

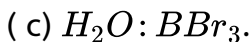
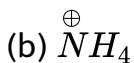
CHEMISTRY

BOOKS - CENGAGE CHEMISTRY (ENGLISH)

GENERAL ORGANIC CHEMISTRY

Illustration

1. Determine the $F. C$ on each atom in :



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2. (a) Draw Lewis structures for :

(i) Ethanol (C_2H_5OH)

(ii) $BrNO$

(iii) $HOCN$

(b) Give an isomeric structure for NH_2OH and explain which structure is more stable.

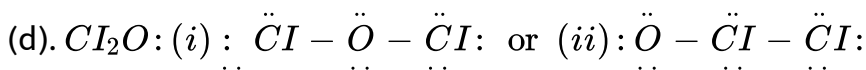
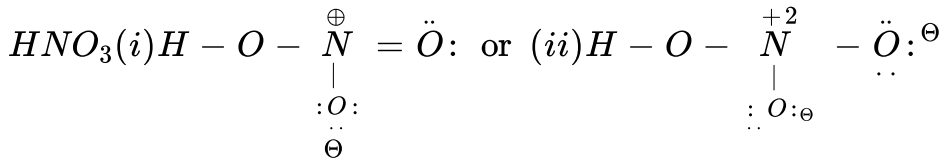
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3. With the help of *F. C.* Explain which Lewis structure is more stable for the following molecules :

(a) N_2O : (i) $:\overset{\ominus}{\ddot{N}} = \overset{2+}{O} = \ddot{N}:\overset{\ominus}$ or (ii) $N \equiv \overset{\oplus}{N} - \overset{\ominus}{\ddot{O}}:$

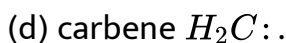
(b).

H_2SO_4 : (i) $H - O - \overset{\overset{:\ddot{O}:\overset{\ominus}}{|}}{S^{+2}} - O - H$ or (ii) $H - O - \overset{\overset{\ddot{O}:}{||}}{S} - O - H$
 $\quad \quad \quad \underset{\underset{:\ddot{O}:}{|}}{\ominus} \quad \quad \quad \underset{\underset{:\ddot{O}:}{|}}{\ominus}$



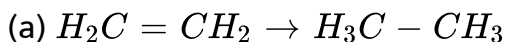
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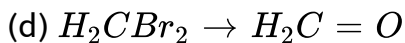
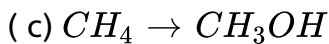
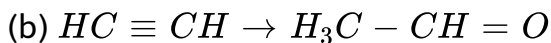
4. Determine $F. C$ on each atom in



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5. Explain whether oxidation, reductio, or neither occurs in the following reactions :

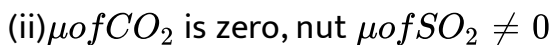




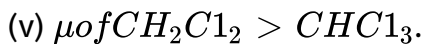
II. Give the structural formula for the simplest hydrocarbon in which C has a zero O. N.

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6. Explain :



(iv) Why the lone pair of \bar{e} 's has no effect on the μ of PH_3 . The bond angle in PH_3 is 92° .



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7. Describe heterolytic (polar) bond cleavage of :

(i) AgI ,

(ii) $\text{H}_3\overset{\oplus}{\text{N}}\overset{\ominus}{\text{B}}\text{F}_3$,

(iii) $[\text{Cu}(\text{OH}_2)_4]^{2\oplus}$

(b) Name the reverse of heterolytic cleavage.

(c) Describe homolytic bond cleavage of $\text{CH}_3 - \text{Co} - \text{Co} - \text{CH}_3$.

(d) Compare the relative energies of singlet and triplet carbenes.

(e) Of X_C : (singlet) and X_2C : (triplet), which is stable ?

(f) Of F_2C : , $C1_2C$: , Br_2C : , I_2C : (singlet), which is more stable ?

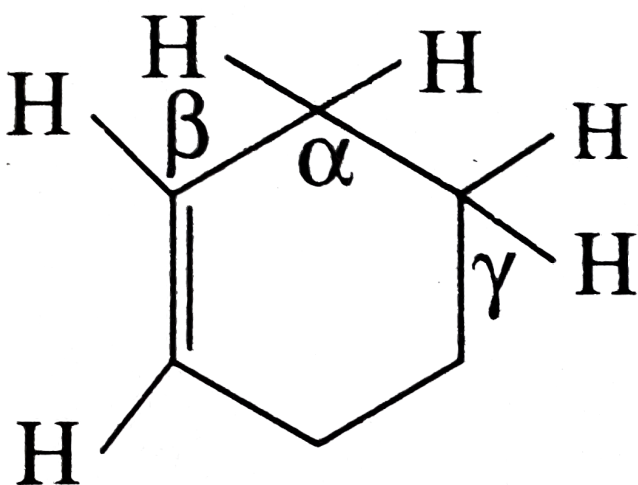
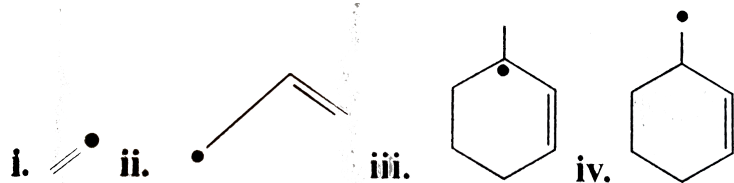
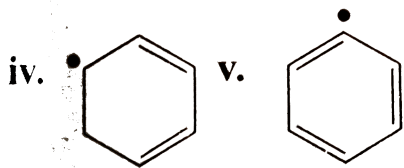
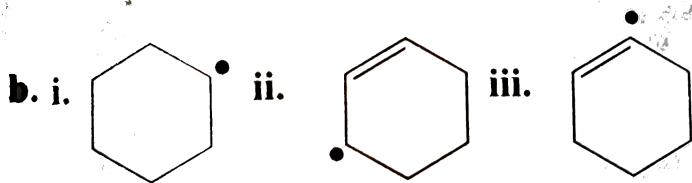
(g) Compare and explain the difference in the IE and EA of $\cdot\text{CH}_3$

.



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8. Give the decreasing order of the stabilities of the following :





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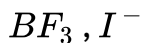
9. Classify the following species as

(a) nucleophile,

(b) electrophile,

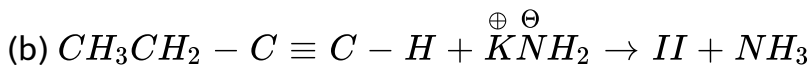
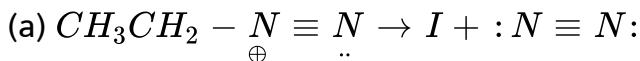
(c) both, or

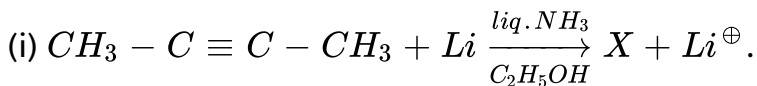
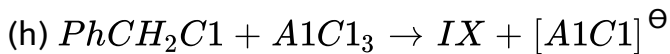
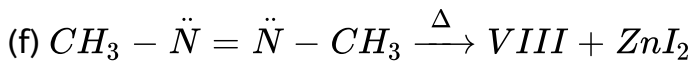
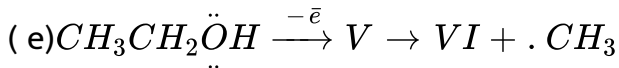
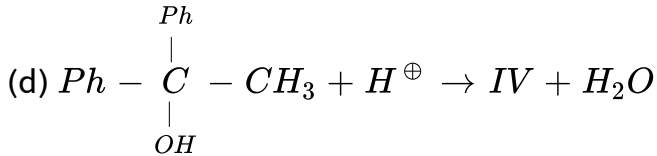
(d) neither.



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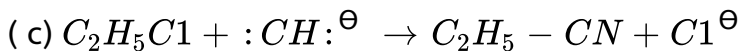
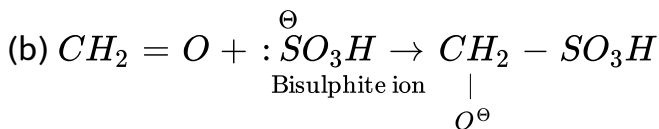
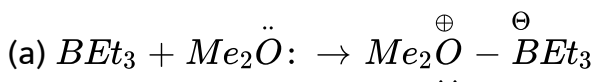
10. Name the intermediate species formed in the following reactions :

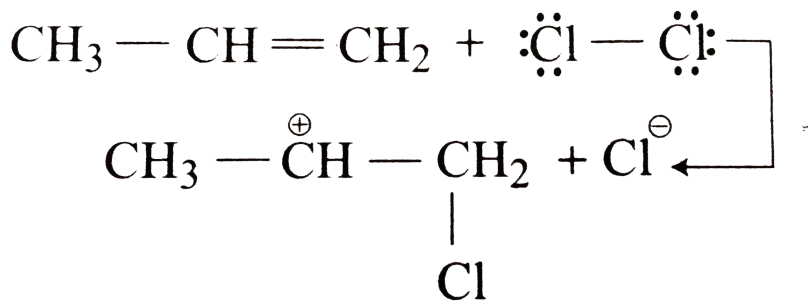




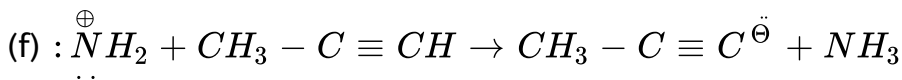
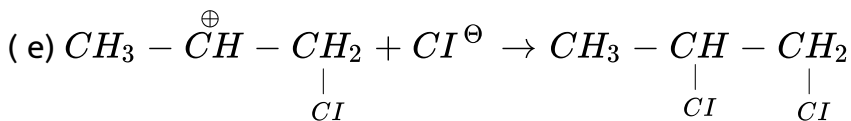
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11. Designate the species (A) and (B) as electrophile (E) or nucleophile (Nu) in the following reactions :



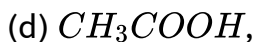
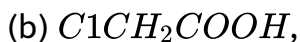
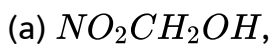


(d)



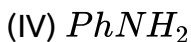
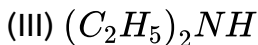
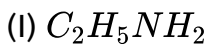
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12. Give the decreasing order of acidic character.



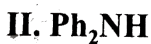
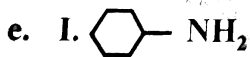
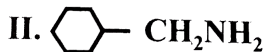
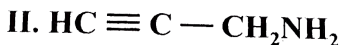
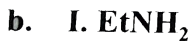
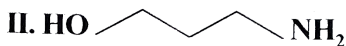
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13. Arrange the following in decreasing order of pK_b values

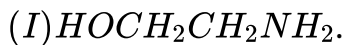


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14. Arrange the following in decreasing order of basicities :



(f) Write the conjugate base and conjugate acid of





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17. (a) Write the resonance structures of NO_2^\ominus (nitrite) and NO_3^\ominus (nitrate ion) in terms of :

(i) outer shell \bar{e} 's with formal charges

(ii) overlapping atomic orbitals.

(c) Compare the resonance (delocalisation) energy and stabilities of NO_2^\ominus and NO_3^\ominus .

(b) (i) Write the resonance contributing and hybrid structures of (I) N_2O (II) $H_2C=N_2$ (diazomethane).

(ii) Give the hybridised state of each atom in each structure.

(iii) Discuss their bond length in each resonance contributing structure and compare with those in hybrid structures.

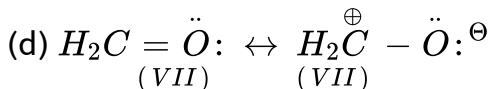
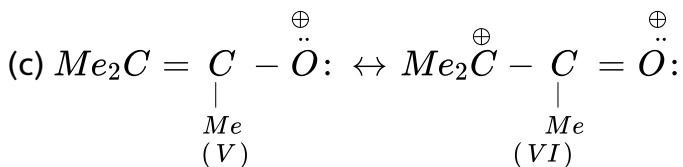
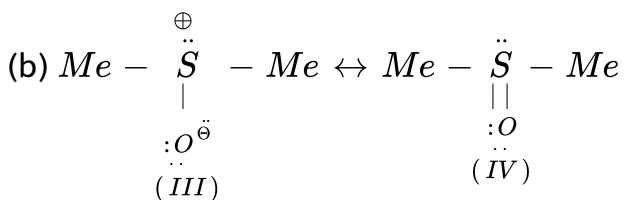
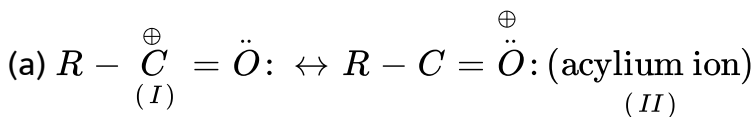


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18. Which N of guanidine (I) is more basic and is more likely to be protonated ?

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19. Compare the stabilities of the following pairs of resonance contributing structures



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20. Give the decreasing order of stabilities of the following alkenes :

(i) Ethene,

(ii) Propene,

(iii) *cis* - 2 - butene

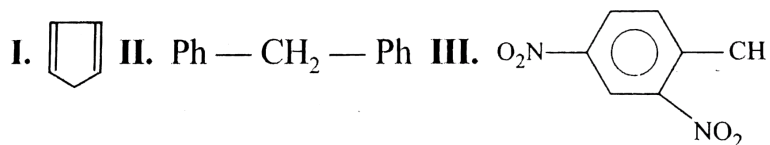
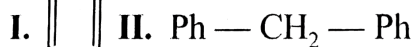
(iv) *trans*-2-Butene

(v) 2 - Methyl-2-butene,

(vi) 2, 3 - Dimethyl-2-butene

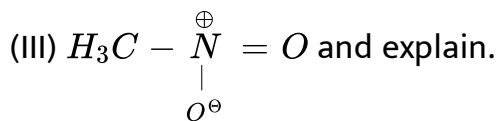
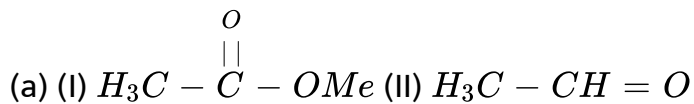
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21. Give the resonance structure of the conjugate bases of the following :



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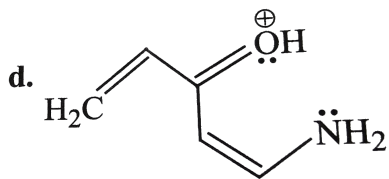
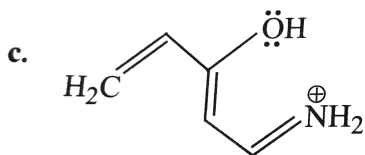
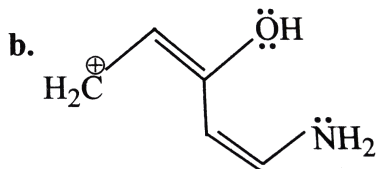
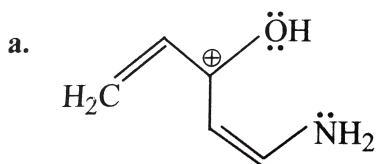
22. Give the decreasing order of acidities of :

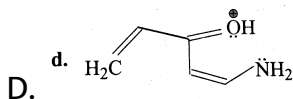
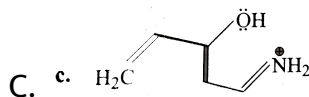
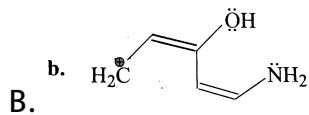
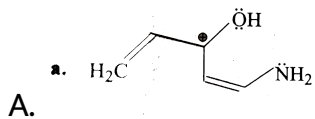


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Solved Example

1. Which of the following is the most stable resonance structure

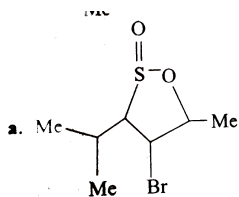
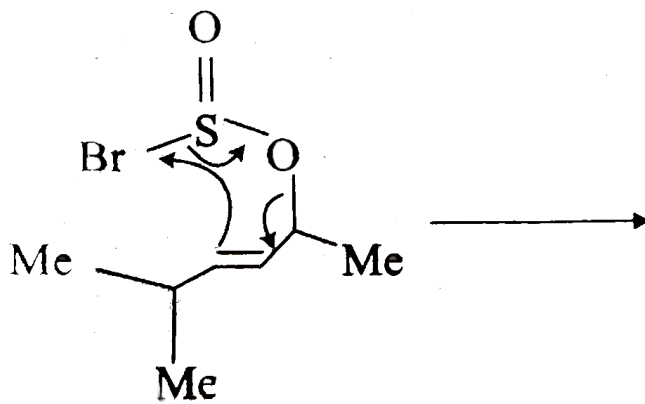




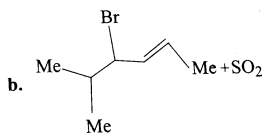
Answer:

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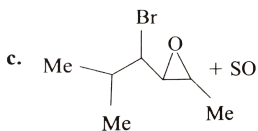
2. Which of the following is a most likely product from the reaction as shown below ?



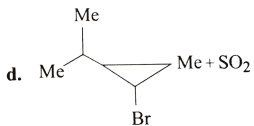
A.



B.



C.



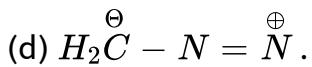
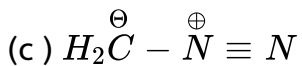
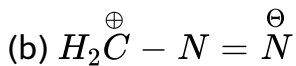
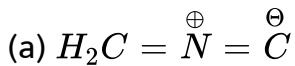
D.

Answer:



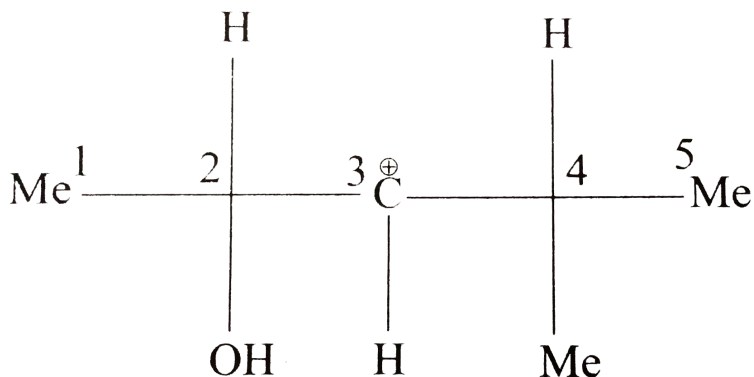
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3. Give the stability of the following resonance structures



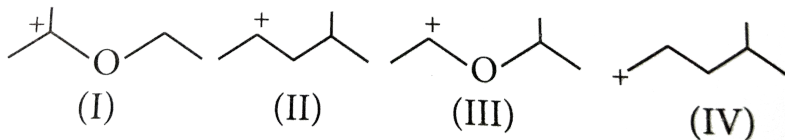
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4. Write the correct resonance structure of the given compound.



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5. The correct stability order for the following species is



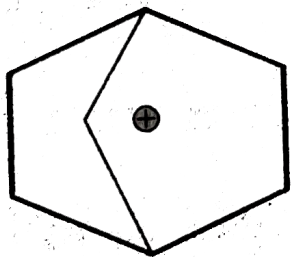
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6. Explain the following :

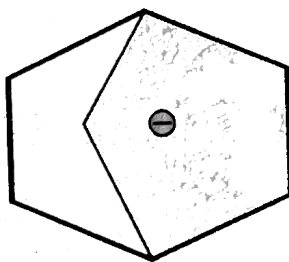
(a) Why $MeNH\overset{\oplus}{C}H_2$ (I) is more stable more than $MeCH_2\overset{\oplus}{C}H_2$ (II)

when both are 1° carbocations ?

(b) Which of the following intermediate is unstable ?



(I)

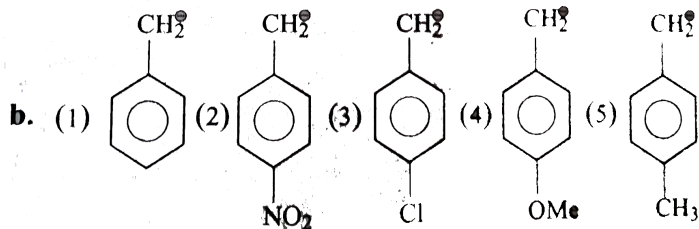
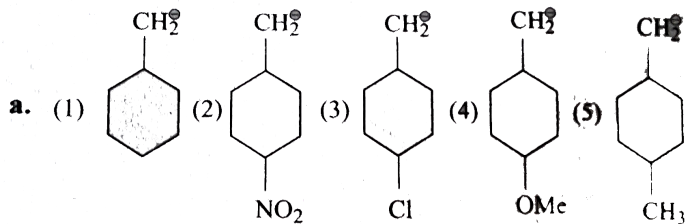


(II)

(c) Why allylic free radical ($CH_2 - CH = CH_2$)(I) is more stable than propyl free radical ($\dot{C}H_2 - CH_2 - CH_3$)(II), when both are 1° free radicals ?

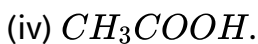
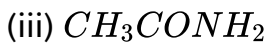
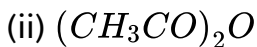
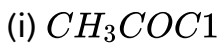
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7. Give decreasing order of the stabilities of the following :



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8. Arrange the following compounds in the order of increasing boiling points :



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9. (l) Arrange the compounds (a) in the order of decreasing boiling points and (b) in the order of decreasing solubility in water

(A) (1) Ethanol (2) Propane, (3) Pentanol

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10. Arrange the following in the decreasing order of boiling points :

(i) (1) C_3H_8

(2) C_2H_5OH

(3) $(CH_3)_2O$

(4) CH_2OHCH_2OH

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11. Arrange the following alcohols :

In the decreasing order of their boiling points.

(1) *n* – Butylalcohol

(2) *sec* – Butylalcohol

(3) *tert* – Butylalcohol.

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12. Arrange the following alcohols in the decreasing order of reactivity towards

Lucas reagent

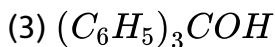
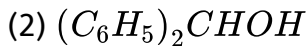
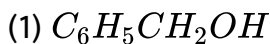
(1) 1-Butanol

(2) 2-butanol

(3) 2-Methyl-2-propanol.

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13. Arrange the following alcohols in the decreasing order of their reactivity with HRr :



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14. Arrange the following in the decreasing order of acidity :

(1) n – Butanol

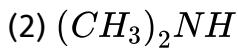
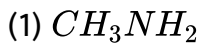
(2) sec-Butanol

(3) tert-Butanol

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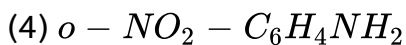
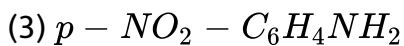
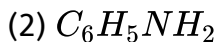
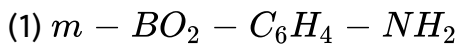
15. Arrange the following in the order of decreasing basic character

:



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16. Arrange in decreasing order of basicity.

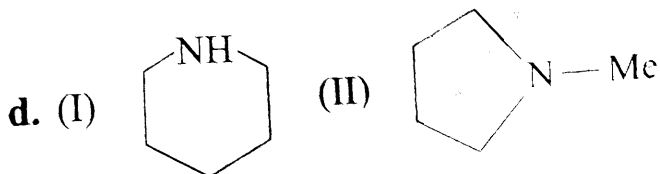
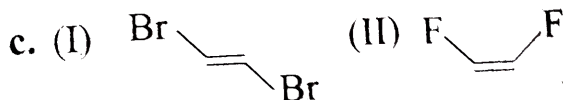
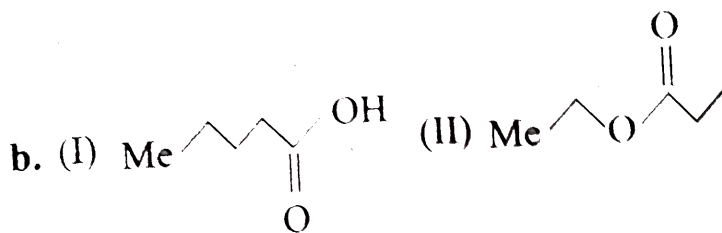
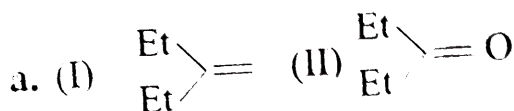


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17. Compare the acidities of amide $\left(R - \overset{\overset{O}{\parallel}}{C} - NH_2 \right)$ and sulphonamide $\left(R - \overset{\overset{O}{\parallel}}{S} - NH_2 \right)$

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18. Which of the following pairs would have higher boiling points ?





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Subjective

1. Give the decreasing order of acidic character of the following :

(1) Benzene

(2) CH_3OH

(3) H_2O

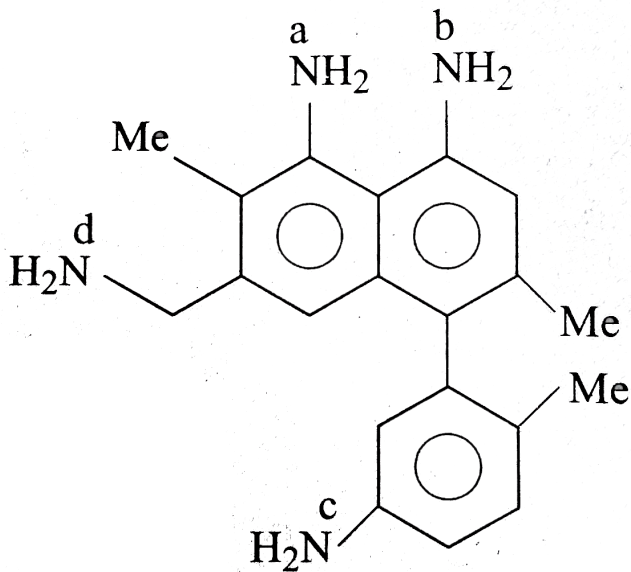
(4) CH_3SH



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2. Give the decreasing order of basic character at a, b, c, d in the following compounds :

I.



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3. Why cyanoanilinium ion $\left(C_6H_4(CN)NH_3^{\oplus}\right)(I)$ is a stronger acid than anilinium ion (II) ?

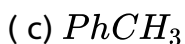
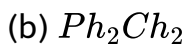
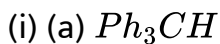
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4. Give the order of acidic character, *o*-, *p*-, and *m*-cyanoanilinium ions.



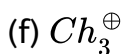
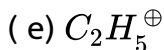
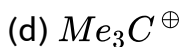
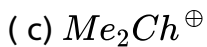
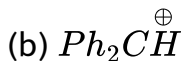
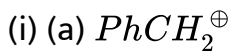
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5. Give the order of acidic character of the following :



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6. Give the order of the stabilities of the following :

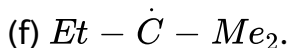
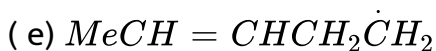
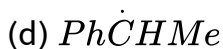
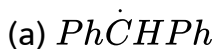


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7. Why pyridine is a much weaker base than aliphatic amines ?

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8. Give the decreasing order of the stabilities of the following free radicals :



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9. Arrange the following acids in the decreasing order of their acid strength:

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10. Which is a stronger base towards a proton $\overset{\ominus}{P}H_2$ or $\overset{\ominus}{N}H_2$?

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11. Give the decreasing order of basic strength of the following :

(a) NH_3

(b) NH_2OH

(c) $NH_2 - NH_2$.

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1. Using curved-arrow notation, show the formation of reactive intermediates when the following covalent bonds undergo heterolytic cleavage.

(a) CH_3-SCH_3 , (b) CH_3-CN , (c) CH_3-Cu

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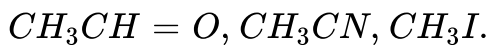
2. Giving justification, categorise the following molecules/ions as nucleophile or electrophile:

HS^- , BF_3 , $C_2H_5O^-$, $(CH_3)_3N$,

Cl^+ , $CH_3-C^+=O$, H_2N^- , NO_2^+

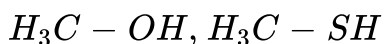
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3. Identify electrophilic centre in the following:



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4. Which bond is more polar in the following pairs of molecules: (a)



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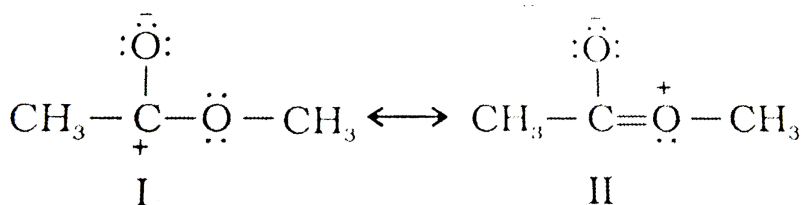
5. In which C-C bond of $CH_3CH_2CH_2Br$, the inductive effect is expected to be the least?

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6. Write resonance structures of $CH_2 = CH-CHO$. Indicate relative stability of the contributing structures.

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7. Explain why the following two structures, I and II cannot be the major contributors to the real structure of CH_3COOCH_3



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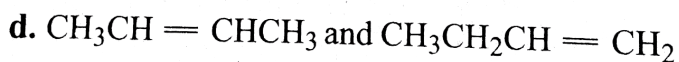
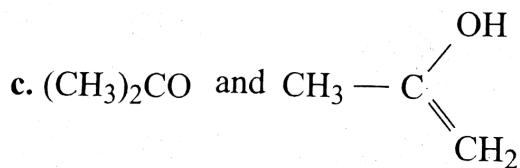
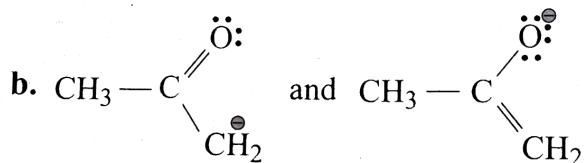
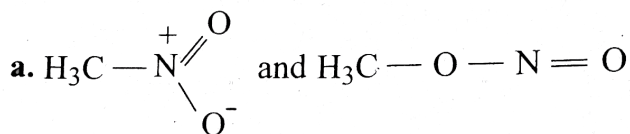
8. Explain why $(CH_3)_3C^+$ is more stable than $CH_3CH_2^+$ and CH_3^+ is the least stable cation

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9. Draw the complete structures of bromomethane

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10. Which of the following pairs of structures do not constitute resonance structures ?



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11. Which is expected to be more stable,

(I) $O_2NCH_2CH_2O^-$ or

(II) $CH_3CH_2O^-$ any why?

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12. Draw the resonance structures for the following compounds.

Show the electron shift using curved-arrow notation.

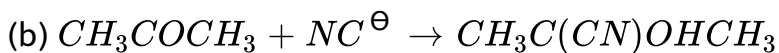
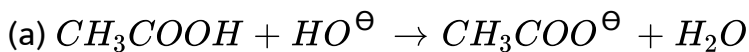
$C_6H_5 - CHO$

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13. Explain why alkyl groups act as electron donors when attached to a π system

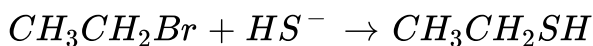
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14. Classify the reagents shown in bonds in the following equations as nucleophiles or electrophiles. Use curved-arrow notation to show the electron movement.



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15. Classify the following reactions in one of the reaction type studied in this unit.



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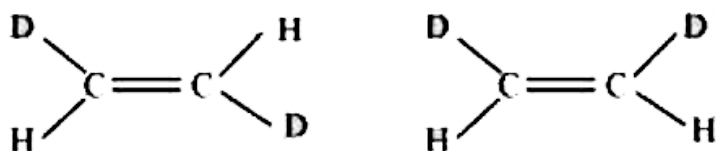
16. What is the relationship between the members of following pairs of structures ? Are they structural or geometrical isomers or

resonance contributors ?

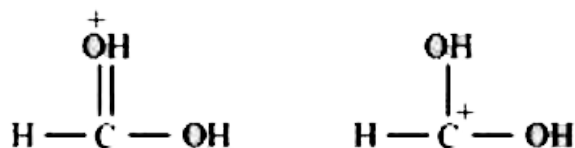
(a)



(b)



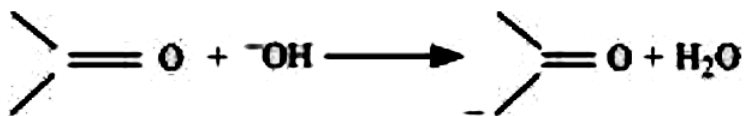
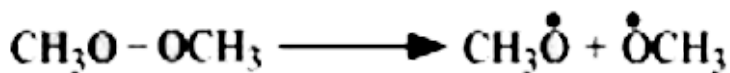
(c)



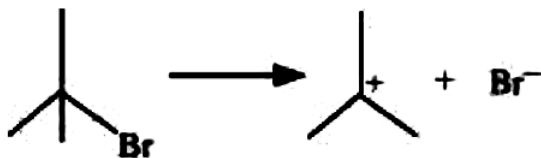
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17. For the following bond cleavages, use curved-arrows to show the electron flow and classify each as homolysis or heterolysis. Identify reactive intermediate produced as free radical, carbocation and carbanion.

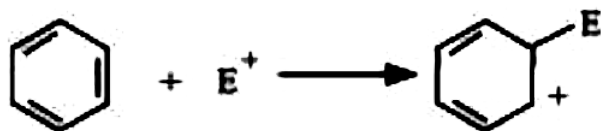
(a)



(c)



(d)



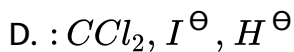
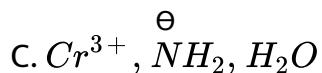
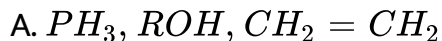
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Comprehension

1. An organic reaction occurs by using reagents called electrophiles and nucleophiles via the formation of some reactive intermediates

called carbocations, carbanions, free radicals, carbenes, nitrenes, radical cations, and radical anions.

Which of the following contains nucleophiles only ?



Answer: A

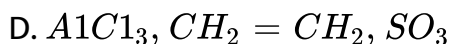
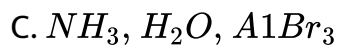
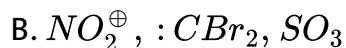


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2. An organic reaction occurs by using reagents called electrophiles and nucleophiles via the formation of some reactive intermediates called carbocations, carbanions, free radicals, carbenes, nitrenes,

radical cations, and radical anions.

Which of the following contains electrophiles only ?

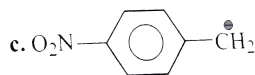
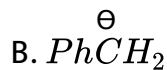
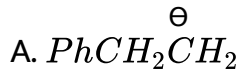


Answer: B

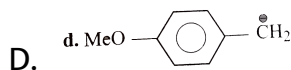
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3. An organic reaction occurs by using reagents called electrophiles and nucleophiles via the formation of some reactive intermediates called carbocations, carbanions, free radicals, carbenes, nitrenes, radical cations, and radical anions.

The most stable carbanion is :



C.



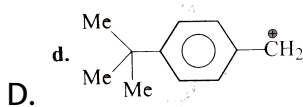
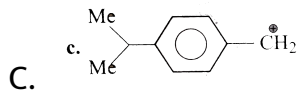
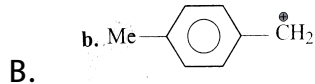
Answer: C

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4. An organic reaction occurs by using reagents called electrophiles and nucleophiles via the formation of some reactive intermediates called carbocations, carbanions, free radicals, carbenes, nitrenes, radical cations, and radical anions.

The most stable carbocation is :





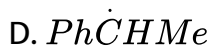
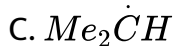
Answer: B

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5. An organic reaction occurs by using reagents called electrophiles and nucleophiles via the formation of some reactive intermediates called carbocations, carbanions, free radicals, carbenes, nitrenes, radical cations, and radical anions.

The most stable free radical is :



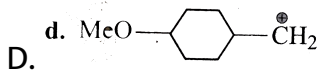
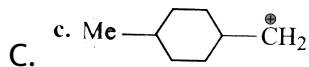
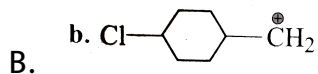
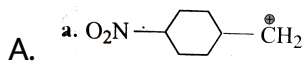


Answer: D

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6. An organic reaction occurs by using reagents called electrophiles and nucleophiles via the formation of some reactive intermediates called carbocations, carbanions, free radicals, carbenes, nitrenes, radical cations, and radical anions.

The least stable carbocation is :



Answer: A

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7. Carbene intermediates are produced by the photolysis of diazomethane (CH_2N_2) or ketene ($CH_2 = C = O$). They are also produced by the reaction of CHX_3 with base or by Simmons-Smith reaction. There are two types of carbenes, singlet and triplet. They are so called due to their spin state.

Spin state of carbene is determined by using the formula :

where S is the sum of all electron spin numbers.

A. $S + 2$

B. $2S + 1$

C. $2S + 2$

D. $S + 1$

Answer: B

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8. Carbene intermediates are produced by the photolysis of diazomethane (CH_2N_2) or kenene ($CH_2 = C = O$). They are also produced by the reaction of CHX_3 with base or by Simmons-Smith reaction. There are two types of carbenes, singlet and triplet. They are so called due to their spin state.

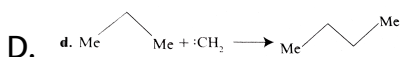
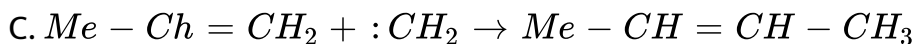
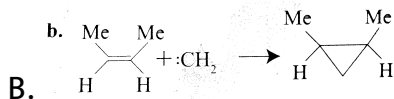
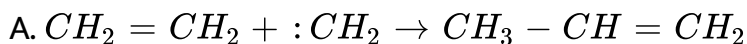
Singlet and triplet carbene are same in :

- A. Types of hybridisation
- B. Number of unshared \bar{e} pairs (or $LP\bar{e}$'s)
- C. Number of σ – *bonds*
- D. Bond angle

Answer: C

9. Carbene intermediates are produced by the photolysis of diazomethane (CH_2N_2) or kenene ($CH_2 = C = O$). They are also produced by the reaction of CHX_3 with base or by Simmons-Smith reaction. There are two types of carbenes, singlet and triplet. They are so called due to their spin state.

In which reaction, the insertion of methylene increases potential energy ?

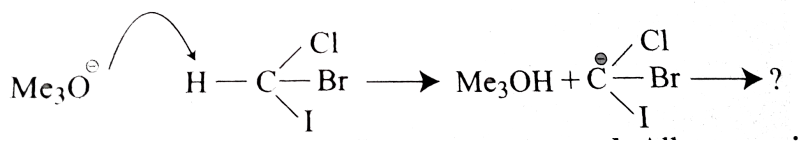


Answer: B



10. Carbene intermediates are produced by the photolysis of diazomethane (CH_2N_2) or ketene ($CH_2 = C = O$). They are also produced by the reaction of CHX_3 with base or by Simmons-Smith reaction. There are two types of carbenes, singlet and triplet. They are so called due to their spin state.

Which carbene is produced in the following reactions ?



A. $:CClBr$

B. $:CBrI$

C. $:CCI$

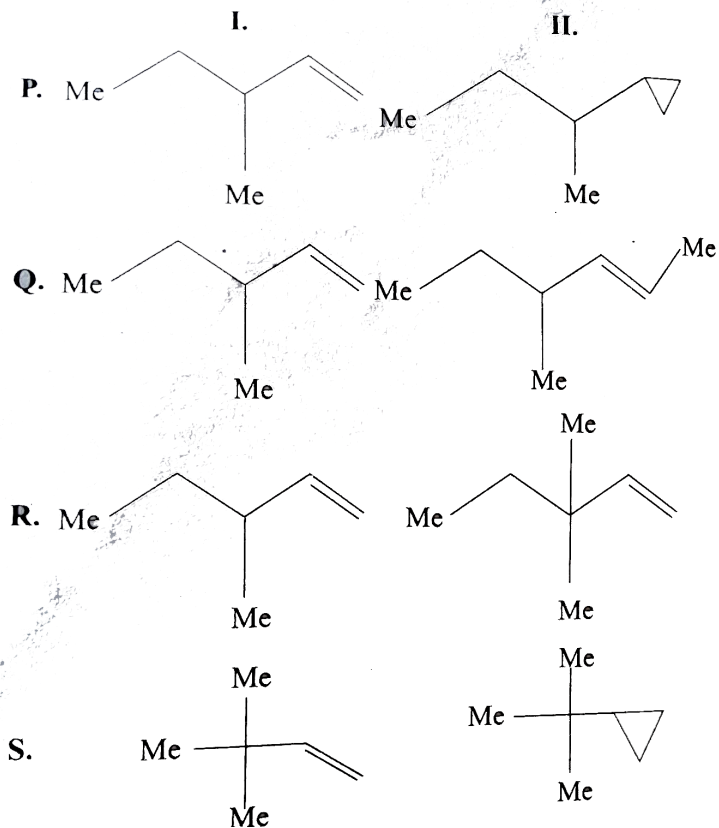
D. All

Answer: A

11. Carbene intermediates are produced by the photolysis of diazomethane (CH_2N_2) or ketene ($CH_2 = C = O$). They are also produced by the reaction of CHX_3 with base or by Simmons-Smith reaction. There are two types of carbenes, singlet and triplet. They are so called due to their spin state.

An optically active alkene (I) with lowest molecular mass on hydrogenation gives optically inactive alkane, but on insertion of methylene carbene ($:CH_2$) in (I), it gives optically active

compound (II). The compounds (I) and (II) are :



A. P

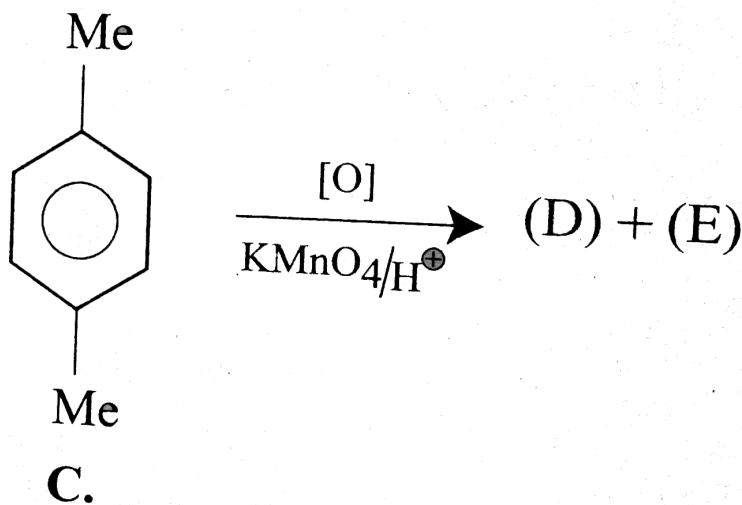
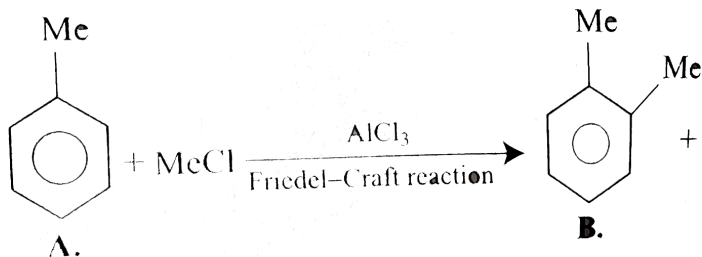
B. P,R

C. P,Q,

D. P,Q,R

Answer: C

12. Consider the following reaction :



The compound *D* is an ortho-isomer and *E* is a *p*-isomer. The compounds *D* and *E*, respectively, are :

A. Phthalic and isophthalic acids

B. Isophthalic and phthalic acids

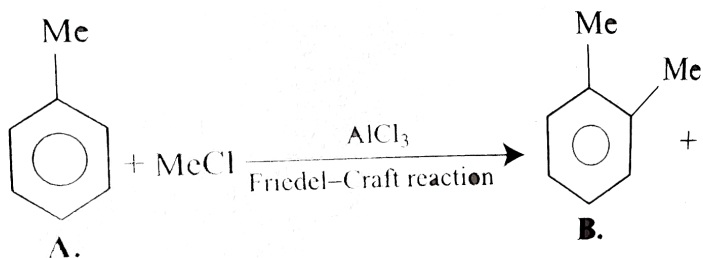
C. Terephthalic and phthalic acids

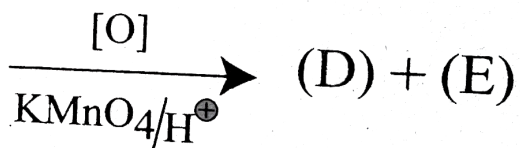
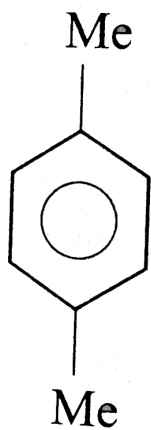
D. Phthalic and terephthalic acids.

Answer: D

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13. Consider the following reaction :





C.

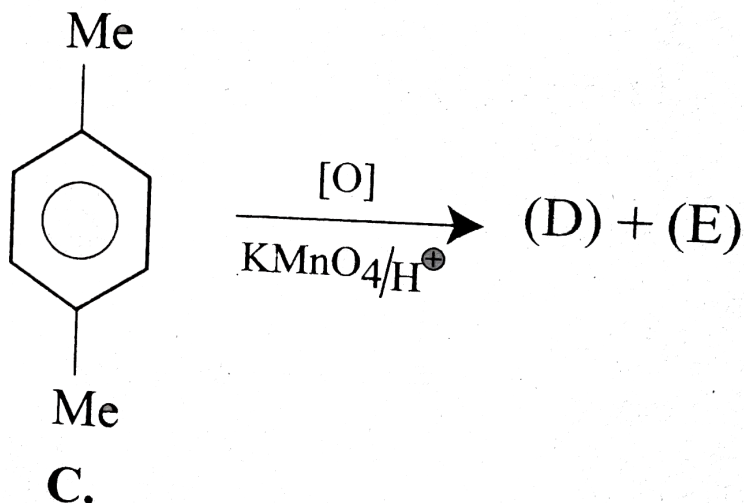
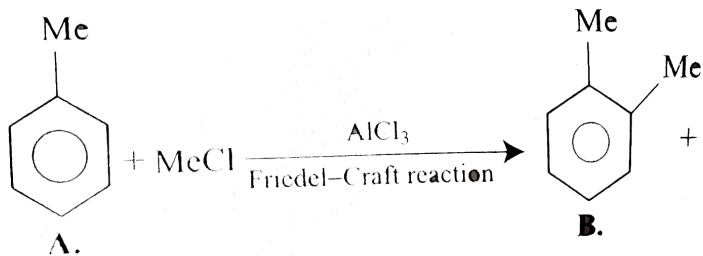
The *m* – isomer of *D* and *E* is called :

- A. Phthalic acid
- B. Isophthalic acid
- C. Terephthalic acid
- D. None

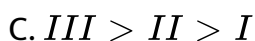
Answer: B

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14. Consider the following reaction :



The decreasing order of acidic strengths of (I) phthalic (II) terephthalic, and (III) isophthalic acids is :

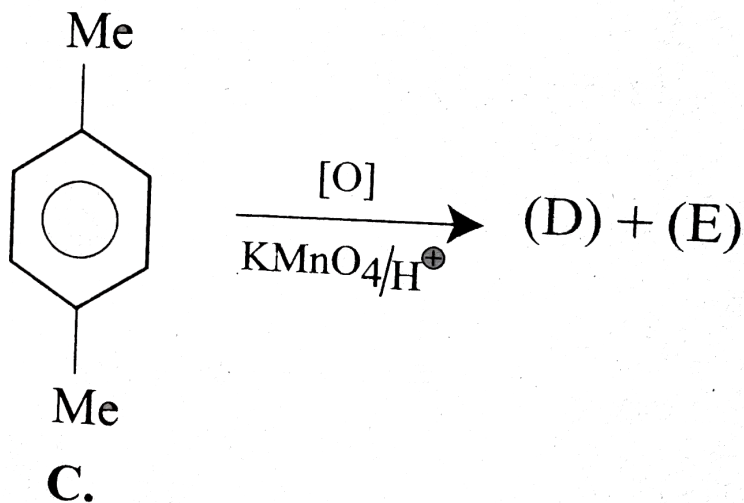
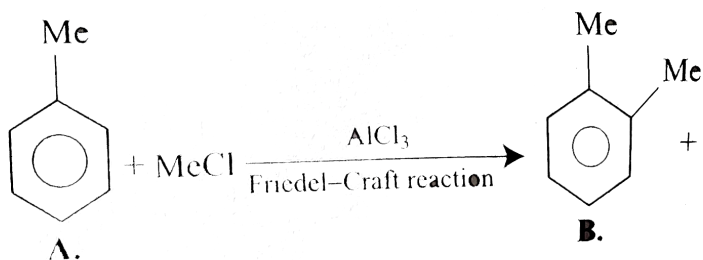


D. $II > III > I$

Answer: A

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15. Consider the following reaction :



Which of the above three acids, *I*, *II*, and *III* forms anhydride on heating ?

A. I

B. II

C. III

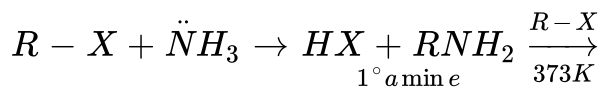
D. All

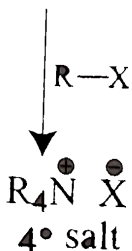
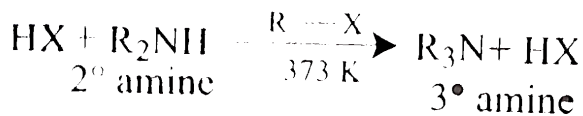
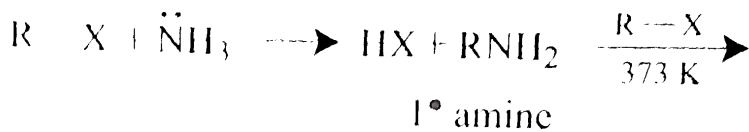
Answer: A



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16. Consider the Hofmann ammonolysis reaction :





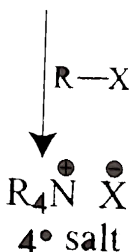
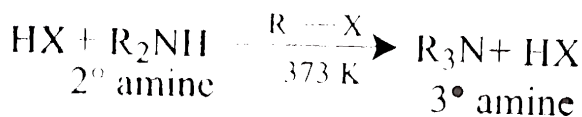
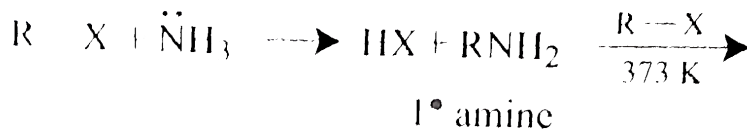
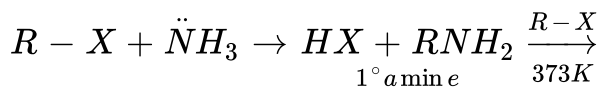
If $R = CH_3$, the correct order of basic character of 1° amine, 2° amine, 3° amine, and NH_3 in aqueous medium is :

- A. $1^\circ > 2^\circ > 3^\circ > NH_3$
- B. $2^\circ > 3^\circ > 1^\circ > NH_3$
- C. $2^\circ > 1^\circ > 3^\circ > NH_3$
- D. $2^\circ > 1^\circ > NH_3 > 3^\circ$

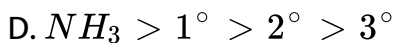
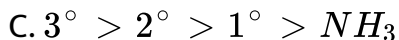
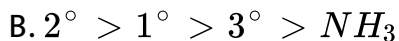
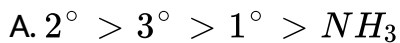
Answer: C

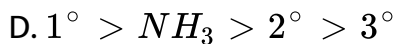
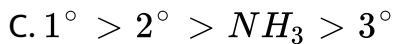
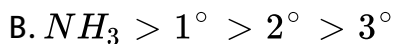
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17. Consider the Hofmann ammonolysis reaction :



If $R = C_2H_5$, the correct of basic character of the above amines in aqueous medium is :

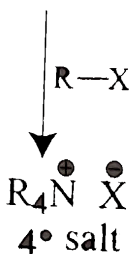
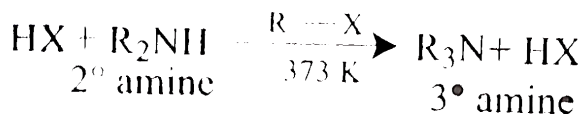
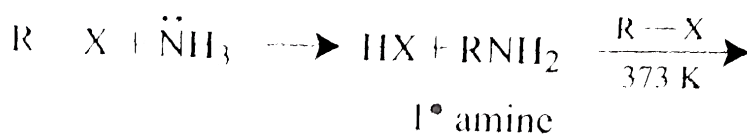
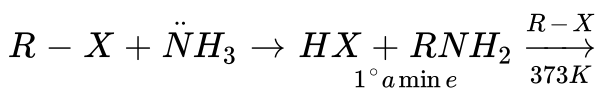




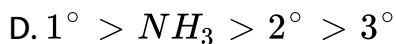
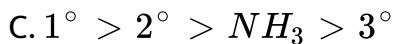
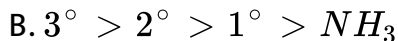
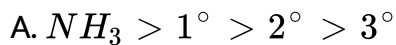
Answer: D

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19. Consider the Hofmann ammonolysis reaction :



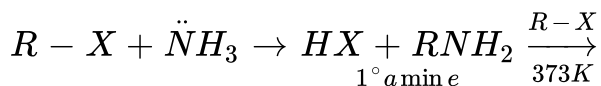
If $R = Me_3C - (t - butyl)$, the correct order of basic character of the above amines in aqueous medium is :

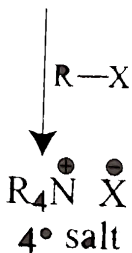
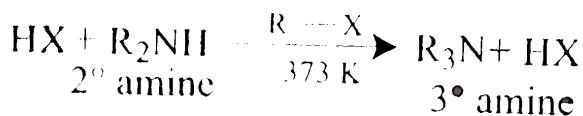
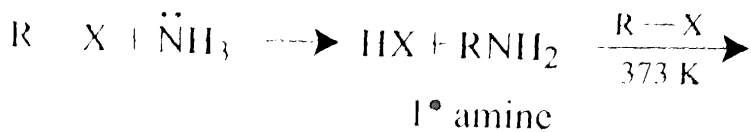


Answer: A

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20. Consider the Hofmann ammonolysis reaction :





For any value of R , the correct order of basic character of the above amines in gaseous phase of nonpolar solvent is :

- A. $3^\circ > 2^\circ > NH_3 > 1^\circ$
- B. $3^\circ > 2^\circ > 1^\circ > NH_3$
- C. $2^\circ > 3^\circ > NH_3 > 1^\circ$
- D. $1^\circ > 2^\circ > 3^\circ > NH_3$

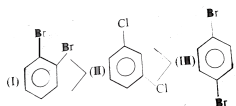
Answer: B

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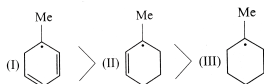
Multiple Correct

1. Which of the following statement is correct ?

A. Dipole moment :



B. Stability of free radical :



C. Basic strength : $CH_3O^\ominus > OH^\ominus > RS^\ominus$

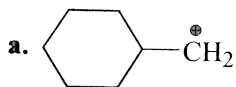
D. Basic and nucleophilic strength : $I^\ominus > Br^\ominus > Cl^\ominus > F^\ominus$

Answer: A::B

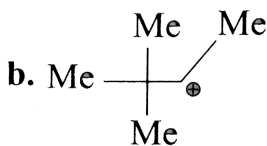


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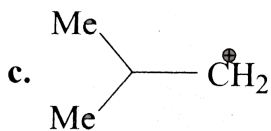
2. In which of the following ΔG decreases if there can be some intramolecular rearrangement ?



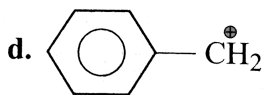
A.



B.



C.



D.

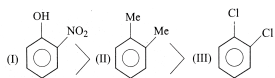
Answer: A::B::C



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3. Which of the following statement is/are correct ?

A. Dipole moment of :



B. Dipole moment of : $CH_3F > CH_3Cl > CH_3Br > CH_3I$

C. Dipole moment of : $NH_3 > NF_3$

D. Dipole moment of : $CH_3Cl > CH_2Cl_2 > CHCl_3 > CCl_4$

Answer: A::C::D

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4. Which of the following is a hard acid ?

A. Br_2

B. Cd^{2+}

C. CO_2

D. Fe^{3+}

Answer: C::D

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5. Which of the following statement is/are correct ?

- A. pK_{a1} of maleic acid is less than pK_{a1} of fumaric acid.
- B. pK_{a2} of maleic acid is greater than pK_{a2} of fumaric acid.
- C. Phthalic acid is a stronger acid than isophthalic acid.
- D. Isophthalic acid is a stronger acid than terephthalic acid.

Answer: A::B::C

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

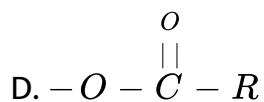
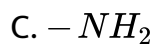
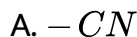
- A. Inductive effect is permanent shifting of $\sigma\bar{e}$'s towards more *EN* element.
- B. Mesomeric effect is delocalisation of $LP\bar{e}$,s with $\pi\bar{e}$,s in conjugation.
- C. Hyperconjugation is simultaneous shift of σ and $\pi\bar{e}$'s at 1,3 – *position* without the movement of *H* atom from its position.
- D. Tautomerism is simultaneous shift of σ and $\pi\bar{e}$'s at 1,3 – *position* with the movemet of *H* atom from its position.

Answer: A::B::C::D



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7. Which of the following group (s) is/are *o* – and *p*-directing ?

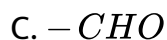
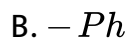


Answer: C::D



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8. Which of the following group (s) is/are *m*-directing ?



D. $-COOH$

Answer: C::D



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9. Which of the following are nucleophiles ?

A. PH_3

B. F^\ominus

C. NH_3

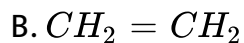
D. H_2O

Answer: A::B::C::D



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10. Which of the following are electrophiles ?



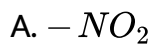
Answer: A::B::C



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11. Which of the following have + M effect

(\bar{e} - donating mesomeric effect) ?



C. $-NH_2$

D. $-SR$

Answer: C::D

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12. Which of the following have $-M$ effect (\bar{e} - withdrawing mesomeric effect) ?



B. $-SO_3H$

C. $-OR$

D. $-Br$

Answer: A::B

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

A. $HCOOH$ is stronger acid than $PhCOOH$

B. Oximes ($R_2C = N - OH$) are more acidic than hydroxylamine (NH_2OH)

C. R_3SiCH_2COOH is more acidic than R_3CCH_2COOH .

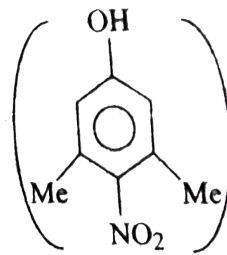
D. Highly branched carboxylic acids are less acidic than unbranched acids.

Answer: A::B::D



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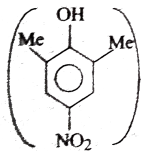
14. Which of the following statement (s) is/are correct ?



A. 3, 5 – Dimethyl-4-nitrophenol (I)

is less

acidic than the isomeric 2, 6 – demthy-4-nitrophenol (II)



B. (I) is more acidic than (II)

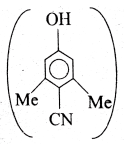
C. I is less acidic than (II) due to steric inhibition of resonance of two (*Me*) groups with (*NO*₂) group.

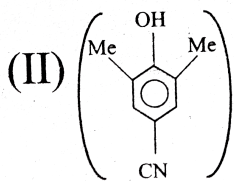
D. (I) is more acidic than (II) due to less +*I* effect of two (*Me*) groups in (I)

Answer: A::C

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15. Which of the following statement is/are correct ?

A. 3,3-Dimethyl-4-cyanophenol (I)  is more acidic than the isomeric 2,6-dimethyl-4-cyanophenol (II)



B. (II) is more acidic than (I)

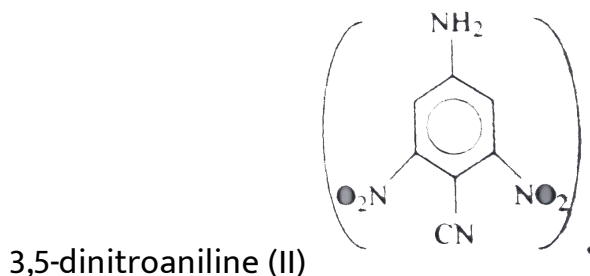
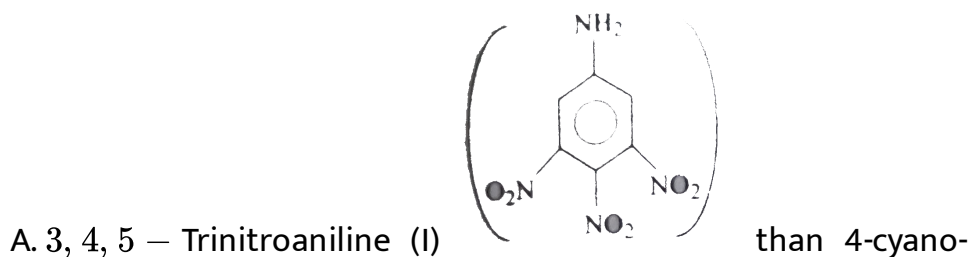
C. (I) is more acidic than (II) due to no steric inhibition of the two *Me* groups with (*CN*) groups, since (–*CN*) group is linear.

D. Acidic character of (I) and (II) is determined by +*I* effect of two *Me* groups in (I) and +*I* and *H.C* effects of two *Me* groups in (II)

Answer: A::C::D

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



B. (II) is more basic than (I)

C. (I) is more basic than (II) due to steric inhibition of resonance in (I)

D. There is no steric inhibition resonance in (*II*)

Answer: A::C::D

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17. Which benzene sulphonic acid and *p* – nitrophenol are treated with $NaHCO_3$, the gases released, respectively are :

A. SO_2 , NO_2

B. SO_2 , NO

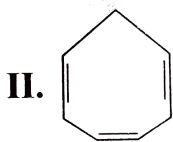
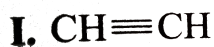
C. SO_2 , CO_2

D. CO_2 , CO_2

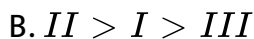
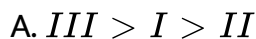
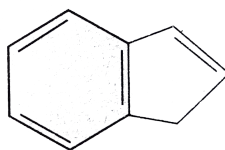
Answer: D

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18. The decreasing order of pK_a value of the following is : (I)



III.



Answer: B

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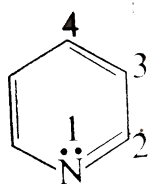
19. Among the following which is correct ?

A. Both cyclopentadienyl anion and benzene are aromatic and have the same stability.

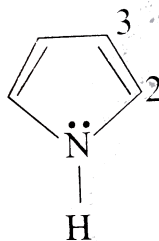
- B. Benzene is aromatic and more stable than cyclopentadienyl anion and it is nonaromatic.
- C. Both cyclopentadienyl anion and benzene are aromatic, but benzene is more stable than cyclopentadienyl anion.
- D. Cyclopentadienyl anion is more stable than benzene although both are aromatic.

Answer: C

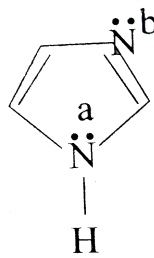
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Pyridine (I)



Pyrrole (II)



Imidazole (III)

20.

Which one (s) is/are true ?

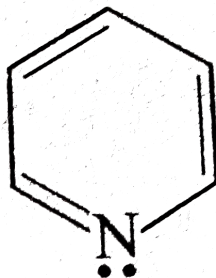
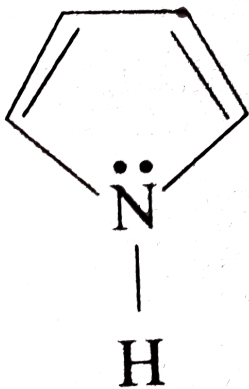
- A. (I) and (III) are modest Bronsted bases whereas (II) is not.
- B. In (III) N^a is more basic than N^b .
- C. When (II) is protonated in the presence of a strong acid, protonation occurs at $C - 2$.
- D. All the nitrogen present in (I), (II), and (III) is sp^2 hybridised.

Answer: A::C::D

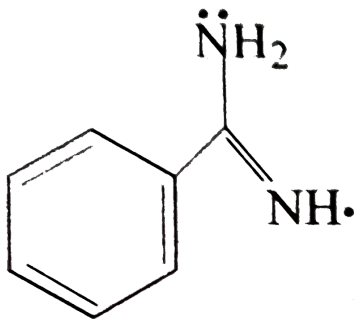
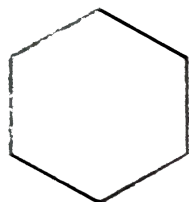


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21.



21.



(III)

(IV)

Which of the following statement is/are correct ?

A. (I) and (II) are aromatic and have equal basic strength.

B. (I) is aromatic and (II) is anti-aromatic, but (II) is stronger base than (I)

C. The order of basicity of the above compounds is (IV) > (III) > (II) > (I).

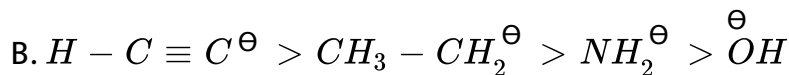
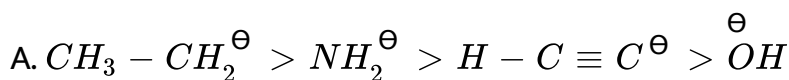
D. The conjugate acid of (IV) is more stabilised than the conjugate acid of (II).

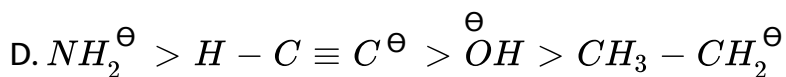
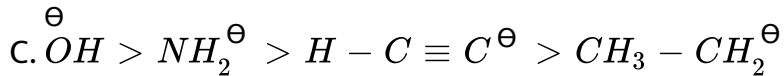
Answer:



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22. What is the decreasing order of strength of the bases OH^- , NH_2^- , $\text{HC} \equiv \text{C}^-$ and CH_3CH_2^- ?



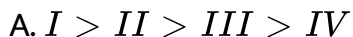


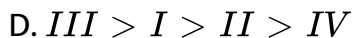
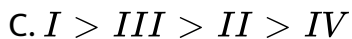
Answer: A

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Single Correct

1. The decreasing order of acidic character of the following is :



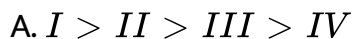
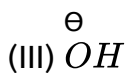
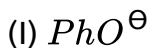


Answer: A



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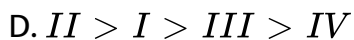
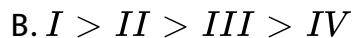
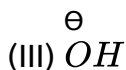
2. The decreasing basic character of the following is :



Answer: B

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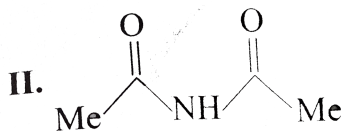
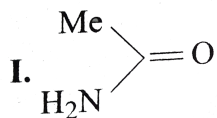
3. The decreasing nucleophilicity of the following is :



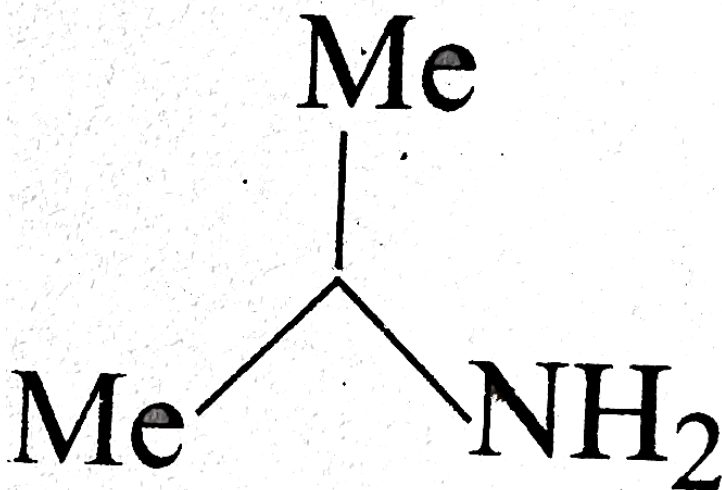
Answer: C

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4. Arrange the following in their decreasing order of Basicity.



(I)



(III)

(IV) NH_3 .

A. $III > IV > II > I$

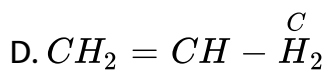
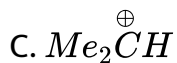
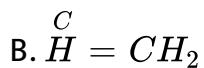
B. $I > II > III > IV$



Answer: A

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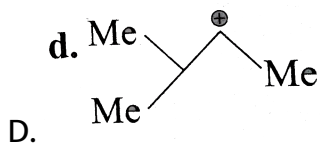
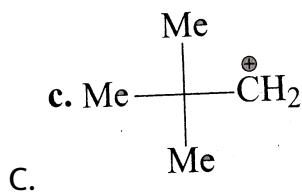
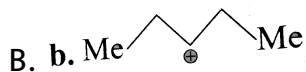
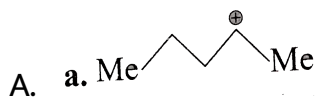
5. Which of the following carbocations is least stable ?



Answer: B

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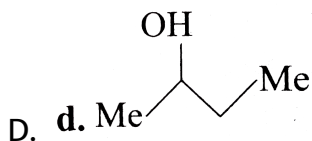
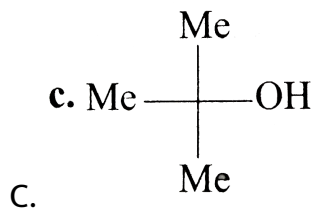
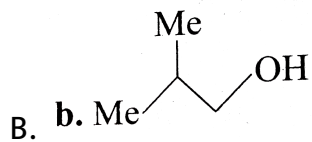
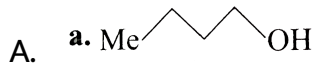
6. Which of the following carbocations is most stable ?



Answer: A

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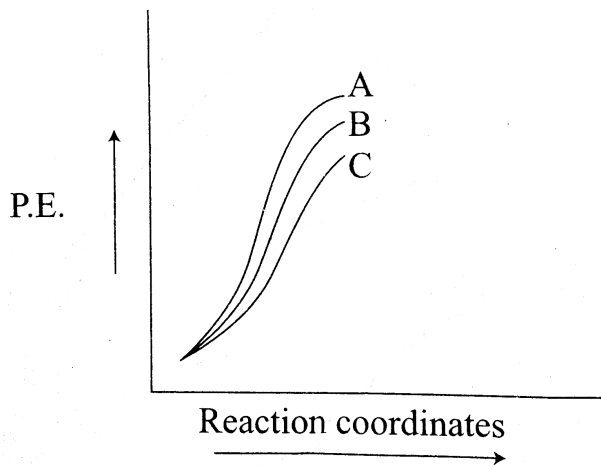
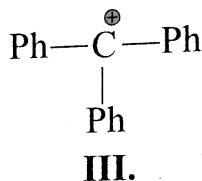
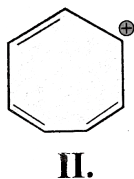
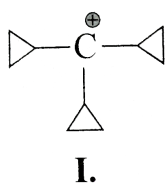
7. The compound which gives the most stable carbonium ion on dehydration is



Answer: C

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8. In the following graph, stability of different carbocations have been shows :



Match the potential energy curve with carbocation.

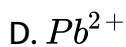
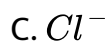
- A. *I II III*
A B C
- B. *I II III*
B A C
- C. *I II III*
C B A
- D. *I II III*
C A B

Answer: C



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9. Which of the following is a soft base ?

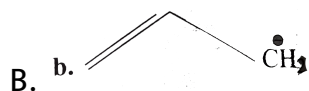
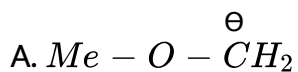


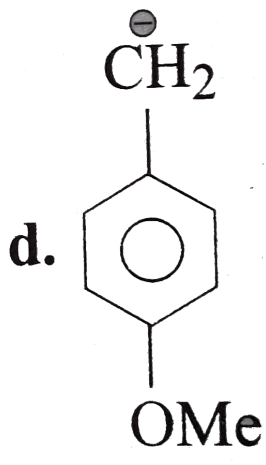
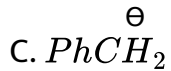
Answer:



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10. Which of the following is least stable ?

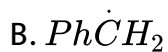
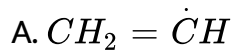


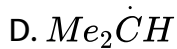


Answer: A

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11. Which of the following species is most stable ?



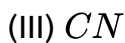
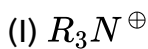


Answer: B



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12. The decreasing order of $-I$ effect of the following is :



Answer:

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13. The decreasing order of $-I$ effect of the following is :

(I) CHO

(II) F

(III) OR

(IV) NH_2

(V) OH

(VI) $Ph.$

A. $I > II > III > IV > V > VI$

B. $II > I > III > IV > V > VI$

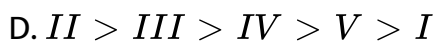
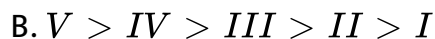
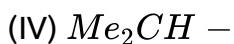
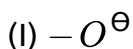
C. $I > II > V > III > IV > VI$

D. $II > I > V > III > IV > VI$

Answer:

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14. The decreasing order of $+I$ effect of the following is :



Answer:



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15. The decreasing order of $-I$ effect of the orbitals is :

(I) sp

(II) sp^2

(III) sp^3 .

A. $I > II > III$

B. $III > II > I$

C. $I > III > II$

D. $II > III > I$

Answer: A



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16. Give the decreasing order of hyperconjugative effect of R in

$R - CH = CH_2$, where R is :

(I) $Me -$

(II) $Et -$

(III) $Me_2CH -$

(IV) $Me_3C -$.

A. $I > II > III > IV$

B. $IV > III > II > I$

C. $II > I > III > IV$

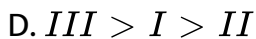
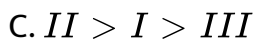
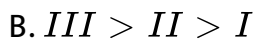
D. $IV > III > I > II$

Answer: A



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17. The decreasing order of the acidic character is :



Answer: A



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18. The decreasing order of boiling points of the following is :



(III) $RCONH_2$

(IV) $RCOOH$.

A. $I > IV > II > III$

B. $III > II > IV > I$

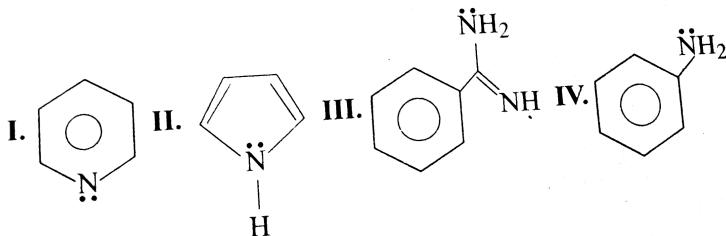
C. $IV > III > I > II$

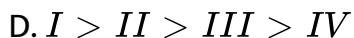
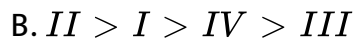
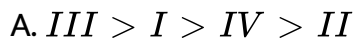
D. $II > I > III > IV$

Answer:

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19. The decreasing order of basic character of the following is :

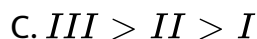
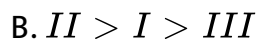




Answer:

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20. The decreasing order of acidic character of the following is :



D. $I > III > II$

Answer: B



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21. The decreasing order of acidic character of the following is :

(I) p-Nitrophenol

(II) o-Nitrophenol

(III) m-Nitrophenol

(IV) Phenol.

A. $I > II > III > IV$

B. $II > I > III > IV$

C. $I > II > IV > III$

D. $II > I > IV > III$

Answer:

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22. The decreasing order of basic characters of the following is :

(I) Aniline

(II) o-Nitroaniline

(III) m-Nitroaniline

(IV) p-Nitroaniline.

A. $I > II > III > IV$

B. $IV > III > II > I$

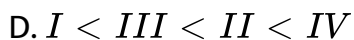
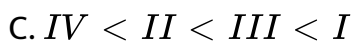
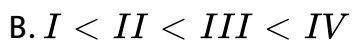
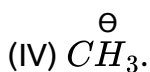
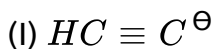
C. $I > III > IV > II$

D. $I > III > II > IV$

Answer:

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23. The increasing order of pK_b value of the following is :



Answer: A

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1. A: Alkene $A(\text{Me}_2\text{C} = \text{CMe}_2)$ is more stable than alkene $B(\text{Et}_2\text{C} = \text{Cet}_2)$

R: Baker-Nathan effect.

A. If both (A) and (R) are true and (R) is the correct explanation of (A).

B. If both (A) and (R) are true but (R) is not correct explanation of (A).

C. If (A) is true but (R) is false.

D. If (A) is false but (R) if true.

Answer: A



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2. A: Methylene has a sextet of \bar{e} 's.

R: Methylene behaves as a nucleophile.

A. If both (A) and (R) are true and (R) is the correct explanation of (A).

B. If both (A) and (R) are true but (R) is not correct explanation of (A).

C. If (A) is true but (R) is false.

D. If (A) is false but (R) if true.

Answer: C



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3. p-methyl benzyl carbocation (I) is more stable than benzyl carbocation (II).

Heterovalent or no bond resonance.

- A. If both (A) and (R) are true and (R) is the correct explanation of (A).
- B. If both (A) and (R) are true but (R) is not correct explanation of (A).
- C. If (A) is true but (R) is false.
- D. If (A) is false but (R) if true.

Answer: A

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4. Explain why $(CH_3)_3C^+$ is more stable than $CH_3CH_2^+$ and CH_3^+ is the least stable cation

A. If both (A) and (R) are true and (R) is the correct explanation of (A).

B. If both (A) and (R) are true but (R) is not correct explanation of (A).

C. If (A) is true but (R) is false.

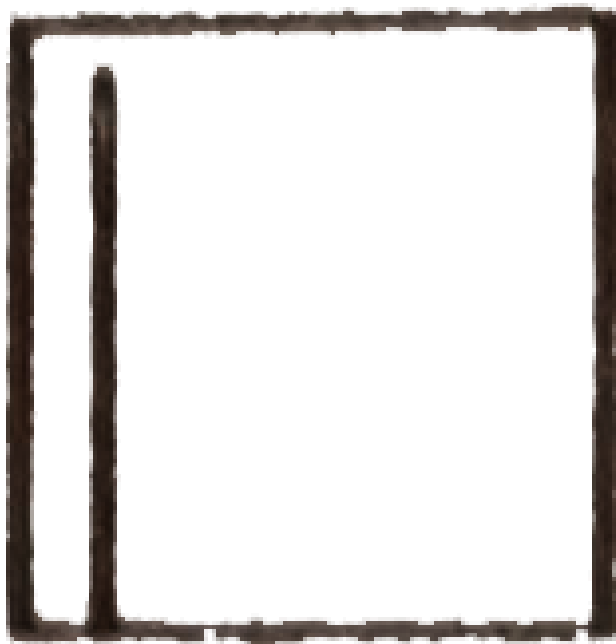
D. If (A) is false but (R) if true.

Answer: D



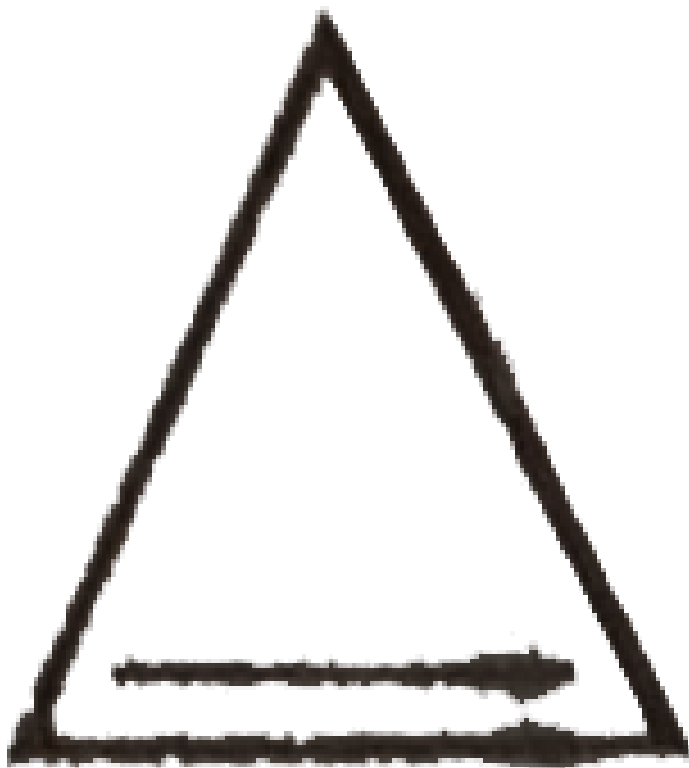
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5. The pK_a value of



(I) is less

than the pK_a value to



(II).

Nonaromatic compounds are more stable than anti-aromatic compounds.

A. If both (A) and (R) are true and (R) is the correct explanation of (A).

B. If both (A) and (R) are true but (R) is not correct explanation of (A).

C. If (A) is true but (R) is false.

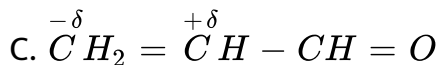
D. If (A) is false but (R) if true.

Answer: A

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Archives

1. Polarization in acrolein as:

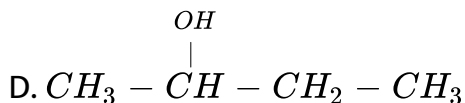
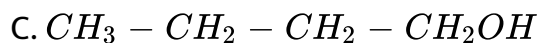
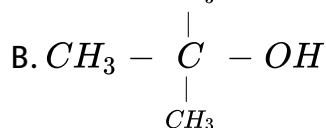
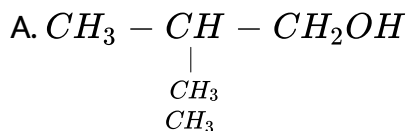




Answer: D

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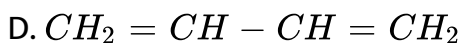
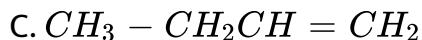
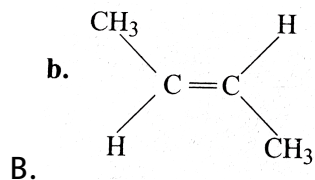
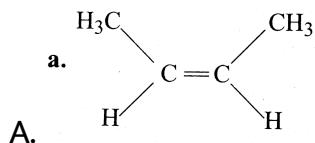
2. The compound which gives the most stable carbonium ion on dehydration is



Answer: B

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3. Which of the following hydrocarbons has the lowest dipole moment.



Answer: B

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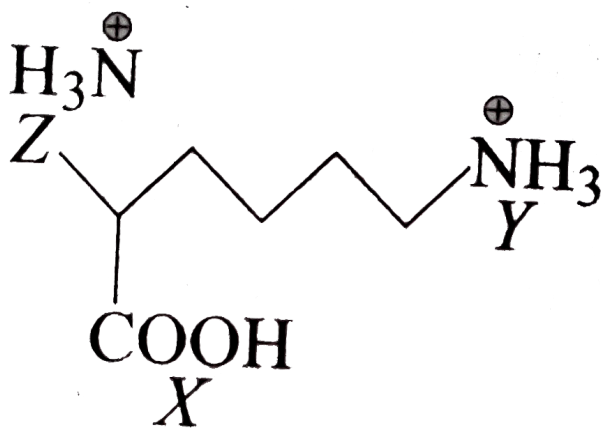
4. Which of the following molecules has highest dipole moment?



Answer: A

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5. Arrange in the order of increasing acidic strengths.



A. $X > Z > Y$

B. $Z < X > Y$

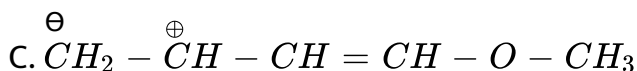
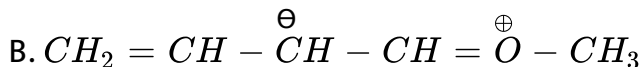
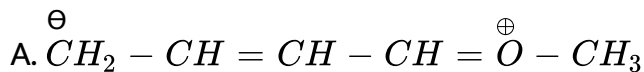
C. $X > Y > Z$

D. $Z > X > Y$

Answer: A

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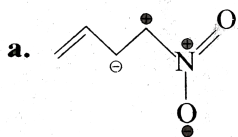
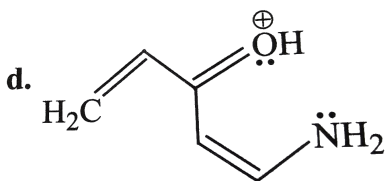
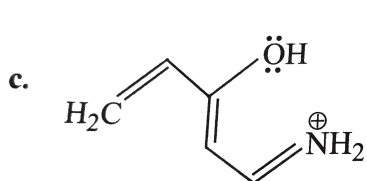
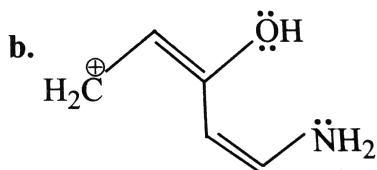
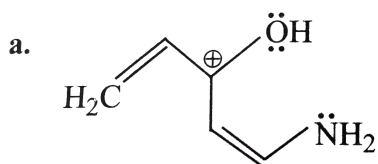
6. Which of the following resonating structures of 1-methoxy-1,3-butadiene is least stable ?



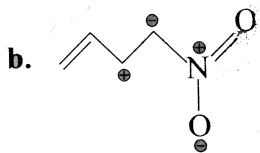
Answer: C

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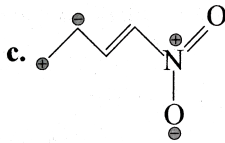
7. Which of the following is the most stable resonance structure



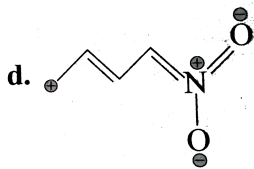
A.



B.



C.



D.

Answer: A

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8. Hyperconjugation involves overlap of which of the following orbitals?

A. $\sigma - \sigma$

B. $\sigma - p$

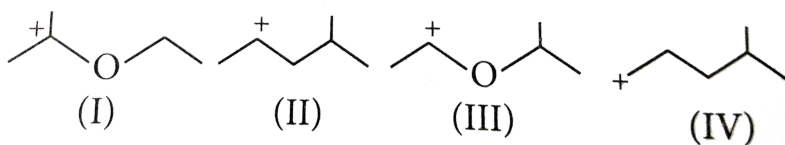
C. $p - p$

D. $\pi - \pi$

Answer: B

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9. The correct stability order for the following species is



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

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

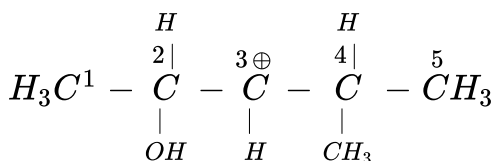
C. $(II) > (I) > (IV) > (III)$

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

Answer:

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10. 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 $C - 4$

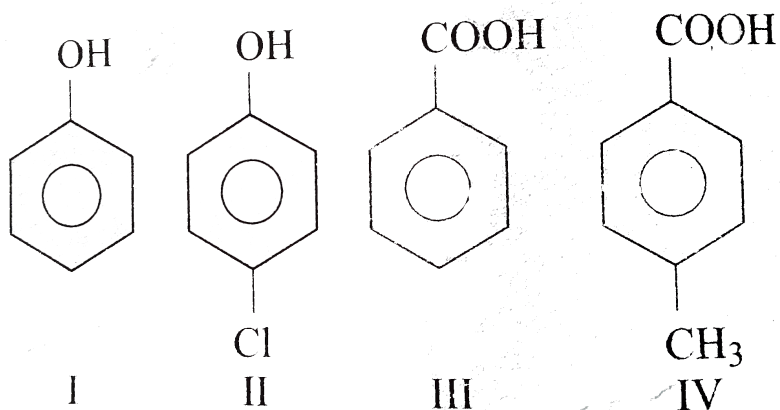
C. CH_3 at $C - 2$

D. H at $C - 2$

Answer:

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11. The correct of acidities of the following is :



A. $III > IV > II > I$

B. $IV > III > I > II$

C. $III > II > I > IV$

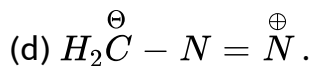
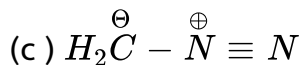
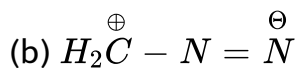
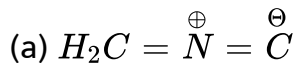
D. $II > III > IV > I$

Answer: A



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12. Give the stability of the following resonance structures



A. $I > II > IV > III$

B. $I > III > II > IV$

C. $II > I > III > IV$

D. $III > I > IV > II$

Answer:



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Fill In The Blanks

1. Among the given cations,.....is most stable (sec-butyl carbonium ion, tert-butyl carbonium ion, n-butyl carbonium ion).

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2. The shape of $\left(\overset{\oplus}{C}H_3 \right)$ is

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3. The bond dissociation energy needed to form the benzyl radical from toluene is _____ than the formation of the methyl radical from methane.

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4. The kind of delocalisation involving sigma bond orbitals is called.....

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Analytical And Descriptive

1. Arrange the following in increasing order of basic strength:

Aniline, p-Nitroaniline and p-toluidine

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