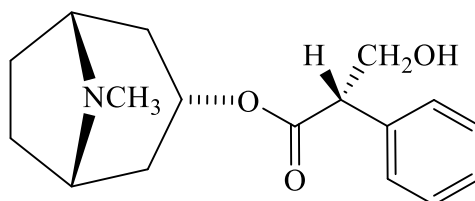


Marks
4

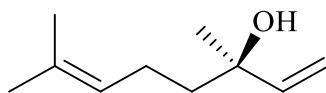
- The tropane alkaloid (–)-hyoscyamine is found in certain plants of the *Solanaceae* family. It is an anticholinergic agent that works by blocking the action of acetylcholine at parasympathetic sites in smooth muscle, secretory glands and the central nervous system.



Give the molecular formula of (–)-hyoscyamine.

List the functional groups present in (–)-hyoscyamine.

- The structure of (-)-linalool, a commonly occurring natural product, is shown below.



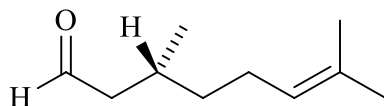
Marks
2

What is the molecular formula of (-)-linalool?

What functional groups are present in (-)-linalool?

Marks
2

- The structure of (+)-citronellal, a widely occurring natural product, is shown below.

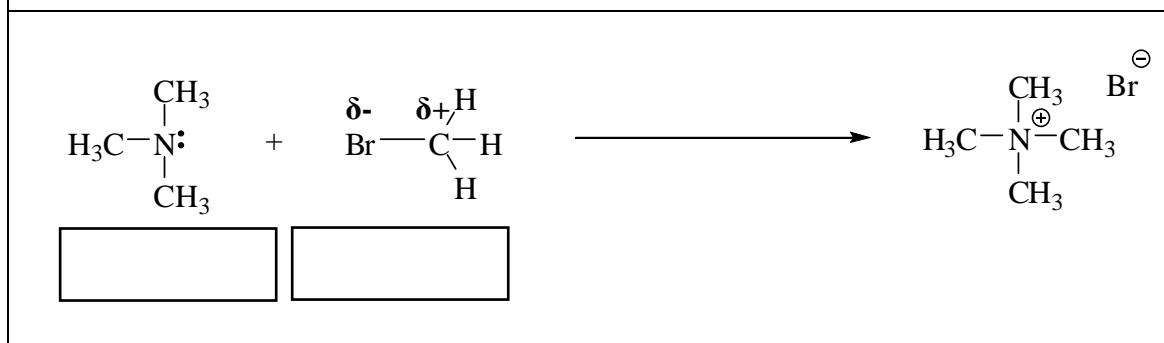
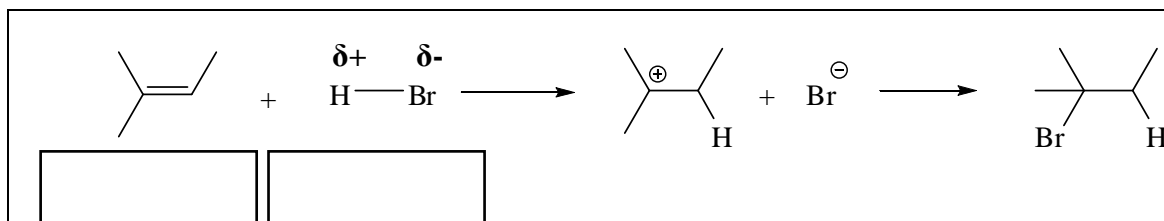


What is the molecular formula of (+)-citronellal?

What functional groups are present in (+)-citronellal?

Marks
4

- Classify the starting materials for each of the following reactions as nucleophile or electrophile in the boxes provided and indicate with δ^+ and δ^- the polarisation of the H–Br and C–Br bonds in the starting materials.


3

- Draw the constitutional formula for each of the following compounds.

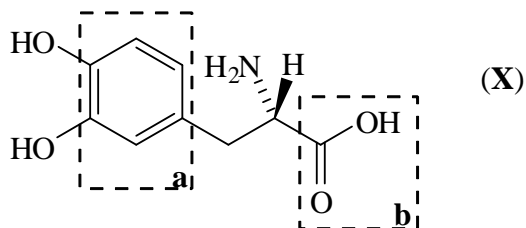
(Z)-4-methylhex-2-ene

trans-1,3-dichlorocyclohexane

(R)-butan-2-ol

Marks
7

- Dopa is a non-proteinogenic amino acid used to treat Parkinson's disease. Only the enantiomer (**X**) is effective in restoring nerve function. The other enantiomer is highly toxic.



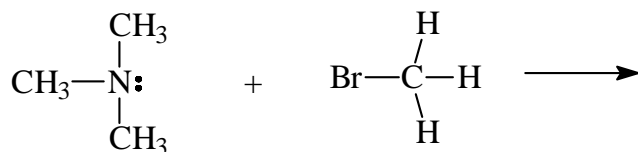
What is the molecular formula of (**X**)?

Name the functional groups, highlighted by the boxes **a** and **b**, present in (**X**).

a =	b =
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Marks
3

- Classify the starting materials for the following reaction as nucleophile or electrophile in the boxes provided and draw the structure of the product.



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2

- Draw the constitutional formula for each of the following compounds.

(E)-5-methylhex-2-ene

cis-1,2-dichlorocyclopentane

- Draw the constitutional formula for each of the following compounds.

3,5-dichlorophenol

(*E*)-4-methyl-2-pentene

(*S*)-2-bromobutane