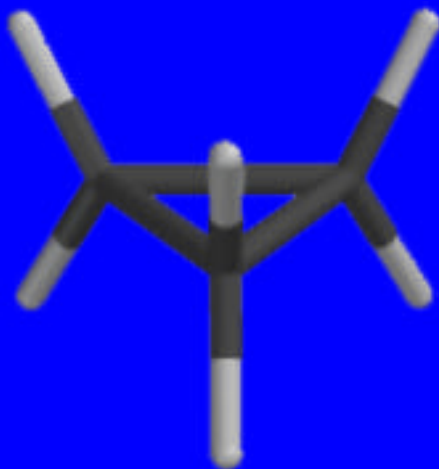


3.9 Small Rings

Cyclopropane

Cyclobutane

Cyclopropane

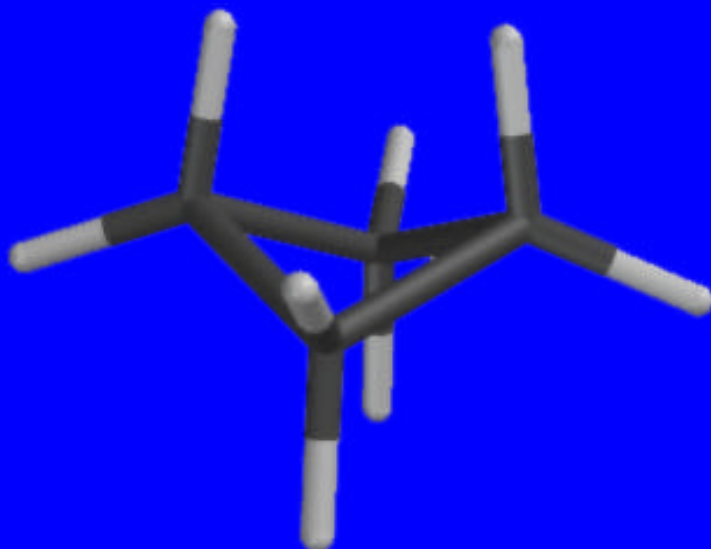


sources of strain

torsional strain

angle strain

Cyclobutane

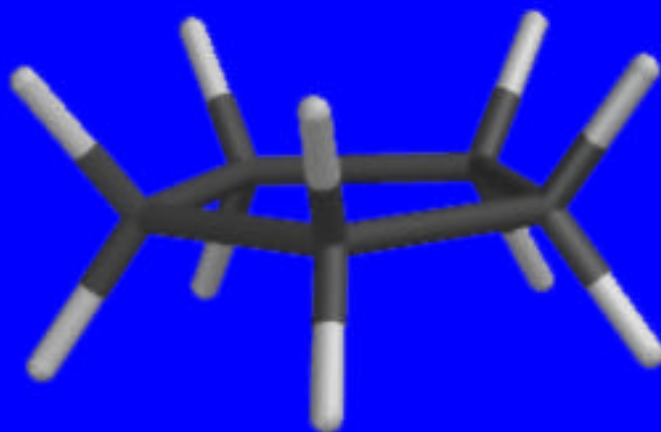


nonplanar conformation relieves some torsional strain

angle strain present

3.10 Cyclopentane

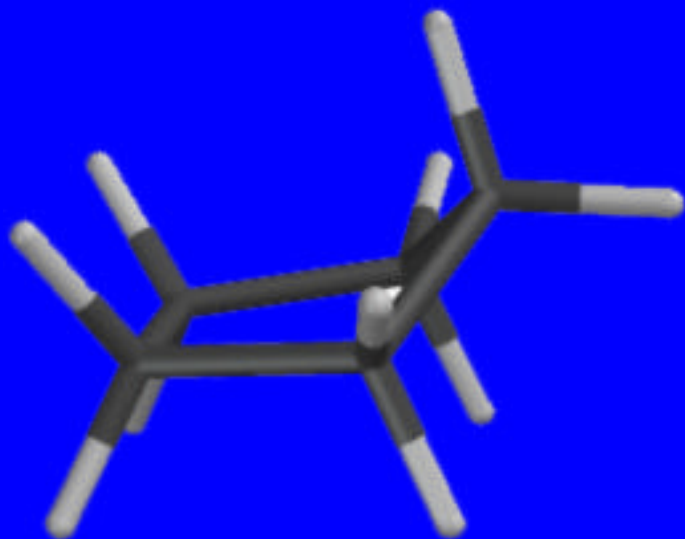
Cyclopentane



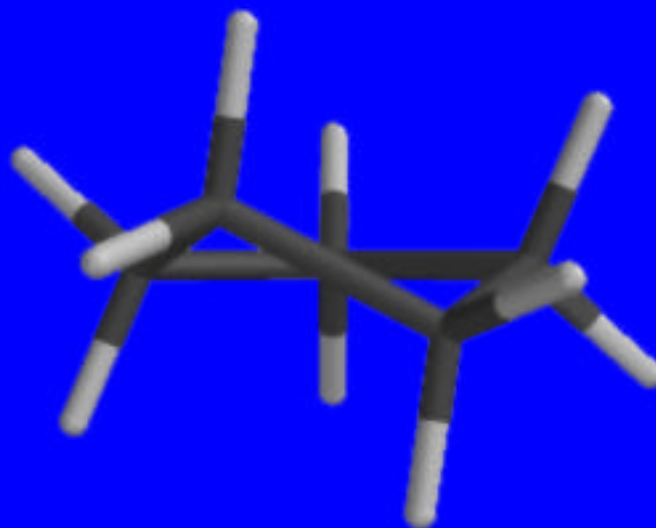
all bonds are eclipsed in planar conformation

planar conformation destabilized
by torsional strain

Nonplanar Conformations of Cyclopentane



Envelope



Half-chair

Relieve some, but not all, of the torsional strain.

Envelope and half-chair are of similar stability and interconvert rapidly.

3.11 Medium and Large Rings

Cycloheptane and Larger Rings

More complicated than cyclohexane.

Common for several conformations to be of similar energy.

Principles are the same, however.
Minimize total strain.