

## CHEMISTRY

### COMPLETE CLASS 11TH + 12TH

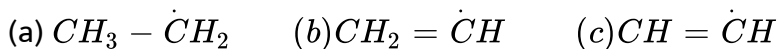
#### GOC

#### Example

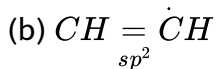
1. Identify the compound showing  $+M$  or  $-M$  separately

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2. Compare the stability of the following free Radical.

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### 3. Compare the stability of the following free Radicals



actual sp

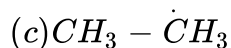
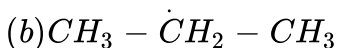
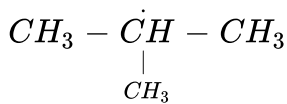
$\Rightarrow$  More repulsion  $\Rightarrow$  less stability

(Therefore this resonating structure is not possible)



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4.



(d)

Compare the  $\overset{C}{-}H$  bond energy of the above compounds.



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5. Compare the potential energy of the following compounds (above compounds)

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6. Compare the bond energies of  $C-H$  bond (at a, b, c, d, e and f position)

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7. Compare the stability of the following free Radical

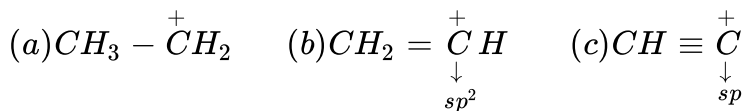


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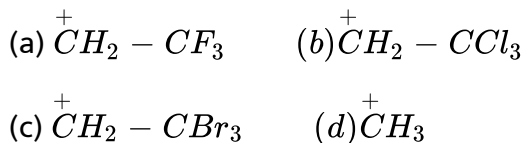
8. Compare the potential energy of  
 $CH_3 - CH_3, CH_2 = CH_2, CH \equiv CH$

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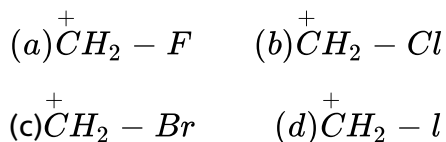
9. Compare the stability of the following carbocation

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10. Compare the stability of the following compounds

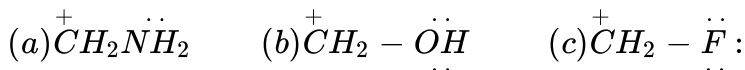
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11. Compare the stability of the following carbocation :

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12. Compare the stabilities of the following carbocation



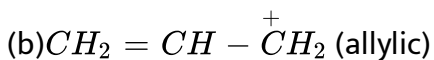
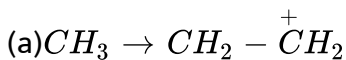
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13. Compare the following carbocation in order of their stability.

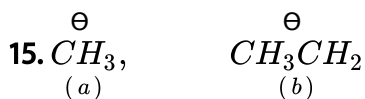


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14. Compare the stability of the following compounds



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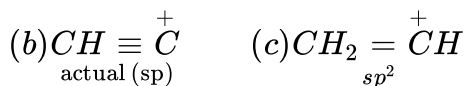


$a > b$  (stability)



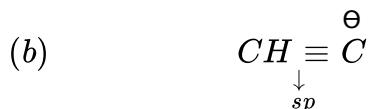
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16. Compare the stability of the following carbocation



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17. Compare the stability of the following carbanion

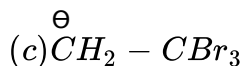


– *ve* charge is attracted by sp hybridised carbon  
 (most electronegative)



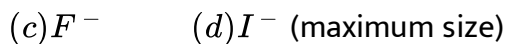
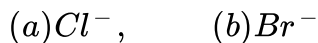
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18. Compare the stability of the following carbanion



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19. Arrange the following anion order of their stability



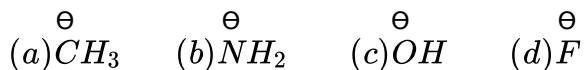
⇒ maximum dispersion of  $-ve$  charge

⇒ max stability



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20. Compare the stability of the following



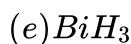
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**21.** Write the correct order of acidic strength of following compounds:



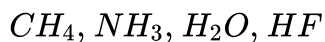
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**22.** Compare the Acidic strength of the following



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**23.** Compare the acidic strength of the following compounds



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24. Compare the stability of the following carbanion.



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25. compare the stability of the following carbocation



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26. Compare the stability of the following carbocation.



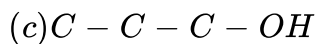
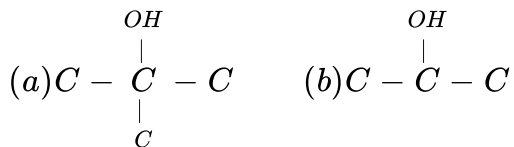
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27. Compare the stability of the following carbocation

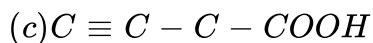
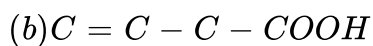
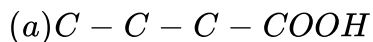


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28. Compare order of dehydration of the following alcohols :

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29. Compare the acidic strength of the following acids.

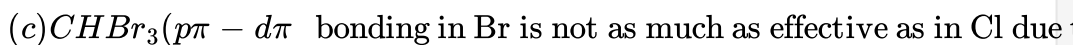
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30. Which is more acidic between the two



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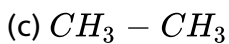
31. Compare the acidic strength of the following

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32. Compare the acidic strength of the following

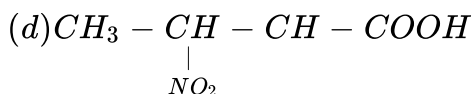
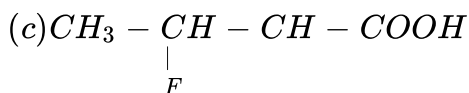
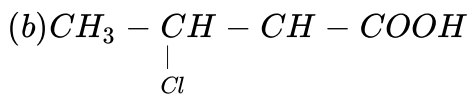
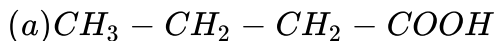
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33. Compare the acidic strength of the following

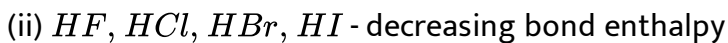
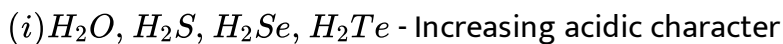


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**34.** Compare the acidic strength of the following :

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**35.** Arrange the following in order of property indicated for each set:

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36. Compare the acidic strength of the following compound



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37. Compare the reactivity of the following compounds with

1 mde of  $AgNO_3$



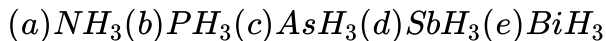
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38. Compare the acidic strength



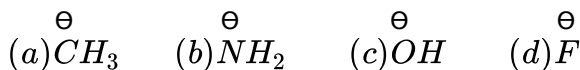
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39. Compare the basic strength of following



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40. Compare the stability of the following



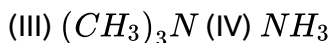
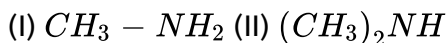
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41. Which is more basic  $\bar{O}H$  or  $H\bar{S}$ ?



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42. Correct order of basic strength in gas phase is





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43. Compare the basic strength of the following



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44. Compare the basic strength of the following



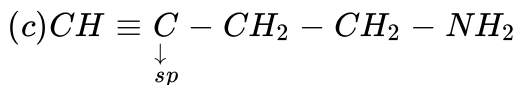
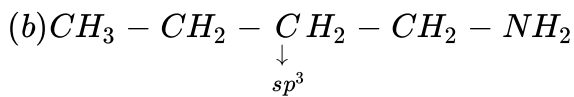
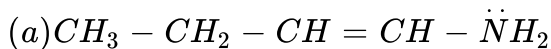
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45. Compare the basic strength



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46. Compare the basicity of the following compounds



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47. Compare the basicity of the numbered nitrogen atoms.



as L.P. is not in Resonance

(or in conjugation)



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48. Compare the basic strength of the following



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49. Compare the basic strength of the following :



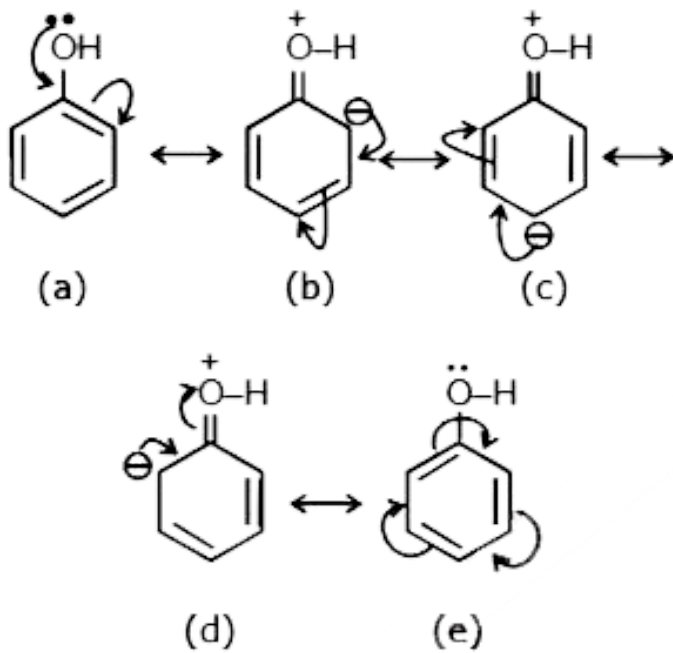
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50. Compare the basic strength of the following :



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Questions



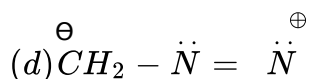
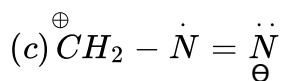
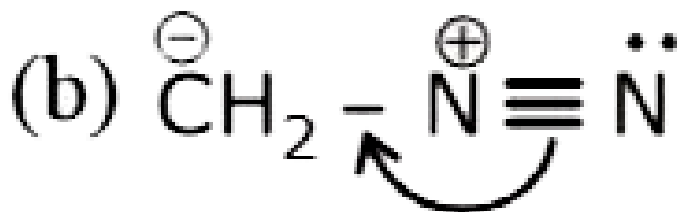
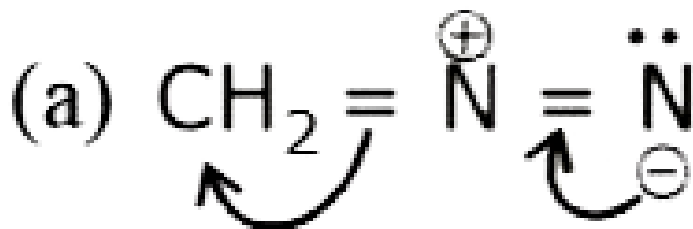
1.

$$a = e > b = d > c$$



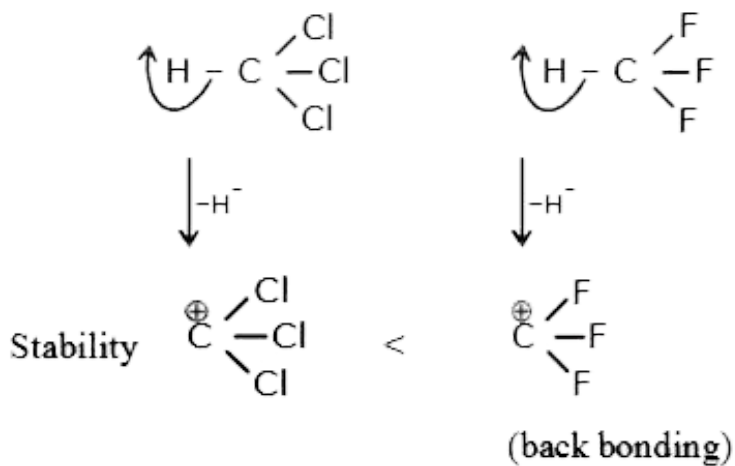
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2. Write the stability order of conjugate structures:

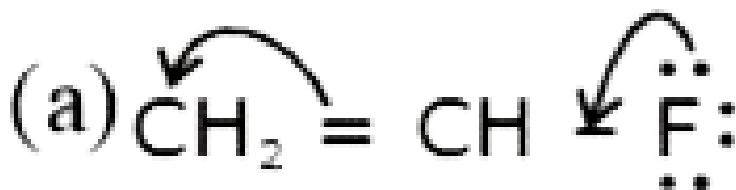


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3. Complete the following reaction



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4.  
 (b).  $^{\ominus}CH_2 - CH = F^+$        $a > b$  (stability)

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## Exercise 1

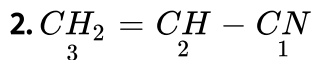
1. Bond formation is:

- A. always exothermic
- B. always endothermic
- C. neither exothermic nor endothermic
- D. sometimes exothermic and sometimes endothermic

**Answer: A**



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$\text{Cl} - \text{C}2$  bond of this molecules is formed by:

- A.  $sp^3 - sp^2$  overlap
- B.  $sp^2 - sp^3$  overlap

C.  $sp - sp^2$  overlap

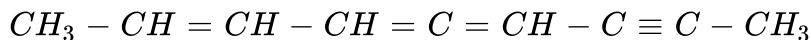
D.  $sp^2 - sp^2$  overlap

**Answer: C**



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**3.** Find out the hybridisation state of carbon atoms in given compounds from left to right.



A.  $sp^3 sp^2 sp^2 sp^2 sp sp^2 sp sp sp^3$

B.  $sp^3 sp^2 sp^2 sp sp sp sp sp sp sp^3$

C.  $sp^3 sp^2 sp^2 sp^2 sp^2 sp sp sp^3$

D.  $sp^3 sp sp sp^2 sp sp^2 sp sp sp^3$

**Answer: A**



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4. Total number of  $\sigma$  and  $\pi$ -bonds are in naphthalene is

A.  $5\pi$  and  $18\sigma$

B.  $6\pi$  and  $19\sigma$

C.  $5\pi$  and  $19\sigma$

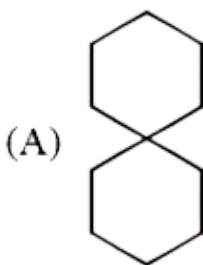
D.  $7\pi$  and  $26\sigma$

Answer: C

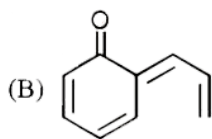


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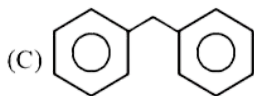
5. In which of the following molecules resonance takes place through out the entire system



A.



B.



C.



D. |



**Answer: B**



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## 6. The inductive effect

A. implies the atom's ability to cause bond polarization

B. increases with increase of distance

C. implies the transfer of lone pair of electrons from more electronegative atom to the lesser electronegative atom in a molecule

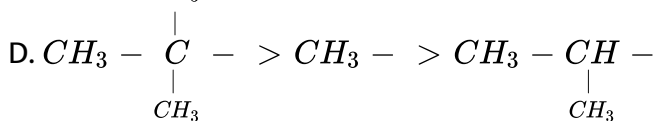
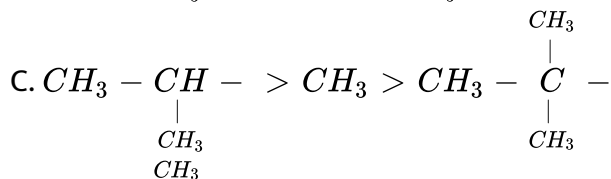
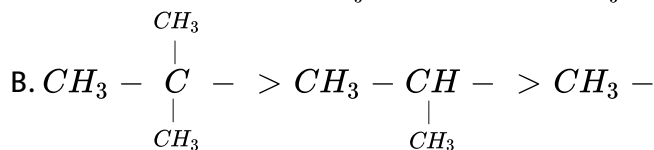
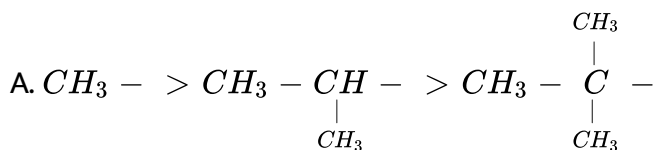
D. implies the transfer of lone pair of electrons from lesser electronegative atom to the more electronegative atom in a molecule

Answer: A



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7. When  $-CH_3$ ,  $CH_3 - \underset{\underset{CH_3}{|}}{CH} -$  and  $CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} -$  groups are introduced on benzene ring then correct order of their inductive effect is

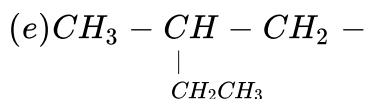
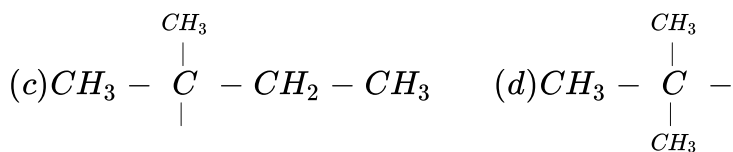
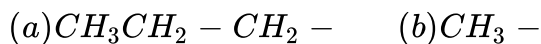


Answer: B

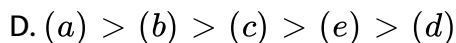
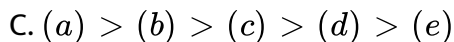
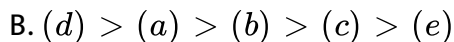
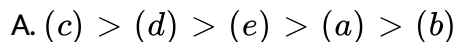


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8. Express in decreasing order of ( + I ) –



Correct answer is -

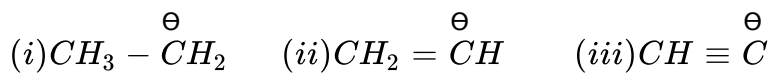


Answer: A

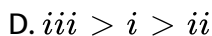
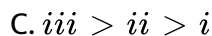
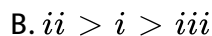
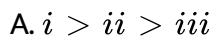


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9. Consider the following carbanions



Correct order of stability of these carboanions in decreasing order is

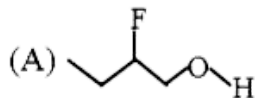


**Answer: C**

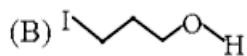


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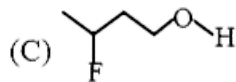
10. In which of the following compounds is hydroxylic proton the most acidic ?



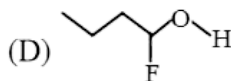
A.



B.



C.



D.

**Answer: D**

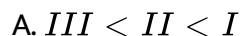


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**11. Consider following acid**



Correct order of their pH value





C.  $I < III < II$

D.  $II < I < III$

**Answer: B**



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**12.** Which of the following acids has lowest  $pK_a$  value?

A. Chloroacetic acid

B. Bromoacetic acid

C. Nitroacetic acid

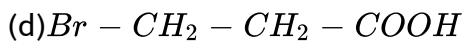
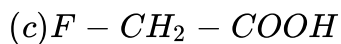
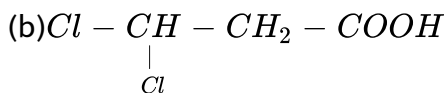
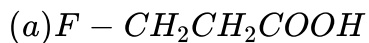
D. Cyanoacetic acid

**Answer: C**



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13. Arrange in decreasing  $pK_a$



Correct answer is

A.  $b > d > a > c$

B.  $a > c > d > b$

C.  $d > a > b > c$

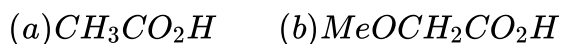
D.  $d > b > a > c$

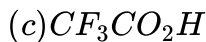
Answer: C



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14. The correct order of increasing acid strength of the compounds





A.  $d < a < c < d$

B.  $d < a < b \leq c$

C.  $a < d < c < b$

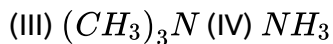
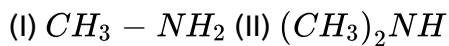
D.  $b < d < a < c$

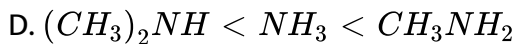
**Answer: B**



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**15.** Correct order of basic strength in gas phase is



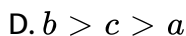
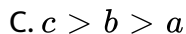
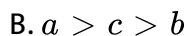
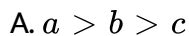
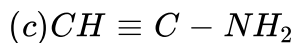


**Answer: A**



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**16.** Arrange basicity of the given compounds in decreasing order -



**Answer: A**



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17. Which one of the following is the strongest base in aqueous solution?

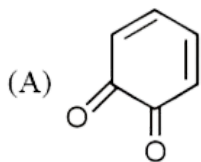
- A. Trimethylamine
- B. Aniline
- C. Dimethylamine
- D. Methylamine

Answer: C

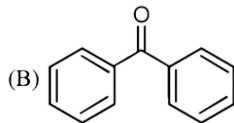


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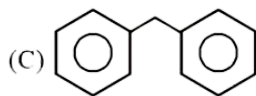
18. In which of the following molecules, all atoms are not coplanar ?



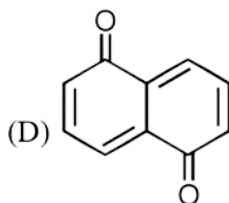
A.



B.



C.

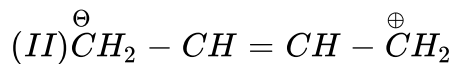


D.

**Answer: C**



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Among, these, which are canonical structures ?

A. I and II

B. I and III

C. II and III

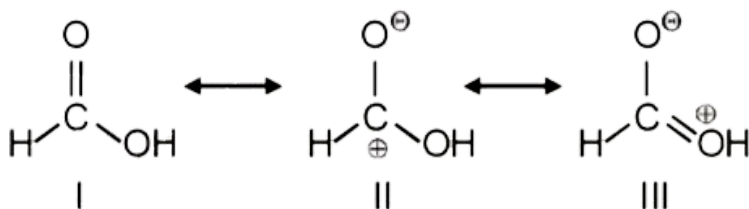
D. all

Answer: D



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20.



Among these canonical structures, the correct order of stability is

A.  $I > II > III$

B.  $III > II > I$

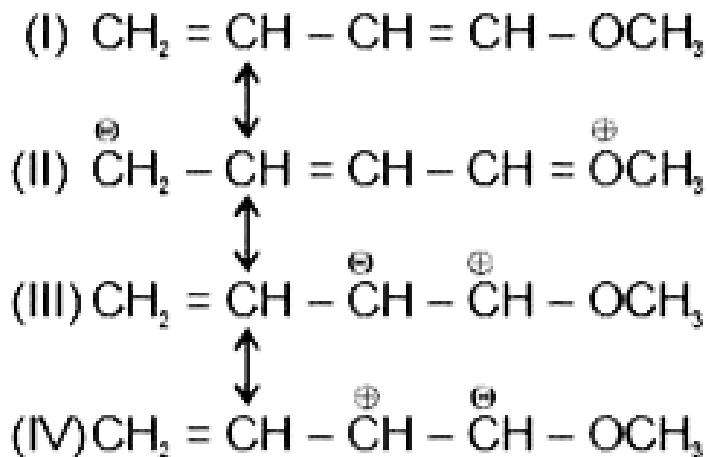
C.  $I > III > II$

D.  $II > I > III$

Answer: C



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21.

Amongst these canonical structures which one is least stable ?

A. I

B. II

C. III

D. IV

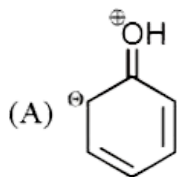


Answer: D

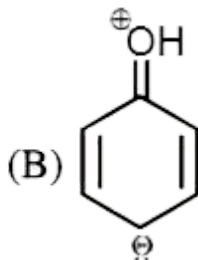


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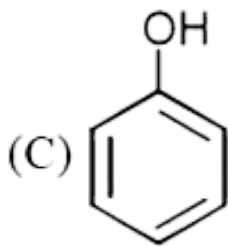
22. For phenol which of the following resonating structure is the most stable ?



A.



B.



C.

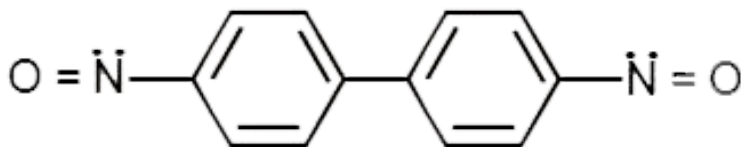
D. All have equal stability

**Answer: C**

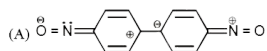


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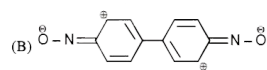
**23.** The most stable resonating structure of following compound is



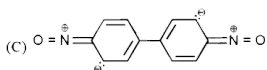
**A.**



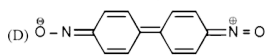
**B.**



**C.**



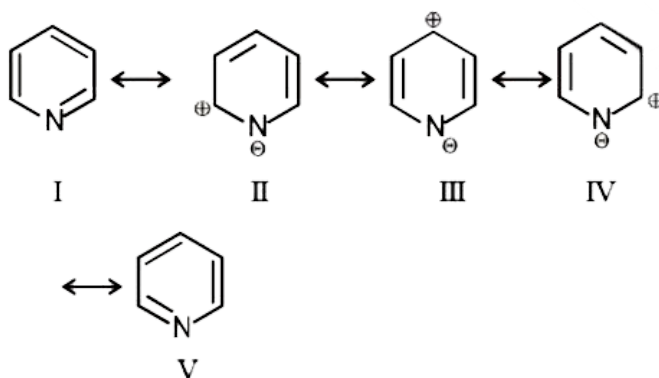
D.



Answer: D



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24.

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

A.  $(I = V) > (II = IV) > III$

B.  $(II = IV) > (I = V) > III$

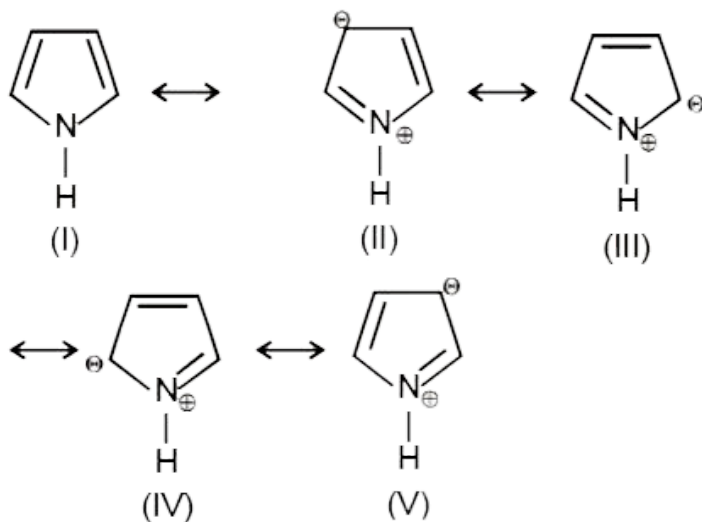
C.  $(I = V) > III > (II = IV)$

D.  $III > (II = IV) > (I = V)$

Answer: C

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25. Write the stability order of Resonating Structures:



A.  $(III = IV) > (II = V) > I$

B.  $I > (II = V) > (III = IV)$

C.  $I > (III = IV) > (II = V)$

D.  $(II = V) > (III = V) > I$

**Answer: C**



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**26. 'M' effect is the resonance of**

- A.  $\pi$  electrons only
- B.  $\sigma$  electrons only
- C.  $\pi$  and  $\sigma$  both
- D. ( + ) ve and ( - ) charge.

**Answer: A**



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**27. Which of the following contain + M but -I effect -**

- A.  $O = CH -$

B.  $-NO_2$

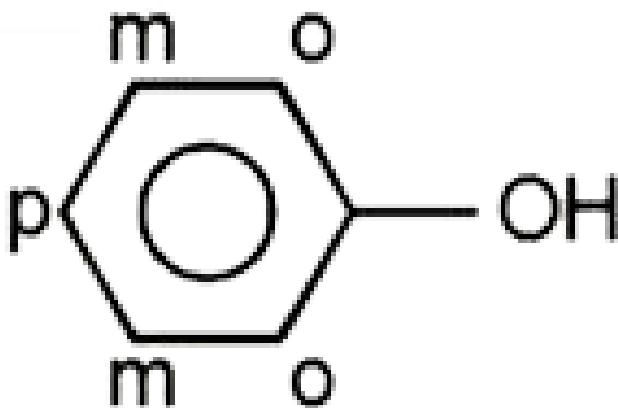
C.  $-Cl$

D.  $CH_3$

**Answer: C**



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28.

In phenol,  $\pi$ -electron-density is maximum on

A. ortho and meta positions

B. ortho and para positions

C. meta and para positions

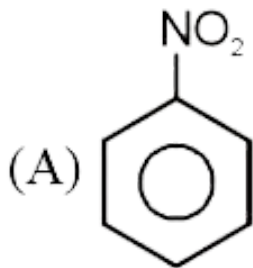
D. none of these

**Answer: B**

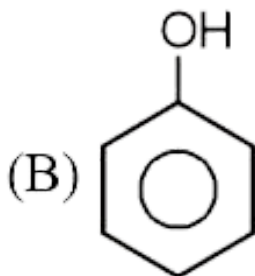


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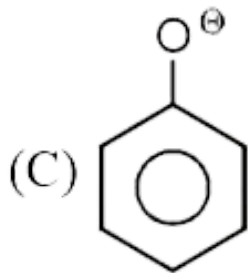
**29.** Which of the following compounds has maximum electron density in ring ?



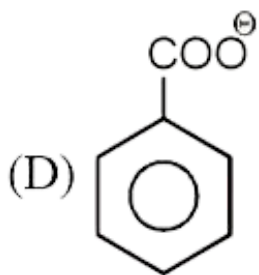
A.



B.



C.



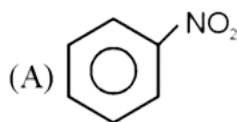
D.

**Answer: C**



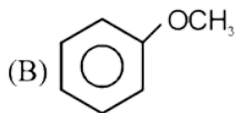
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**30.** In which of the following molecules pi-electron density in ring is minimum ?

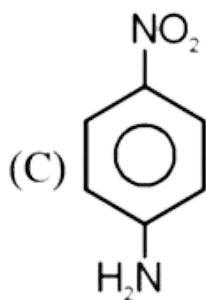


A.

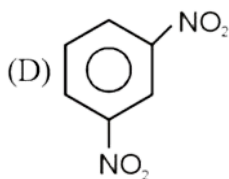




B.



C.



D.

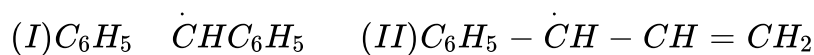
**Answer: D**

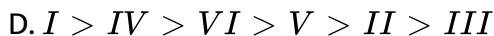
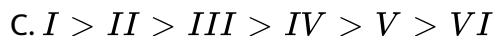
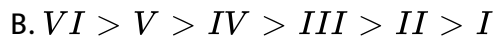
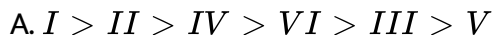
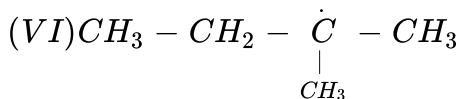


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## Exercise 2 Level I

1. Rank the following free radicals in order of decreasing stability



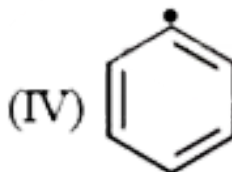
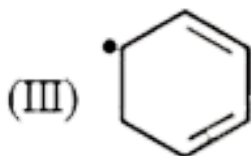
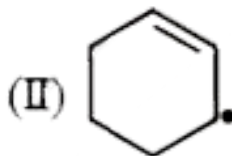
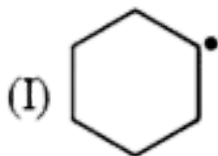


**Answer: A**



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2. Rank the following radicals in order of decreasing stability



A.  $III > II > I > IV$

B.  $III > IV > I > II$

C.  $II > III > I > IV$


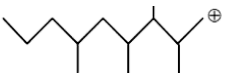
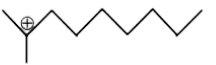

D.  $IV > II > I > III$

Answer: A



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3. Select the most stable carboncation among the following -

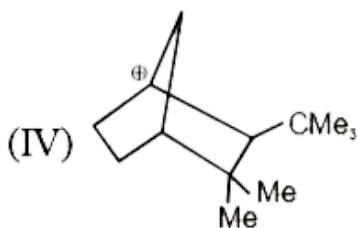
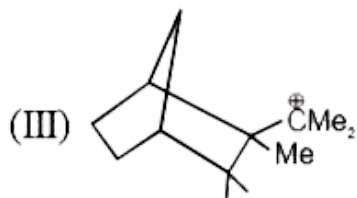
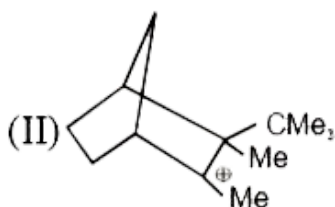
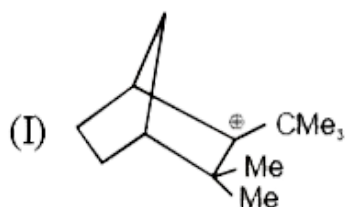
- A. 
- B. 
- C. 
- D. 

Answer: C

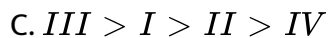


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4. Write correct order of stability of following carbocations :



A.  $I > II > III > IV$

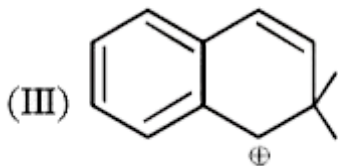
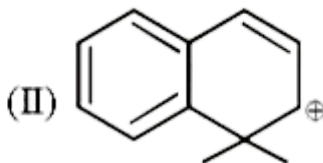
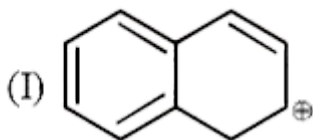


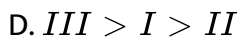
Answer: B



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5. Arrange the following carbocations in the increasing order of their stability.



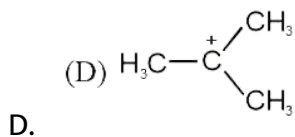
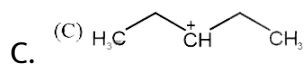
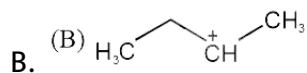
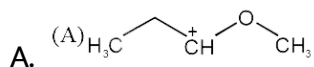


**Answer: A**



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**6. Which of the following carbocation will be most stable ?**



**Answer: A**



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7. Statement-1:  $Me - \overset{\oplus}{C}H_2$  is more stable than  $MeO - \overset{\oplus}{C}H_2$

Statement-2: Me is a +I group whereas MeO is a -I group.

A. Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.

B. Statement-1 is true, statement-2 is true and statement-2 is NOT correct explanation for statement-1.

C. Statement-1 is false, statement-2 is true.

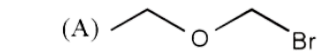
D. Statement-1 is true, statement-2 is false.

**Answer: C**

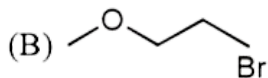


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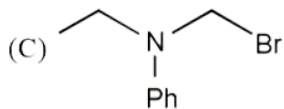
8. Ease of ionization to produce carbocation and bromide ion under the treatment of  $Ag^{\oplus}$  will be maximum in which of the following compounds?



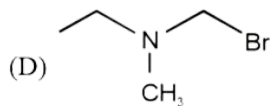
A.



B.



C.



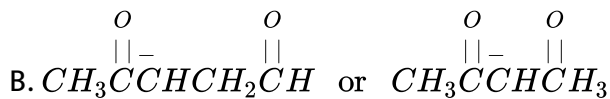
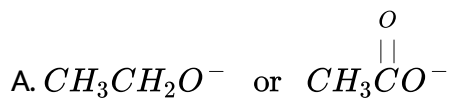
D.

**Answer: D**

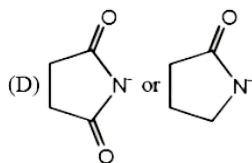
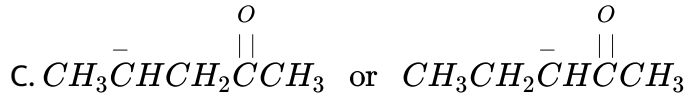


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9. In which of the following pairs, first species is more stable than second ?





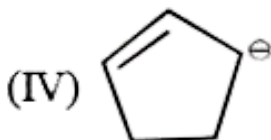
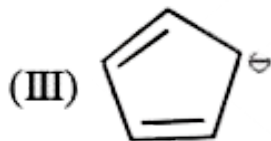
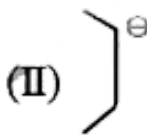
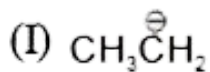
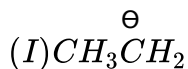


D.

Answer: D

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10. The order of stability of the following carbanion is



A.  $I > II > III > IV$

B.  $I > III > II > IV$



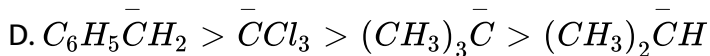
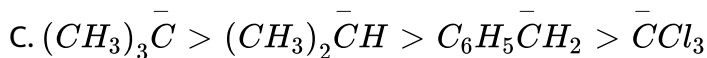
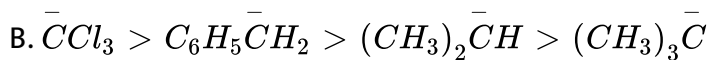
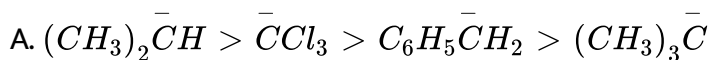
**Answer: D**



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**11. Arrange the carbonions,**

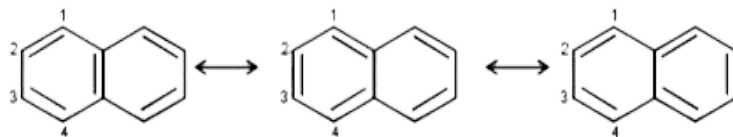
$(CH_3)_3\bar{C}$ ,  $\bar{CCl}_3$ ,  $(CH_3)_2\bar{CH}$ ,  $C_6H_5\bar{CH}_2$  in order of their decreasing stability



**Answer: B**



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12.

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

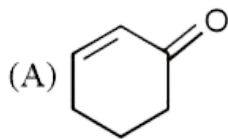
- A. All  $C-C$  bonds are of some length
- B.  $C1 - C2$  bond is shorter than  $C2 - C3$  bond.
- C.  $C1 - C2$  bond is longer than  $C2 - C3$  bond
- D. None .

**Answer: B**

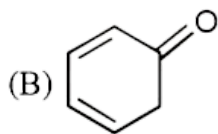


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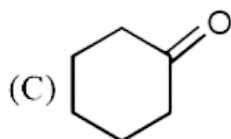
13. Which of the following has longest  $C-O$  bond:



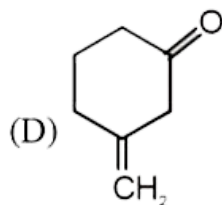
A.



B.



C.



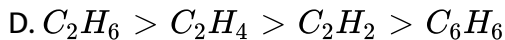
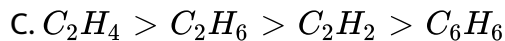
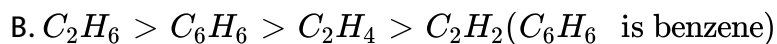
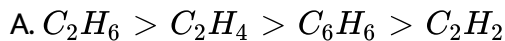
D.

**Answer: B**



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**14.** Among the following molecules, the correct order of  $C - C$  bond length is

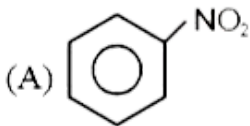


Answer: B

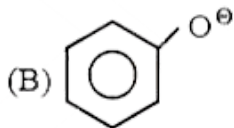


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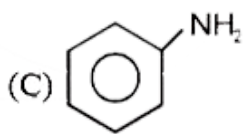
15. In which of the following molecules  $\pi$ -electron density in ring is maximum.



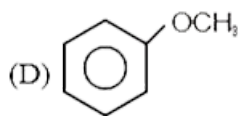
A.



B.



C.

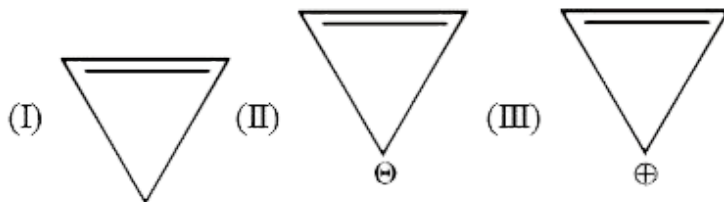


D.

**Answer: B**



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**16.**

Which of these cyclopropene systems is aromatic

A. I

B. II

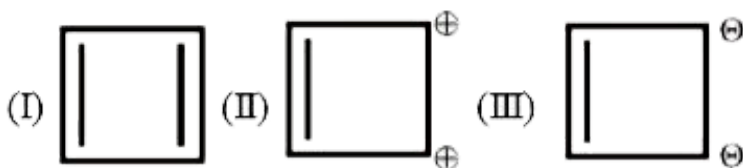
C. III

D. all of these

**Answer: C**



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17.

Which of these species is anti-aromatic ?

A. I only

B. II only

C. III only

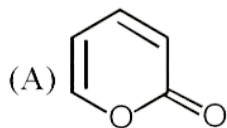
D. both II and III

**Answer: A**

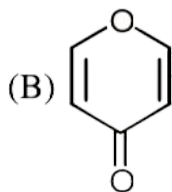


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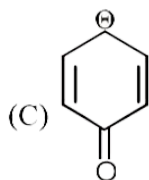
18. Which of the following compounds is not aromatic



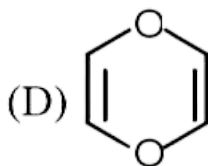
A.



B.



C.



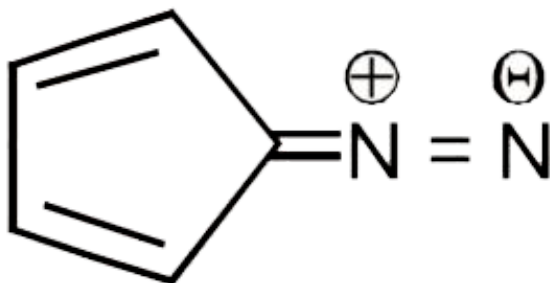
D.

Answer: D



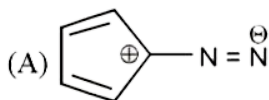
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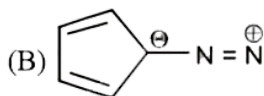


19.

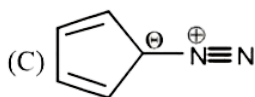
The most stable canonical structure of this molecule is



A.



B.



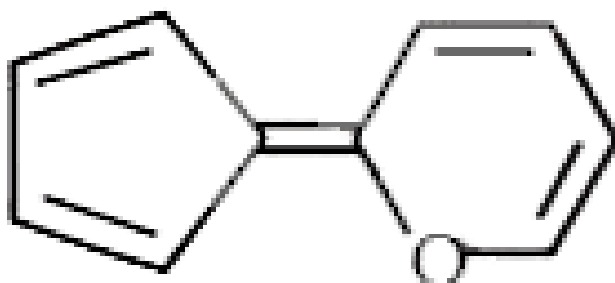
C.

D. All are equally stable

**Answer: C**

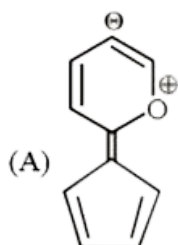


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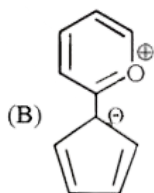


20.

The most stable canonical structure of this molecule is

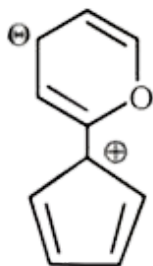


A.



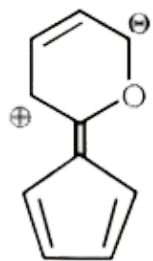
B.

(C)



C.

(D)



D.

Answer: B



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(I)



(II)



(III)



21.

The barrier for rotation about the indicated bonds

Will be maximum in which of these three compounds ?

A. I

B. II

C. III

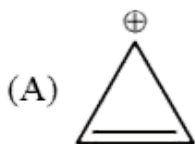
D. same in all

**Answer: B**

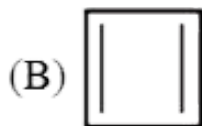


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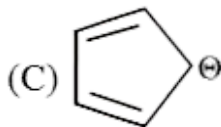
**22.** Identify the odd species out Which of the species among the following is different from others ?



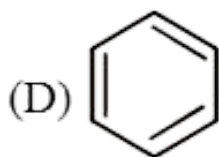
A.



B.



C.



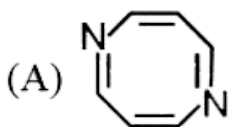
D.

**Answer: B**

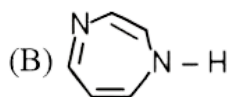


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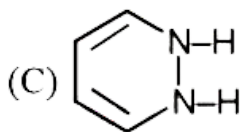
**23.** Which of the following heterocyclic compounds would have aromatic character ?



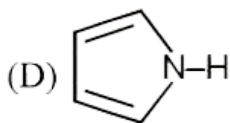
A.



B.



C.



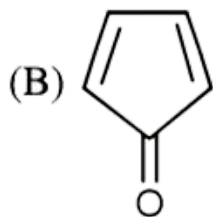
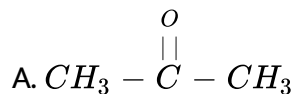
D.

**Answer: D**

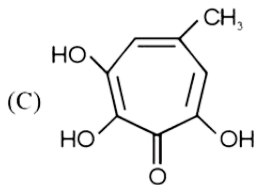


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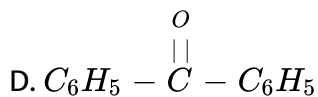
**24.** Which one of the following carbonyl compound when treated with dilute acid forms the more stable carbocation ?



B.



C.

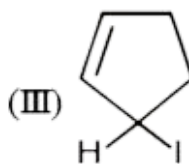
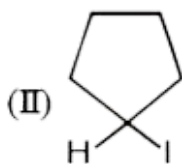
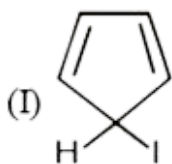


**Answer: C**



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**25.** The order of the rate of formation of carbocations from the following iodo compound is:



A.  $I > II > III$

B.  $I > III > II$

C.  $III > II > I$

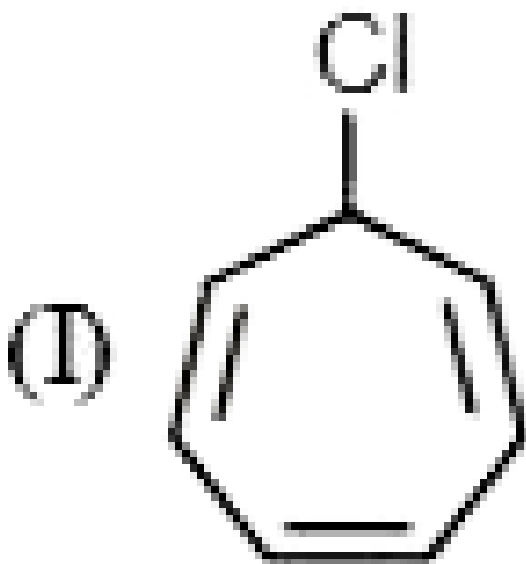
D.  $II > III > I$

Answer: C



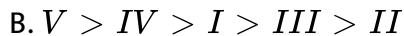
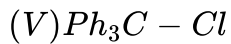
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26. Write correct order of reactivity of following halogen derivatives towards  $AgNO_3$ .



(II)  $CH_2 = CH - Cl$



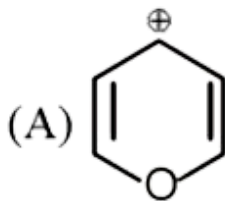


Answer: A

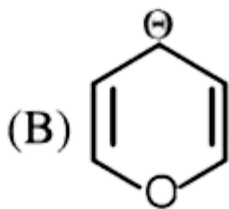


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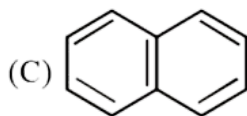
27. Which of the following species is not aromatic ?



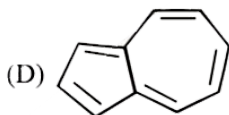
A.



B.



C.

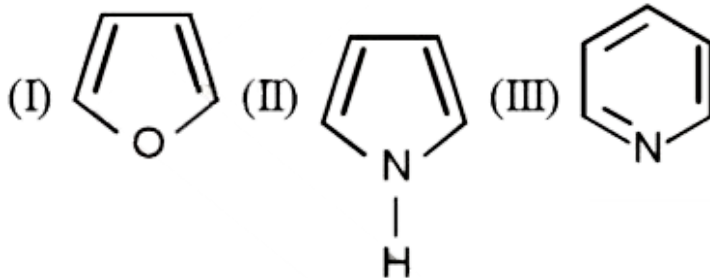


D.

**Answer: B**



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28.

The aromatic character is maximum in which of these three compounds ?

A. I

B. II

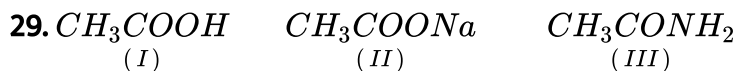
C. III

D. Same in all

**Answer: C**



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Among these compounds, the correct order of resonance energy is

A.  $I > II > III$

B.  $III > II > I$

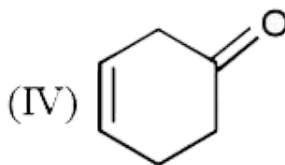
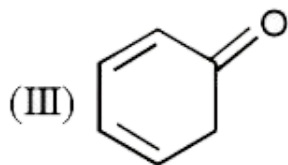
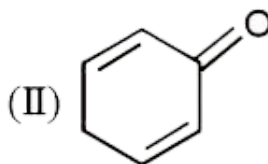
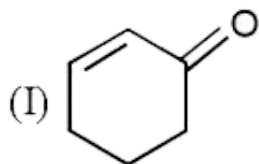
C.  $II > III > I$

D.  $II > I > III$

**Answer: C**



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30.

Among these compounds, which one has maximum resonance energy ?

A. I

B. II

C. III

D. IV

Answer: C

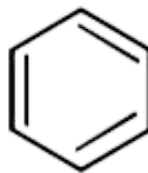


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(I)



(II)



31.

Which of the following orders is correct for the resonance energy of these two compounds ?

A.  $I > II$

B.  $II > I$

C.  $I = II$

D. there is nothing like  $\pi$ -electron energy

**Answer: B**



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**Exercise 2 Level II**

1. Which of the following statements is (are) true about resonance.

(a) Resonance is an intramolecular process.

(b) Resonance involves delocalization of both  $\sigma$  and  $\pi$  electrons.

(c) Resonance involves delocalization of  $\pi$  electrons and lone pair only.

(d) Resonance decreases potential energy of a molecule. **(e) Resonance has no effect on the potential energy of a molecule.**

**(f) Resonance is the only way to increase molecular stability.**

**(g) Resonance is not the only way to increase molecular stability.**

**(h) Any resonating molecule is always more stable than any nonresonating molecule.**

**(i) The canonical structure explains all features of a molecule.**

**(j) The resonance hybrid explains all features of a molecule.**

**(k) Resonating structures are real and resonance hybrid is imaginary.**

**(l) Resonance hybrid is real and resonating structures are imaginary.**

**(m) Resonance hybrid is always more stable than all canonical structures.**



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**2. Resonance energy will be more if**

**(a) canonical structures are equivalent than if canonical structures are non-equivalent.**

**(b) molecule is aromatic than if molecule is not aromatic.**



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**3. A canonical structure will be more stable if**

**(a) it has more number of  $\pi$  bonds than if it has less number of  $\pi$  bonds.**

**(b) the octate of all atoms are complete than if octate of all atoms are not complete.**

**(c ) it involves cyclic delocalization of  $(4n + 2)\pi$  – electrons than if it involves acyclic delocalization of  $(4n + 2)\pi$  – electrons.**

**(d) it involves cyclic delocalization  $(4n)\pi$ - electrons than if it involves acyclic delocalizationof  $(4n)\pi$  – electrons.**

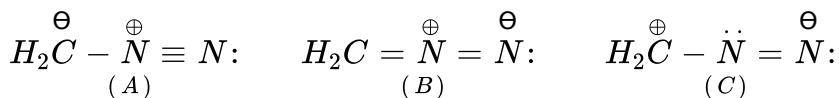
**(e)  $+ve$  charge is on more electronegative atom than if  $+ve$  charge is on less electronegative atoms.**

(f)  $-ve$  charge is on more electronegative atom than if  $-ve$  charge is on less electronegative atom.



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4. Consider structural formulas A, B and C :



(a) Are A, B and C constitutional isomers, or are they resonance forms?

(b) Which structures have a negatively charged carbon?

(c) Which structures have a positively charged carbon?

(d) Which structures have a positively charged nitrogen?

(e) Which structures have a negatively charged nitrogen?

(f) What is the net charge on each structure?

(g) Which is a more stable structure, A or B? Why?

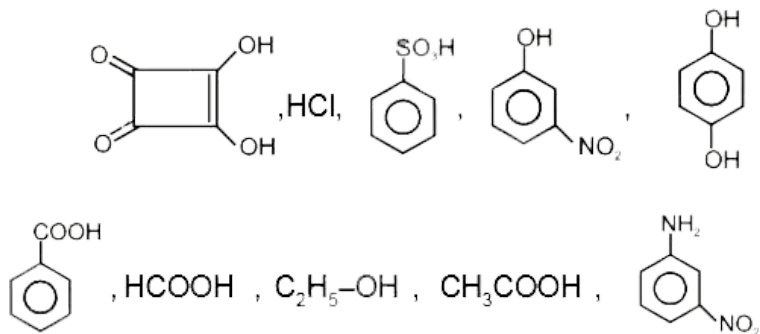
(h) Which is a more stable structure, B or C? Why?



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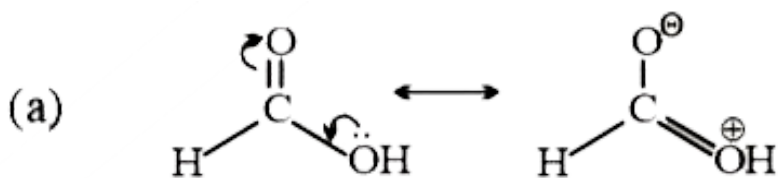


5. How many of the following compounds give  $CO_2$  on reaction with  $NaHCO_3$ .



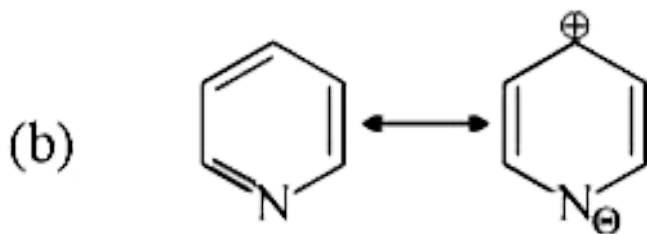
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6. Identify more stable canonical structure in each of the following pairs :



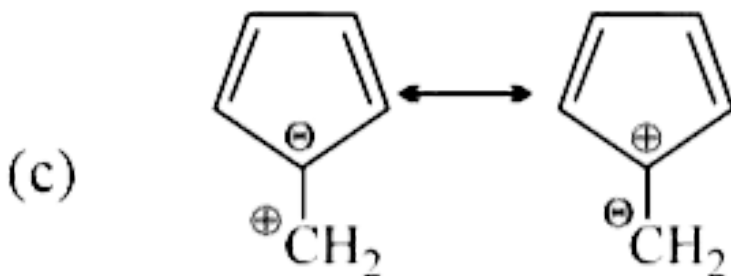
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7. Identify more stable canonical structure in each of the following pairs :



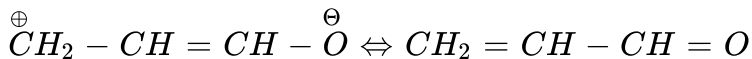
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8. Identify more stable canonical structure in each of the following pairs :



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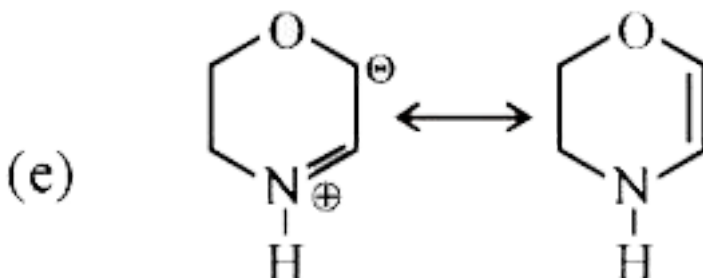
9. Identify more stable canonical structure in each of the following pairs :



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10. Identify more stable canonical structure in each of the following pairs

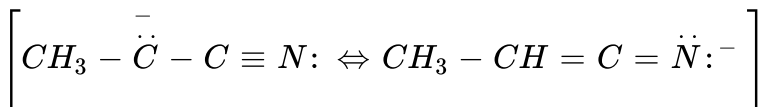
:



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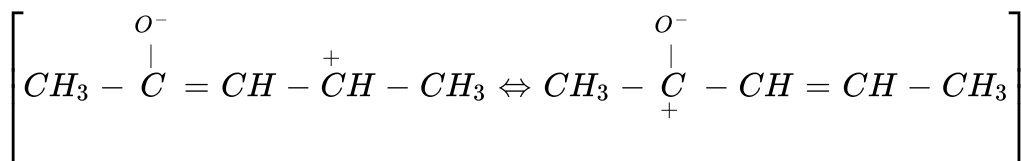
11. In the following sets of resonance forms, label the major and minor contributors and state which structures would be of equal energy. Add

any missing resonance forms.



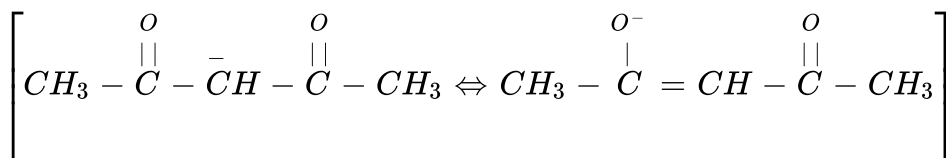
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12. In the following sets of resonance forms, label the major and minor contributors and state which structures would be of equal energy. Add any missing resonance forms.



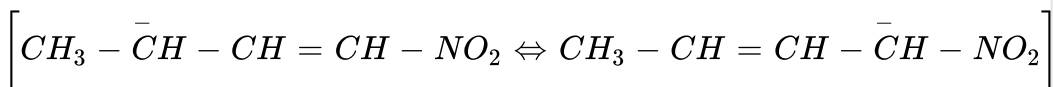
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13. In the following sets of resonance forms, label the major and minor contributors and state which structures would be of equal energy. Add any missing resonance forms.

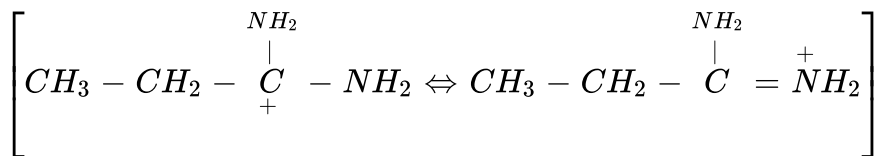


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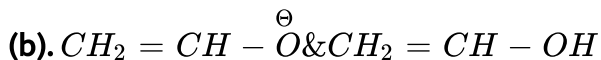
14. In the following sets of resonance forms, label the major and minor contributors and state which structures would be of equal energy. Add any missing resonance forms.

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15. In the following sets of resonance forms, label the major and minor contributors and state which structures would be of equal energy. Add any missing resonance forms.

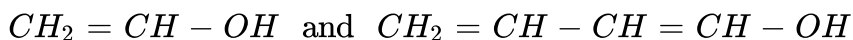
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16. Which of the following pairs has higher resonance energy:



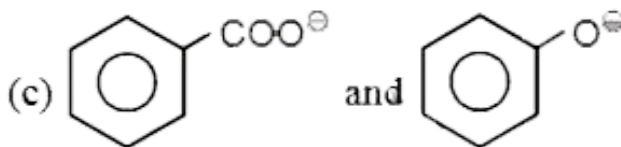
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17. Which of the following pairs has higher resonance energy :



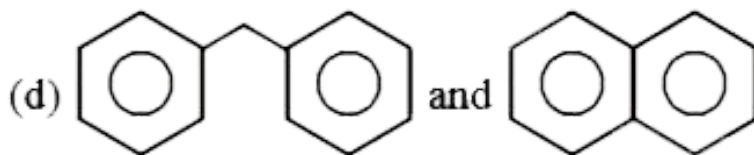
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18. Which of the following pairs has higher resonance energy:



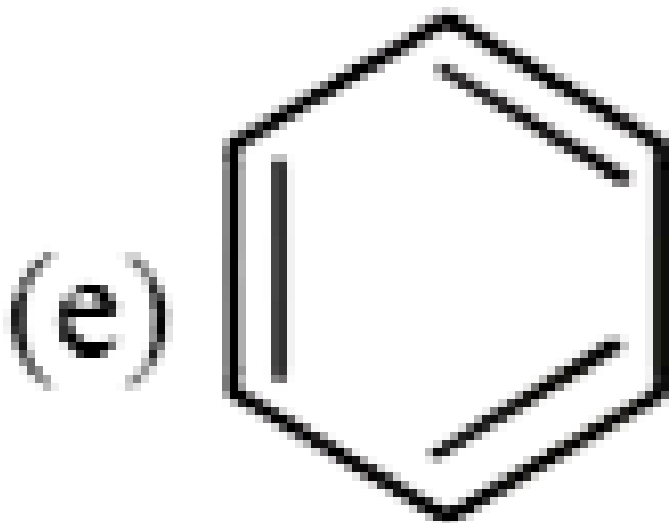
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19. Which of the following pairs has higher resonance energy:

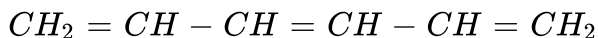


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20. Which of the following pairs has higher resonance energy:

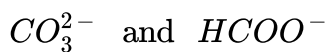


and



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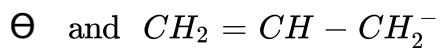
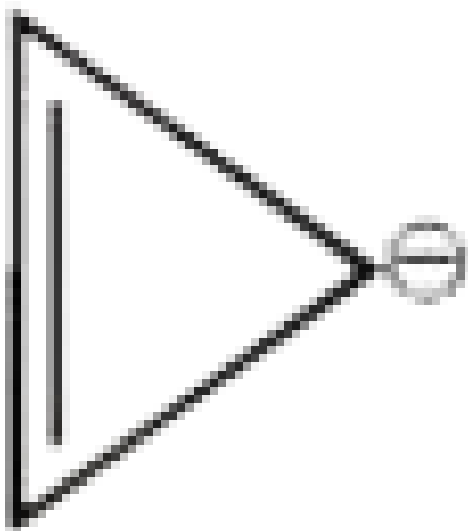
21. Which of the following pairs has less resonance energy:



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22. Which of the following pairs has less resonance energy:

(b)

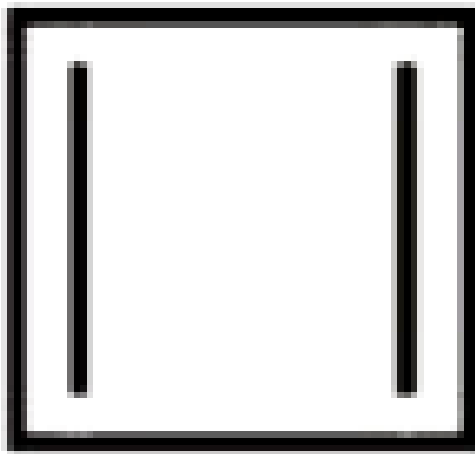


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23. Which of the following pairs has less resonance energy:

(c)



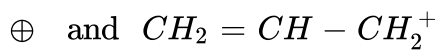
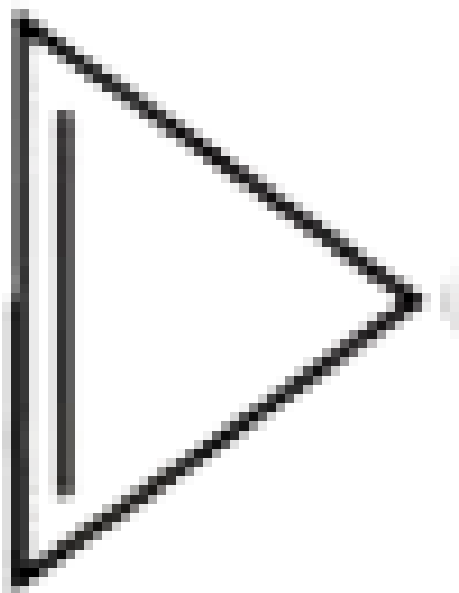
and  $CH_2 = CH - CH = CH_2$



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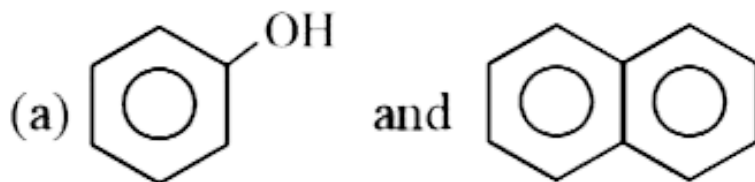
24. Which of the following pairs has less resonance energy:

(d)



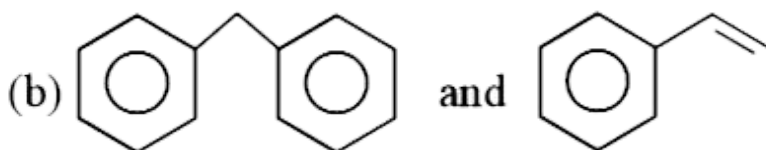
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25. Which of the following pairs has higher resonance energy :



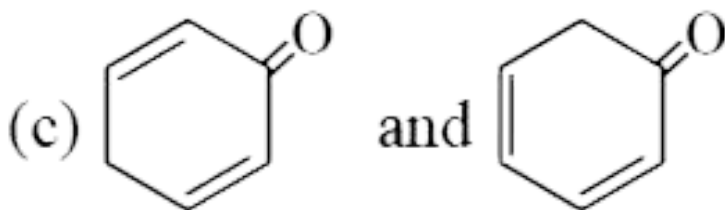
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26. Which of the following pairs has higher resonance energy :



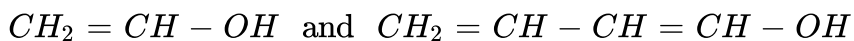
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27. Which of the following pairs has higher resonance energy :



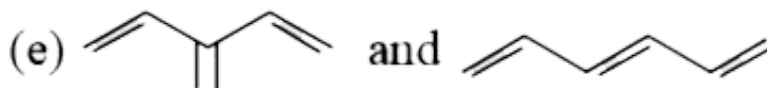
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28. Which of the following pairs has higher resonance energy :



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29. Which of the following pairs has higher resonance energy :



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Loss of proton from these two acids produces

- A. same anion
- B. different anions
- C. same cation
- D. different cations

Answer: A

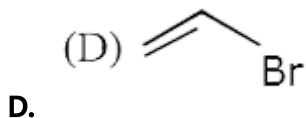
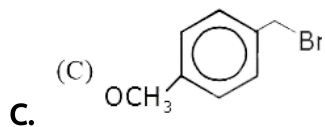
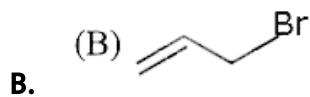


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31. Ease of ionization to produce carbocation and bromide ion under the treatment of  $Ag^{\oplus}$  will be maximum in which of the following compounds ?



A.

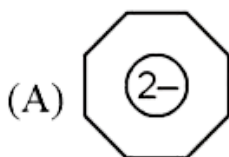
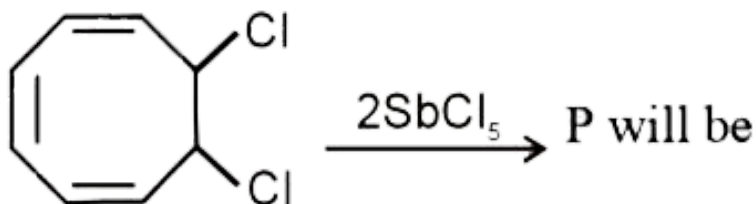


Answer: A

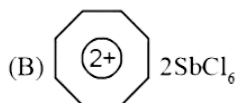


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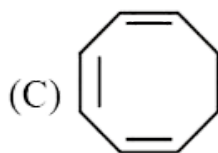
32. Complete the following reaction



A.



B.



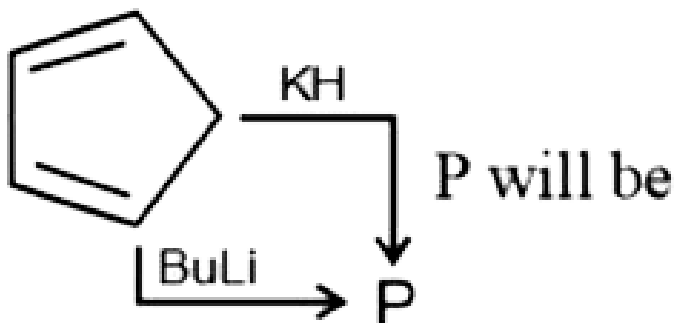
C.

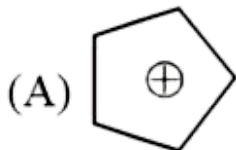
D. mixture of (a) and (b)

Answer: B

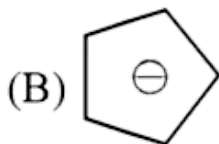
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33. Complete the following reaction





A.



B.

C. mixture of (A) & (B)

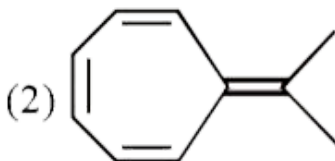
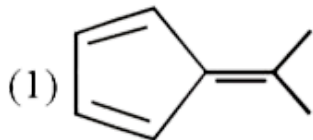
D. none of these

Answer: B



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34. Which one of the following statements is True:



A. PhLi adds to both compound with equal ease



B. PhLi does not add to either of the compound

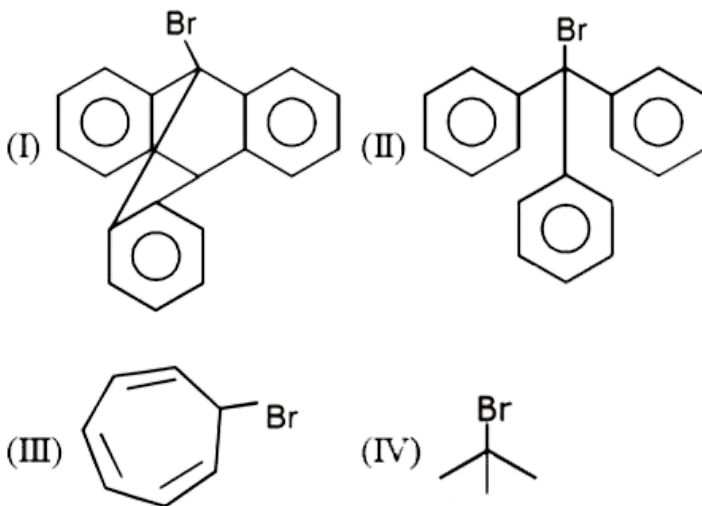
C. PhLi react readily with 1 but does not add to 2

D. PhLi react readily with 2 but does not add to 1

Answer: C

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35. Correct order of rate of hydrolysis or rate of reaction toward  $AgNO_3$  for following compounds is



A.  $III > II > IV > I$

B.  $I > II > III > IV$

C.  $III > I > II > IV$

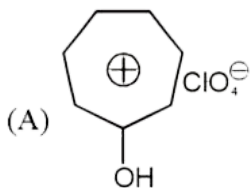
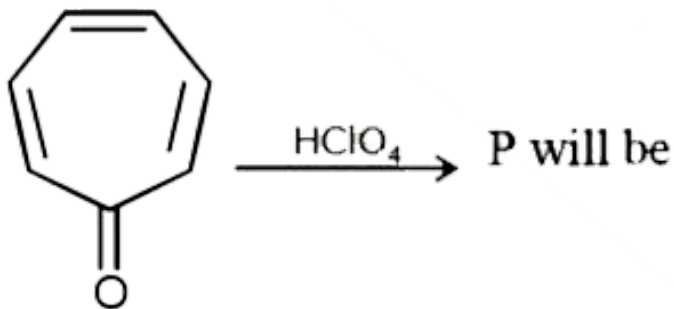
D.  $III > II > I > IV$

Answer: A

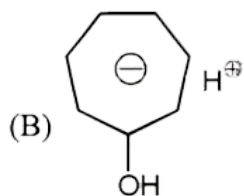


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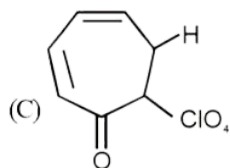
36. Complete the following reaction



A.



B.



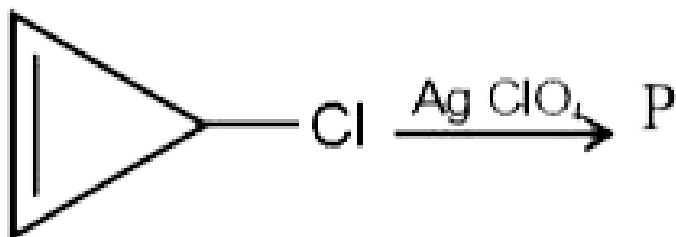
C.

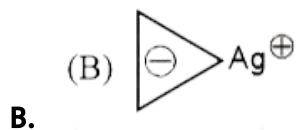
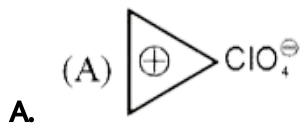
D. Mixture of (A) & (B)

Answer: A

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37. Complete the following reaction





C. Mixture of (A) & (B)

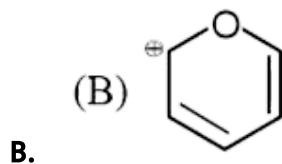
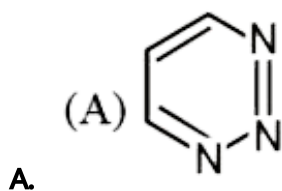
D. None of these

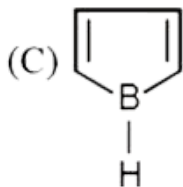
Answer: A



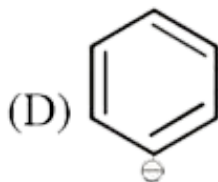
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38. Aromatic compounds are:





C.



D.

Answer: ABD

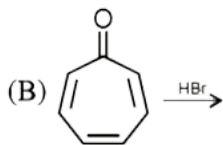


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39. Which of the following reactions give aromatic compound ?

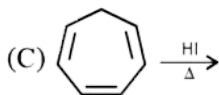


A.



B.

C.



D.

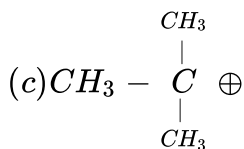
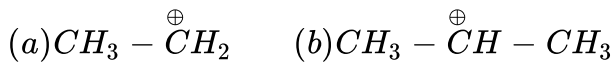


Answer: ABC



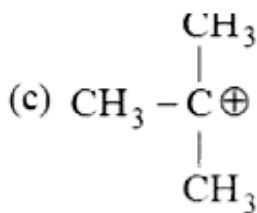
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40. Write stability order of following intermediates:

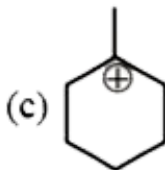
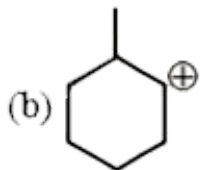
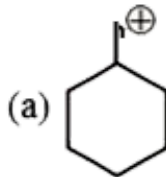


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41. Write stability order of following intermediates:



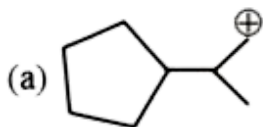
(ii)



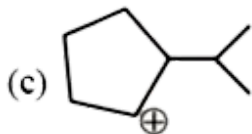
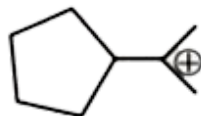
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42. Write stability order of following intermediates:

(iii)

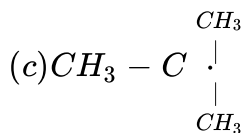
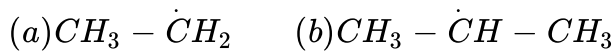


(b)



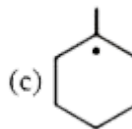
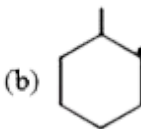
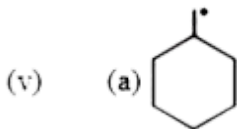
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43. Write stability order of following intermediates:



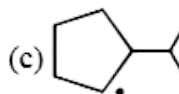
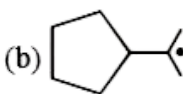
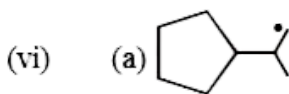
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44. Write stability order of following intermediates:



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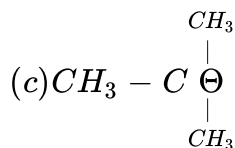
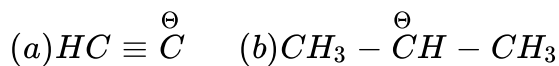
45. Write stability order of following intermediates:



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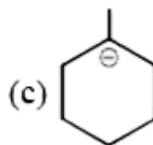
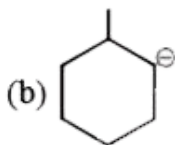
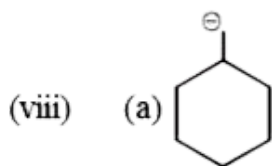


46. Write stability order of following intermediates:



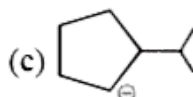
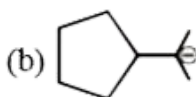
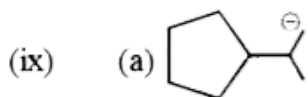
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47. Write stability order of following intermediates:

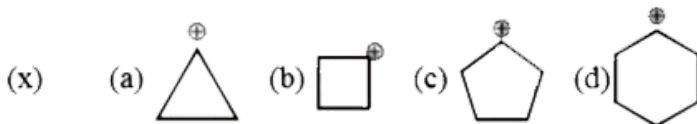


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48. Write stability order of following intermediates:

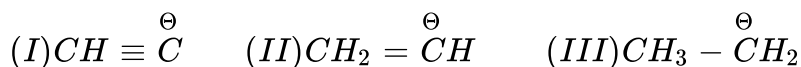


49. Write stability order of following intermediates:



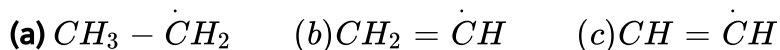
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50. Arrange the following in correct order of their stability ?



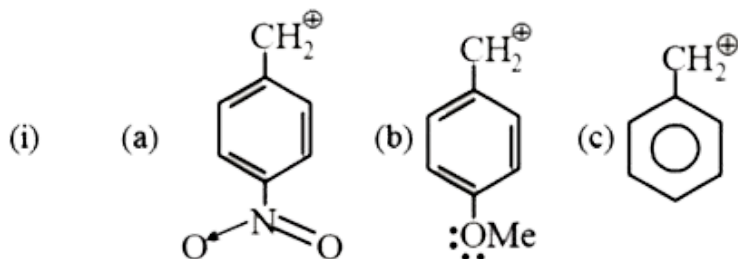
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51. Compare the stability of the following free Radical.



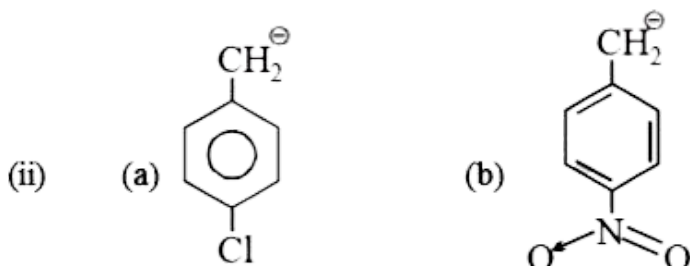
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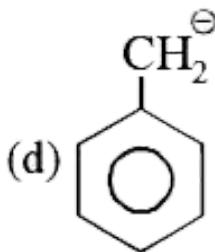
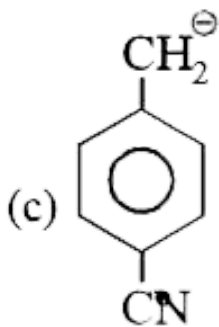
52. Write stability order of following intermediates:



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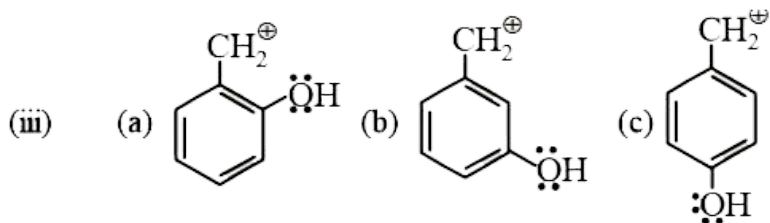
53. Write stability order of following intermediates:





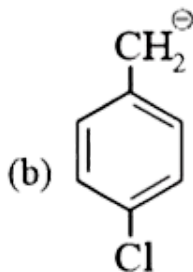
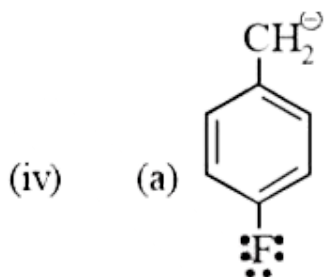
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54. Write stability order of following intermediates:



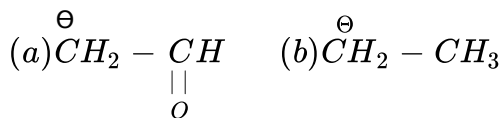
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55. Write stability order of following intermediates:



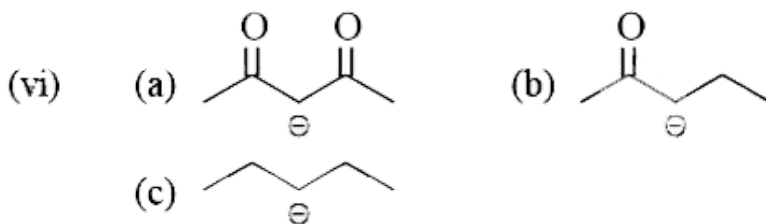
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56. Write stability order of following intermediates:



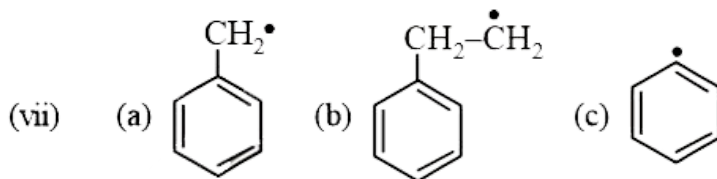
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57. Write stability order of following intermediates:



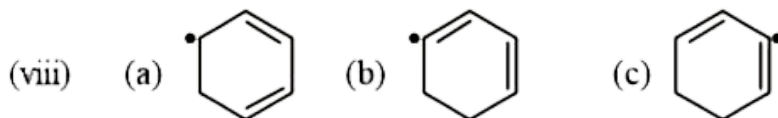
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58. Write stability order of following intermediates:



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59. Write stability order of following intermediates:

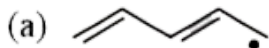




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60. Write stability order of following intermediates:

(ix)



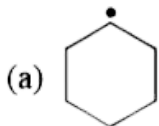
(b)



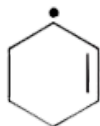
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61. Write stability order of following intermediates:

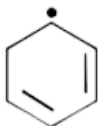
(x)



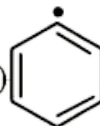
(b)



(c)



(d)

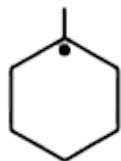


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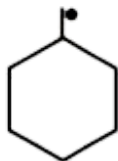
62. Write stability order of following intermediates:

(xi)

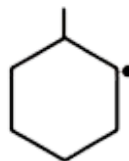
(a)



(b)



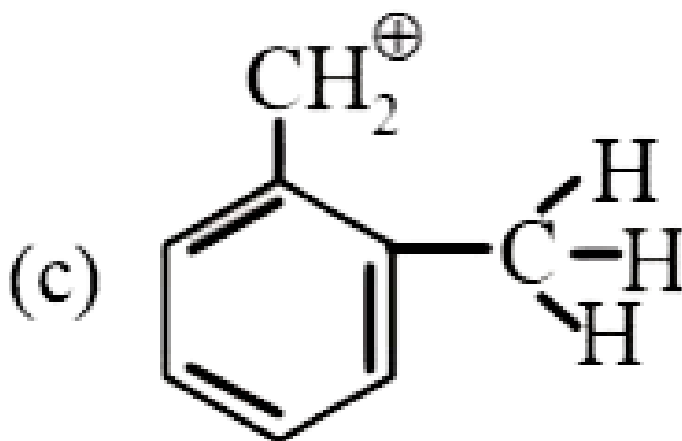
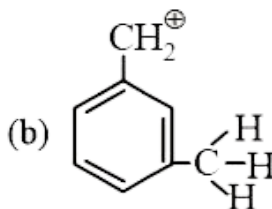
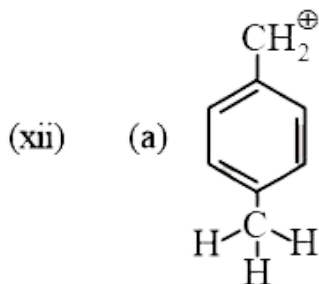
(c)





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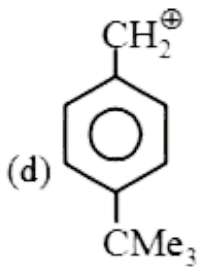
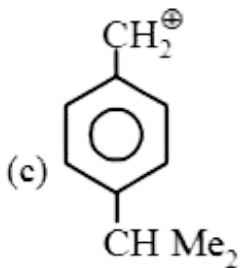
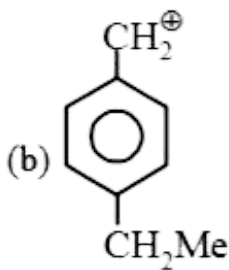
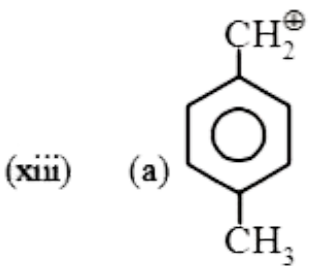
63. Write stability order of following intermediates:



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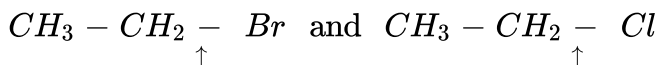


**64. Write stability order of following intermediates:**



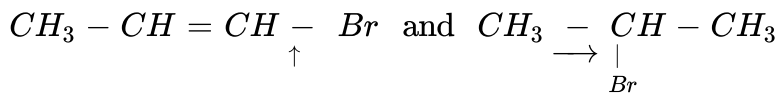
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65. In which of the following pairs, indicated bond is of greater strength :



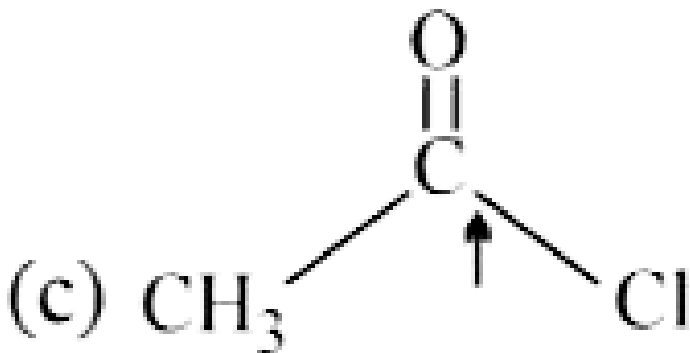
### Watch Video Solution

66. In which of the following pairs, indicated bond is of greater strength :



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67. In which of the following pairs, indicated bond is of greater strength :

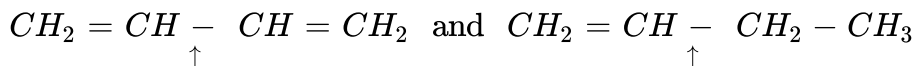


and



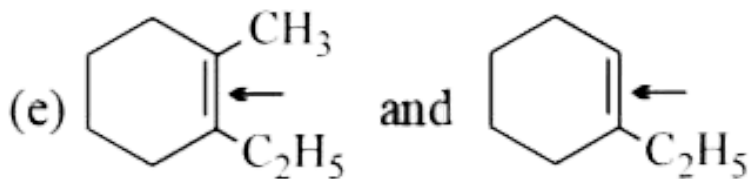
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68. In which of the following pairs, indicated bond is of greater strength :



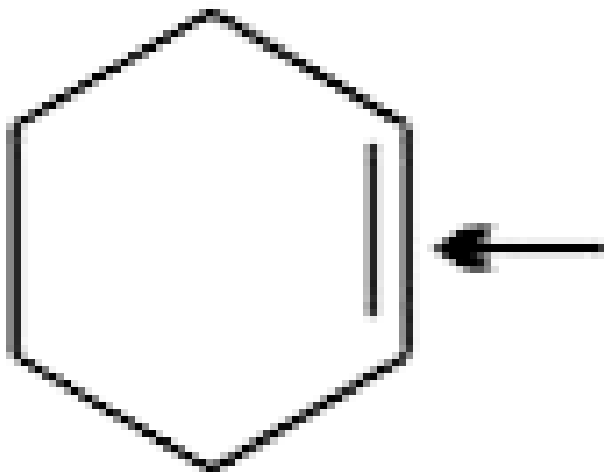
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69. In which of the following pairs, indicated bond is of greater strength :

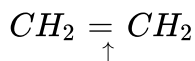


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70. In which of the following pairs, indicated bond having less bond dissociation energy :

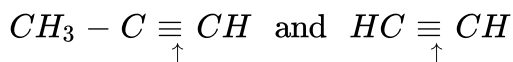


and



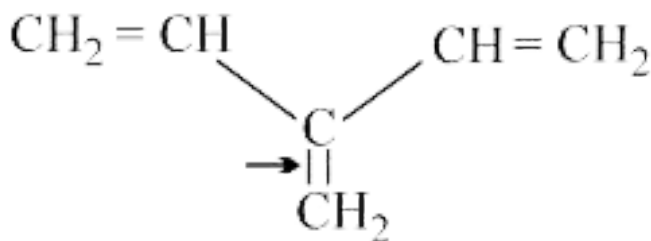
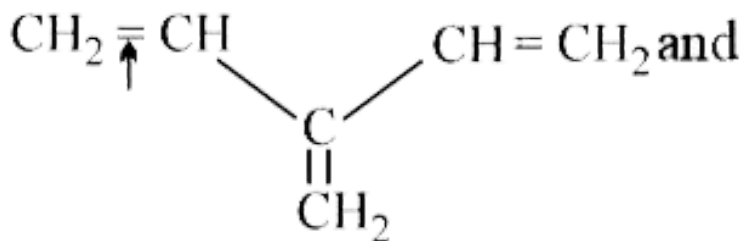
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71. In which of the following pairs, indicated bond having less bond dissociation energy :



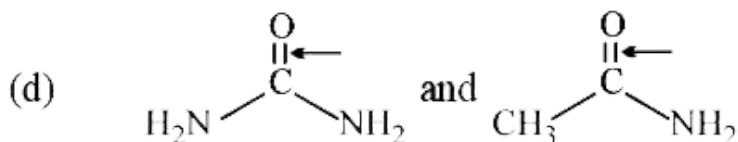
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72. In which of the following pairs, indicated bond having less bond dissociation energy :



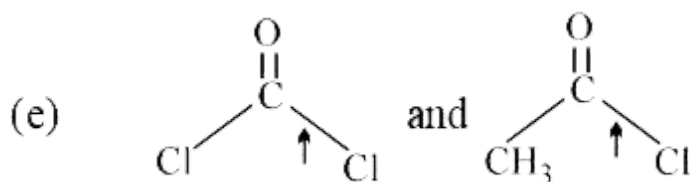
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73. In which of the following pairs, indicated bond having less bond dissociation energy :

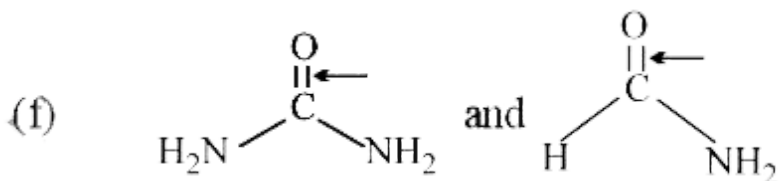


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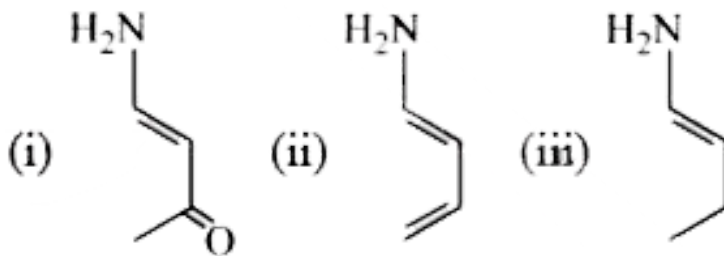
74. In which of the following pairs, indicated bond having less bond dissociation energy :

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75. In which of the following pairs, indicated bond having less bond dissociation energy :

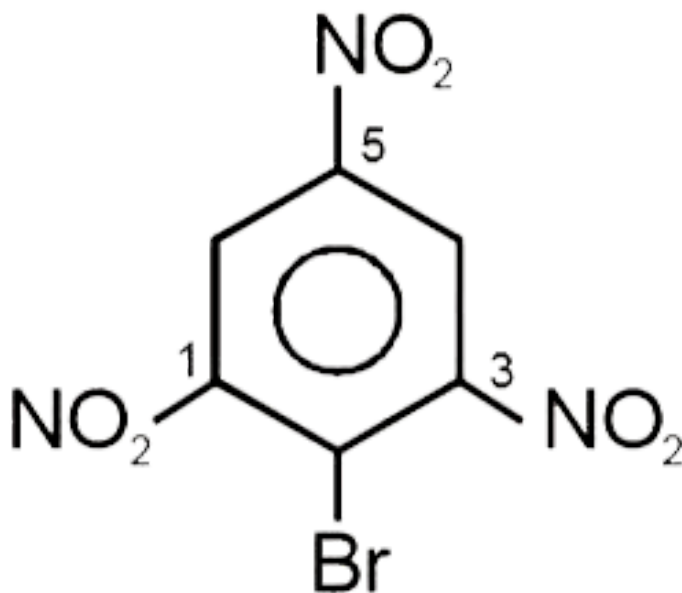
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76. Compare the C–N bond-length in the following species:



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77. Which of the following statements would be true about this compound:



A. All three C – N bonds are of same length.

B. C1 – N and C3 – N bonds are of same length but shorter than C5 – N bond

C. C1 – N and C3 – N bonds are of same length but longer than C5 – N bond

D. C1 – N and C3 – N bonds are of different length but both are longer than C5 – N bond.

Answer: C



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78. Choose the more stable alkene in each of the following pairs. Explain your reasoning.

1-Methylcyclohexene or 3-methylcyclohexene



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79. Choose the more stable alkene in each of the following pair. Explain your reasoning.

(a). 1-Methylcyclohexene or 3-methylcyclohexene

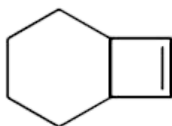
(b). Isopropenylcyclopentane or allylcyclopentane.



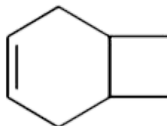
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80. Choose the more stable alkene in each of the following pairs. Explain your reasoning.

(c)

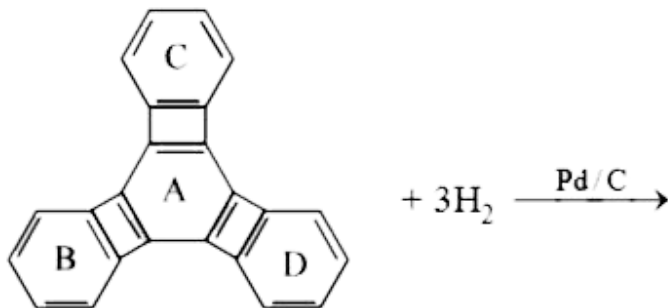


or



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81. Consider the given reaction :



In the above reaction which one of the given ring will undergo reduction?

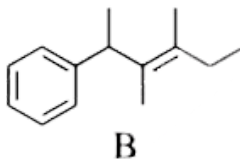
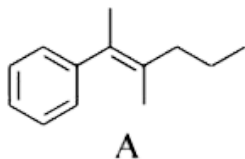


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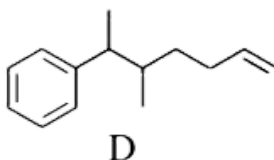
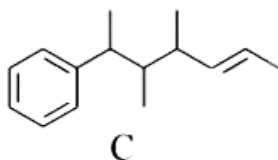
82. Compare heat of hydrogenation (Decreasing order)

heat of hydrogenation

(i)

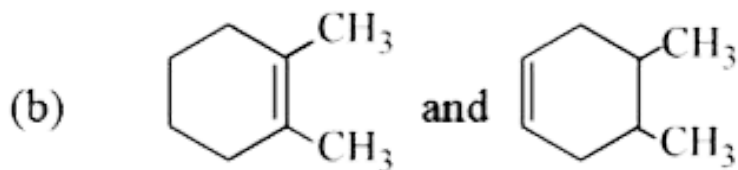


(ii)



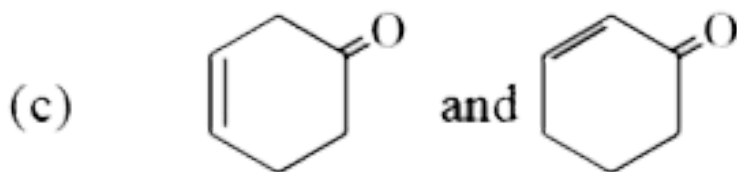
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83. Compare heat of hydrogenation (Decreasing order)



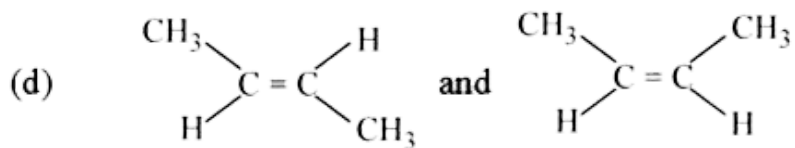
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84. Compare heat of hydrogenation (Decreasing order)



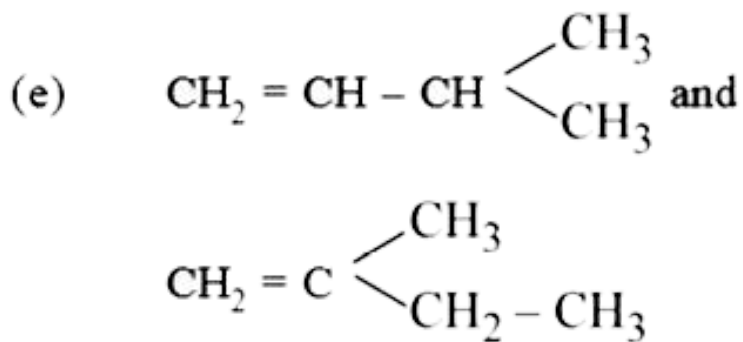
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85. Compare heat of hydrogenation (Decreasing order)



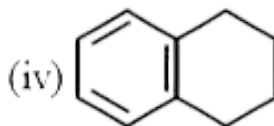
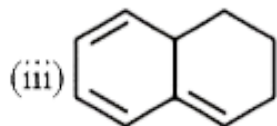
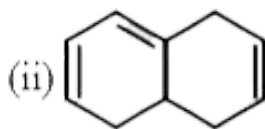
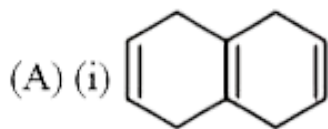
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86. Compare heat of hydrogenation (Decreasing order)



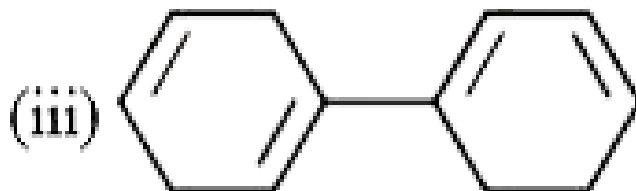
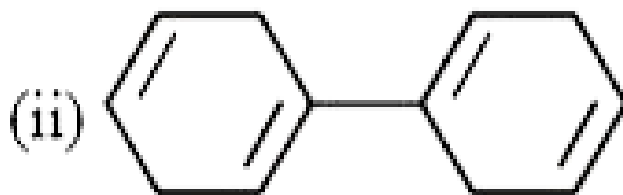
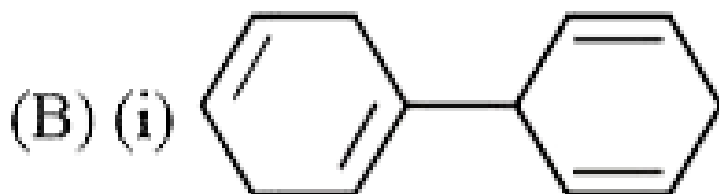
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87. (I) Stability order and (II) heat of hydrogenation orders.



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88. (I) Stability order and (II) heat of hydrogenation orders.



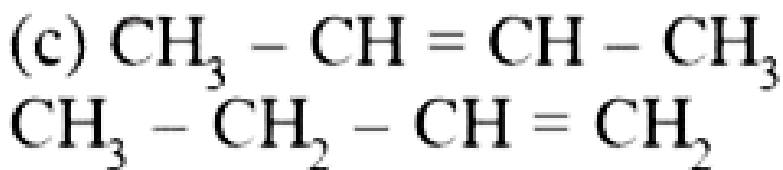
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89. Among the following pairs identify the one which gives higher heat of hydrogenation :



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90. Among the following pairs identify the one which gives higher heat of hydrogenation :



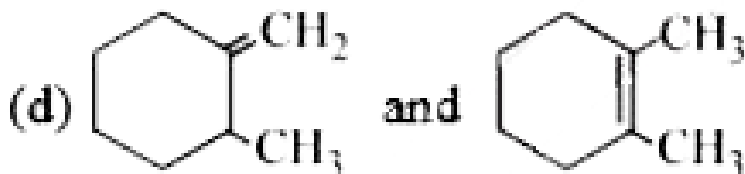
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91. Among the following pairs identify the one which gives higher heat of hydrogenation :



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92. Among the following pairs identify the one which gives higher heat of hydrogenation :



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93. Match each alkene with the appropriate heat of combustion:

Heats of combustion (kJ/mol) : 5293, 4658, 4650, 4638, 4632

1-Heptene

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**94. Match each alkene with the appropriate heat of combustion:**

**Heats of combustion (kJ/mol) :** 5293, 4658, 4650, 4638, 4632

**2, 4 – Dimethyl-1-pentene**



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**95. Match each alkene with the appropriate heat of combustion:**

**Heats of combustion (kJ/mol) :** 5293, 4658, 4650, 4638, 4632

**2, 4 – Dimethyl-2-pentene , 4, 4 – Dimethyl-2-pentene , 2, 4, 4 –**

**Trimethyl-2-pentene, 2,4-Dimethyl-1-pentene, 1-Heptene**



**View Text Solution**

**96. Match each alkene with the appropriate heat of combustion:**

**Heats of combustion (kJ/mol) :** 5293, 4658, 4650, 4638, 4632

2, 4 – Dimethyl-2-pentene , 4, 4 – Dimethyl-2-pentene , 2, 4, 4 – Trimethyl-2-pentene, 2,4-Dimethyl-1-pentene, 1-Heptene

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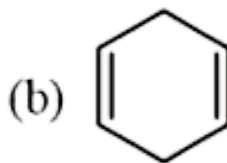
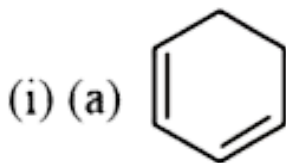
97. Match each alkene with the appropriate heat of combustion:

Heats of combustion (kJ/mol) : 5293, 4658, 4650, 4638, 4632

2, 4 – Dimethyl-2-pentene , 4, 4 – Dimethyl-2-pentene , 2, 4, 4 – Trimethyl-2-pentene, 2,4-Dimethyl-1-pentene, 1-Heptene

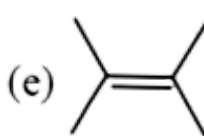
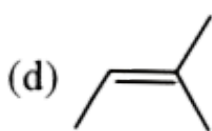
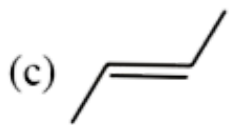
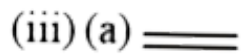
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98. Write increasing order of heat of hydrogenation :



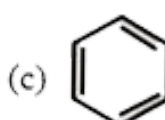
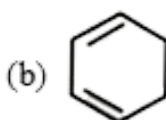
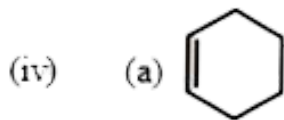
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99. Write increasing order of heat of hydrogenation :



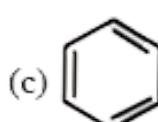
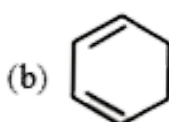
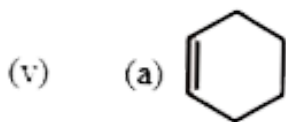
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100. Write increasing order of heat of hydrogenation :



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101. Write increasing order of heat of hydrogenation :



(HOH per  $\pi$  bond)

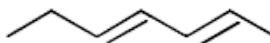


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102. Write increasing order of heat of hydrogenation :

(vii)

(a)



(b)

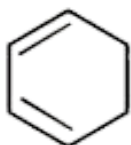


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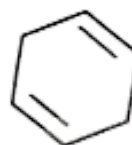
103. Write increasing order of heat of hydrogenation :

(viii)

(a)

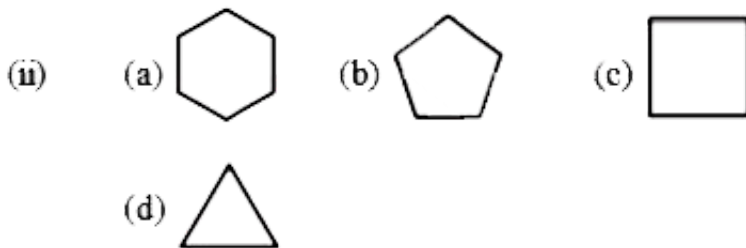


(b)



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104. Give decreasing order of heat of combustion (HOC):



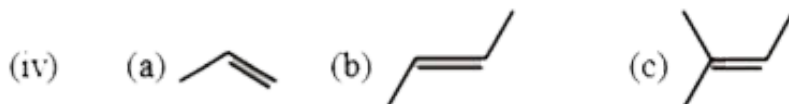
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105. Give decreasing order of heat of combustion (HOC):



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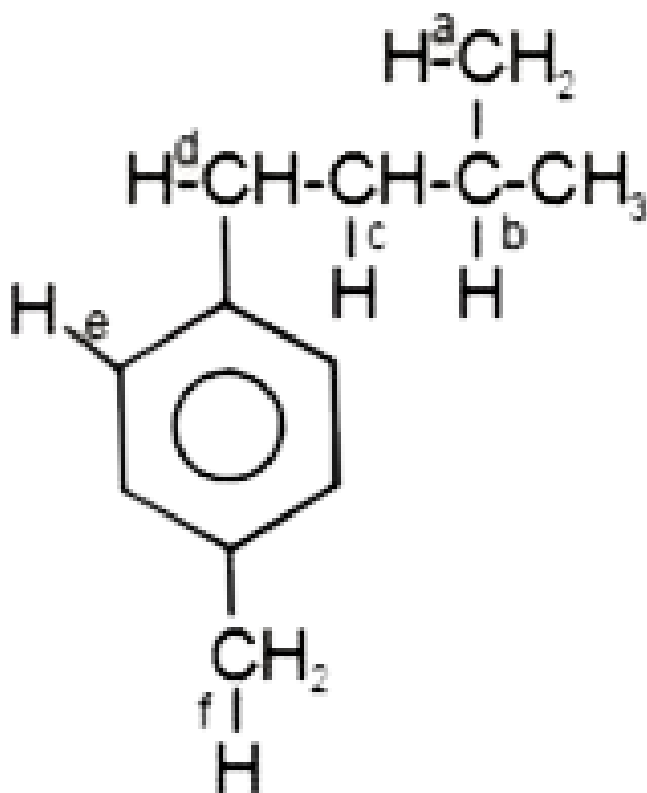
106. Give decreasing order of heat of combustion (HOC):





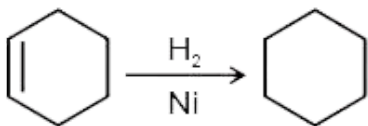
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107. Arrange in order of C-H bond energy

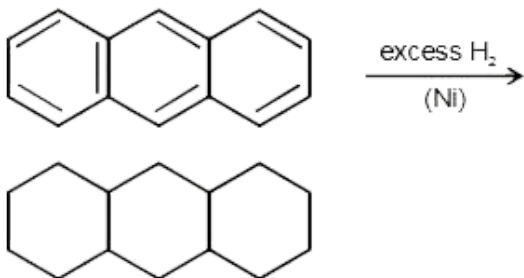


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108. Use the following data to answer the questions below:



$$\Delta H = -28.6 \text{ Kcal mol}^{-1}$$

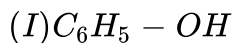


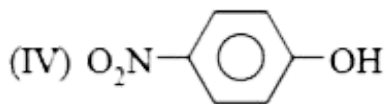
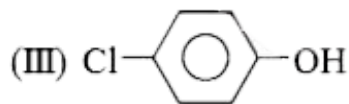
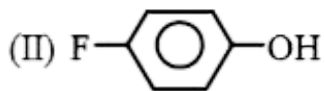
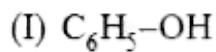
$\Delta H = -116.2 \text{ Kcal mol}^{-1}$  Anthracene Calculate the resonance energy of anthracene in kcal/mol.



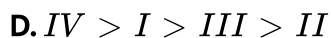
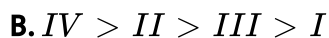
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109. Arrange the given phenols in their decreasing order of acidity:





Select the correct answer from the given code:

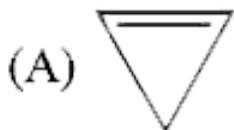


Answer: C



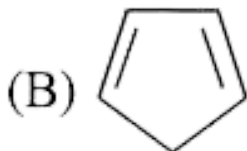
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110. Which one of the following is the most acidic?

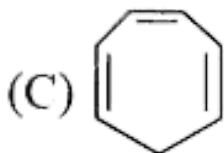


A.

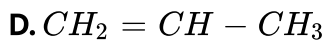




B.



C.

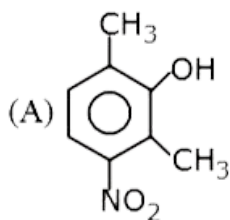


Answer: B

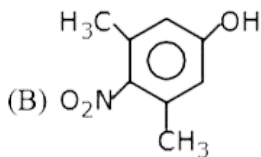


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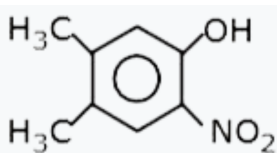
111. Which one of the following phenols will show highest acidity?



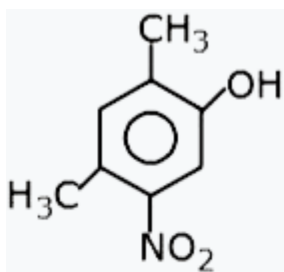
A.



B.



C.



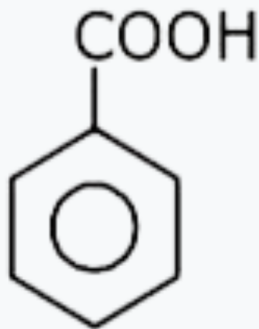
D.

Answer: C

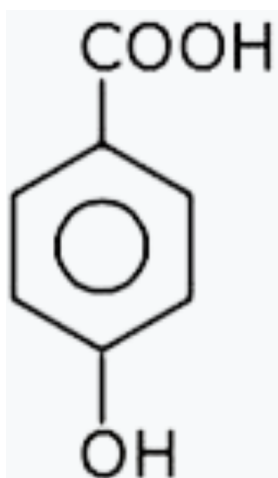


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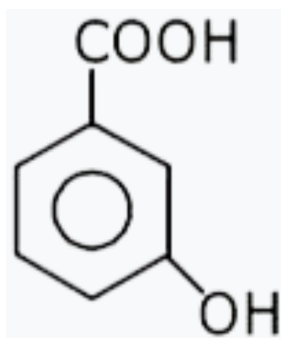
112. Which of the following is weakest acid?



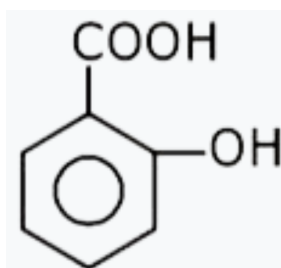
A.



B.



C.



D.

**Answer: B**



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**113. Arrange pH of the given compounds in decreasing order:**

**(1) Phenol**

**(2) Ethyl alcohol**

**(3) Formic acid**

**(4). Benzoic acid**

**A.  $1 > 2 > 3 > 4$**

**B.  $2 > 1 > 4 > 3$**

**C.  $3 > 2 > 4 > 1$**

**D.  $4 > 3 > 1 > 2$**

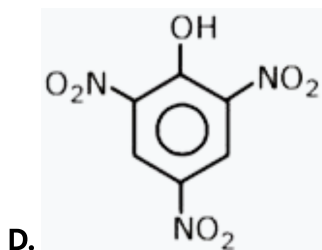
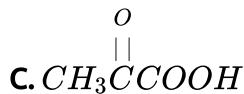
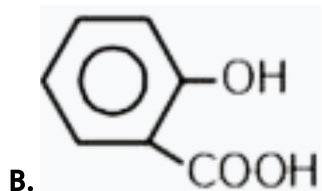
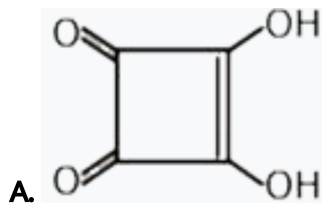
**Answer: B**



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114. Consider the following compound :

Which of the above compounds reacts with  $\text{NaHCO}_3$  giving  $\text{CO}_2$



Answer: ABCD



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1. Write the correct order of acidic strength of following compounds:



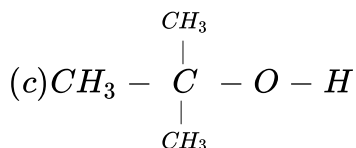
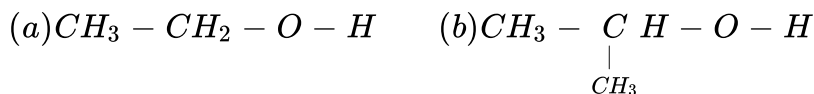
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2. Write the correct order of acidic strength of following compounds:



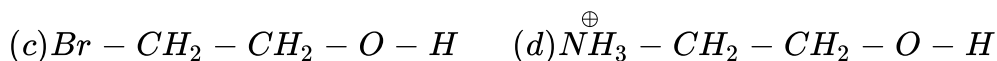
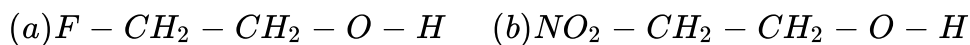
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3. Write the correct order of acidic strength of following compounds:



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4. Write the correct order of acidic strength of following compounds:



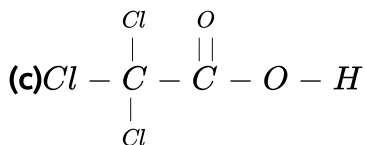
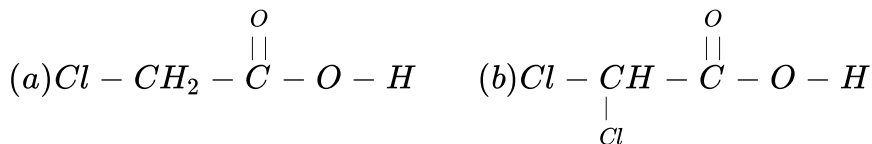
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5. Write the correct order of acidic strength of following compounds:



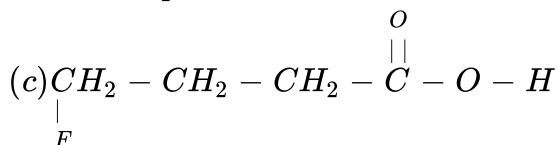
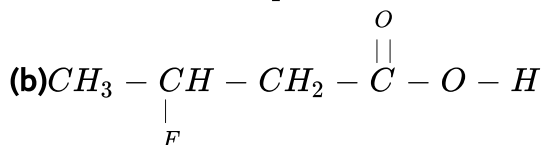
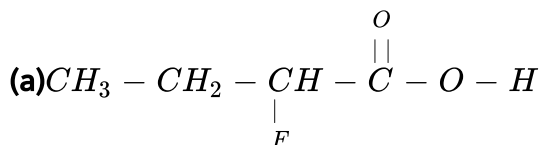
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6. Write correct order of acidic strength of following compounds:

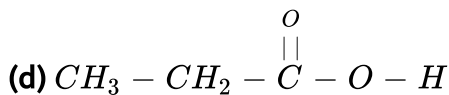
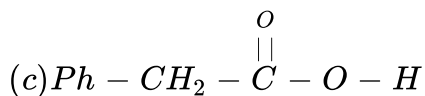
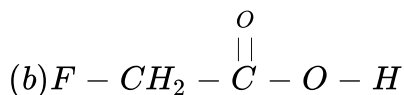
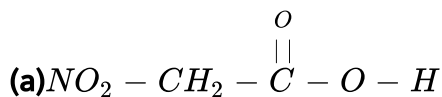


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7. Write correct order of acidic strength of following compounds:

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8. Write correct order of acidic strength of following compounds:







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9. Record the following sets of compounds according to increasing

$$pK_a (= -\log K_a)$$

1-butyne, 1-butene, butane



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10. Record the following sets of compounds according to increasing

$$pK_a (= -\log K_a)$$

Propanoic acid, 3-bromopropanoic acid, 2-nitropropanoic acid



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11. Record the following sets of compounds according to increasing

$$pK_a (= -\log K_a)$$

Phenol, o-nitrophenol, o-cresol



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[Watch Video Solution](#)

12. Record the following sets of compounds according to increasing

$$pK_a (= -\log K_a)$$

Hexylamine, aniline, methylamine

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13. Explain which is a stronger acid

[Watch Video Solution](#)

14. Explain which is a stronger acid.

[Watch Video Solution](#)

15. Explain which is a stronger acid.



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16. Which of the following would you predict to be the stronger acid?

(a) Benzoic acid or para-nitrobenzoic acid

(b)  $CH_3 - CH_2 - CH_2 - OH$  or  $CH_3 - CH = CH - OH$

(c)  $CH_3 - CH = CH - CH_2 - OH$  or  $CH_3 - CH = CH - OH$ .



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17. Which of the following would you predict to be the stronger acid ?



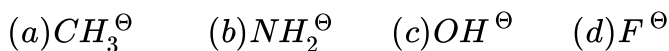
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18. Write increasing order of basic strength of following:



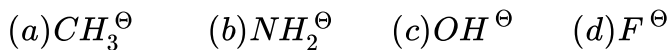
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19. Write increasing order of basic strength of following:



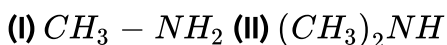
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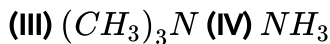
20. Write increasing order of basic strength of following:



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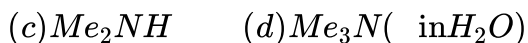
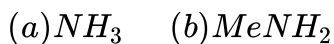
21. Correct order of basic strength in gas phase is





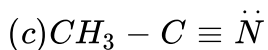
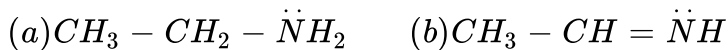
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22. Write increasing order of basic strength of following:



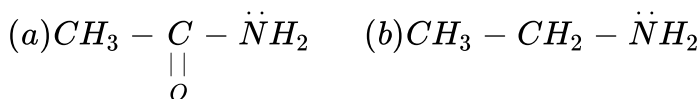
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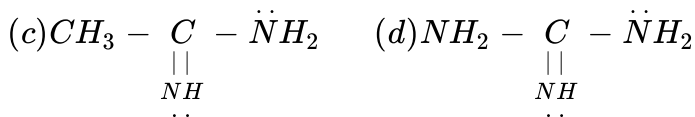
23. Write increasing order of basic strength of following:



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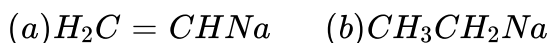
24. Write increasing order of basic strength of following:





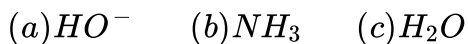
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25. Arrange the following compound in decreasing order of their basicity.



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26. Arrange the following compound in decreasing order of their basicity.



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27. Consider the following bases:

(I) o-nitroaniline

(II) m-nitroaniline

(III) p-nitroaniline

The decreasing order of basicity is:

A.  $II > III > I$

B.  $II > I > III$

C.  $I > II > III$

D.  $I > III > II$

Answer: A



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28. Consider the basicity of the following aromatic amines:

(I) aniline

(II) p-nitroaniline

(III) p-methoxyaniline

(IV) p-methylaniline

The correct order of decreasing basicity is:

A.  $III > IV > I > II$

B.  $III > IV > II > I$

C.  $I > II > III > IV$

D.  $IV > III > II > I$

Answer: A



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29. Which one of the following is least basic in character?



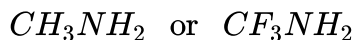
Answer: A



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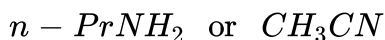


30. In each of the following pair of compounds, which is more basic in aqueous solution? Give an explanation for your choice:



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31. In each of the following pair of compounds, which is more basic in aqueous solution? Give an explanation for your choice:



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32. In each of the following pair of compounds, which is more basic in aqueous solution? Give an explanation for your choice:



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33. In each of the following pair of compounds, which is more basic in aqueous solution? Give an explanation for your choice:

m-nitroaniline or p-nitroaniline



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34. From the following pair, select the stronger base:

p-methoxy aniline or p-cyanoaniline



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35. From the following pair, select the stronger base:

pyridine or pyrrole



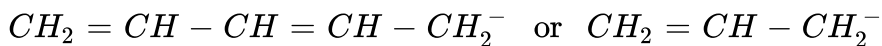
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36. From the following pair, select the stronger base:



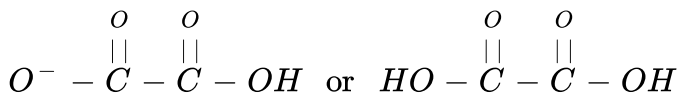
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37. Explain which compound is the weaker base.



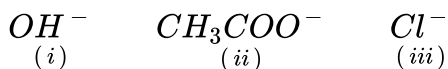
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38. Explain which compound is the weaker base.



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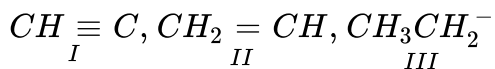
39. Arrange the basic strength of the following compounds.





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40. The basic strength of

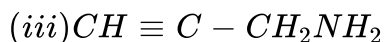
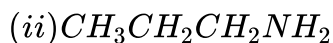
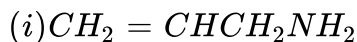


will be in order



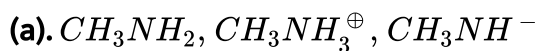
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41. Arrange the basic strength of the following compounds.



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42. Arrange the following compounds in order of increasing basicity.



(b)  $CH_3O^-$ ,  $CH_3NH^-$ ,  $CH_3CH_2^-$ .



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43. Arrange the following compounds in order of increasing basicity.

(a).  $CH_3NH_2$ ,  $CH_3NH_3^+$ ,  $CH_3NH^-$

(b)  $CH_3O^-$ ,  $CH_3NH^-$ ,  $CH_3CH_2^-$ .



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44. Arrange the following compounds in order of increasing basicity.

$CH_3CH=CH^-$ ,  $CH_3CH_2CH_2^-$ ,  $CH_3C \equiv C^-$



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#### Exercise 4 Level I

1. Amongst the following the most basic compound is :

- A. aniline
- B. benzylamine
- C. p-nitroaniline
- D. acetanilide

**Answer: B**



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**2. The number and type of bonds between two carbon atoms in calcium carbide are**

- A. two sigma, two pi
- B. two sigma, one pi
- C. one sigma, two pi
- D. one sigma, one pi

**Answer: C**

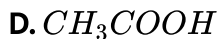
3. Due to the presence of an unpaired electron, free radicals are:

- A. cations
- B. anions
- C. chemically inactive
- D. chemically reactive

Answer: D

4. Among the following acids which has the lowest  $pK_a$  value-

- A.  $CH_3CH_2COOH$
- B.  $(CH_2)_2CH - COOH$
- C.  $HCOOH$

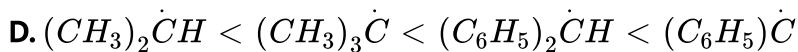
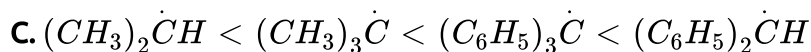
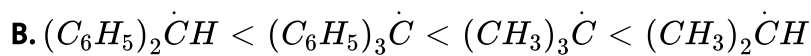
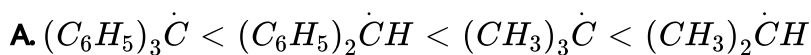


Answer: C



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5. The increasing order of stability of the following free radicals is:



Answer: D



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6. Which one of the following is the strongest base in aqueous solution?



**A. Trimethylamine**

**B. Aniline**

**C. Dimethylamine**

**D. Methylamine**

**Answer: C**



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**7. Presence of a nitro group in a benzene ring.**

**A. activates the ring towards electrophilic substitution**

**B. renders the ring basic**

**C. deactivates the ring towards nucleophilic substitution**

**D. deactivates the ring towards electrophilic substitution**

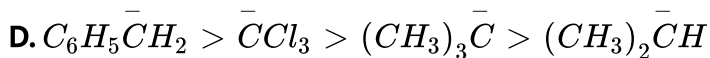
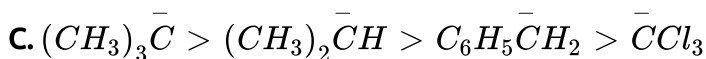
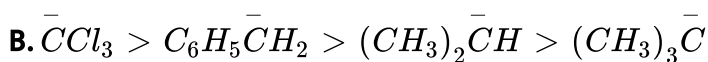
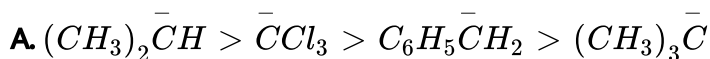
**Answer: D**



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8. Arrange the carbonions,

$(CH_3)_3\bar{C}$ ,  $\bar{CCl}_3$ ,  $(CH_3)_2\bar{CH}$ ,  $C_6H_5\bar{CH}_2$  in order of their decreasing stability



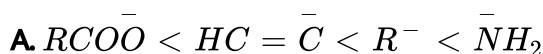
Answer: B

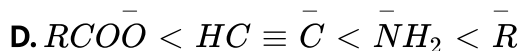
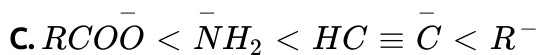
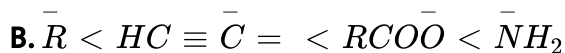


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9. The correct order of increasing basicity of the given conjugate bases

( $R = CH_3$ ) is





Answer: D



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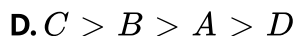
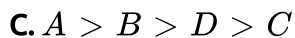
10. The correct order of acid strength of the following compounds

A. Phenol

B. p-Cresol

C. m-Nitrophenol

D. p-Nitrophenol.



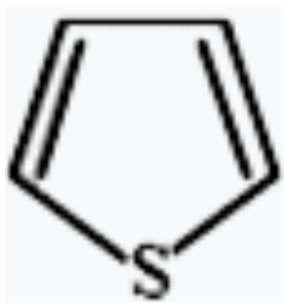
Answer: A



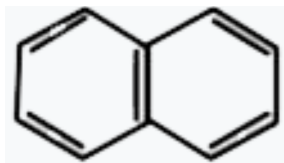
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11. The non aromatic compound among the following is -

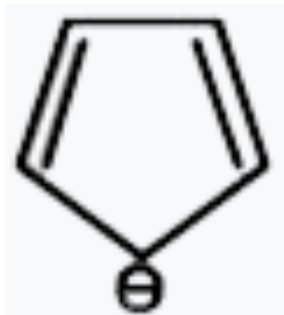
A.



B.



C.





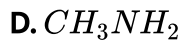
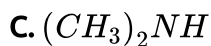
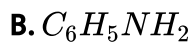
D.

Answer: D



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12. Considering the basic strength of amines in aqueous solution, which one has the smallest  $pK_b$  value?



Answer: C



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13. Which of the following molecules is least resonance stabilised?

A. 

B. 

C. 

D. 

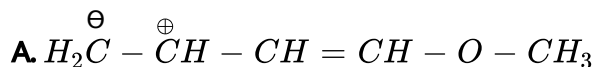
Answer: C

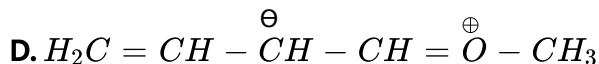
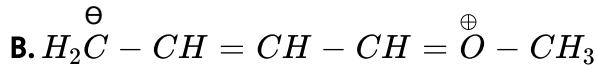


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#### Exercise 4 Level II

1. For 1-methoxy-1, 3-butadiene, which of the following resonating structure is least stable?



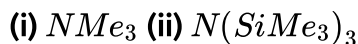


Answer: C



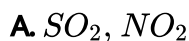
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2. Predict whether the following molecules are isostructural or not. Justify your answer.



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3. When benzene sulfonic acid and p-nitrophenol are treated with  $NaHCO_3$ , the gases released respectively are



B.  $SO_2$ ,  $NO$

C.  $SO_2$ ,  $CO_2$

D.  $CO_2$ ,  $CO_2$

Answer: D



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4. (I) 1,2-dihydroxy benzene

(II), 1,3-dihydroxy benzene

(III) 1,4-dihydroxy benzene

(IV) Hydroxy benzene

The increasing order of boiling points of above mentioned alcohols is

A.  $I < II < III < IV$

B.  $I < II < IV < III$

C.  $IV < I < II < III$

D.  $IV < II < I < III$



**Answer: C**



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**5. Among the following, the least stable resonance structure is :**

A. 

B. 

C. 

D. 

**Answer: A**



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**6. Statement-1: p-Hydroxybenzoic acid has a lower boiling point than o-hydroxybenzoic acid.**

Statement-2: o-Hydroxybenzoic acid has a intramolecular hydrogen bonding.

- A. Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.
- B. Statement-1 is true, statement-2 is true and statement-2 is NOT correct explanation for statement-1.
- C. Statement1 is true, statement-2 is false.
- D. Statement1 is false, statement-2 is true.

Answer: D



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7. Hyperconjugation involves overlap of the following orbitals :

A.  $\sigma - \sigma$

B.  $\sigma - p$

C.  $p - p$

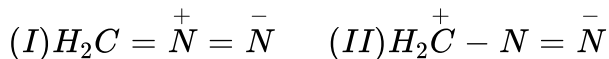
D.  $\pi - \pi$

Answer: B



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8. The correct stability order of the following resonance structures is



A.  $I > II > IV > III$

B.  $I > III > II > IV$

C.  $II > I > III > IV$

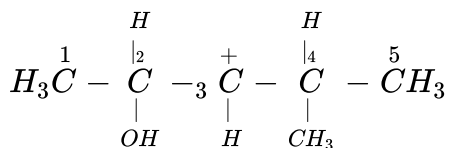
D.  $III > I > IV > II$

Answer: B



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9. In the following carbocation,  $H/CH_3$  that is most likely to migrate to the positively charged carbon is



A.  $CH_3$  at  $C - 4$

B.  $H$  at  $C - 4$

C.  $CH_3$  at  $C - 2$

D.  $H$  at  $C - 2$

Answer: D



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10. Among the following compounds, the most acidic is:

A. p-nitrophenol

B. p-hydroxybenzoic acid

C. o-hydroxybenzoic acid

D. p-toluic acid

Answer: C



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11. In Allen ( $C_3H_4$ ), the type (s) of hybridisation of the carbon atoms is (are

A. sp and  $sp^3$

B. sp and  $sp^2$

C. only  $sp^2$

D.  $sp^2$  and  $sp^3$

Answer: B



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12. Which of the following molecules in pure form is (are) unstable at room temperature

A. 

B. 

C. 

D. 

Answer: B



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13. The compound that does not liberate  $CO_2$ , on treatment with aqueous sodium bicarbonate is

A. Benzoic acid

B. Benzenesulphonic acid

C. Salicylic acid

#### D. Carbolic acid (Phenol)

Answer: D



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14. The hyperconjugative stabilities of tert-butyl cation and 2-butene, respectively, are due to

A.  $\sigma \rightarrow p$  (empty) and  $\sigma \rightarrow \pi^*$  electron delocalisations

B.  $\sigma \rightarrow \sigma$  and  $\sigma \rightarrow \pi^*$  electron delocalisations

C.  $\sigma \rightarrow p$  (filled) and  $\sigma \rightarrow \pi^*$  electron delocalisations

D.  $p$  (filled)  $\rightarrow \sigma$  and  $\sigma \rightarrow \pi^*$  electron delocalisations

Answer: A



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