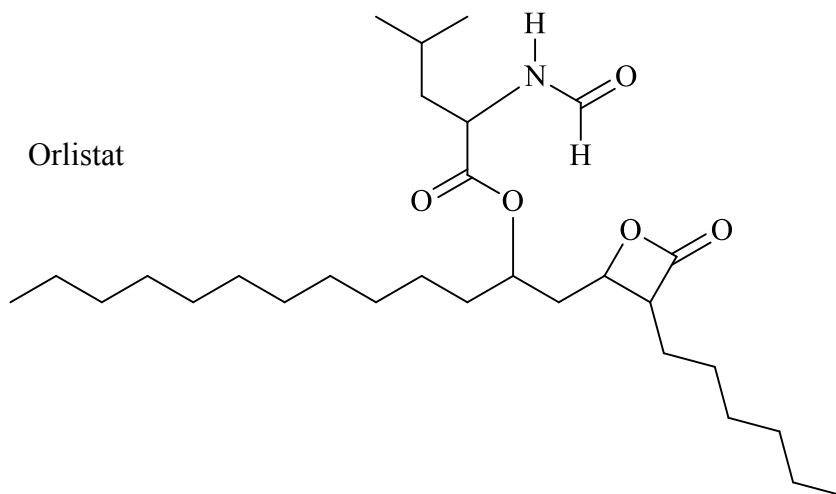


**Marks**  
**6**

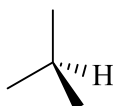
- Orlistat (shown below) is a drug for obesity management which acts by inhibiting the absorption of dietary fats. Indicate all stereogenic centres on the structure below.

Orlistat



How many different diastereoisomers are possible for Orlistat?

Select one of the stereogenic centres and draw the isomer with the (*R*)-configuration.

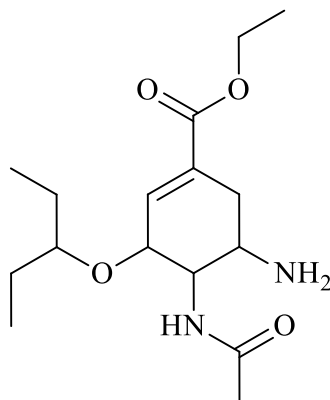


List the functional groups present in Orlistat.

Is Orlistat likely to be soluble in water? Why?

- Oseltamivir, marketed under the trade name Tamiflu, is an antiviral drug, which may slow the spread of influenza (flu) virus between cells in the body by stopping the virus from chemically cutting ties with its host cell.

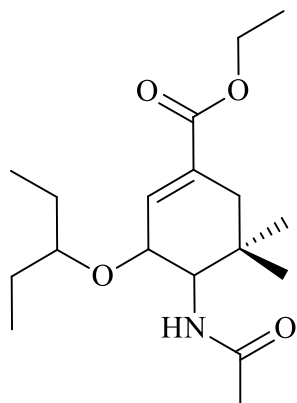
Tamiflu



How many stereogenic centres are there in Tamiflu?

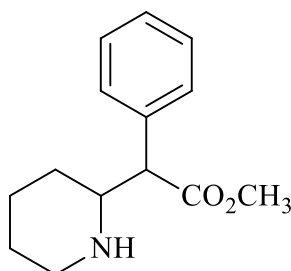
How many possible stereoisomers can exist for Tamiflu?

Add the  $\text{NH}_2$  and H groups to the stereogenic centre indicated below to give the (*R*)-configuration of that centre.



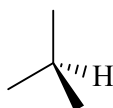
- Methylphenidate, also known as Ritalin, is a psychostimulant drug approved for treatment of attention-deficit disorder. It belongs to the piperidine class of compounds and increases the levels of dopamine and norepinephrine in the brain through reuptake inhibition of the monoamine transporter.

methylphenidate



How many stereogenic (chiral) centres are there in methylphenidate?

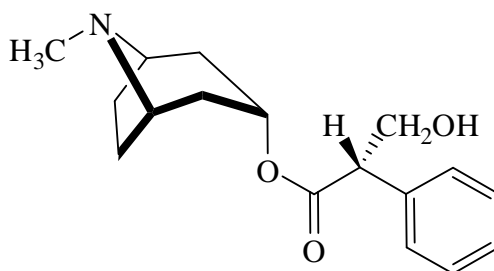
Using a stereogenic centre you have identified, draw the (*R*)-configuration of that centre.



Ritalin is generally sold as the hydrochloride salt. Draw the structure of this salt and suggest why this is the preferred compound for sale.

**Marks**  
**7**

- 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

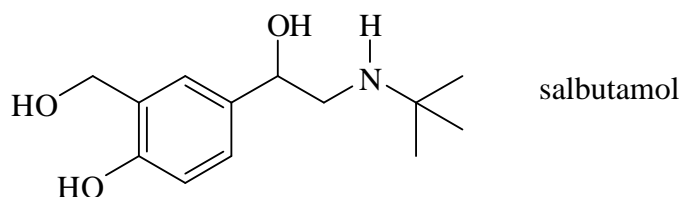
tropic acid

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

Is tropine optically active? Explain your answer.

**Marks**  
**6**

- Salbutamol is available under the trade name Ventolin® as a racemic mixture of compounds. A stick representation of the compound is shown below.



Give the molecular formula of salbutamol.

List the functional groups present in salbutamol.

A competing manufacturer distributes a product, which contains only the (*R*)-enantiomer of salbutamol, under the trade name Xopenex®. On the structure above, mark the stereogenic centre with an asterisk (\*).

List the substituents attached to this stereogenic centre in descending order of priority according to the sequence rules by drawing them in the boxes below.

Highest priority

Lowest priority

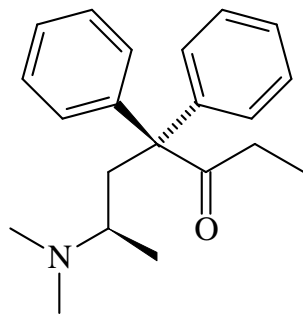
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Draw the (*R*)-enantiomer of salbutamol.



**Marks**  
**6**

- A stick representation for the active enantiomer of methadone, an analgesic used as a maintenance drug in the treatment of heroin addiction, is shown below.



Give the molecular formula of methadone.

List the functional groups present in methadone.

Treatment of methadone with  $\text{NaBH}_4$  gives compounds (X) and (Y). Draw the structures of (X) and (Y).

(X)	(Y)

What is the stereochemical relationship between compounds (X) and (Y)?