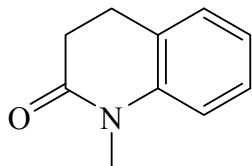


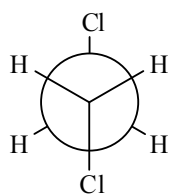
1. What is the molecular formula of the following compound?

- a) C_9H_9NO
 b) $C_9H_{10}NO$
 c) $C_{10}H_{10}NO$
 d) $C_{10}H_{11}NO$
 e) $C_{10}H_{12}NO$

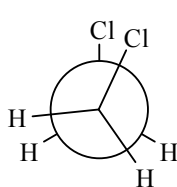


2. Rank the following conformational isomers of 1,2-dichloroethane in order of increasing energy.

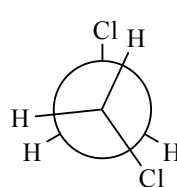
- a) $V < X < Y < Z$
 b) $V < Y < Z < X$
 c) $Z < V < Y < X$
 d) $Z \approx V < X \approx Y$
 e) $V < Z < Y < X$



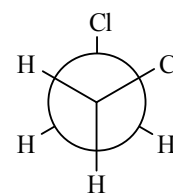
V



X



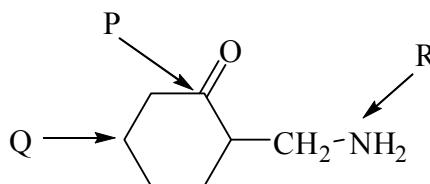
Y



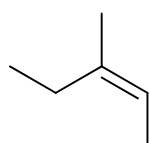
Z

3. What is the hybridisation of the designated atoms in the following compound?

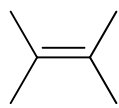
- a) $P = sp^2$, $Q = sp^3$, $R = sp$
 b) $P = sp^3$, $Q = sp^2$, $R = sp^2$
 c) $P = sp^2$, $Q = sp^3$, $R = sp^3$
 d) $P = sp^3$, $Q = sp^3$, $R = sp^3$
 e) $P = sp^2$, $Q = sp^3$, $R = sp^2$



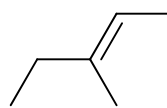
4. What is the correct stick representation of (Z)-3-methyl-2-pentene?



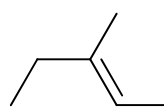
A



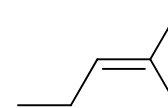
B



C



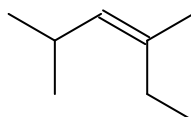
D



E

5. What is the correct name for the following compound?

- a) (E)-3,5-dimethyl-3-hexene
 b) (Z)-3,5-dimethyl-3-hexene
 c) (Z)-2,4-dimethyl-3-hexene
 d) (E)-2-ethyl-4-methyl-2-pentene
 e) (Z)-2-ethyl-4-methyl-2-pentene



6. How many cyclic ketones (constitutional isomers only) have the molecular formula C_5H_8O ?

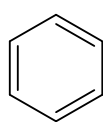
- a) 2 b) 3 c) 4 d) 5 e) 6

7. Which one of the following statements regarding the nitration of benzene is true?

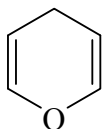
- a) This is an E_{Ar} reaction.
 b) The active nucleophile is NO_2^+ .
 c) The Wheland Intermediate can lose NO_2^- to give the starting material.
 d) Phenol (hydroxybenzene) reacts faster than benzene.
 e) The Wheland Intermediate is lower in energy than the starting material.

8. Which of the following compounds are aromatic?

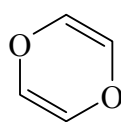
- a) W, X, Y
 b) W, Y, Z
 c) V, X
 d) V, X, Z
 e) V, Z



V



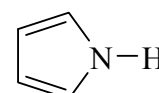
W



X



Y

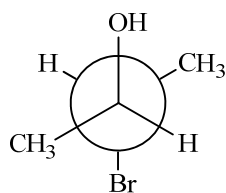
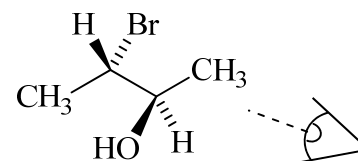


Z

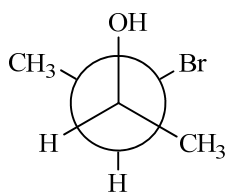
9. How many sigma and pi bonds are in the molecule $CH_3CHCCHCH_2CCCH_2CHCH_2$?

- a) 21 σ and 5 π
 b) 22 σ and 5 π
 c) 17 σ and 9 π
 d) 20 σ and 4 π
 e) 21 σ and 4 π

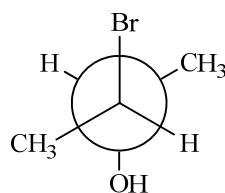
10. Identify the correct Newman projection when the given molecule is viewed from the right hand side as shown.



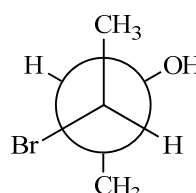
A



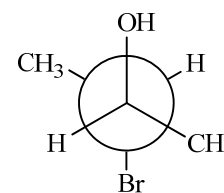
B



C



D

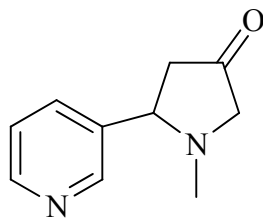


E

Correct answers: 1D, 2E, 3C, 4A, 5C, 6E, 7D, 8E, 9A, 10E

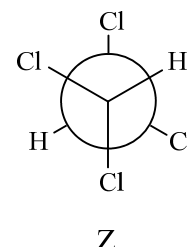
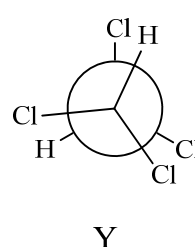
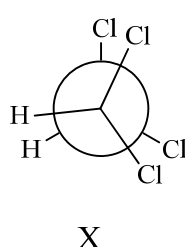
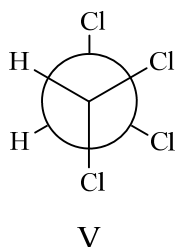
1. What is the molecular formula of the following compound?

- a) $C_9H_9N_2O$
 b) $C_9H_{10}N_2O$
 c) $C_{10}H_{10}N_2O$
 d) $C_{10}H_{11}N_2O$
 e) $C_{10}H_{12}N_2O$



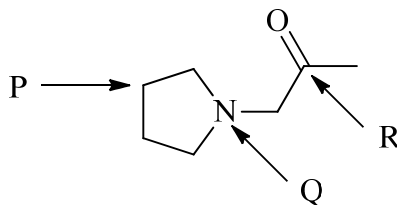
2. Rank the following conformational isomers of 1,1,2,2-tetrachloroethane in order of increasing energy.

- a) $V \approx Z < Y < X$
 b) $Z < V < Y < X$
 c) $Z < V < Y \approx X$
 d) $Z \approx V < X \approx Y$
 e) $V < Z < X < Y$

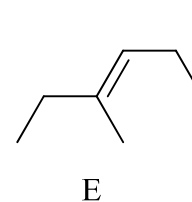
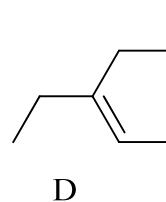
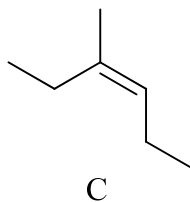
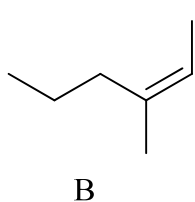
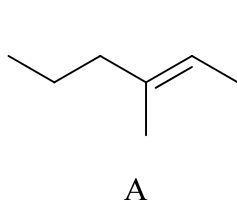


3. What is the hybridisation of the designated atoms in the following compound?

- a) $P = sp^2$, $Q = sp^3$, $R = sp^2$
 b) $P = sp^3$, $Q = sp^2$, $R = sp^2$
 c) $P = sp^3$, $Q = sp^3$, $R = sp^2$
 d) $P = sp^3$, $Q = sp^3$, $R = sp^3$
 e) $P = sp^2$, $Q = sp^2$, $R = sp^2$

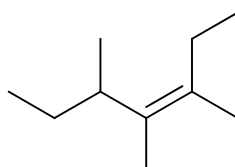


4. What is the correct stick representation of (*E*)-3-methyl-3-hexene?



5. What is the correct name for the following compound?

- a) (*E*)-3,4,5-trimethyl-4-heptene
 b) (*Z*)-3,4,5-trimethyl-3-heptene
 c) (*E*)-3,4,5-trimethyl-3-heptene
 d) (*E*)-2-ethyl-3,4-dimethyl-2-hexene
 e) (*Z*)-2-ethyl-3,4-dimethyl-2-hexene



6. How many alcohols (constitutional isomers only) have the molecular formula $C_5H_{10}O$ and contain a ring with exactly 3 carbon atoms in it?

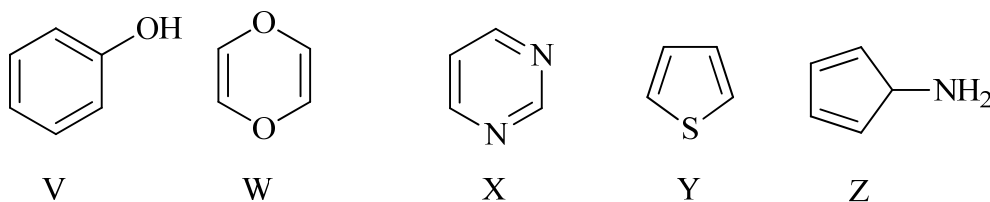
- a) 6 b) 7 c) 8 d) 9 e) 10

7. Which one of the following statements regarding the nitration of benzene is false?

- a) This is an S_EAr reaction.
 b) The active nucleophile is NO_2^+ .
 c) The Wheland Intermediate can lose H^+ to give the product.
 d) Nitrobenzene reacts slower than benzene.
 e) The Wheland Intermediate is not aromatic.

8. Which of the following compounds are aromatic?

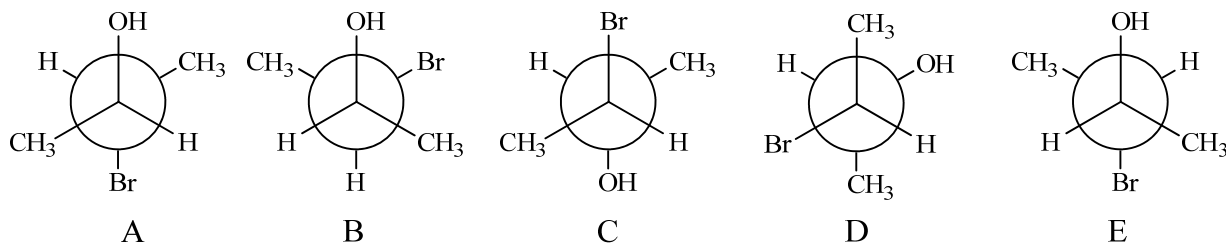
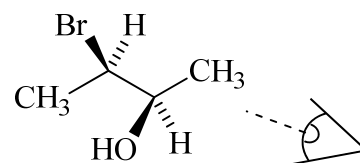
- a) V, X, Y
 b) W, Y, Z
 c) V, X
 d) V, X, Z
 e) all of them



9. How many sigma and pi bonds are in the molecule $CH_2CHCHCHCCCHCH_2$?

- a) 14 σ and 4 π
 b) 14 σ and 5 π
 c) 16 σ and 4 π
 d) 15 σ and 4 π
 e) 15 σ and 5 π

10. Identify the correct Newman projection when the given molecule is viewed from the right hand side as shown.



Correct answers: 1E, 2B, 3C, 4E, 5B, 6D, 7B, 8A, 9E, 10B