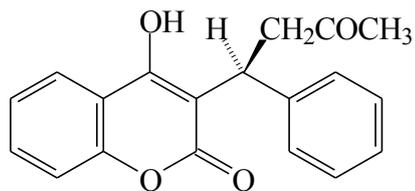


Marks
4

- Warfarin, whose structure is shown below, is a synthetic anticoagulant.



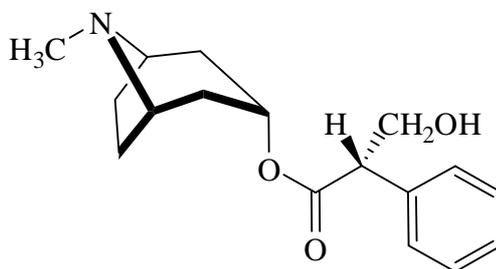
Give the molecular formula of warfarin.

What is the configuration at the stereogenic (chiral) carbon centre of warfarin?

Draw the structures of two tautomers of warfarin.

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- 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.

Hydrolysis of (-)-hyoscyamine results in two fragments, tropine and tropic acid. Draw each of these fragments.

| tropine | tropic acid |
|---------|-------------|
| | |

What is the stereochemistry at the tropic acid stereocentre? Write (*R*) or (*S*).

Is tropine optically active? Explain your answer.