

How to hack nature – student worksheet

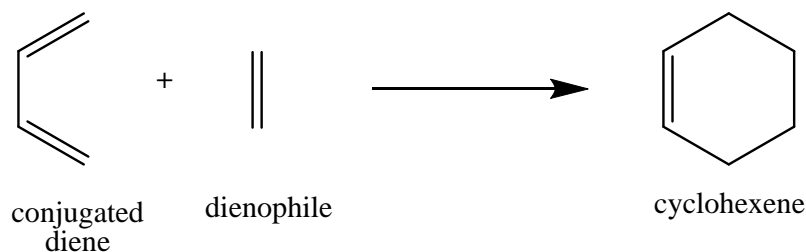
Education in Chemistry

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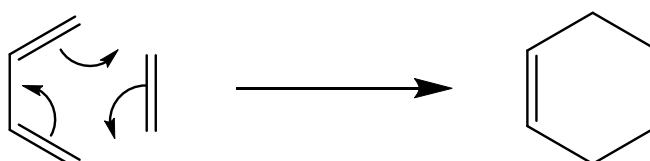
Read the article The nature hackers and answer these questions.

- 1) Describe, using bullet points or a flow chart, the natural evolution of a protein.
- 2) Why are the enzymes we find in nature nowadays less suited to non-natural applications compared to ancient enzymes?
- 3) Explain why ancient enzymes are more suitable for laboratory or industrial applications, and describe the steps you would need to take to find a suitable ancient enzyme for a laboratory reaction.
- 4) Below is some information about the Diels–Alder reaction. Use this information and the article to answer the questions.

General scheme of Diels-Alder reaction

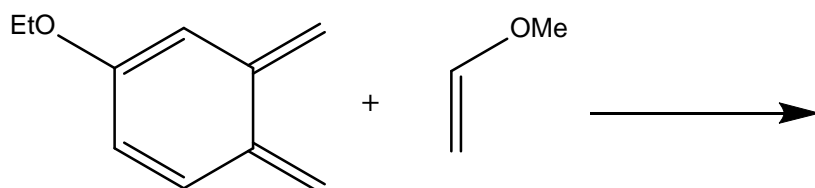


Mechanism

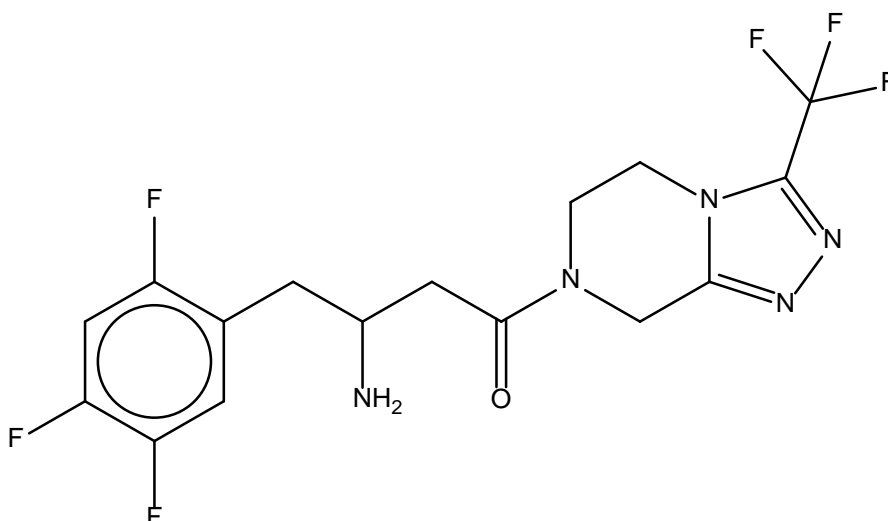


(a) Why is the Diels–Alder reaction so important for chemists?

(b) Predict the product(s) from the Diels–Alder reaction shown below and suggest why a Diels–Alderase enzyme may be useful in this reaction.



5) The figure below shows sitagliptin.



(a) Copy the structure and identify the chiral centre.

(b) Compare and contrast the traditional synthesis with the enzyme-catalysed synthesis.

<i>Traditional</i>	<i>Enzyme</i>