CycloAlkanes:

- Baeyer strain Theory:
- Stability of cycloalkanes
- Applies on first few cycloalkanes.
- Given by Adolf Baeyer in 1885.

Based on:

① Normal angle between a pair of bonds of a carbonation is 109°28'min.

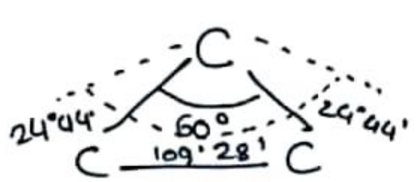
② Assume that all cycloalkanes are planar

③ calculated strain on Basic structure.

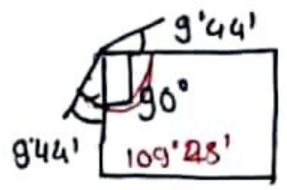
Angle strain = $\frac{1}{2}$ (109°28' − actual angle)

= $\frac{1}{2}$ (109°28' − 60)

= 24°44'



[DEPTH OF BIOLOGY]



cyclobutane.

- Angle strain in cycloalkane:

Compound	Bond Angle	Angle strain.
a) cyclopropane	60° △	24°44'
b) cyclobutane	90° □	9°44'
c) cyclopentane	108° ⬠	0°44'
d) cyclohexane	120° ⬡	−5°16'

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- Limitations:

① This theory only applies on the lower cyclo alkanes

ex: cyclopropane ⇒ highly strained molecule.

↙ max. angle strain

↘ most unstable molecule.

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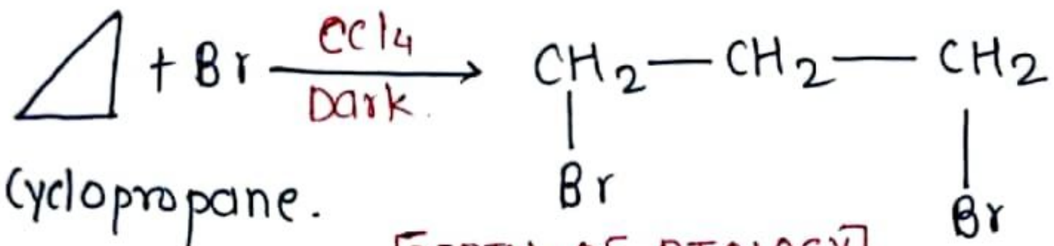
⇒ This is fact that cyclopropane gives easily ring opening reactions with Br_2, HBr & H_2.

* Addition Reaction:



Cyclopropane.

- The angle strain in cyclobutane is less than that in cyclopropane. so low in unstability, means it is more stable than cyclopropane.
- As expected cyclobutane (□) undergo ring opening reaction but only under more specific condition.

⇒ The angle strain is lowest in cyclopentane.

⇓

Most stable

⇓

Does not give ring opening reaction.

② Higher than cyclopentane are not follow this rule. cyclohexane, cyclopentane are most stable: (not follow Baeyer strain theory)

- They do not give ring opening reaction easily.

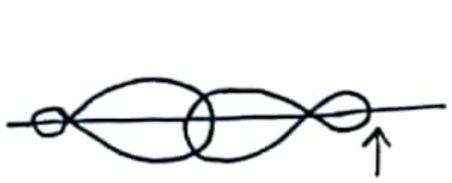
Coulson Moffitt Model (or)

Bent Bond.

in cycloalkane.

- concept of max. overlapping of c-orbital
- Banana Bond Theory → Look like Banana type geometry.

- General representation of e- density (or) configuration resembling a Similar "Bent" structure in Small ring.



Sigma Bond (strong bond)

Intermolecular axis.

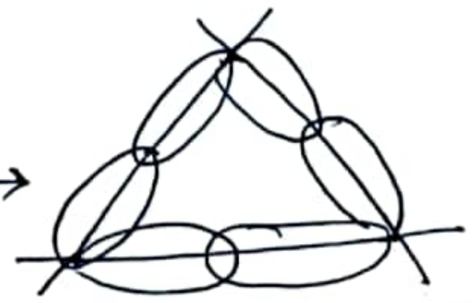
Bent Bond (weak bond)

Bent Bond is Intermediate between σ & π bond.

[DEPTH OF BIOLOGY]

S = 25%
P = 75%

Bond →



S = 16%
P = 84%

Repulsion max.

Bent.