Hybridisation & Shapes of Organic Molecules

Q.1. Butyne-2 contains :

a) sp hybridised carbon atoms only
b) SP^3 hybridised carbon atoms only
c) both sp and SP^2 hybridised carbon atoms
d) both sp and SP^3 hybridised carbon atoms

Q.2. Which one of the following has the shortest carbon carbon bond length ?

a) Benzene
b) Ethene
c) Ethyne
d) Ethane

Q.3. The compound which contains all the four 1^o, 2^o, 3^o and 4^o carbon atoms is

a) 2, 3-dimethylpentane
b) 3-chloro-2, 3-dimethylpentane
c) 2, 3, 4-trimethylpentane
d) 3, 3- dimethylpentane

Q.4. . In which of the following, the bond length between two carbons is equal

a) 2- Butene
b) 1- Butene
c) Propyne
d) Benzene

Q.5. . As the s - character of hybrid orbital increases, the bond angle

a) increases
b) decreases
c) does not change
d) becomes zero

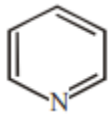
Q.6. Which of the following compounds is not aromatic?

a)

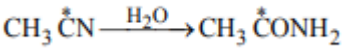
b)

c)

d)



Q.7. The change in the state of hybridization of the asterisked carbon in the following reaction is



a) sp^3 to sp^2
b) sp^3 to sp
c) sp to sp^2
d) sp^2 to sp^3

Q.8. The restricted rotation about carbon carbon double bond in 2-butene is due to

a) Overlap of one s and sp^2 hybridized orbitals
b) Overlap of two sp^2 hybridized orbitals
c) Overlap of one p and one sp^2 hybridized orbitals
d) Sideways overlap of two p orbitals

Q.9. The number of σ and π bonds in but-1-ene-3-yne are

a) 5σ and 5π
b) 7σ and 3π
c) 8σ and 2π
d) 8σ and 4π

Q.10. Unpaired electron in $CH_3^{\cdot}$ occupies

a) sp hybrid orbital
b) SP^3 hybrid orbital
c) p orbital
d) SP^2 hybrid orbital

Q.11.The C–H bond length is minimum in the bond formed by

a) sp-s overlapping (as in alkynes)
b) sp^2-s overlapping (as in alkenes)
c) sp^3-s overlapping (as in alkanes)
d) None of these

Q.12.Allyl isocyanide has

a) 9 σ and 4 π - bonds
b) 8σ and 5π - bonds
c) 9 σ , 3 π and 2 non- bonded electrons
d) 8 σ , 3 π and 4 non - bonded electrons

Q.13.The structure of $H_2C = C = CH_2$ is

a) linear
b) planar
c) non-planar
d) has several resonance structures

Q.14.Of the following compounds which will have a zero dipole moment?

a) 1, 1 - dichloroethylene
b) Trans -1, 2 - dichloroethylene
c) Cis - 1 , 2 - dichloroethylene
d) None of these

Q.15.During elimination reactions, the hybrid state of carbon atoms involved change as shown below:

a) sp^3 to sp^2 nature
b) sp^3 to sp nature
c) No change in hybridised state
d) Either (a) or (b)

Q.16.In allene (C_3H_4), the type(s) of hybridisation of the carbon atoms is (are) :

a) sp and sp^3
b) sp and sp^2
c) only sp^3
d) sp^2 and sp^3

Q.17.Which one of the following does not have sp^2 hybridized carbon ?

a) Acetonitrile
b) Acetic acid
c) Acetone
d) Acetamide

Q.18.The restricted rotation about carbon carbon double bond in 2-butene is due to

a) Overlap of one s- and sp^2- hybridized orbitals
b) Overlap of two sp^2- hybridized orbitals
c) Overlap of one p- and one sp^2- hybridized orbitals
d) Sideways overlap of two p- orbitals

Q.19.The shortest C – C bond distance is found in

a) Diamond
b) Ethane
c) Benzene
d) Acetylene

Q.20.The Cl – C – Cl angle in 1,1,2,2- tetrachloroethene and tetrachloromethane respectively will be about

a) 120°
b) 90° and 109.5°
c) 109.5° and 90°
d) 120° and 109.5°

Q.21.Cyclic hydrocarbon 'A' has all the carbon and hydrogen atoms in a single plane. All the carbon carbon bonds have the same length, less than 1.54 Å, but more than 1.34 Å. The C – C – C bond angle will be

a) 109°28'
b) 100°
c) 180°
d) 120°

Q.22.Huckel's rule states that a monocyclic conjugated compound will be aromatic if it contains

a) (4n + 2π) electrons
b) (4π + 2n) electrons
c) 4π electrons
d) (4n + 2)π electrons

Q.23.The maximum number of carbon atoms arranged linearly in the molecule

a) 2
b) 3
c) 4
d) 5

Q.24. In which of the following species, all types of hybrid carbons are present ?

a) $CH_2 = C = CH_2$
b) $CH_3–CH=CH–CH_2^+$
c) $CH_3–C\equiv C–CH_2^+$
d) $CH_3–CH=CH–CH_2^-$

Q.25.How many primary carbon atoms are there in

$CH_3CH_2CH(CH_3)C(CH_3)_2CH_2CH_2CH_3$?

a) 3
b) 4
c) 5
d) 6