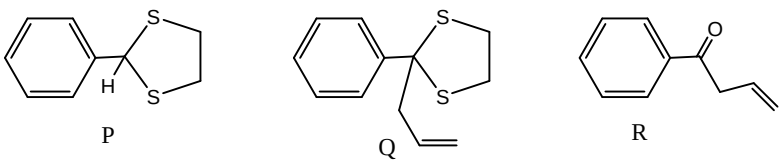
78. In the following three step transformation, identify the correct combination of product P, Q and R. [LDA=$LiN(^iPr)_2$].



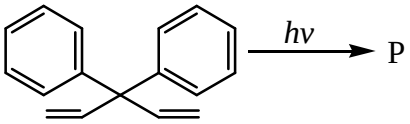
(a)


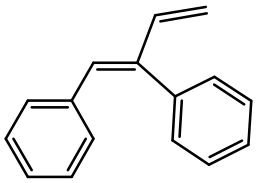
(b)


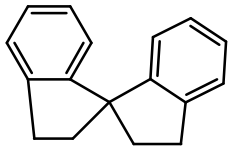
(c)


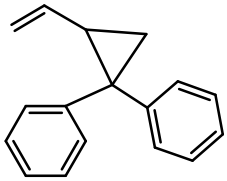
(d)


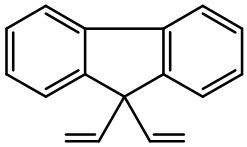
79. The major product P formed in the following photochemical reaction is:



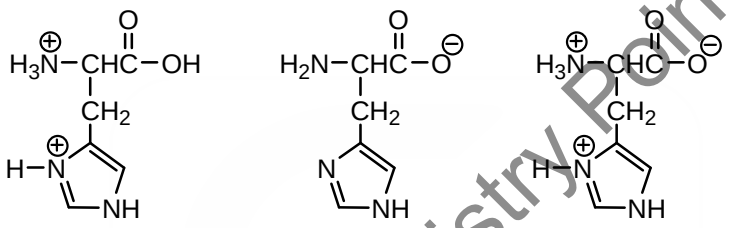
(a) 

(b) 

(c) 

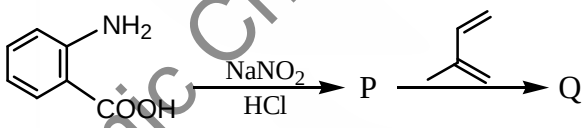
(d) 

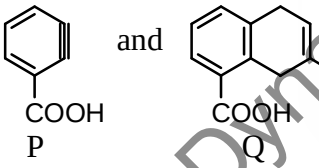
80. Three molecular ionic states, P-R, are possible for the amino acid histidine. Identify the correct choice of pH values, respectively, for the observation of the ionic states P-R.

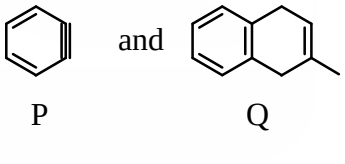


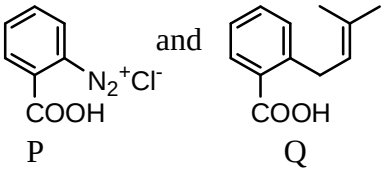
(a) P at pH 1; Q at pH 12 ; R at pH 7
(b) P at pH 7; Q at pH 1; R at pH 12
(c) P at pH 12; Q at pH 7; R at pH 1
(d) P at pH 12; Q at pH 1; R at pH 7

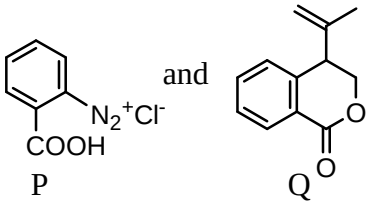
81. In the reaction shown below, identify the correct combination of the intermediate P and the product Q.



(a) 

(b) 

(c) 

(d) 

82. – 90. contain a Statement with a Reason and an Assertion. for each question, choose the correct answer from the following four choices.
(a) Both Reason and Assertion are correct
(b) Both reason and Assertion are wrong
(c) Reason is correct and Assertion is wrong
(d) Reason is wrong but Assertion is correct

82. **Statement :** solid carbon dioxide is called as dry ice.
Reason : CO_2 sublimes when kept in open atmosphere.
Assertion : Triple point of CO_2 lies above one atmosphere.

83. **Statement :** Entropy of pure, perfectly crystalline substance is zero at absolute zero of temperature.
Reason : At absolute zero, molecules can have only one orientation.
Assertion : Statistical definition of entropy is given by the equation, S = k ln W, where W is the probability of orientation

84. **Statement :** Catalytic decomposition of ammonia on platinum takes place at 1000°C.
Reason : Ammonia is more strongly adsorbed than hydrogen on platinum.
Assertion : The rate law for the decomposition of ammonia on platinum is given as, $\text{Rate} = k\frac{p_{NH_3}}{p_{H_2}}$.

85. **Statement :** $CoCl_4^{2-}$ is a regular tetrahedron but $CuCl_4^{2-}$ is a distorted tetrahedron.
Reason : Unsymmetrical distribution of electrons in e_g orbital leads to distortion in $CuCl_4^{2-}$.
Assertion : Cl^- ligands interact differently with orbitals of unequal electron population. This leads to distortion in tetrahedral geometry.

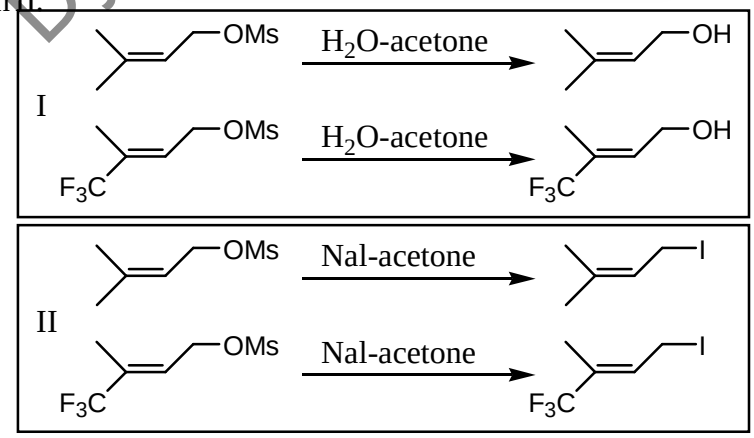
86. **Statement :** Schottky and Frenkel defects are stoichiometric defect occurring in crystal lattices.
Reason : Schottky defects are due to the absence of one positive and one negative ion and Frenkel defects are due to the presence of one hole and one ion in an interstitial position.
Assertion : The ratio of number of atoms of one kind to the number of atoms of the other kind does not correspond exactly to the ideal whole number ratio implied by the formula which leads to stoichiometric defects.

87. **Statement :** Ga is below Al in Group IIIA, yet the atomic size of Ga is almost the same as that of Al.
Reason : Lanthanide contraction
Assertion : Poor shielding of nuclear charge results in outer electrons being more firmly held by the nucleus.

88. **Statement:** 5-Bromopyrimidine ($C_4H_3BrN_2$) exhibits two prominent peaks in the mass spectrum at m/z 158 and 160 in the ratio of 1:1.
Reason: There are two basic centres in the molecule, which are protonated.
Assertion: There are two isotopes of bromine, ^{79}Br and ^{81}Br, that occur in the ratio of 1:1.
Choose the correct answer from the following four choices.
(a) Both Reason and Assertion are correct. (b) Both Reason and Assertion are wrong
(c) Reason is correct and Assertion is wrong. (d) Reason is wrong but Assertion is correct.

89. **Statement :** Pyridine is more basic than pyrrole.
Reason : The nitrogen in pyrrole carries a proton while the nitrogen in pyridine does not.
Assertion : Nitrogens in trigonal geometry are generally more basic than the nitrogens in tetrahedral geometry.

90. **Statement :** Replacement of CH_3 with CF_3 decreases the rate decreases the rate of reaction I, but increases the rate of reaction II.



Reason : Reaction I proceeds through SN_1 mechanism and reaction II proceeds through SN_2 mechanism.
Assertion : Being an electron withdrawing group, CF_3 destabilizes the transition state in SN_1 reaction, but stabilizes the transition state in SN_2 reaction.