

CYCLOALKANES

Cycloalkanes or cycloparaffins are saturated hydrocarbons in which carbon atoms are joined by single covalent bonds to form a ring.

They are also called Alicyclic compounds. The prefix 'ali' is added because of their similarity to aliphatic compounds.

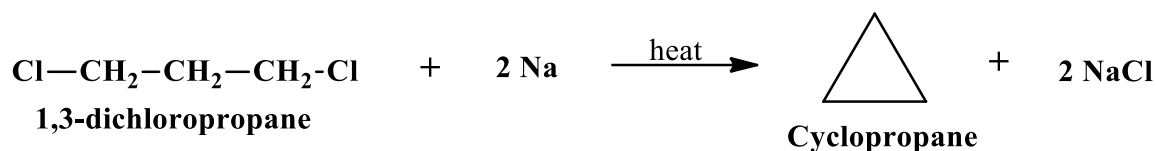
The unsubstituted cycloalkane forms a homologous series with general formula C_nH_{2n} .

The first member of the series is cyclopropane (C_3H_6).

METHODS OF PREPARATION

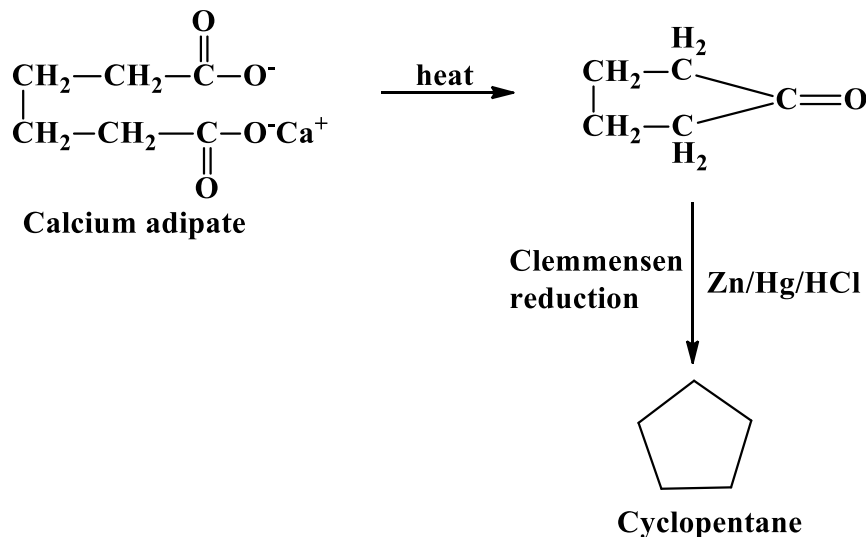
1. From dihalides:

Terminal dihalides when treated with Na or Zn form cycloalkane.



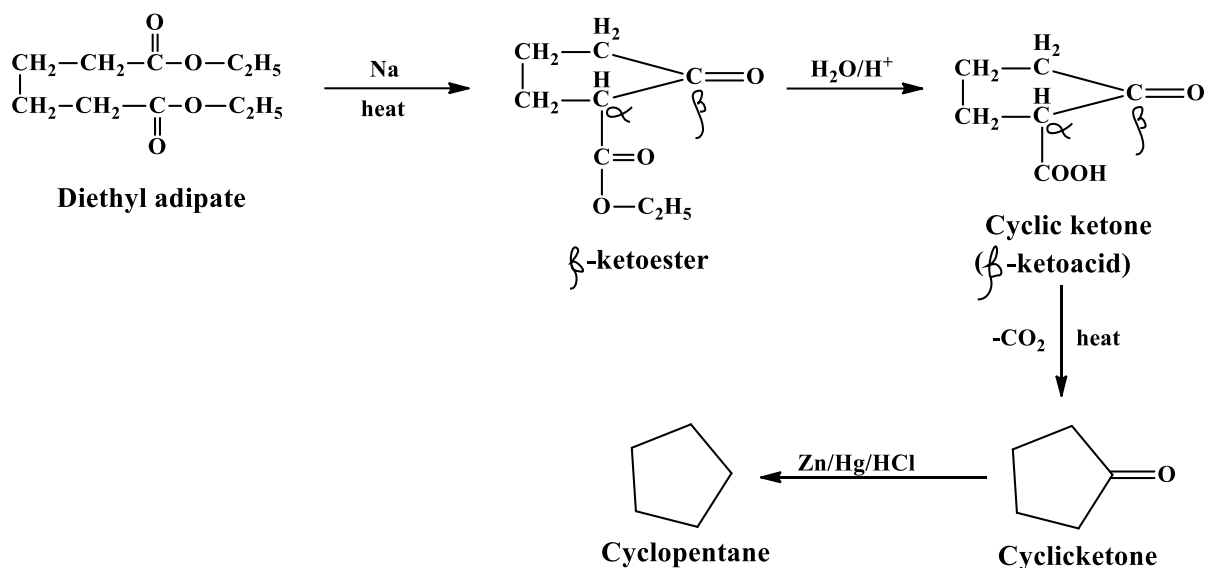
2. From calcium salt dicarboxylic acid:

When calcium or barium salts of dicarboxylic acids are heated, cyclic ketones are formed. The cyclic ketones can be converted into corresponding cycloalkanes by Clemmensen reduction.



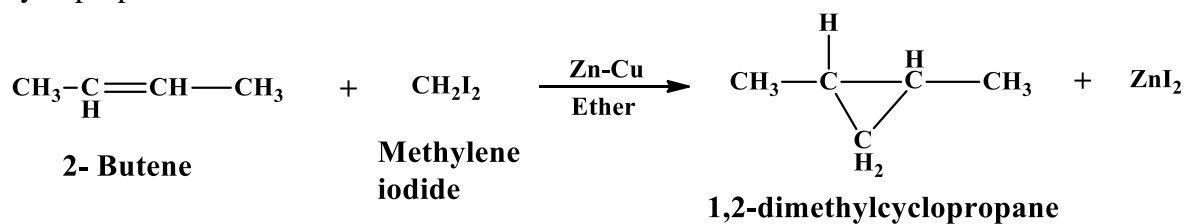
3. From ester of dicarboxylic acid (Dieckmann reaction):

Esters of dicarboxylic acids when treated with sodium undergo intramolecular acetoacetic ester condensation and β -keto esters are formed. The β -keto esters on hydrolysis give cyclic ketones. The cycloketone converted into corresponding cycloalkanes by Clemmensen reduction.

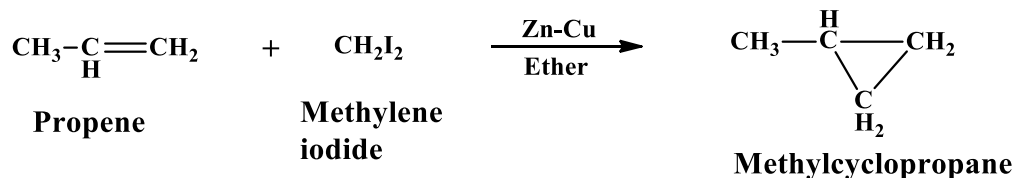
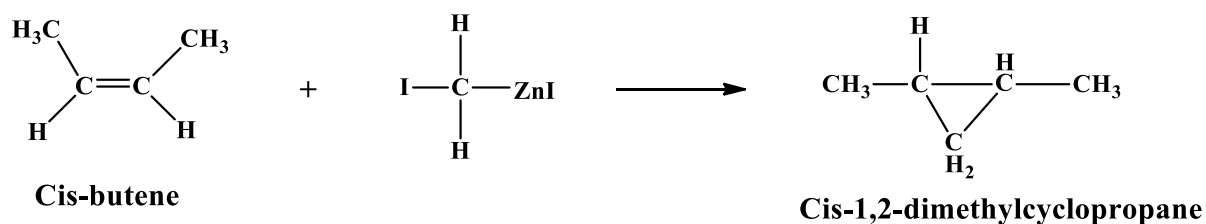
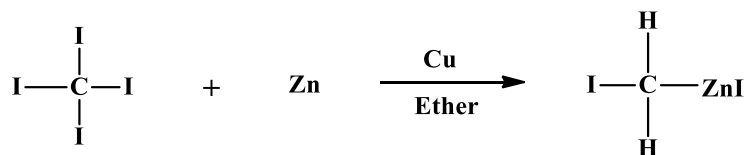


4. From alkenes (Simmons Smith reaction):

When alkenes are treated with methylene iodide (CH_2I_2) in the presence of Zn-Cu, cyclopropane derivatives are formed.

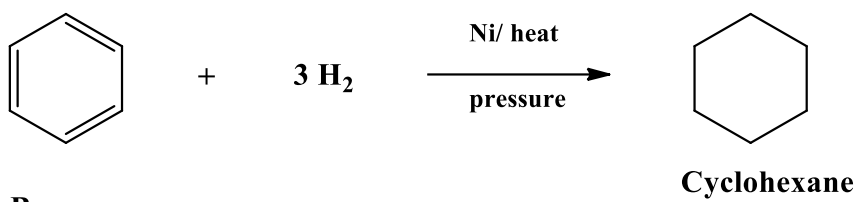


Mechanism:



Note: The reaction is stereospecific with respect to an alkene. Substituents that are trans in alkenes are trans in the cyclopropane.

5. From Aromatic hydrocarbon:



Six-membered cycloalkanes can be prepared by the catalytic reduction of benzene and its derivatives.