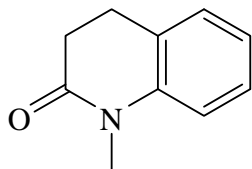
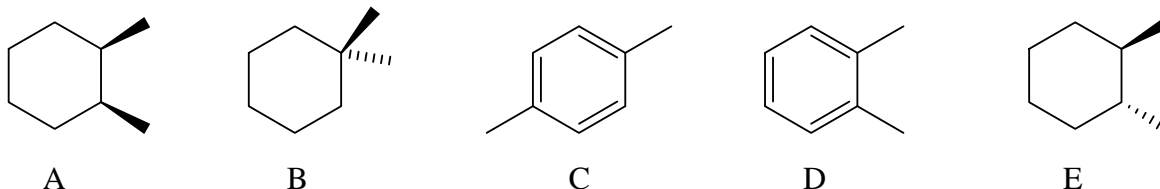


1. What is the molecular formula of the following compound?

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

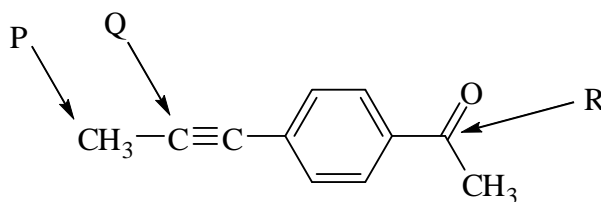


2. Which one of the following molecules has methyl groups in a *trans*- arrangement?

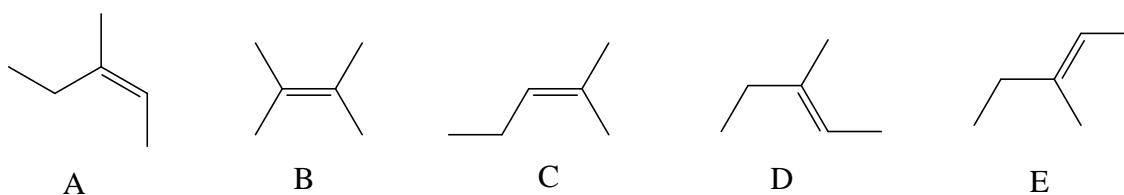


3. What is the hybridisation of the designated atoms in the following compound?

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

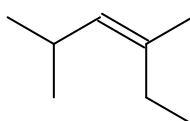


4. What is the correct stick representation of (*Z*)-3-methyl-2-pentene?



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. Which two of the following structures are configurational isomers?

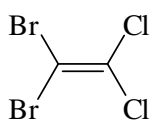
a) **V** and **W**

b) **X** and **Y**

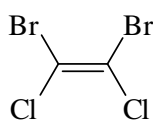
c) **X** and **Z**

d) **Y** and **Z**

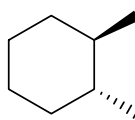
e) none of them



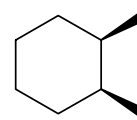
V



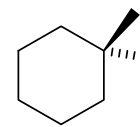
W



X



Y



Z

7. Which of the curly arrows are **incorrectly** drawn in the following reaction mechanism?

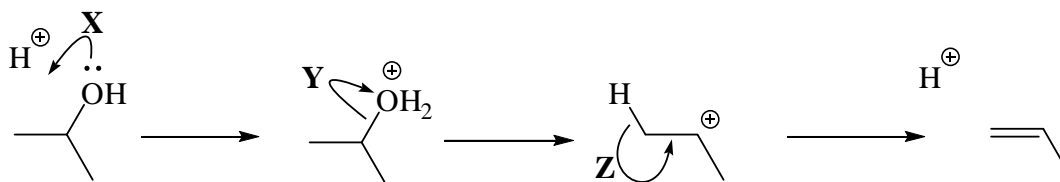
a) **X** only

b) **Y** only

c) **Z** only

d) all of them

e) none of them



8. Which one of the following functional groups is **incorrectly** labelled?

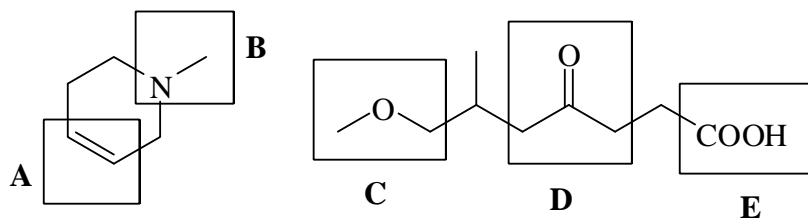
a) alkene

b) amine

c) aldehyde

d) ketone

e) carboxylic acid



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

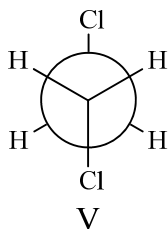
a) **V** < **X** < **Y** < **Z**

b) **V** < **Y** < **Z** < **X**

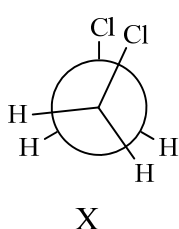
c) **Z** < **V** < **Y** < **X**

d) **Z** ≈ **V** < **X** ≈ **Y**

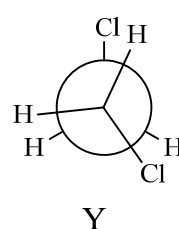
e) **V** < **Z** < **Y** < **X**



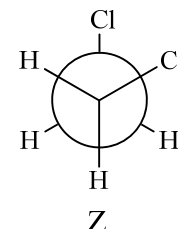
V



X

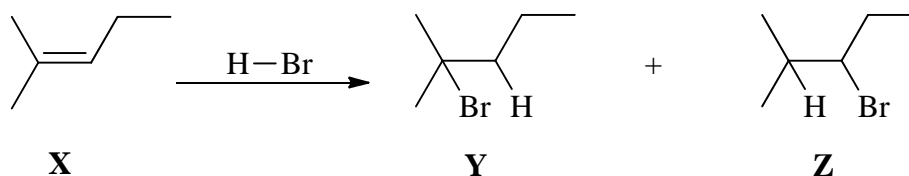


Y



Z

10. Identify the nucleophile and electrophile in the first step of the following reaction and also predict which will be the major product formed.

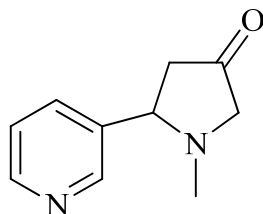


- | | nucleophile | electrophile | major product |
|----|-------------|--------------|-----------------------------|
| a) | H of HBr | X | Y and Z equal |
| b) | X | Br of HBr | Z |
| c) | H of HBr | X | Y |
| d) | X | H of HBr | Y |
| e) | Br of HBr | X | Z |

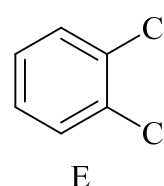
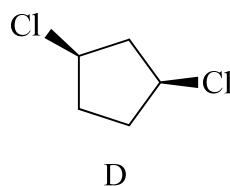
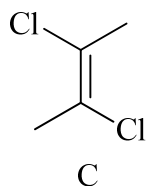
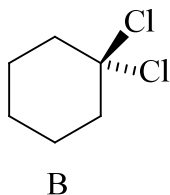
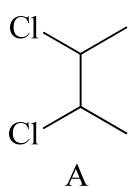
Correct answers: 1D, 2E, 3D, 4A, 5C, 6B, 7E, 8C, 9E, 10D

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) $C_{10}H_{12}N_2O$

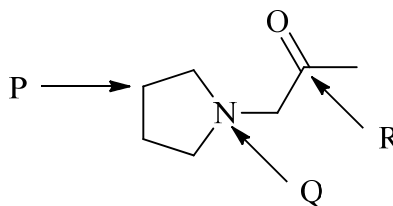


2. Which one of the following molecules has chlorine atoms in a *cis*- arrangement?

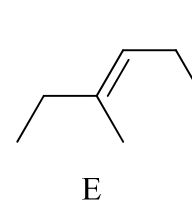
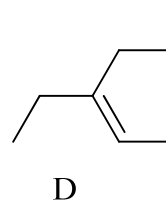
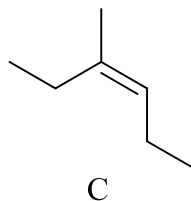
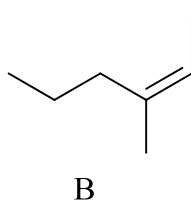
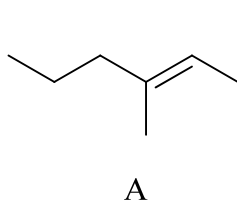


3. What is the hybridisation of the designated atoms in the following compound?

- 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) $P = sp^2$, $Q = sp^2$, $R = sp^2$

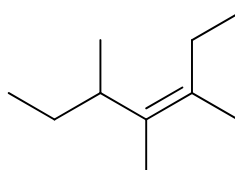


4. What is the correct stick representation of (*E*)-3-methyl-3-hexene?



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. Which two of the following structures are configurational isomers?

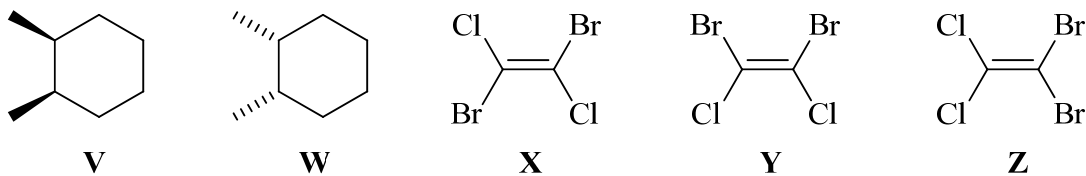
a) V and W

b) X and Y

c) X and Z

d) Y and Z

e) none of them



7. Which of the curly arrows are **incorrectly** drawn in the following reaction mechanism?

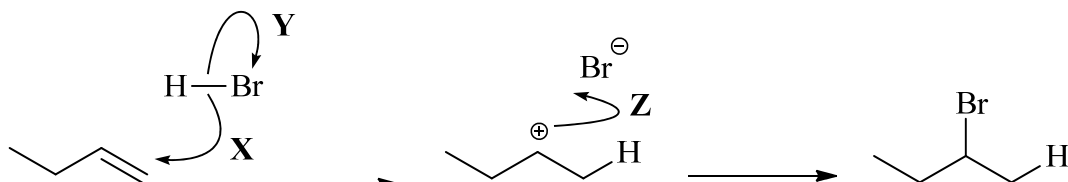
a) X only

b) Y only

c) Y and Z

d) X and Y

e) X and Z



8. Which one of the following functional groups is **incorrectly** labelled?

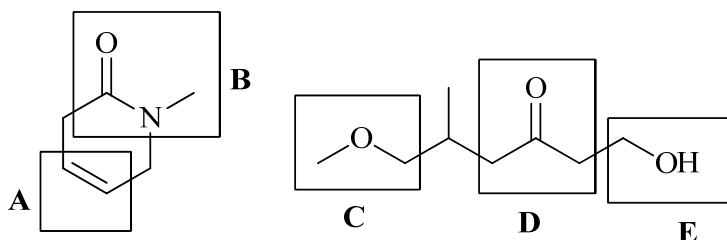
a) alkene

b) amine

c) ether

d) ketone

e) alcohol



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

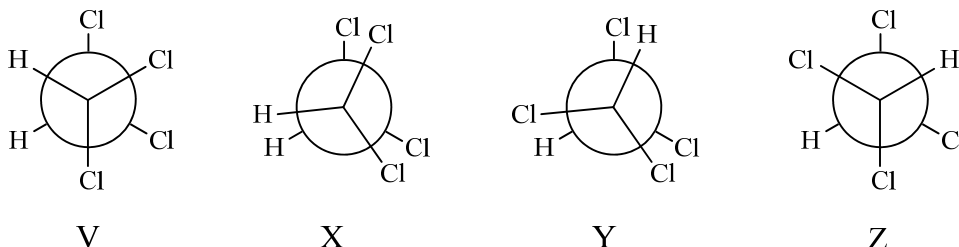
a) $V \approx Z < Y < X$

b) $Z < V < Y < X$

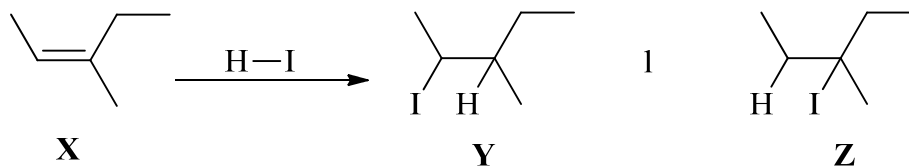
c) $Z < V < Y \approx X$

d) $Z \approx V < X \approx Y$

e) $V < Z < X < Y$



10. Identify the nucleophile and electrophile in the first step of the following reaction and also predict which will be the major product formed.



- | | nucleophile | electrophile | major product |
|----|-------------|--------------|---------------|
| a) | X | H of HI | Z |
| b) | X | I of HI | Y |
| c) | H of HI | X | Z |
| d) | H of HI | X | Y and Z equal |
| e) | I of HI | X | Z |

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