

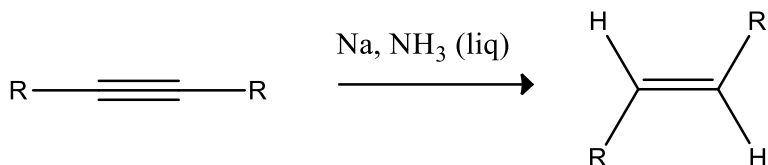
Answer on Question #52197 – Chemistry – Organic Chemistry

Question:

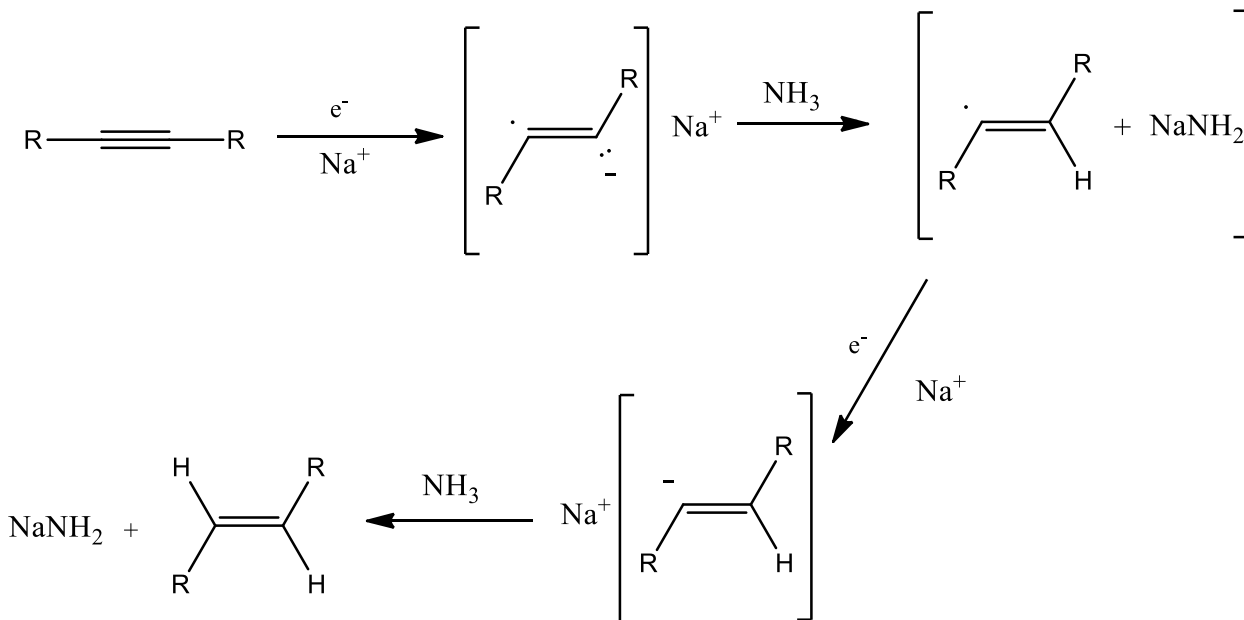
- 1) How would you prepare a trans alkene from an alkyne? Give its mechanism.
- 2) Arrange the following in the decreasing order of their basic strength. Justify your answer.
alkanide anion; alkenide anion; alkynide anion
- 3) What is resonance energy? Explain taking the example of benzene.
- 4) What do you understand by para-directing activators, para-directing deactivators and meta-directing deactivators?

Answer:

- 1) Synthesis of trans-alkene:



The mechanism of the reaction:

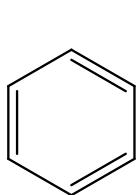


- 2) Basic strength decreases in the following order:

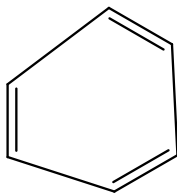
Alkanide > alkenide > alkynide

It can be explained by the presence of pi-electron system which stabilizes the anion by the delocalization of negative charge. The most efficient delocalization occurs for the alkynide anion. Therefore it becomes the most stable and the most acidic than others. The alkanide is the most unstable thus it has the highest basic strength.

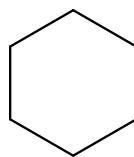
- 3) The resonance energy is the energy difference between the conjugated pi-system and the system containing the same number of atoms with the separated double bonds.



Benzene



(Hexatrien)



Cyclohexane

The enthalpy for the hydrogenation of benzene to cyclohexane is less than the corresponding value for the hypothetical molecule of hexatrien containing three non-conjugated double bonds. This difference is the resonance energy (152 kJ/mol).

- 4) The para-directing activator is the substituent in the aromatic system which directs the substitution to the para-position to itself and increases the rate of the reaction.

The para-directing deactivator is the substituent in the aromatic system which directs the substitution to the para-position to itself and decreases the rate of the reaction.

The meta-directing deactivator is the substituent in the aromatic system which directs the substitution to the meta-position to itself and decreases the rate of the reaction.