Answer all the questions below as fully as you can then check your answers

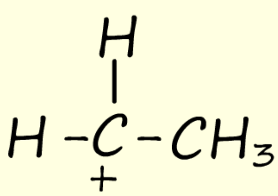
1. Draw the displayed formula for the following 4 alkenes:

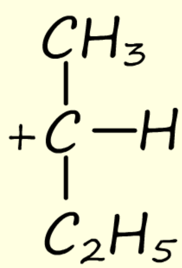
a. ethene b. propene c. but-1-ene d. but-2-ene

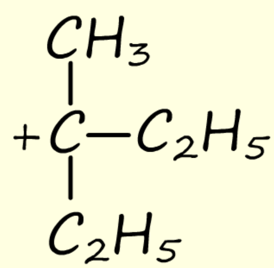
2. Which of the above 4 alkenes are symmetrical and which are unsymmetrical?

3. Describe the order of stability of carbocations and offer an explanation as to why some carbocations are more stable than others.

4. Decide whether each of the following carbocations are primary, secondary or tertiary carbocations.







5. Draw pent-1-ene.

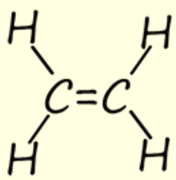
a. Show the mechanism for the reaction of pent-1-ene with hydrogen chloride gas, include the two possible products of the reaction.

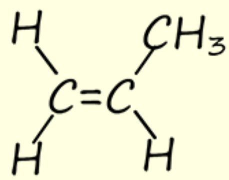
b. Which of the products is the major product and which is the minor product? Give a reason for your answer.

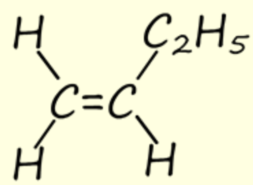
Answers

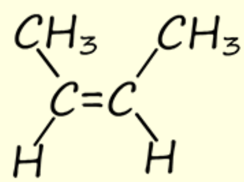
1. Draw the displayed formula for the following 4 alkenes:

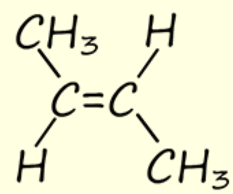
a. ethene b. propene c. but-1-ene d. but-2-ene


ethene

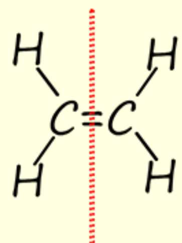

propene

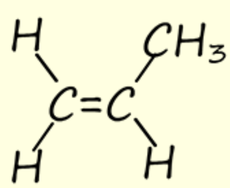

but-1-ene

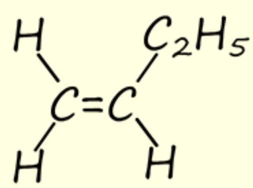

Z-but-2-ene

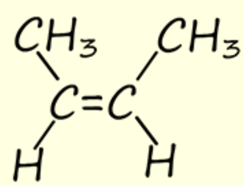

E-but-2-ene

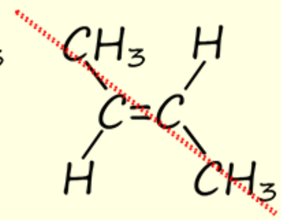
2. Which of the above 4 alkenes are symmetrical and which are unsymmetrical?


symmetrical


unsymmetrical


unsymmetrical

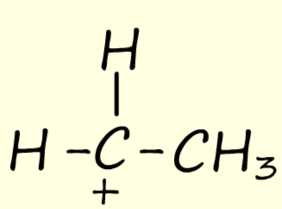

unsymmetrical

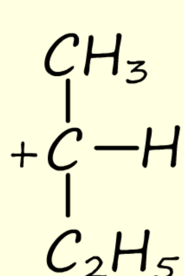

symmetrical

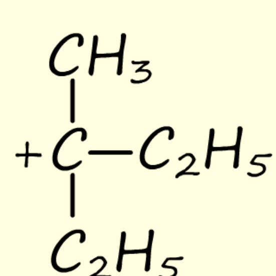
3. Describe the order of stability of carbocations and offer an explanation as to why some carbocations are more stable than others.

Tertiary are more stable than secondary which are more stable than primary. This is due to the inductive effect of alkyl groups which push electron density onto the carbocation and help to stabilise it.

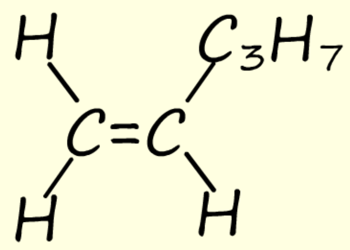
4. Decide whether each of the following carbocations are primary, secondary or tertiary carbocations.


Primary carbocation

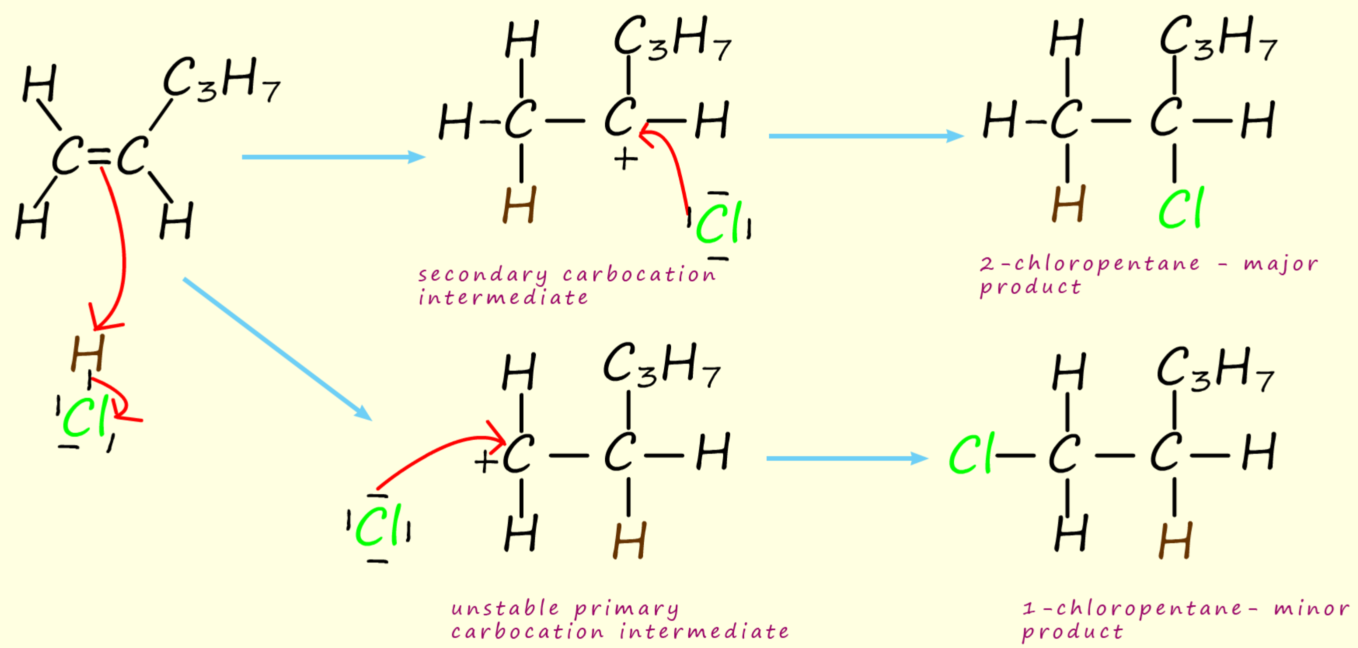

Secondary carbocation


tertiary carbocation

5. Draw pent-1-ene.



a. Show the mechanism for the reaction of pent-1-ene with hydrogen chloride gas, include the two possible products of the reaction.



b. Which of the products is the major product and which is the minor product? Give a reason for your answer.

2-chloropentane is the major product as it production goes through a secondary carbocation whereas the other position isomer, the 1-chloropentane goes through an unstable primary carbocation intermediate.