

**Bonding and hybridisation in organic compounds**

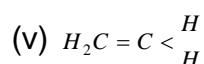
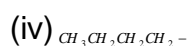
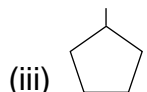
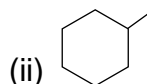
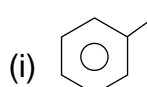
- In methane molecule, the hydrogen atoms around carbon are arranged as  
(a) Square planar (b) Tetrahedral  
(c) Triangular (d) Octahedral
- In carbon tetrachloride, four valence of carbon are directed to four corners of  
(a) Rectangle  
(b) Square  
(c) Tetrahedron  
(d) None of these
- In alkene (ethene) number of  $sp^2$  hybrid carbon atoms are  
(a) 1 (b) 2  
(c) 3 (d) 0
- Each carbon atom in benzene is in the state of hybridization  
(a)  $sp^3$  (b)  $sp^2$   
(c)  $sp$  (d)  $s^3p$
- Which of the following hybridisation has highest percentage of s-character  
(a)  $sp^3$   
(b)  $sp^2$   
(c)  $sp$   
(d) None of these
- The hybridisation present in  $C_2H_2$  is  
(a)  $sp$  (b)  $sp^2$   
(c)  $sp^3$  (d)  $dsp^2$
- What hybrid orbitals will form the following compound  
 $H_3C - CH = CH - CH_2 - CH_3$   
(a)  $sp$  and  $sp^3$  (b)  $sp^2$  and  $sp^3$   
(c)  $sp$  and  $sp^2$  (d) Only  $sp^3$
- The compound in which carbon uses only its  $sp^3$  hybrid orbitals for bond formation is  
(a)  $HCOOH$  (b)  $(NH_2)_2CO$   
(c)  $(CH_3)_3COH$  (d)  $(CH_3)_3CHO$
- A straight chain hydrocarbon has the molecular formula  $C_8H_{10}$ . The hybridisation for the carbon atoms from one end of the chain to the other are \_\_\_\_\_ respectively  
 $sp^3, sp^2, sp^2, sp^3, sp^2, sp^2, sp$  and  $sp$ .  
The structural formula of the hydrocarbon would be  
(a)  $CH_3 - C \equiv C - CH_2 - CH = CH - CH = CH_2$   
(b)  $CH_3 - CH_2 - CH = CH - CH_2 - C \equiv C - CH = CH_2$   
(c)  $CH_3 - CH = CH - CH_2 - C \equiv C - CH = CH_2$   
(d)  $CH_3 - CH = CH - CH_2 - CH = CH - C \equiv CH$



10. Which of the following has a bond formed by overlap of  $sp - sp^3$  hybrid orbitals
- (a)  $CH_3 - C \equiv C - H$   
 (b)  $CH_3 - CH = CH - CH_3$   
 (c)  $CH_2 = CH - CH = CH_2$   
 (d)  $HC \equiv CH$
11. The bond between carbon atom (1) and carbon atom (2) in compound  $N \equiv C - CH = CH_2$  involves the hybridised carbon as
- (a)  $sp^2$  and  $sp^2$  (b)  $sp^3$  and  $sp$   
 (c)  $sp$  and  $sp^2$  (d)  $sp$  and  $sp$
12. Number of  $\pi$  bonds in  $CH_2 = CH - CH = CH - C \equiv CH$  is
- (a) 2 (b) 3  
 (c) 4 (d) 5
13. Number of  $\pi$  electrons present in naphthalene is
- (a) 4 (b) 6  
 (c) 10 (d) 14
14. Number of  $\pi$  electrons in cyclobutadienyl anion  $(C_4H_4)^{-2}$  is
- (a) 2 (b) 4  
 (c) 6 (d) 8
15. Homolytic fission of C - C bond in ethane gives an intermediate in which carbon is
- (a)  $sp^3$  hybridised  
 (b)  $sp^2$  hybridised  
 (c)  $sp$  hybridised  
 (d)  $sp^2d$  hybridized
16. In the reaction
- $$\begin{array}{c} Br > C = C < Br \\ H > 1 & 2 < H \end{array} \xrightarrow[\text{Catalyst}]{H_2} \begin{array}{c} BrCH_2 & CH_2Br \\ 3 & 4 \end{array}$$
- The hybridisation states of carbon atoms 1, 2, 3, 4 are
- (a) 1 and 2  $sp^2$ ; 3 and 4  $sp^3$   
 (b) 1 and 2  $sp^2$ ; 3 and 4  $sp$   
 (c) 1, 2, 3 and 4  $sp$   
 (d) 1, 2  $sp^3$ ; 3, 4  $sp^2$
17. In which of the compounds given below is there more than one kind of hybridisation ( $sp, sp^2, sp^3$ ) for carbon
- (i)  $CH_3CH_2CH_2CH_3$   
 (ii)  $CH_3 - CH = CH - CH_3$   
 (iii)  $CH_2 = CH - CH = CH_2$   
 (iv)  $H - C \equiv C - H$
- (a) (ii) and (iv) (b) (i) and (iv)  
 (c) (ii) and (iii) (d) (ii)



18. Examine the following common chemical structures to which simple functional groups are often attached



Which of these systems have essentially planar geometry

- (a) (i) and (v)                      (b) (ii) and (iii)  
(c) (ii), (iii) and (iv)          (d) (iv)
19. The structure of di-chloromethane is  
(a) Tetrahedral                      (b) Trigonal  
(c) Linear                              (d) Hexagonal
20. The numbers of sigma ( $\sigma$ ) bonds in 1-butene is  
(a) 8                                      (b) 10  
(c) 11                                      (d) 12

