

Note Each Isomer must have at least 1 degree of Unsaturation.

(11)



(Ring-chain Isomers)

✓

MF:  $C_3H_6$ MF:  $C_3H_6$ 

(12)



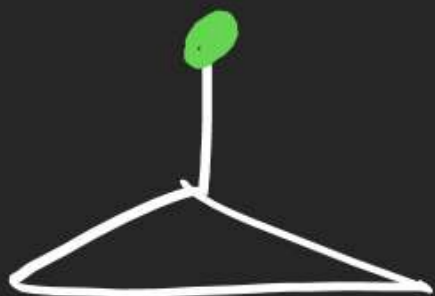
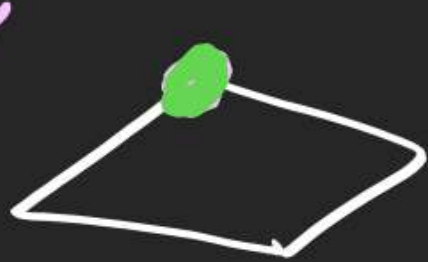
Ring chain

(13)



Ring chain

(14)



Ring chain Isomer

(15)



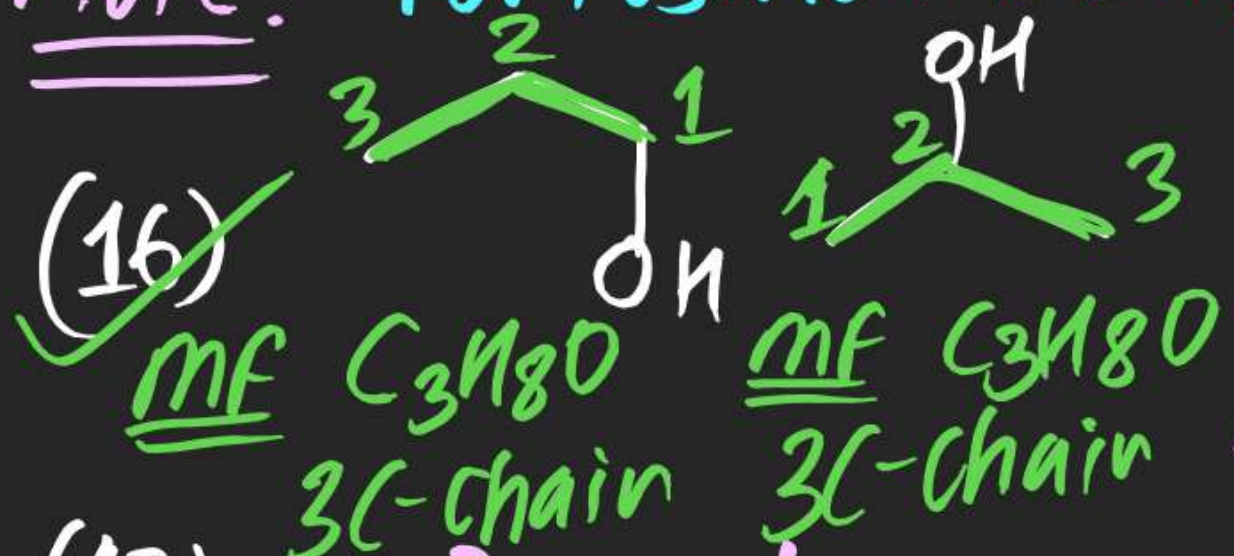
Ring chain



# (#) Position Isomerism:

⇒ Compounds having same m.f But different position of atoms/groups are known as Position isomers.

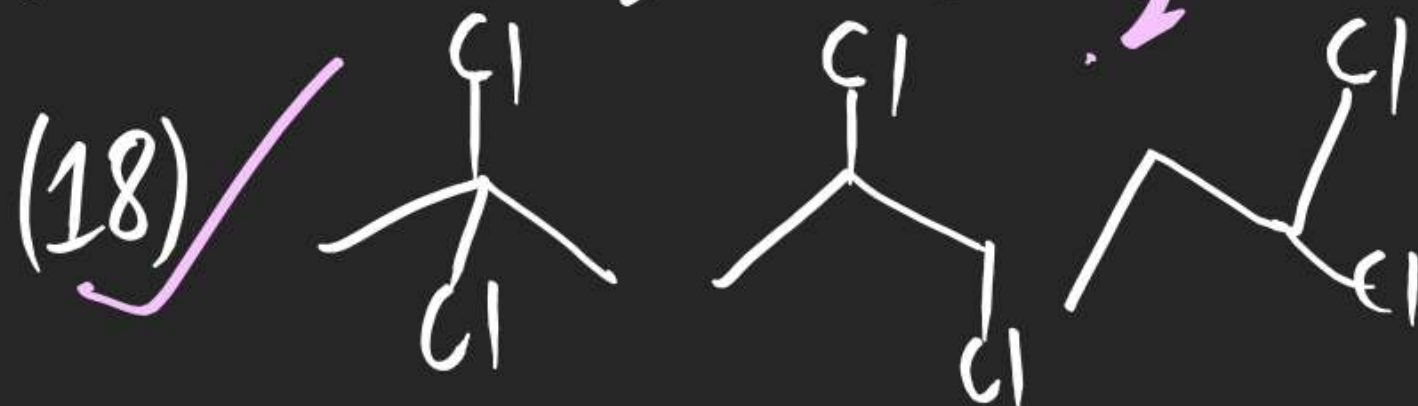
Note: For Position isomers, Chain length must be same.



Position Isomers.

2nd in class

10th Rank in class

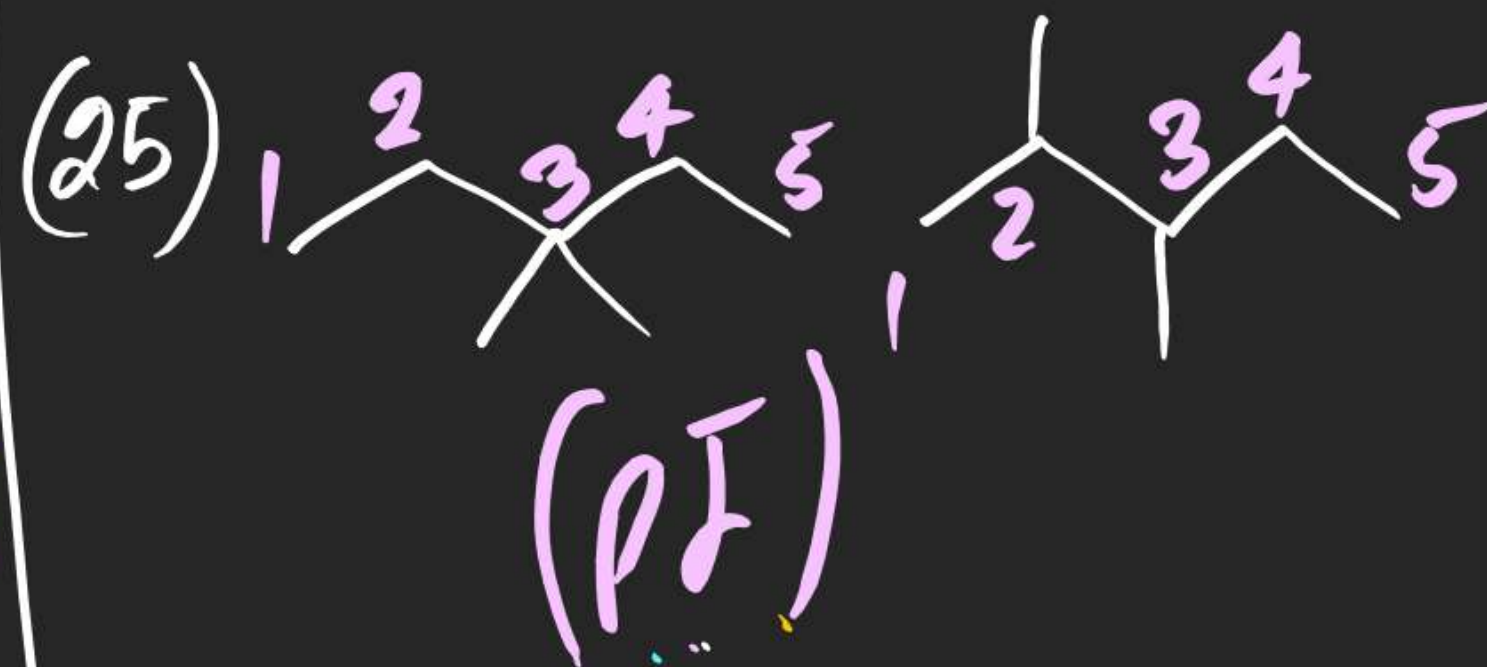
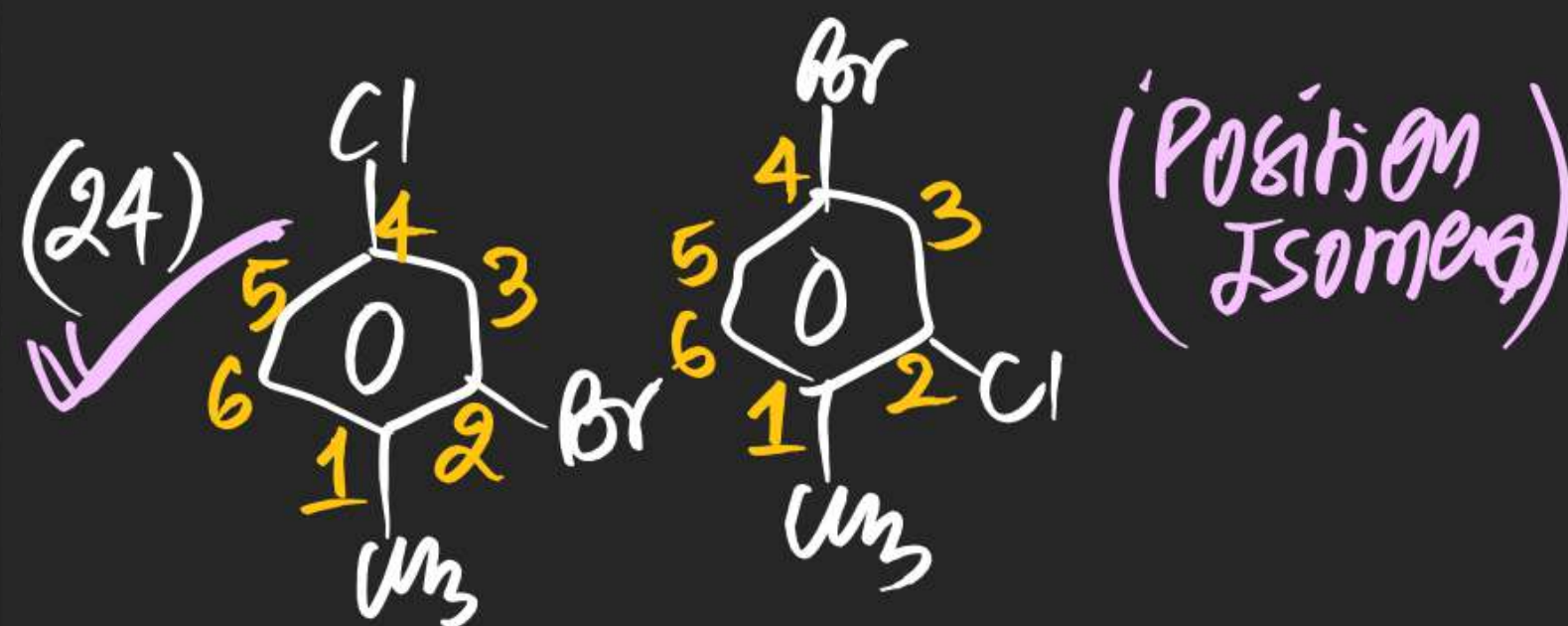
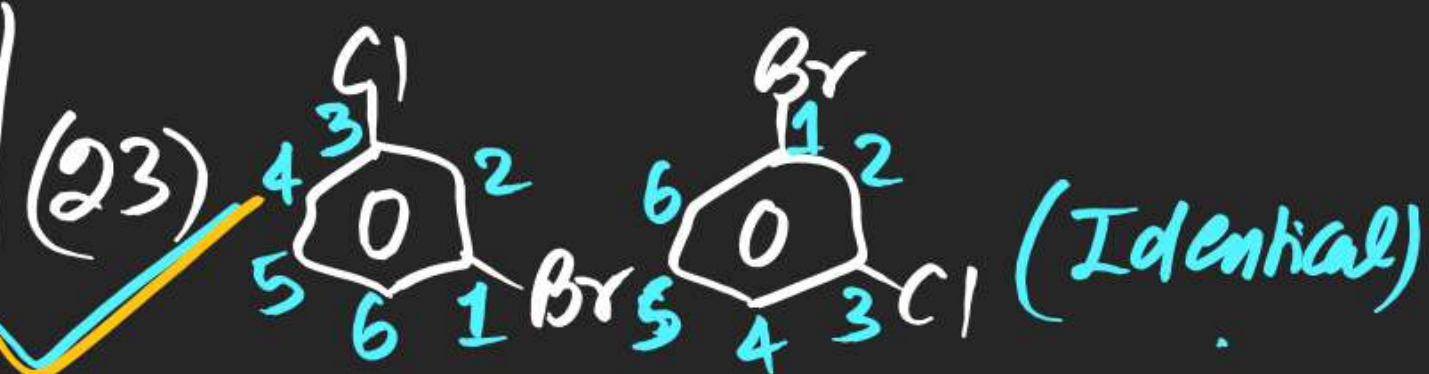
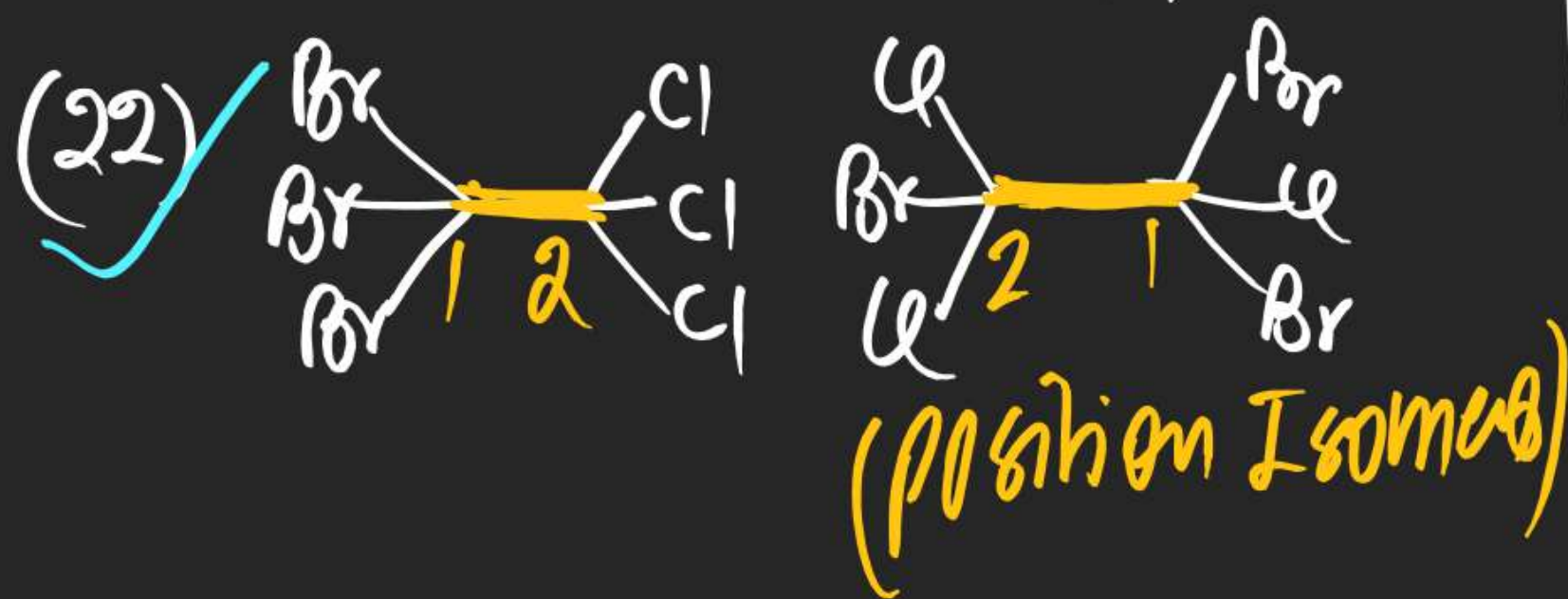
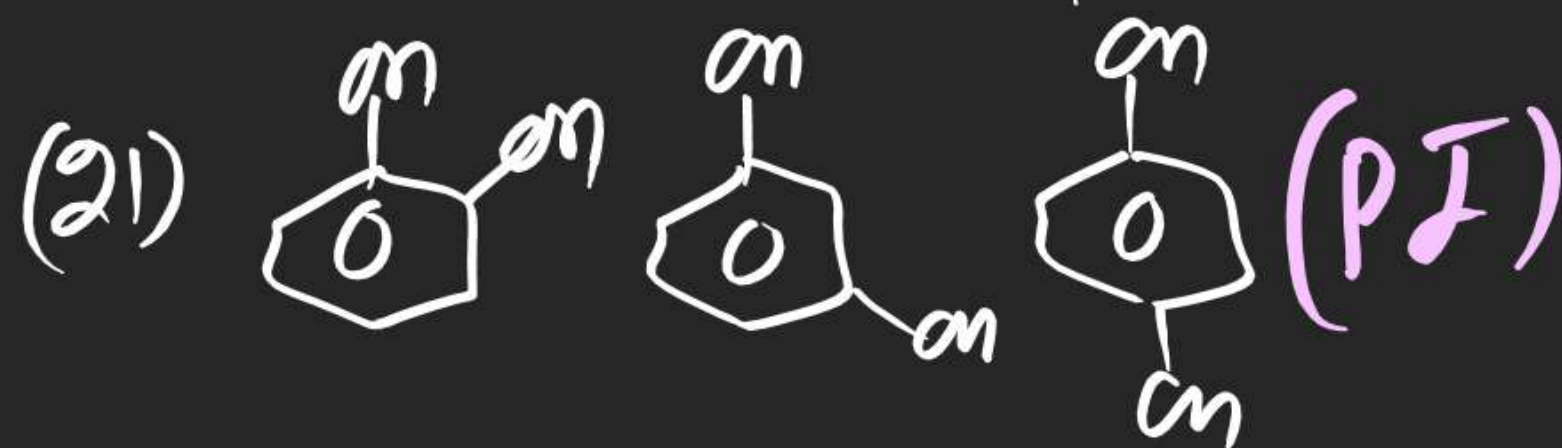
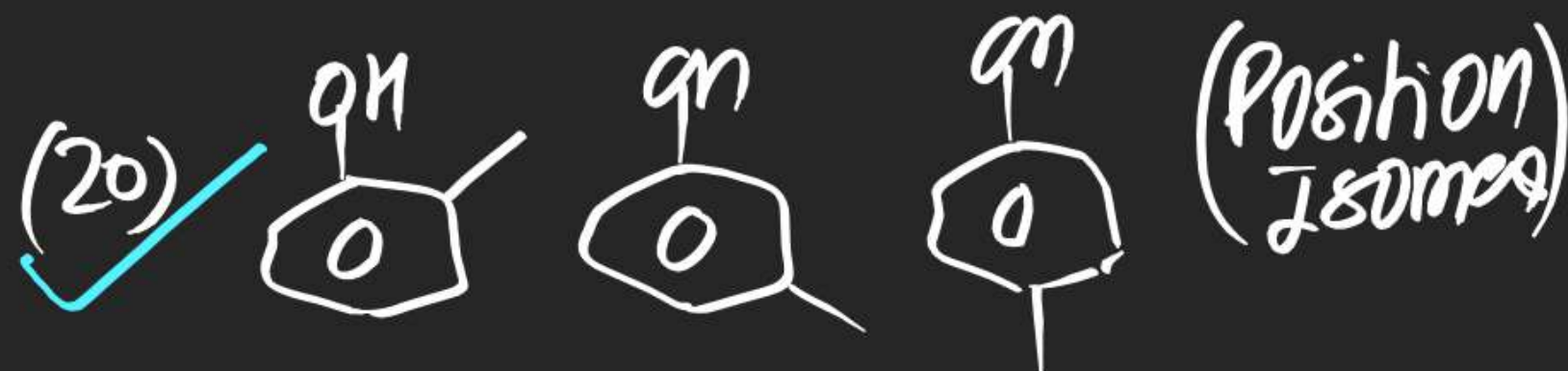
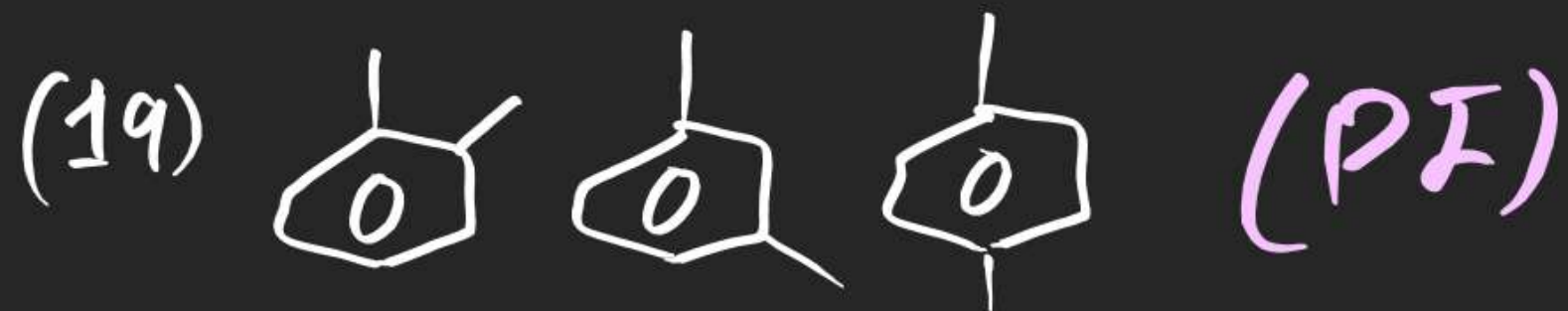


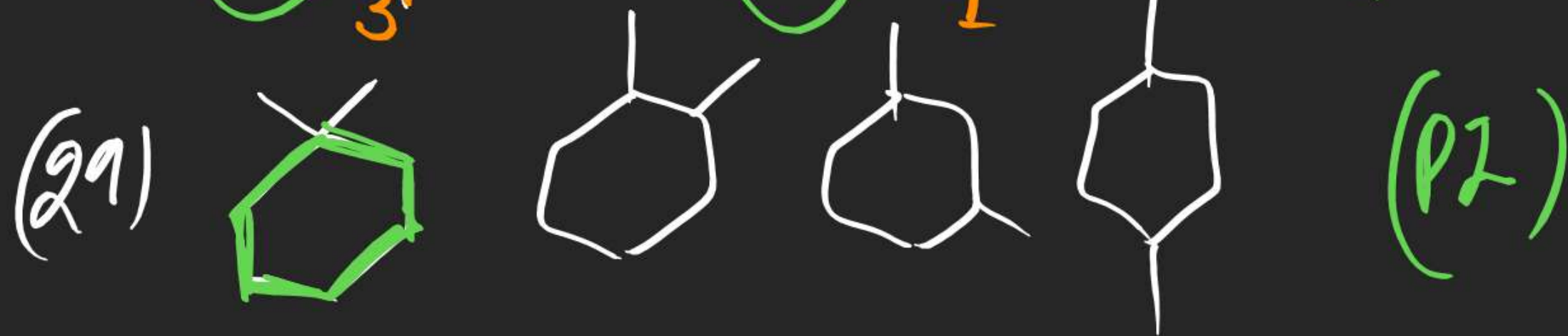
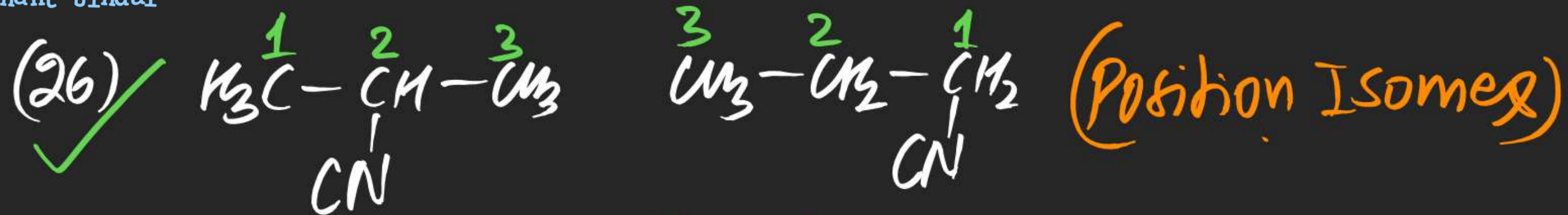
Position isomers.

2 students

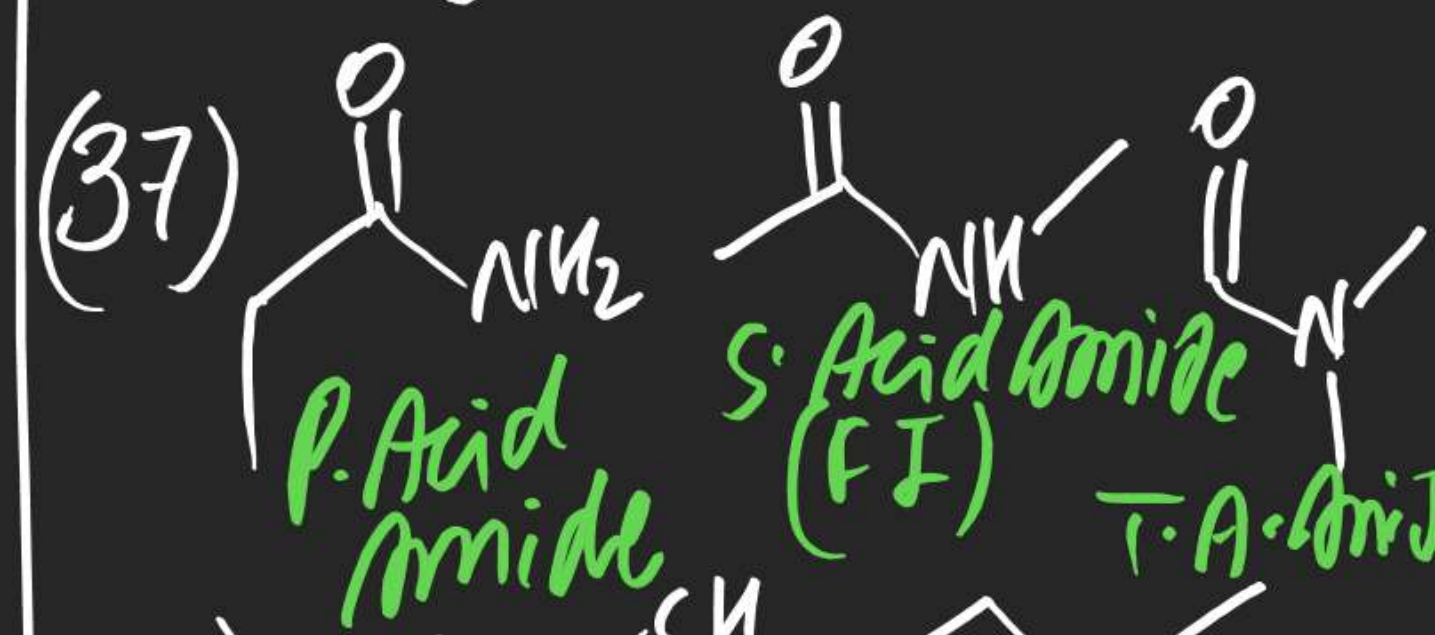
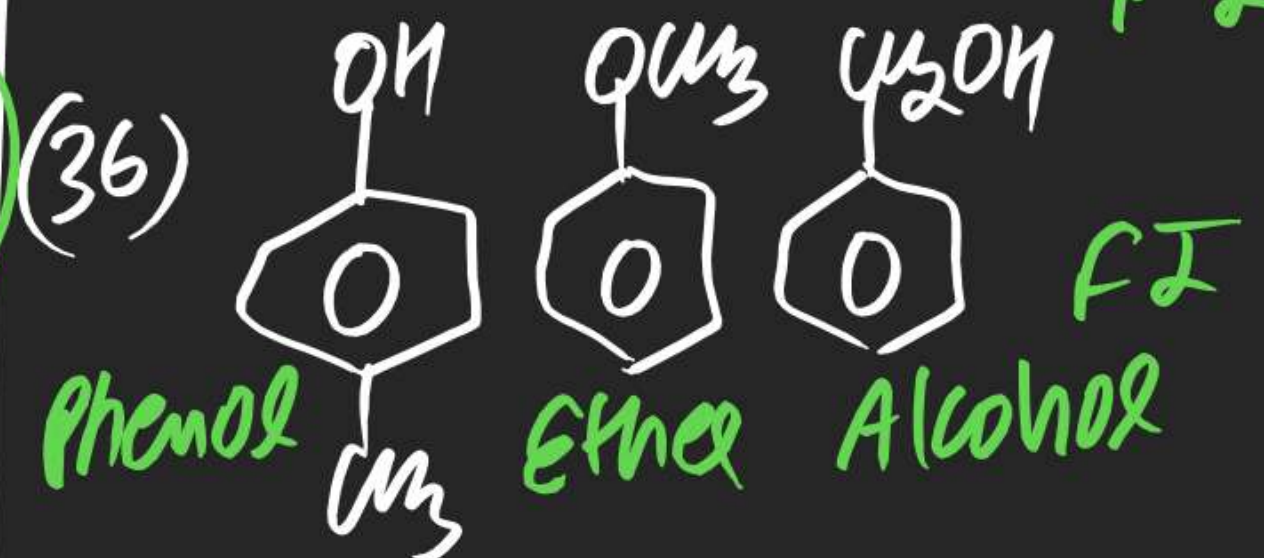
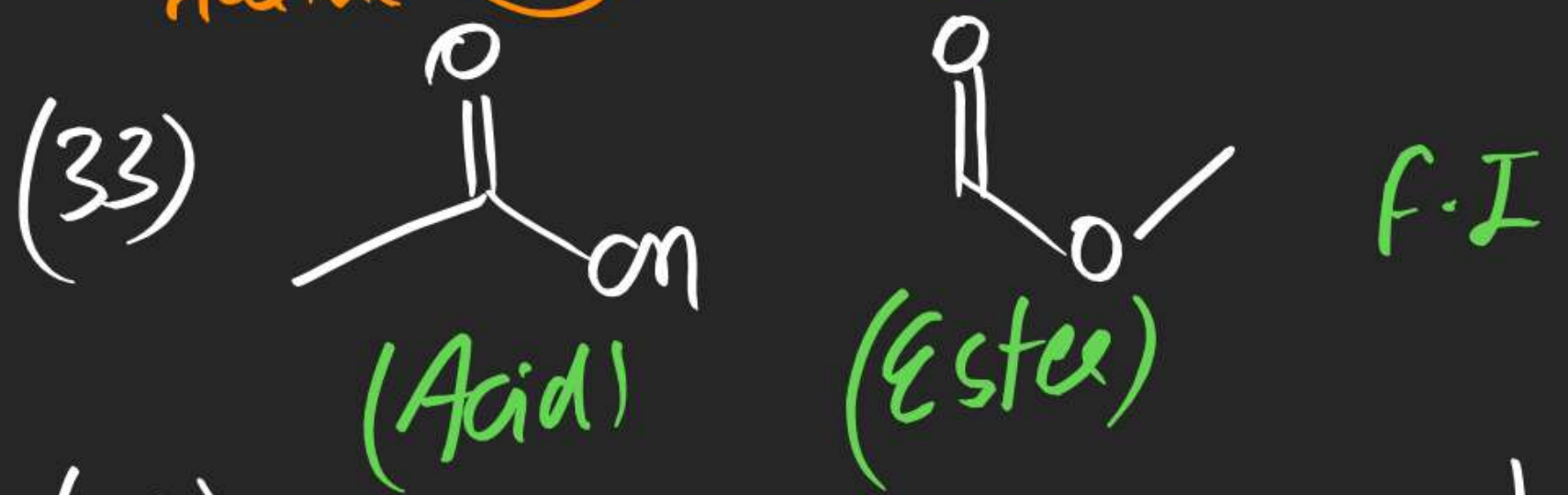
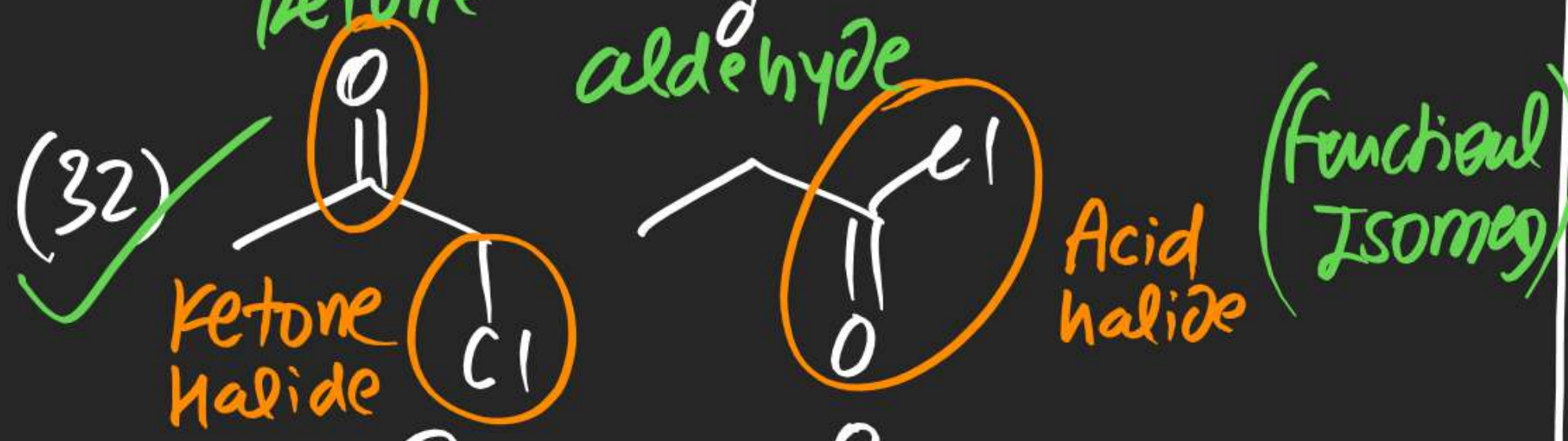
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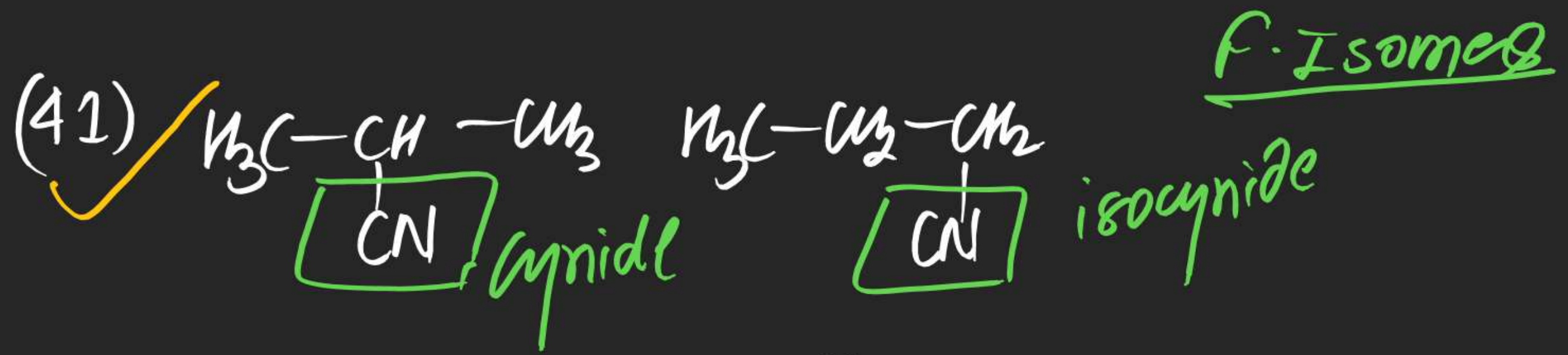
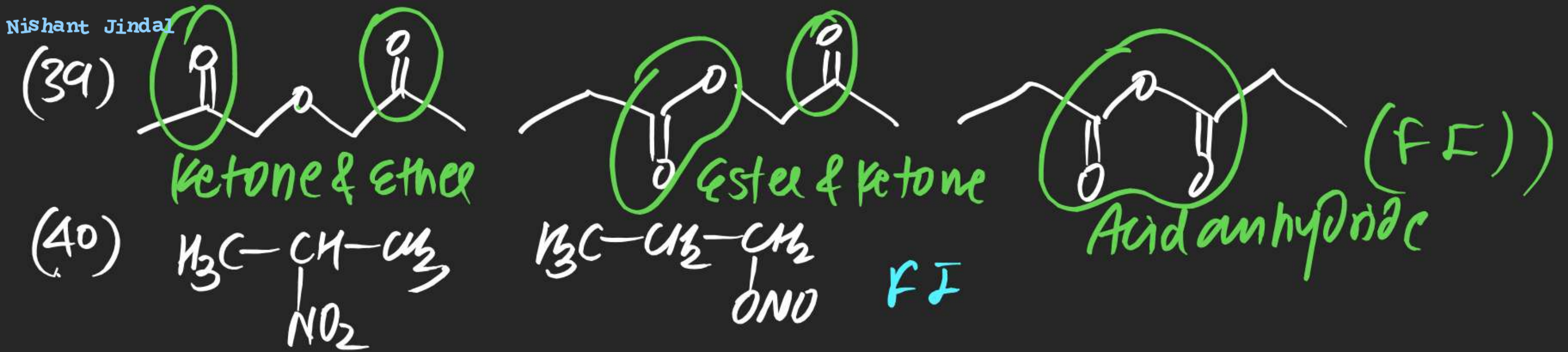






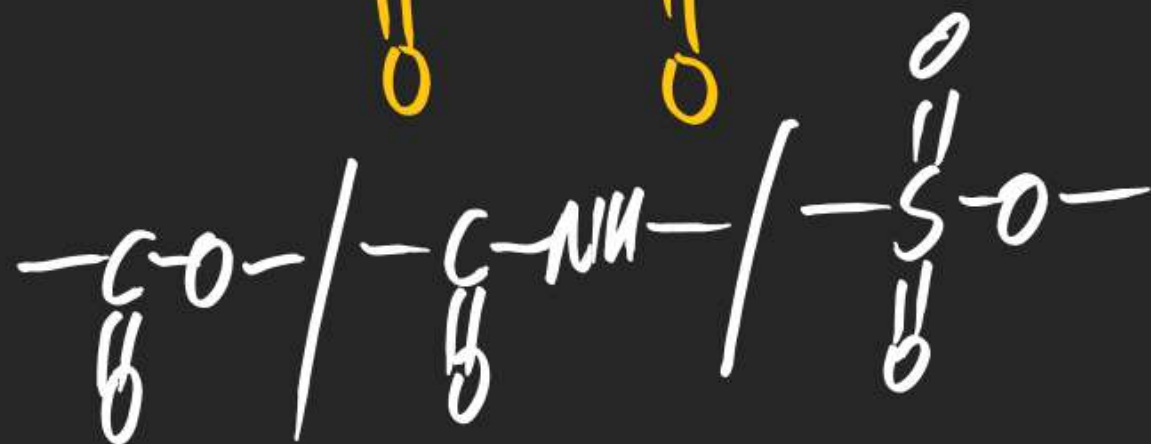
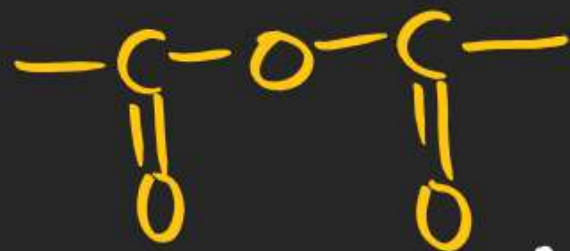






(#) metamerism: Compounds having same MF But differ in alkyl groups w.r. to Bivalent functional groups.

monovalent







MF  $\Rightarrow$   $C_4H_{10}O$

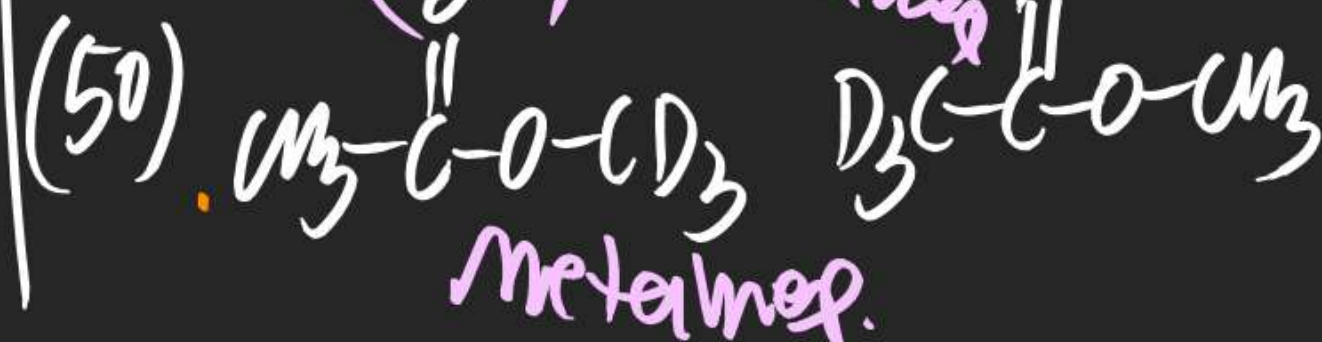
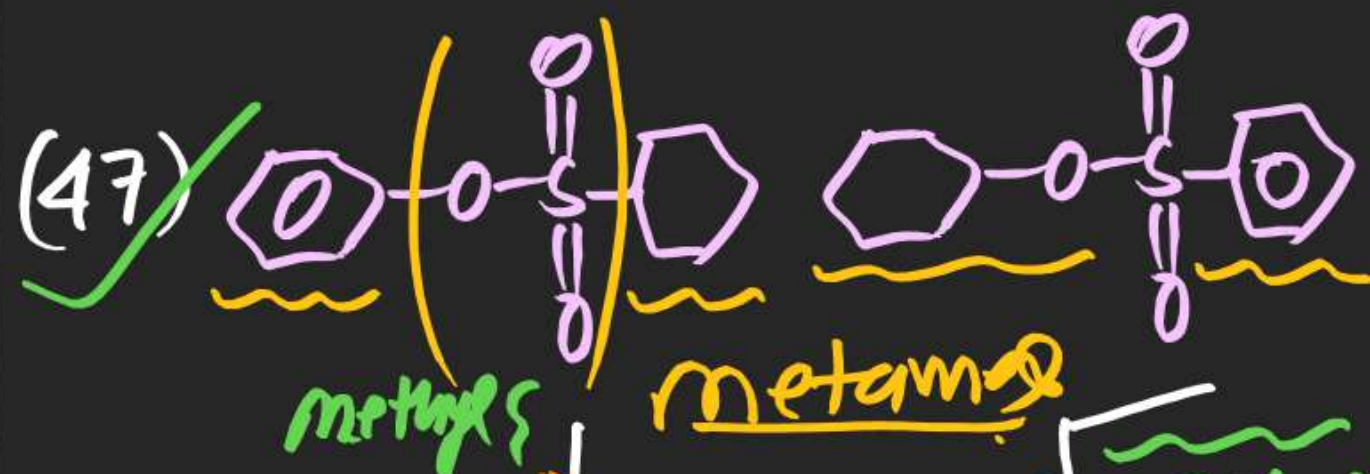
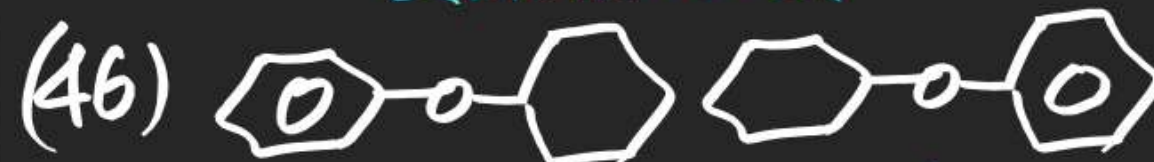
MF  $C_4H_{10}O$



metamer



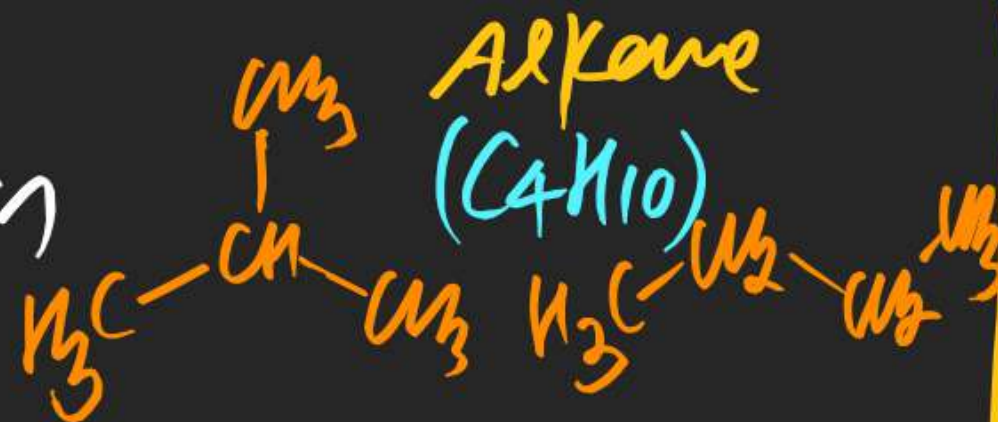
Identical



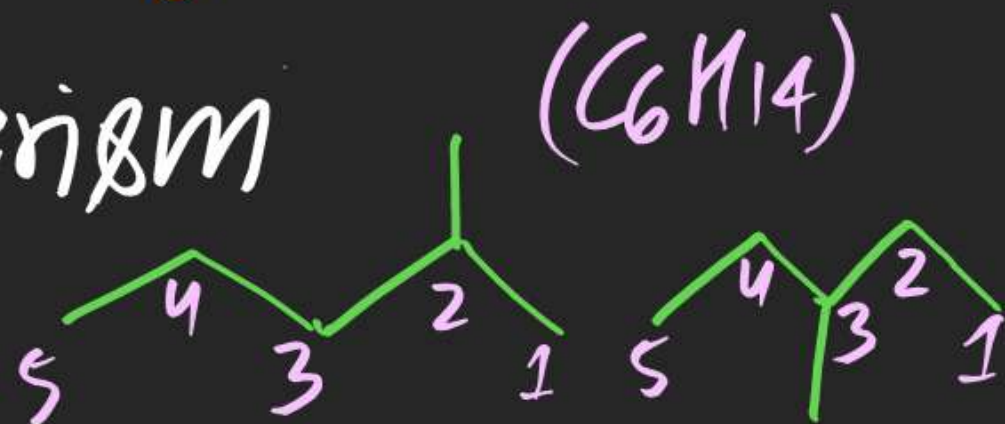


(51) Draw HydroCarbon with least mol. wt which can show.

(a) Chain isomerism



(c) Position isomerism



(b) Ring chain isomerism

X

Alkene  
( $C_4H_8$ )



( $C_4H_8$ )



$C_3H_6$



Alkyne  
( $C_5H_8$ )



$C_4H_6$



$C_3H_4$

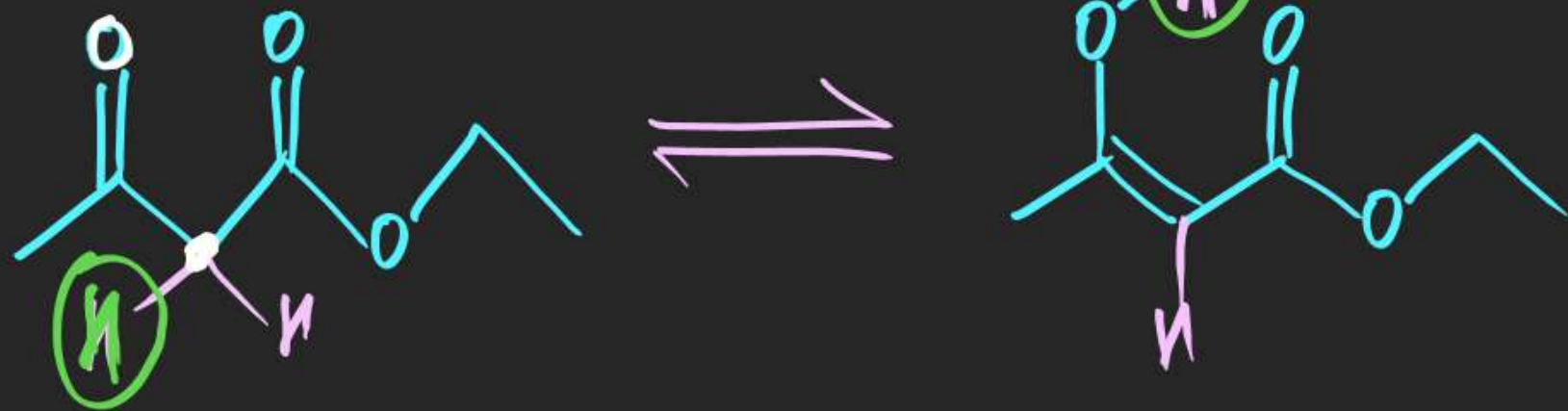




**Tautomerism:** Such kind of Isomerism arises due to oscillation of monovalent atom.

⇒ Frankland  
 $C_6H_{10}O_3$

Duppa.  
 $C_6H_{10}O_3$



- ⇒ Intracconvertible
- ⇒ dynamic equilibrium
- ⇒ Can't be separated at Room Temp.
- ⇒ Tautomerism.



Ex: A organic compound having MF  $C_6H_{10}O_3$  (DOV=2)  
give following observation.

- (a) (+) ve Test for ester ( $\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{O}- \end{array}$ )  
 (b) (+) \_\_\_\_\_ Ketone ( $\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}- \end{array}$ )  
 (c) \_\_\_\_\_ Alcohol ( $-\text{OH}$ )  
 (d) \_\_\_\_\_ Unsaturation (alkene) ( $\text{C}=\text{C}$ )

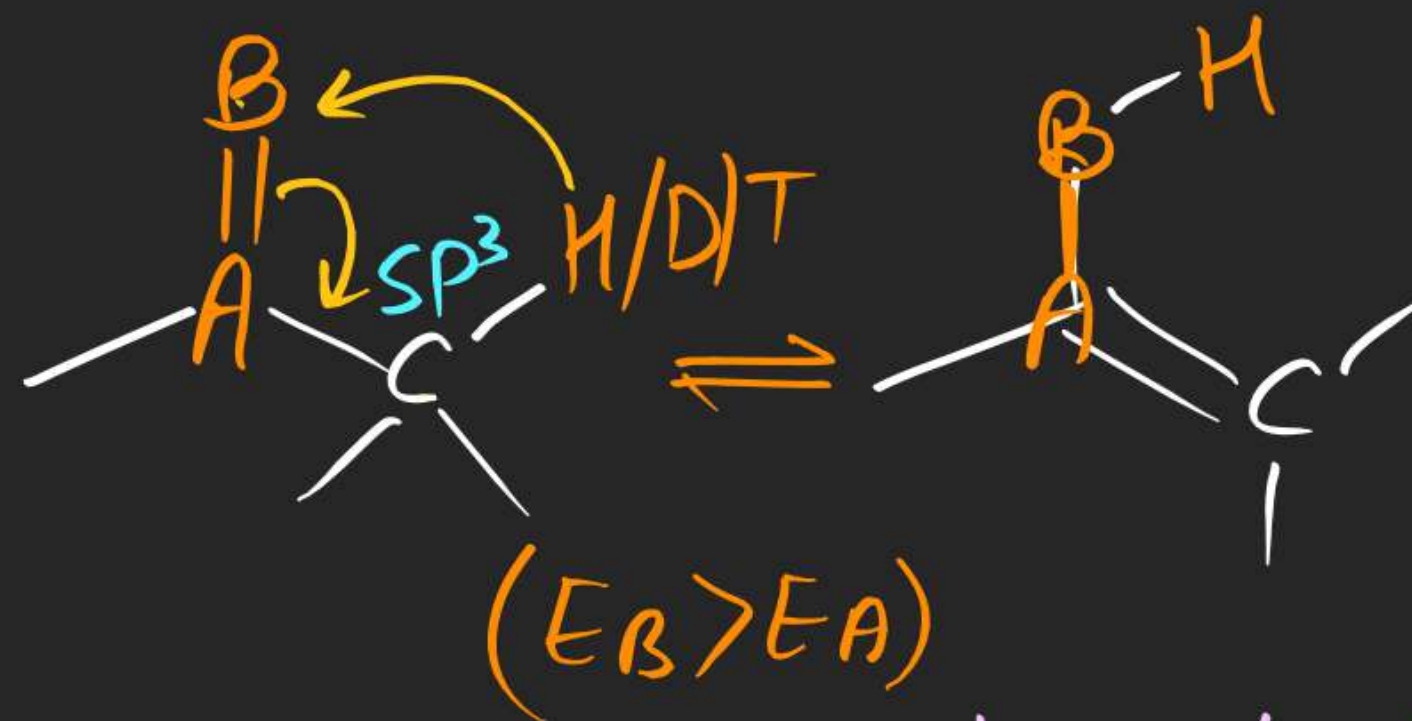
Comment on comp. of organic composition.

Soln:





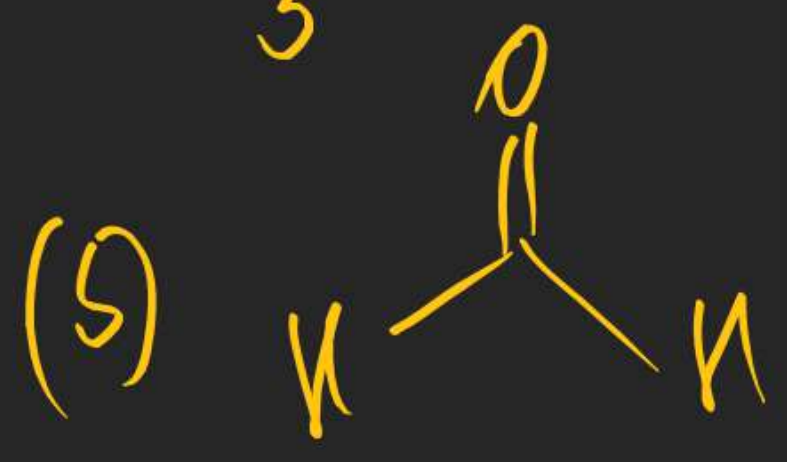
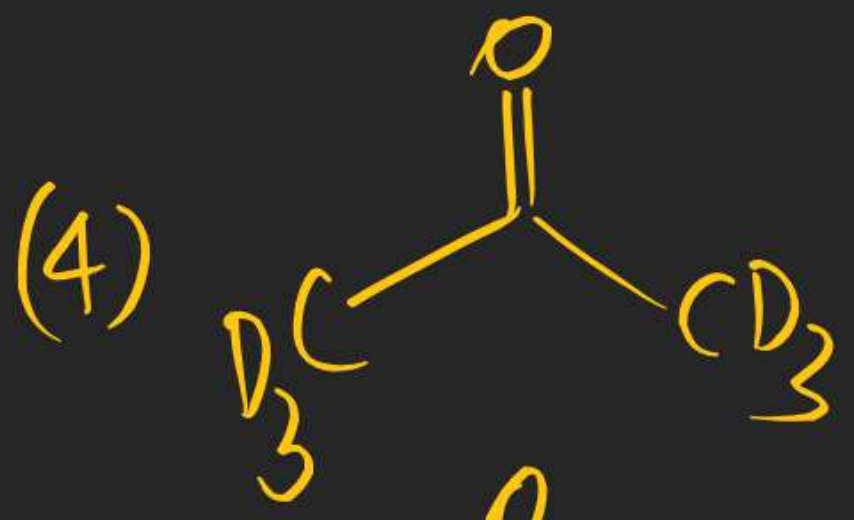
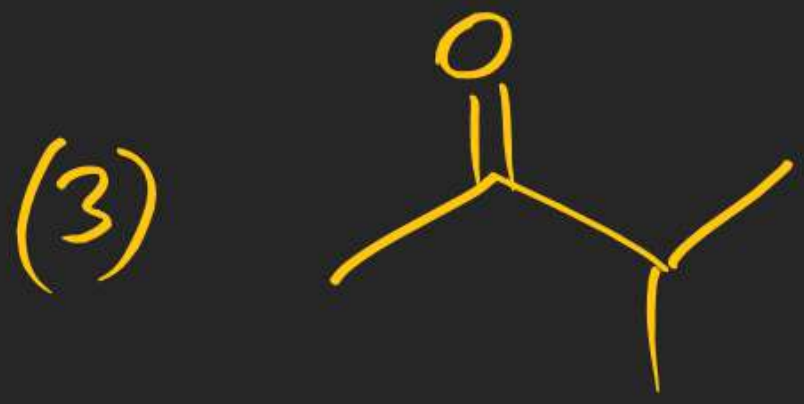
# (#) Condition of Tautomerism:



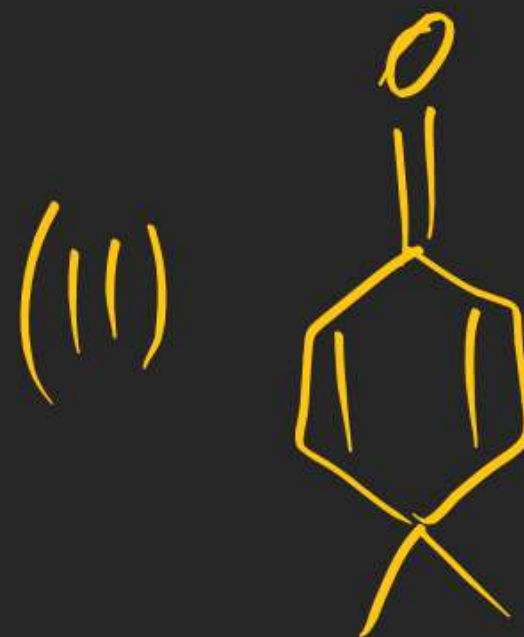
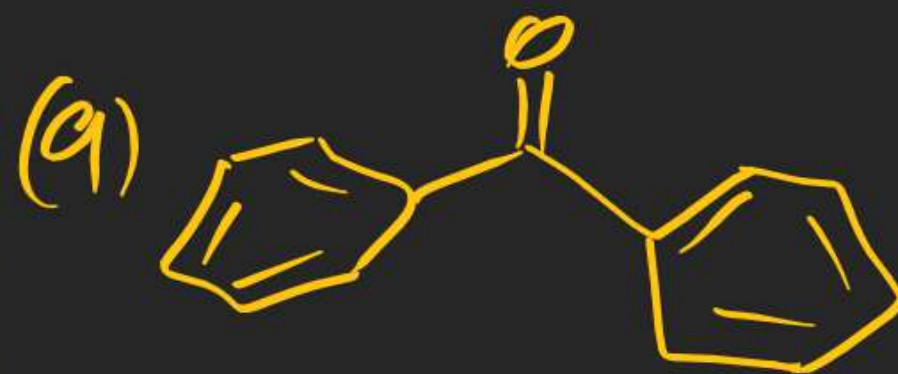
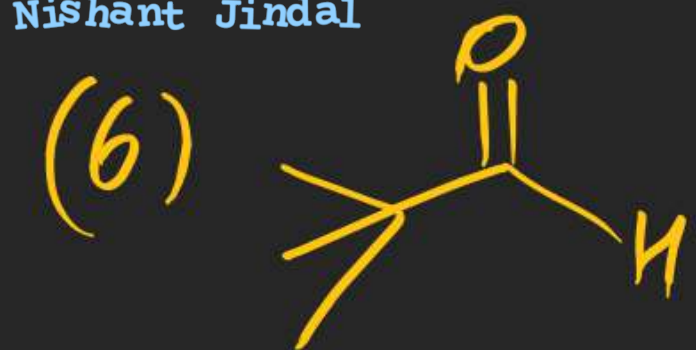
Ex: Identify compounds which can show tautomerism & also draw its First two stable tautomers.









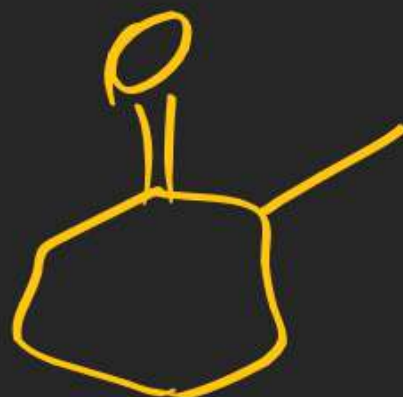




(12)



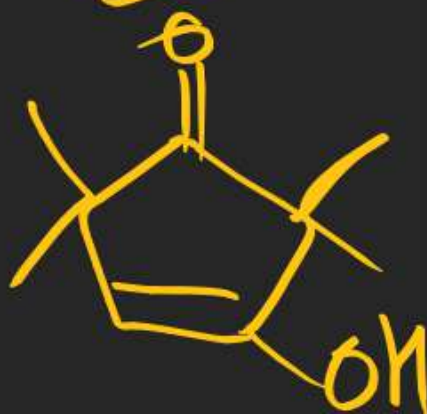
(13)



(14)



(15)





(16)



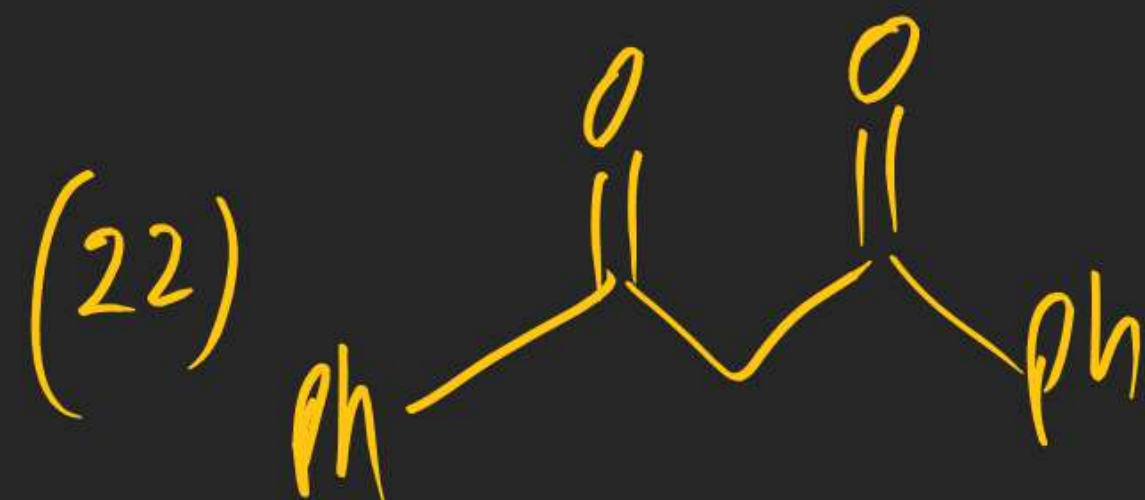
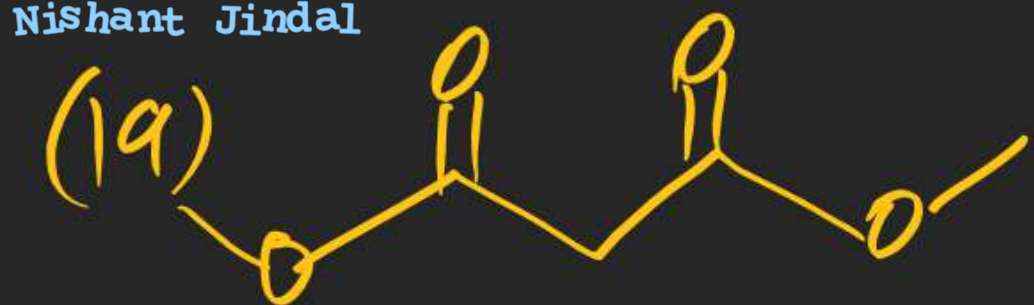
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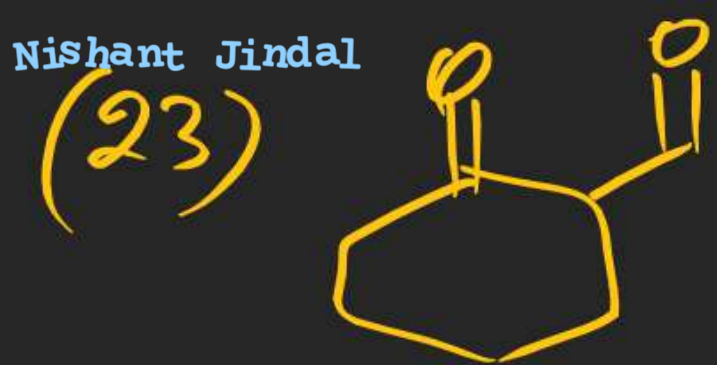


(18)











(27)



(28)



(29)



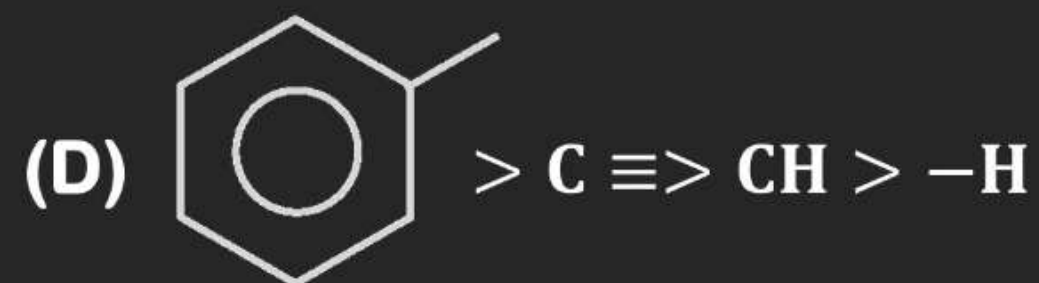
(30)



## General Organic Chemistry

EXERCISE – I

Q.1 Which of the following is false order of – I effect?



EX-2  
BB

GOC sheet  
EX-1  
GOC (1-25)



Q.17 Which of the following groups can either donate or withdraw a pair of electrons in resonance depending upon situation:

(a)  $-\text{NO}_2$

(b)  $-\text{NO}$

(c)  $-\text{CH}=\text{CH}_2$

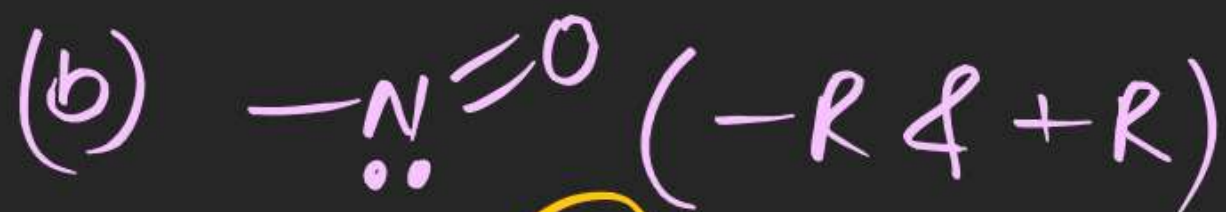
(d)  $-\text{CHO}$

(e)  $-\text{NH}_2$

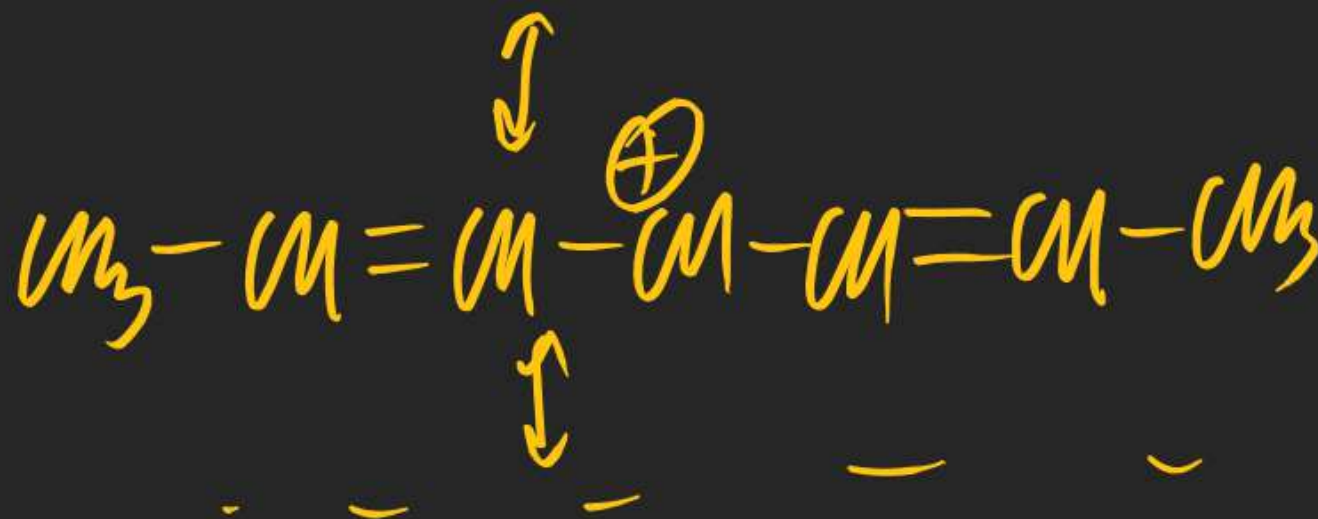
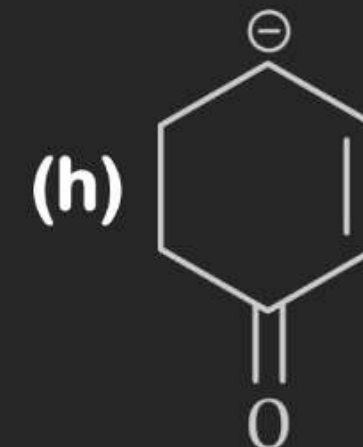
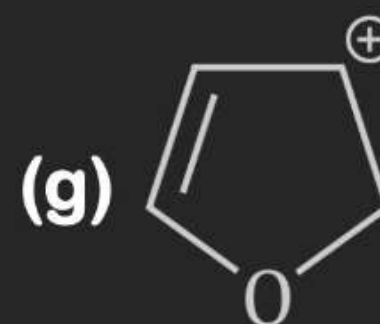
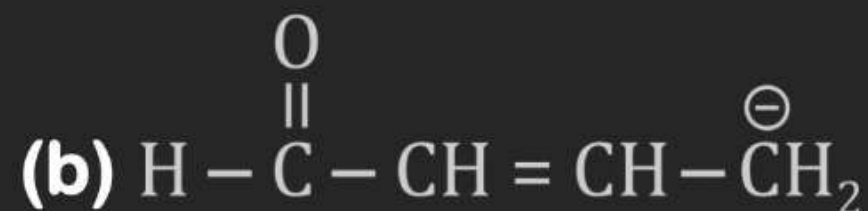
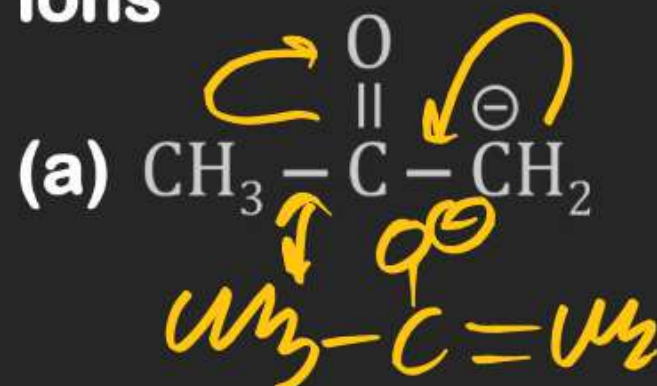
(f)  $-\text{N}=\text{NH}$

(-R)

(+R)

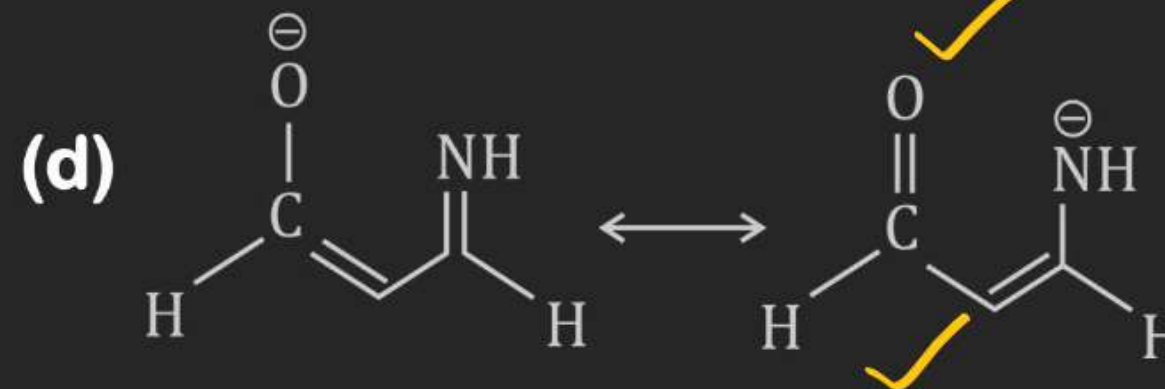
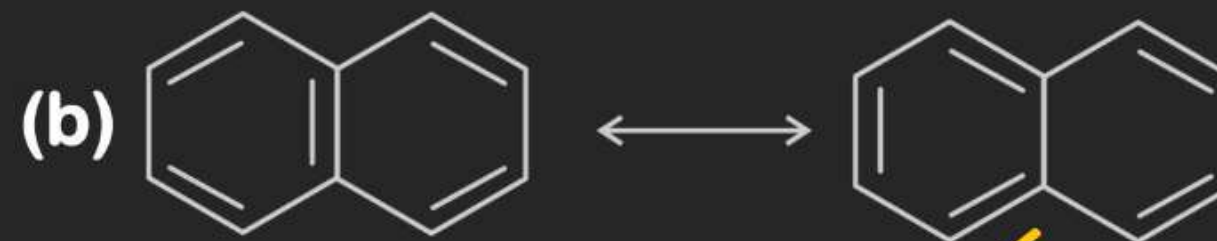
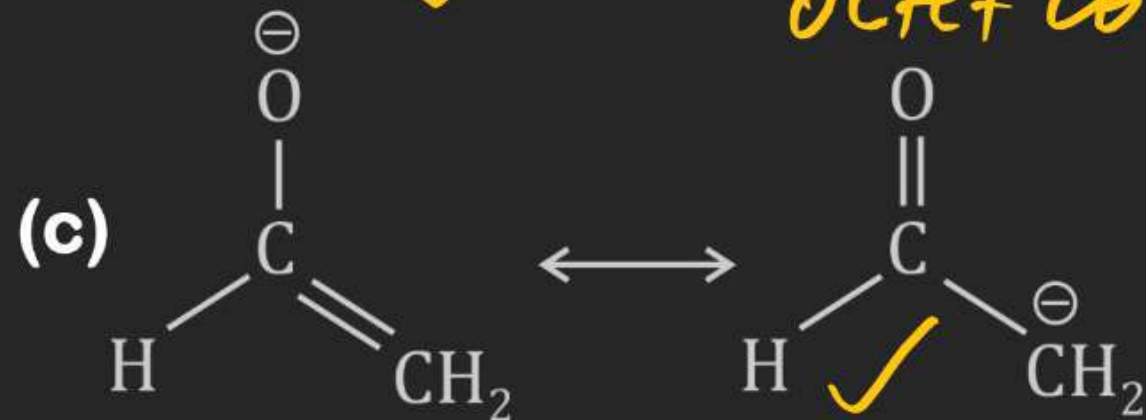


**Q.18** Draw the resonance forms to show the delocalization of charges in the following ions

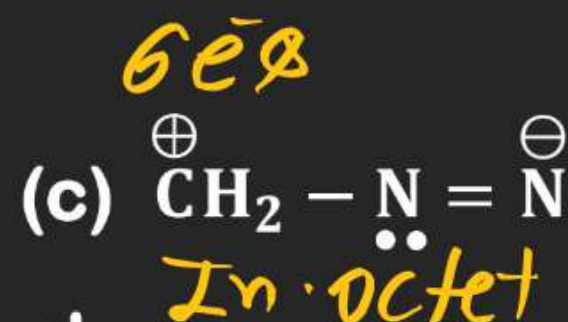
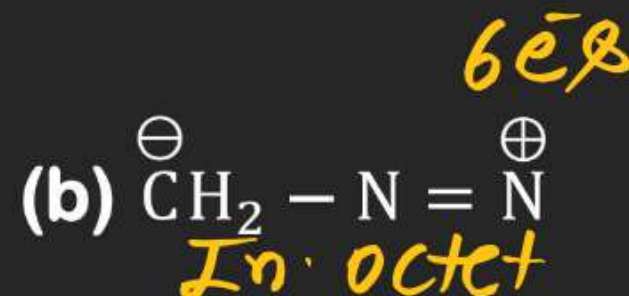




**Q.19** Identify less stable canonical structure in each of the following pairs:



**Q.22** Arrange the following resonating structure according to their contribution towards resonance hybrid?



(A)  $a > d > c > b$

~~(B)  $b > a > c > d$~~

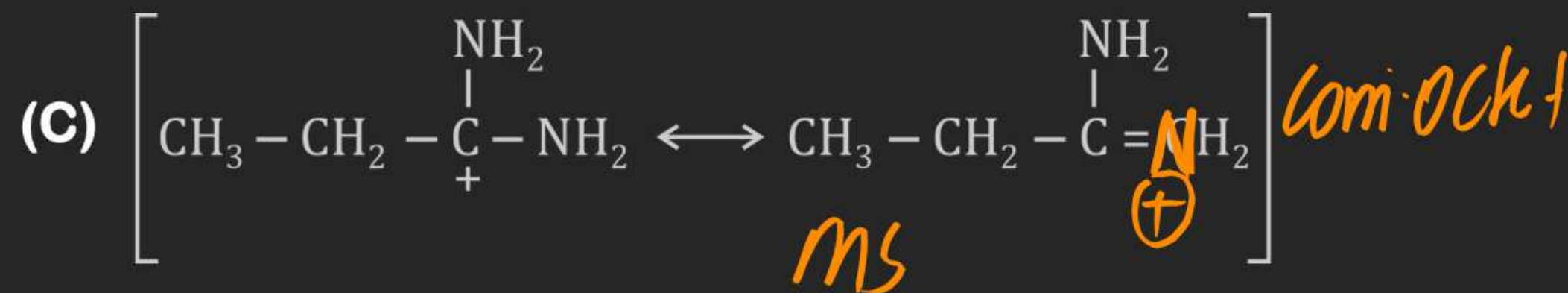
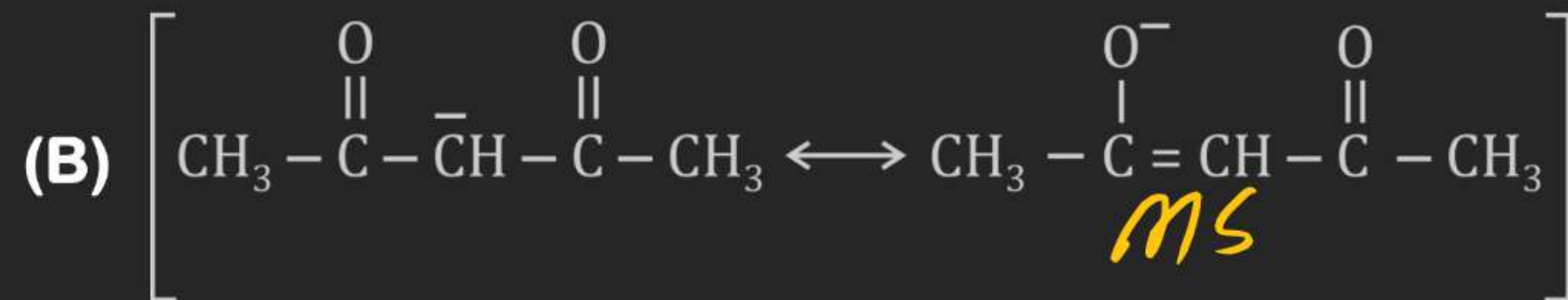
~~(C)  $a > c > b > d$~~

(D)  $d > a > b > c$

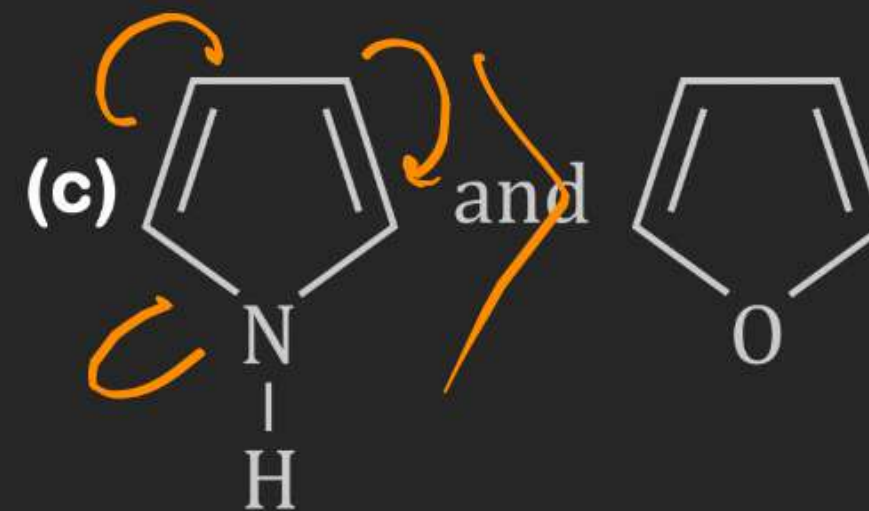
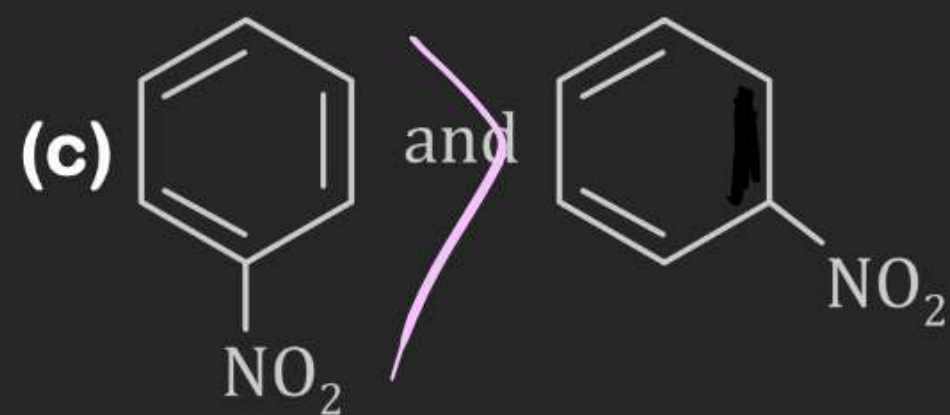
*Ans*  
~~(A)~~  
~~(C)~~



**Q.23** In each of the following pairs of resonating structure which resonating structure is more stable:

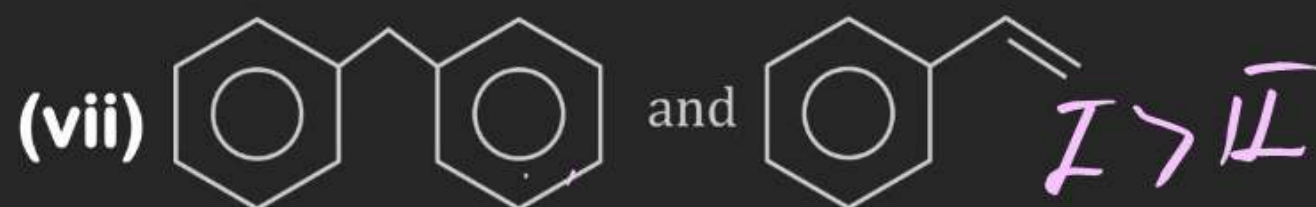
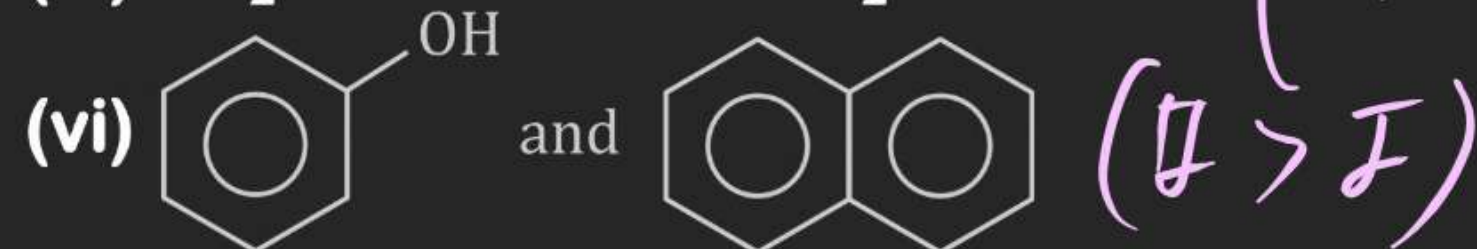
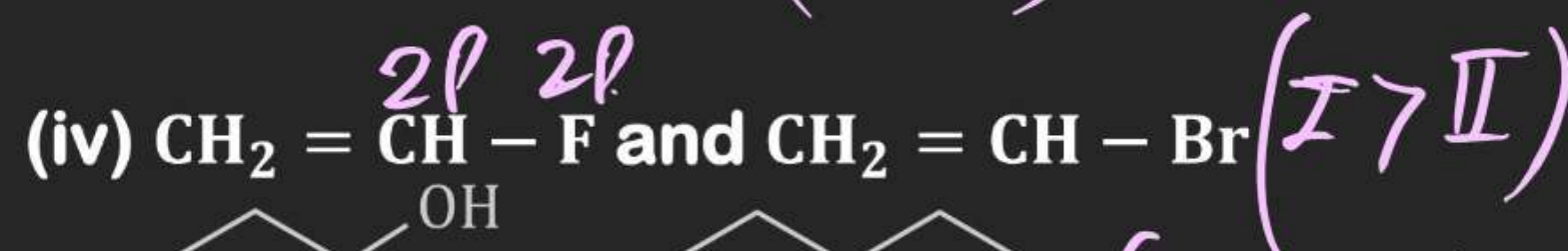
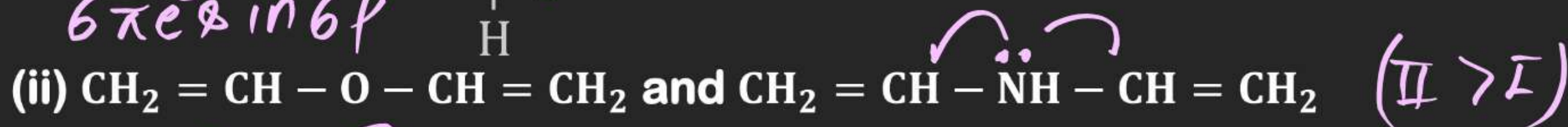
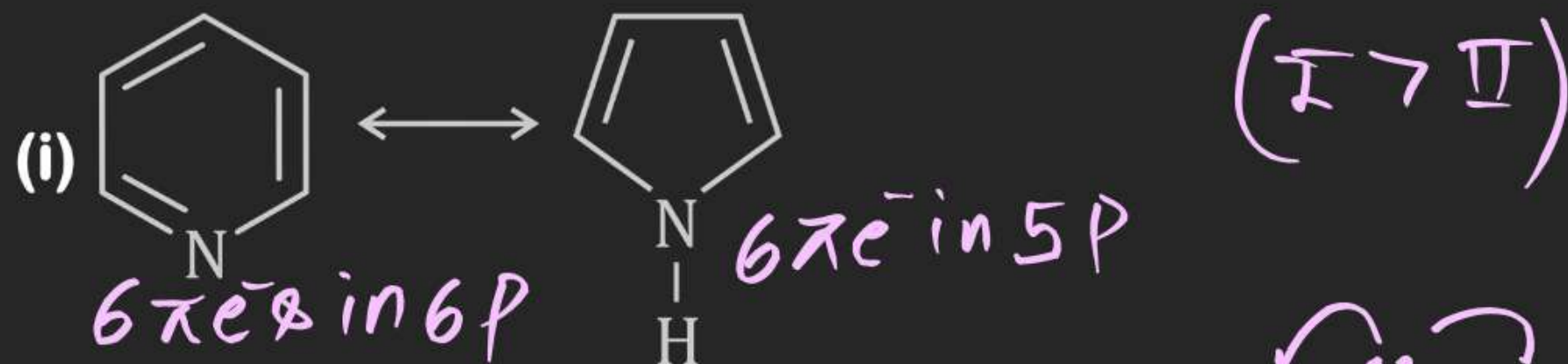


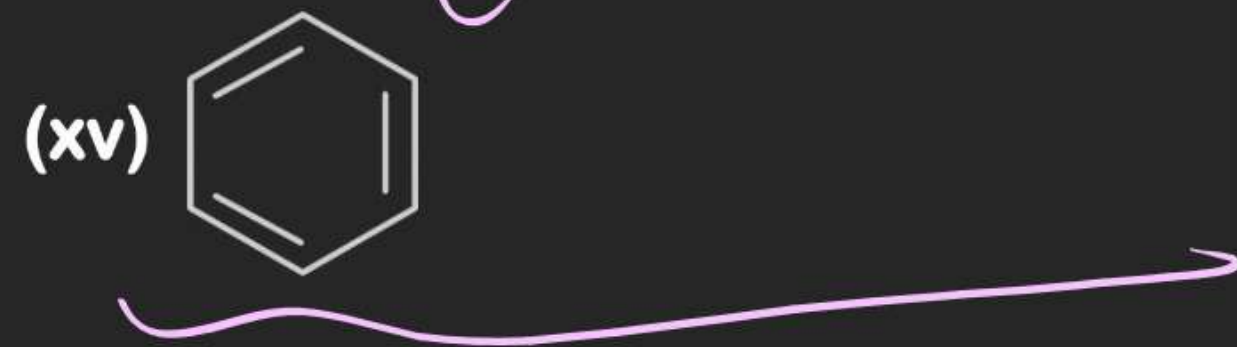
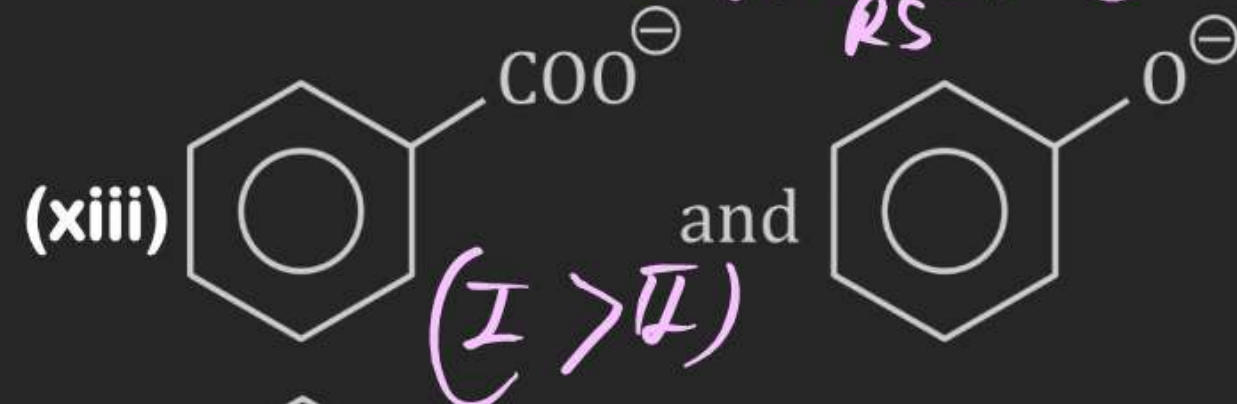
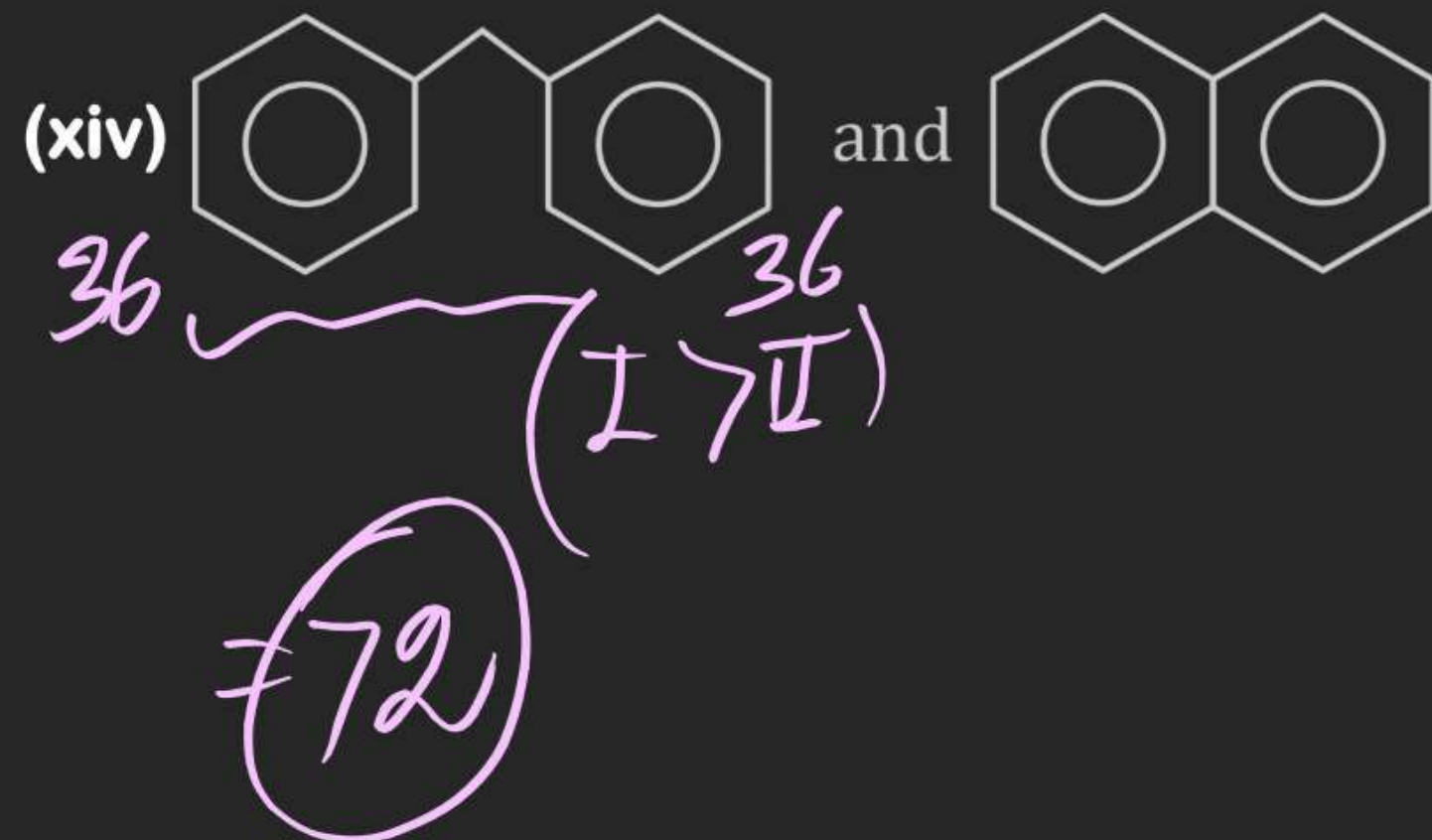
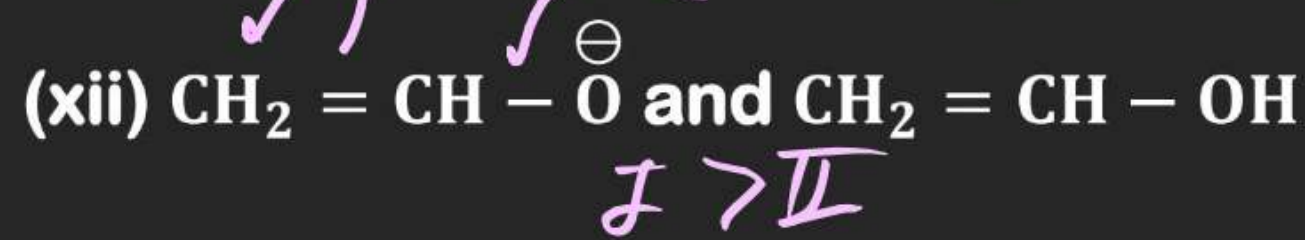
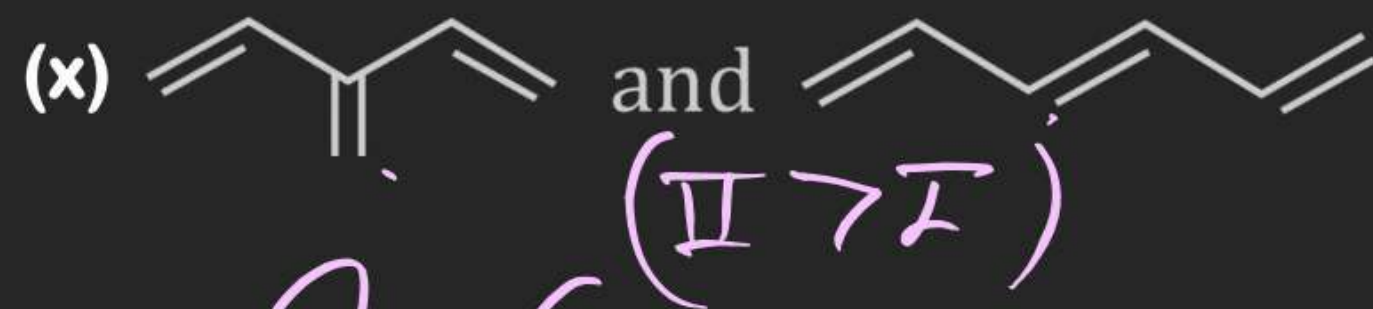
**Q.25** In the given pair of compounds select the one in each pair having lesser resonance energy :





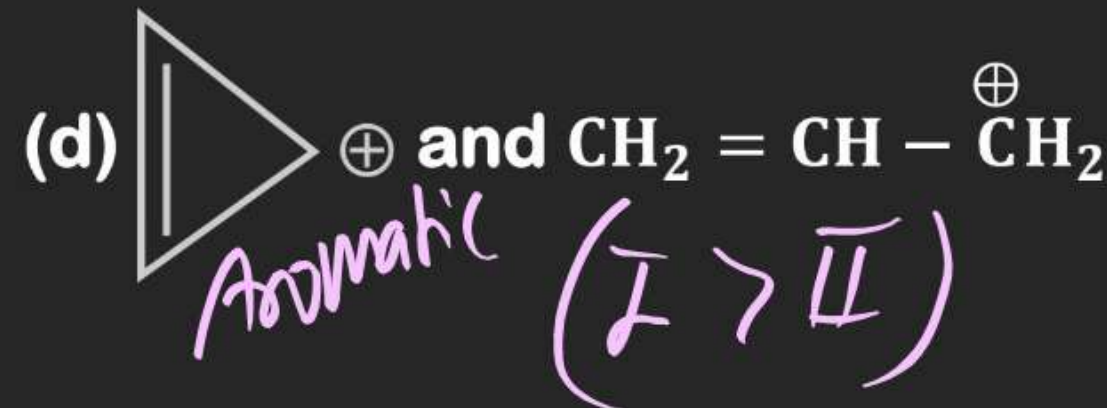
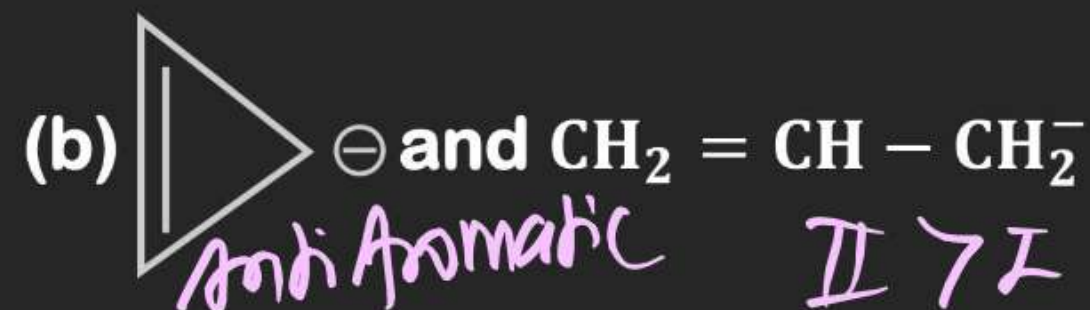
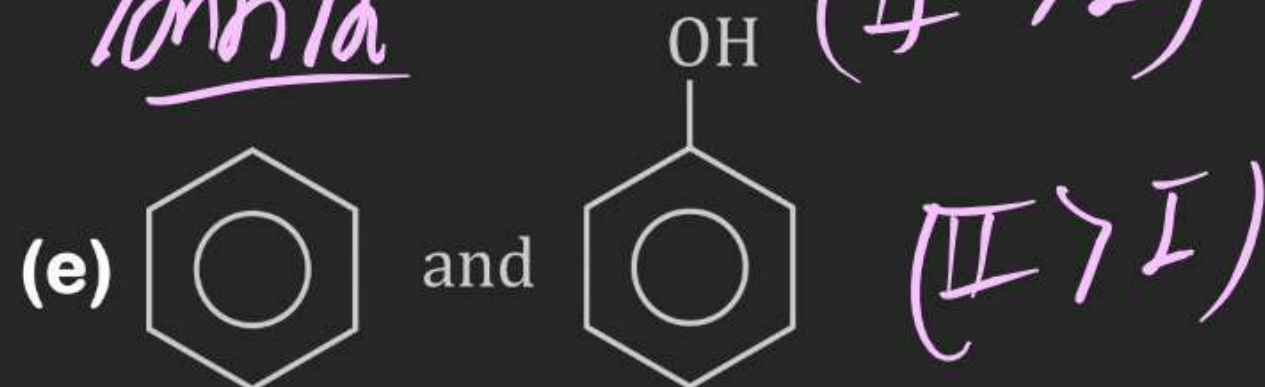
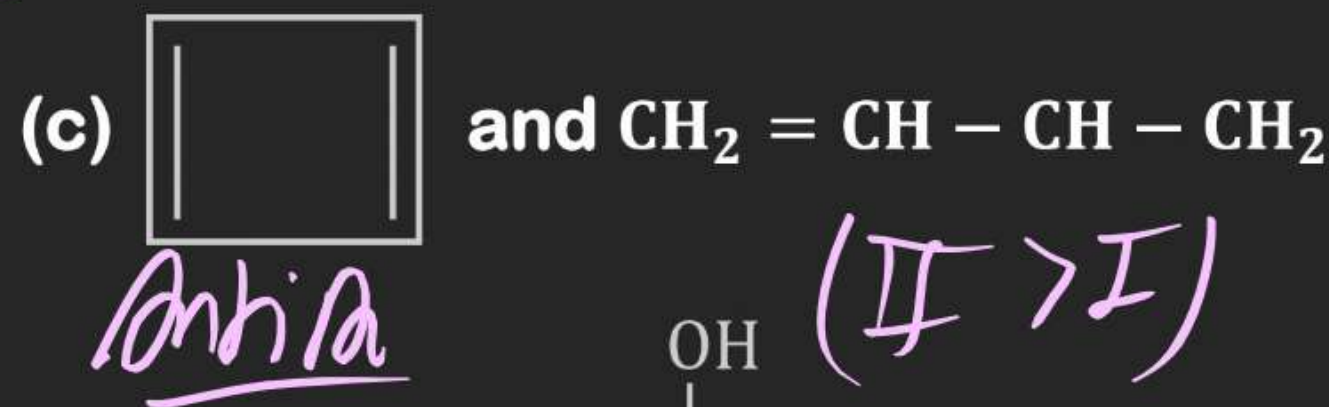
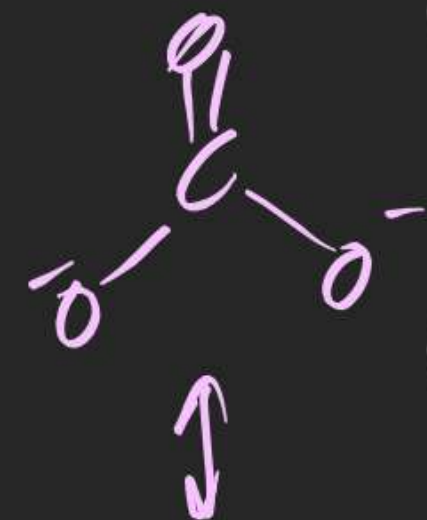
**Q.27** In the given pair of compounds select the one in each pair having higher resonance energy :



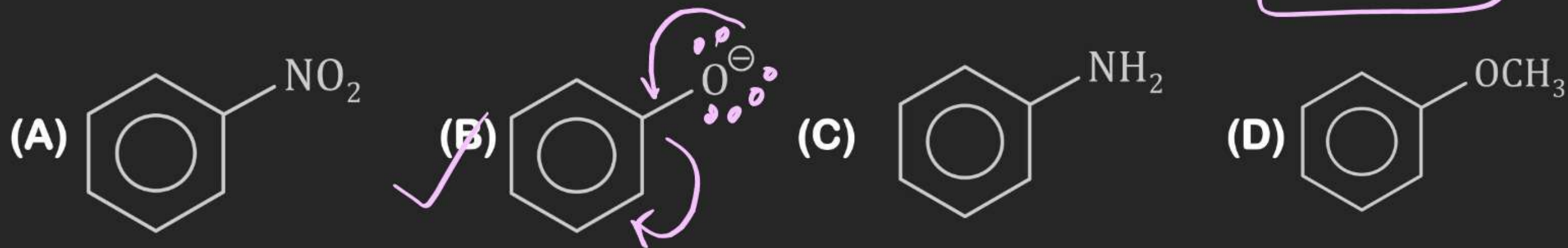




**Q.28** In the given pair of compounds select the one in each pair having lesser resonance energy:

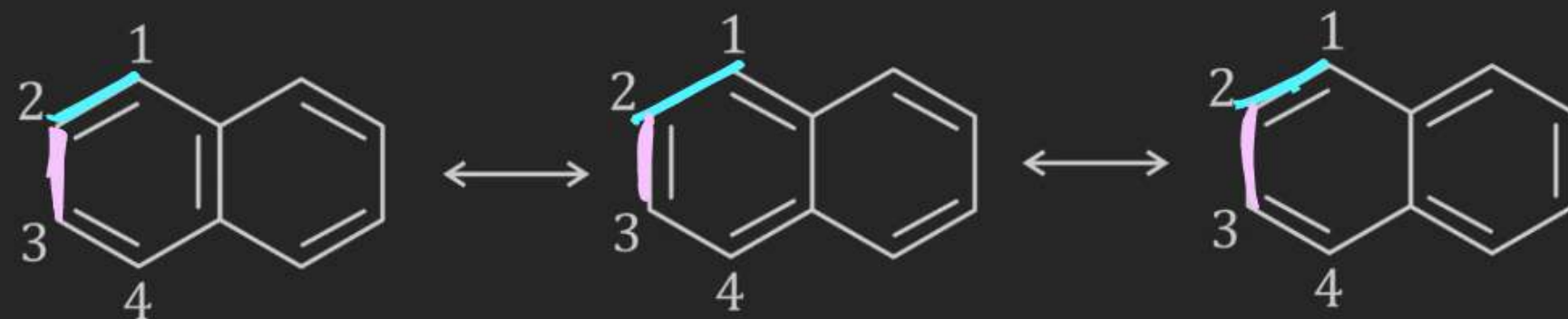


**Q.31** In which of the following molecules  $\pi$ -electron density in ring is **maximum**:



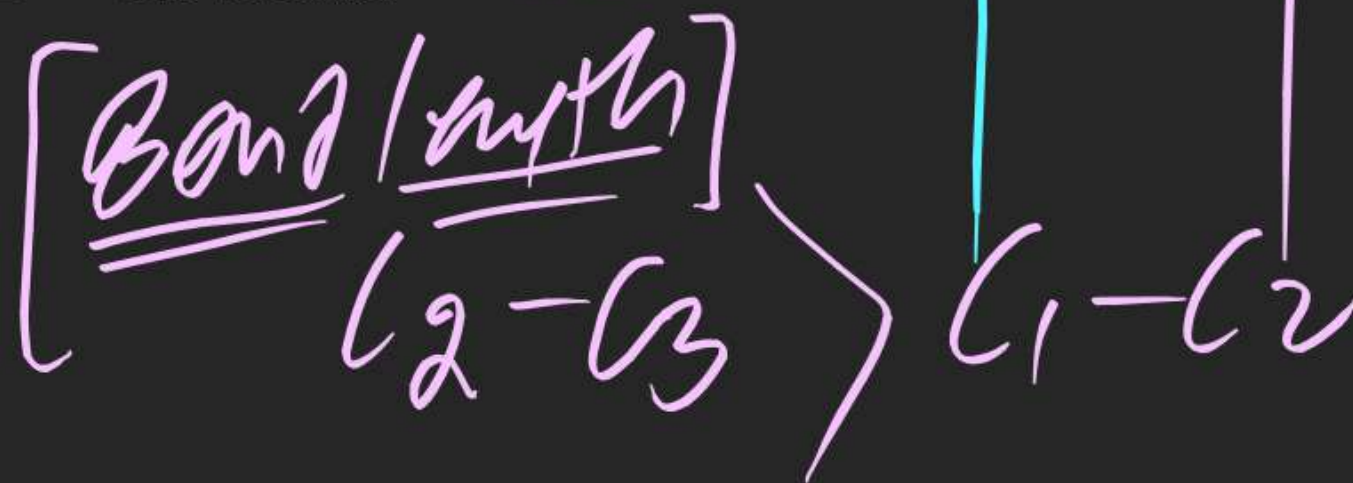


Q.37

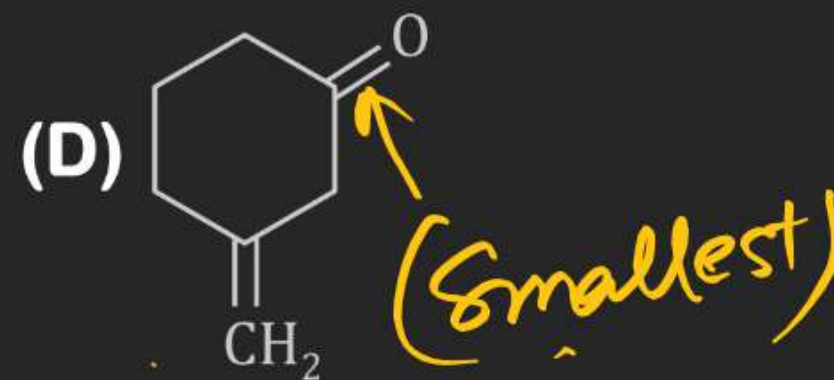
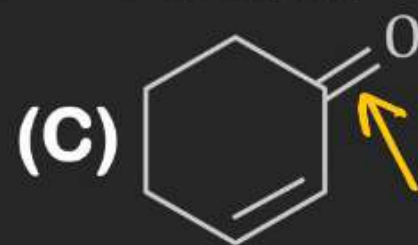
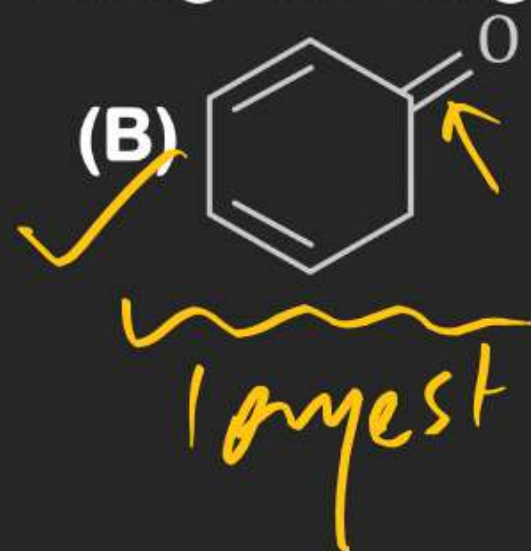
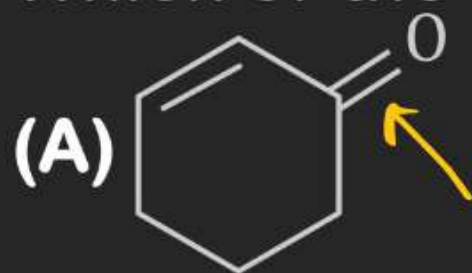


These are three canonical structures of naphthalene. Examine them and find correct statement among the following :

- (A) All C – C bonds are of same length  
 (B) C1 – C2 bond is shorter than C2 – C3 bond.  
 (C) C1 – C2 bond is longer than C2 – C3 bond  
 (D) None



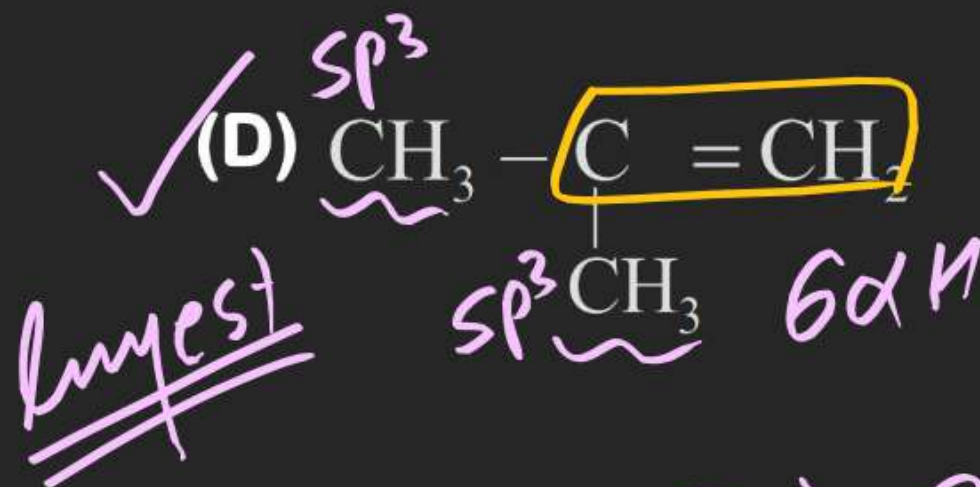
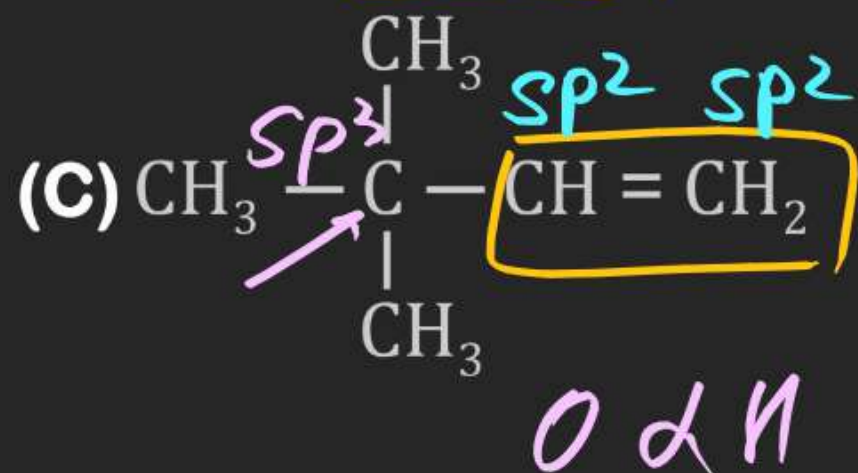
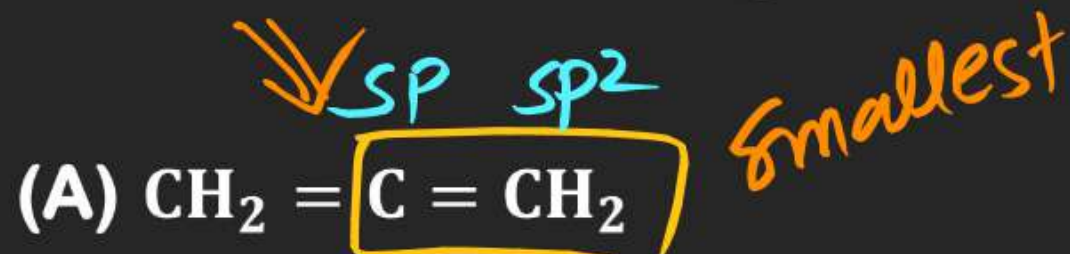
Q.38 Which of the following has longest C – O bond:



B > A = C > D

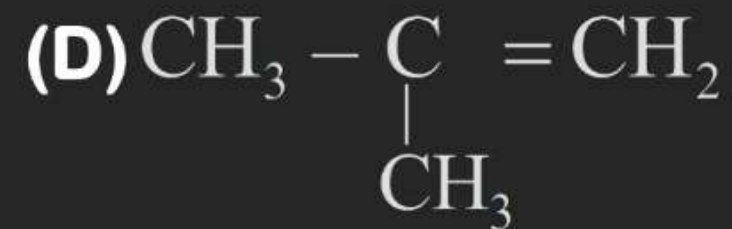
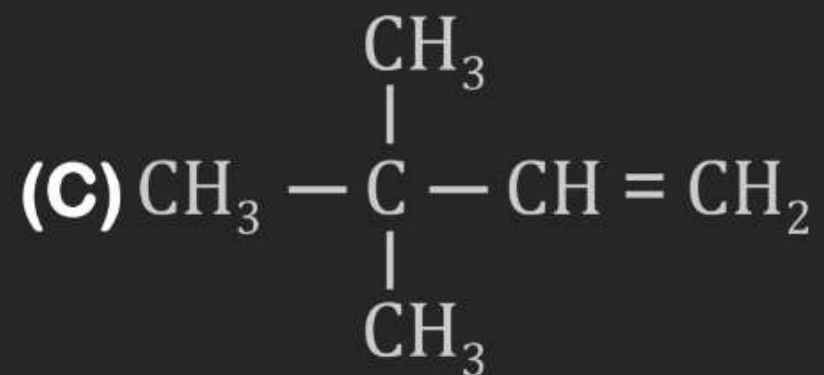


Q.41 Which of the following molecule has longest C = C bond length?



$D > B > C > A$

**Q.42** Which of the following molecule has shortest  $\text{C} = \text{C}$  bond length?



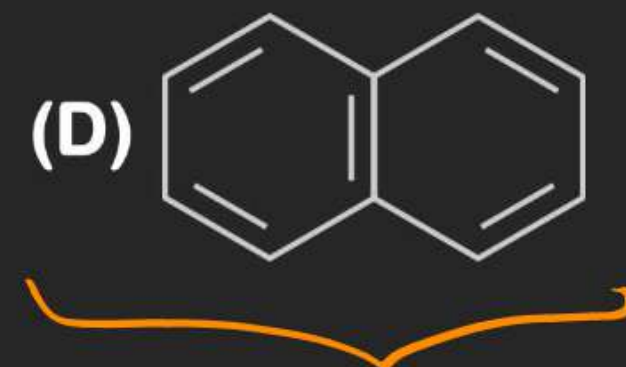


**Q.43** C – C and C = C bond lengths are unequal in:

**(A) Benzene**

**(B) 1,3-buta-di-ene**

**(C) 1,3-cyclohexa-di-ene**



**Q.44** Among the following molecules, the correct order of C – C bond length is ( $C_6H_6$  is benzene)

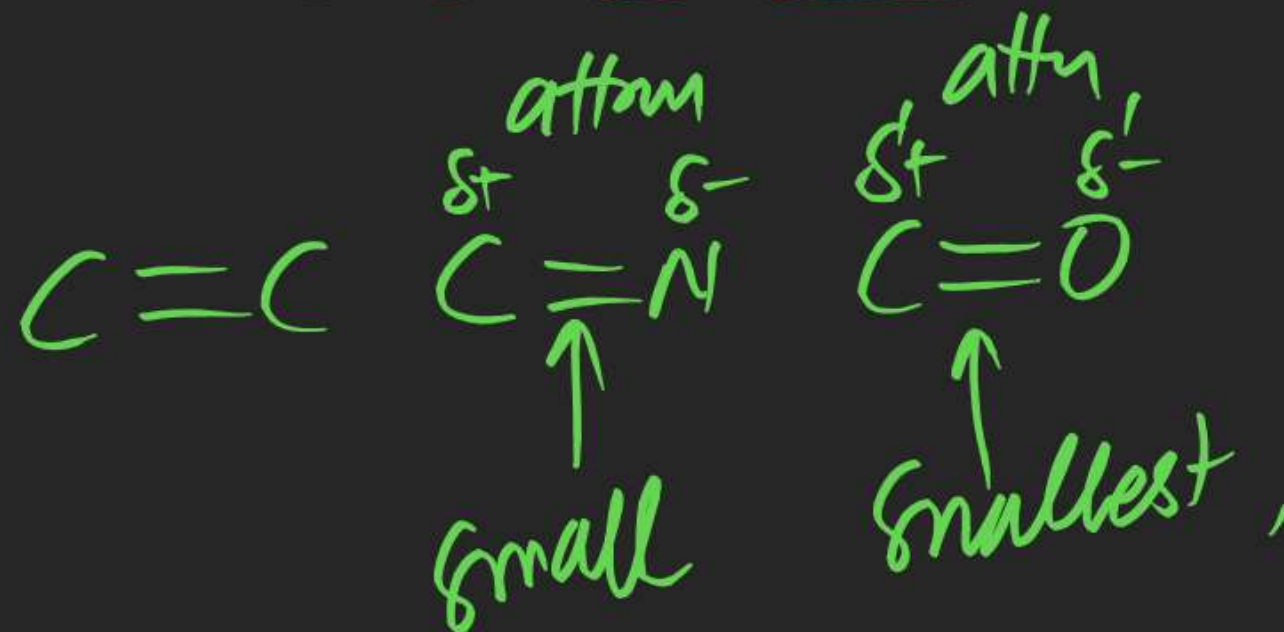
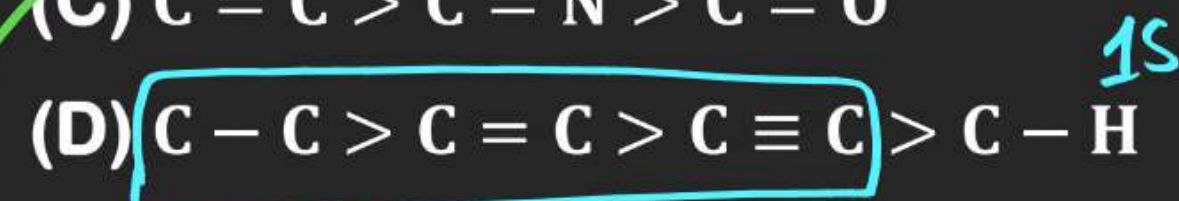


Bond length

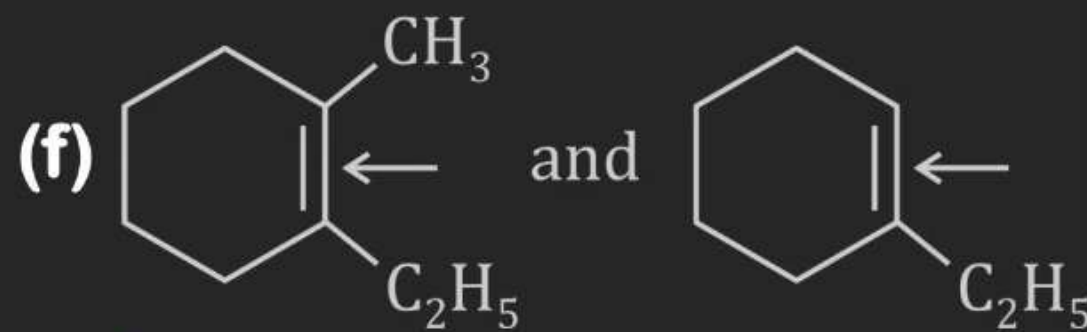
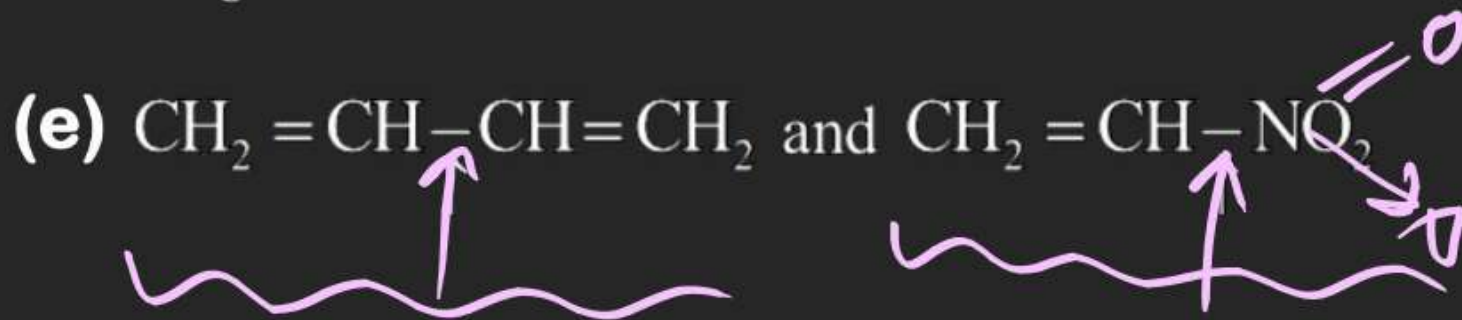
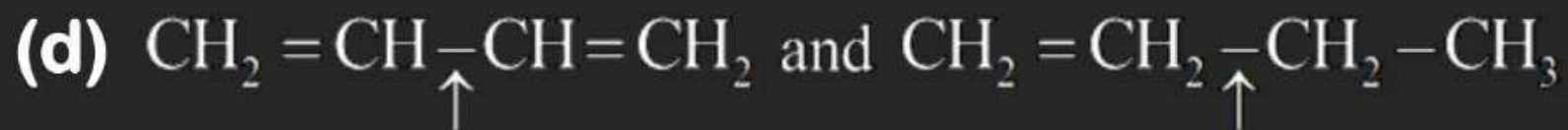
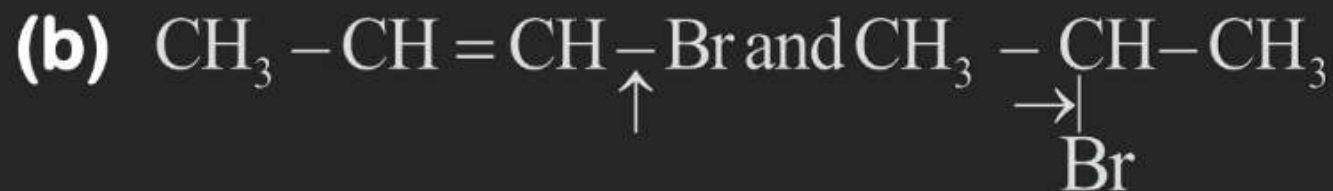




**Q.46** Which of the following is (are) the correct order of bond lengths:



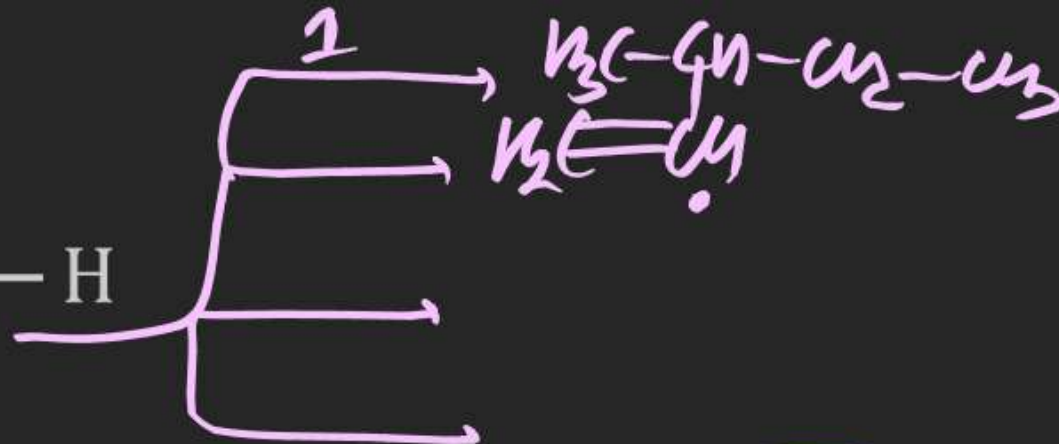
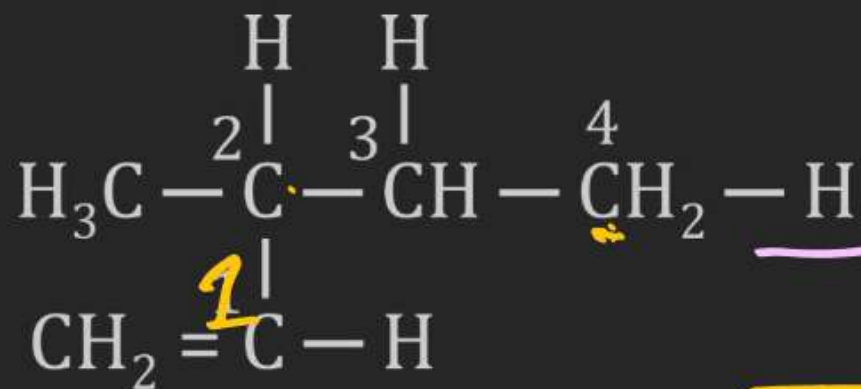
**Q.48 In which of the following pairs, indicated bond is of greater strength:**



Single Bond chn  $\uparrow$  BS  $\downarrow$   
double  $\text{—————}$   $\uparrow$  BS  $\uparrow$



Q.49



the correct order of **bond dissociation energy** (provided bond undergoes homolytic cleavage):



**Q.51** In which case, C – O bond length is shorter for I<sup>st</sup> compound:

