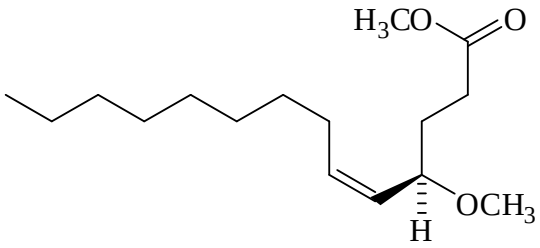
Marks 7

- Compound (**X**) is a derivative of a naturally occurring Japanese beetle pheromone.



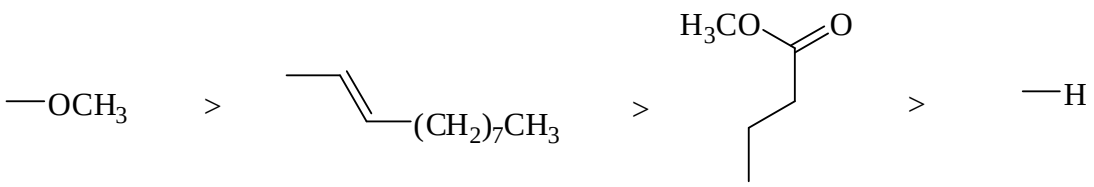
(**X**)

What is the molecular formula of (**X**)? **$C_{16}H_{30}O_3$**

What is the stereochemistry of the C–C double bond in (**X**)? **(*Z*)**

List the substituents attached to the stereogenic centre in descending order of priority according to the sequence rule.

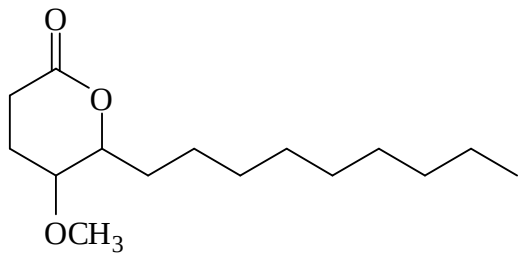
highest priority lowest priority



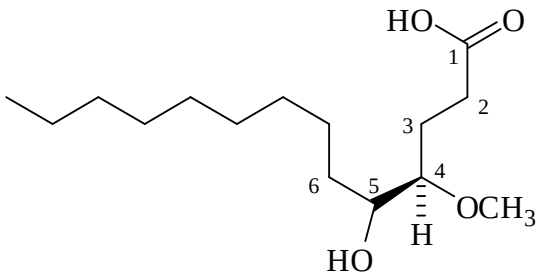
What is the absolute stereochemistry of **(X)**? Write (*R*) or (*S*). **(*R*)**

On heating with 4 M H_2SO_4, one of the products obtained is compound (**Y**), whose structure is shown on the right. Explain the formation of this product.

(**Y**)

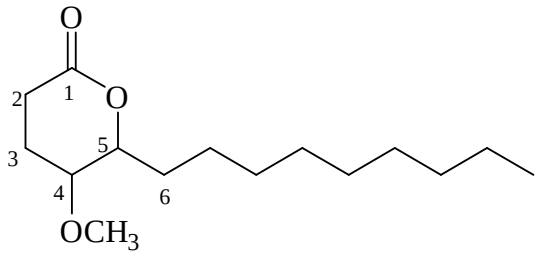


The 4 M H_2SO_4 catalyses 2 reactions; (i) hydrolysis of the ester to a carboxylic acid and (ii) addition of water across the C=C double bond to give the following intermediate:



ANSWER CONTINUES ON THE NEXT PAGE

This intermediate can undergo an intramolecular esterification (the OH on carbon 5 reacts with the carboxylic acid group at carbon 1) to give the cyclic ester (Y).



How many different stereoisomers are possible for compound (**Y**)?	**4***

***There are stereogenic centres at C4 and C5.**