# PHARMACOLEARN

*It’s Important to Know!*

# BP301T — Pharmaceutical Organic Chemistry II

B.Pharm Semester 3 · Unit 5 — Cycloalkanes

## Unit V: Cycloalkanes

### Ring strain and conformations

Cycloalkanes are saturated cyclic hydrocarbons. Ring stability depends on angle strain, torsional strain and non-bonded interactions. Small rings have significant angle strain. Larger rings can adopt non-planar conformations that reduce strain. Cyclohexane is commonly discussed through chair, boat and related conformations, with the chair form generally preferred because it reduces several interactions.

### Substitution and stability

In a substituted cycloalkane, axial and equatorial positions are not equivalent. Bulky substituents generally prefer equatorial positions because this reduces close interactions. A ring flip changes axial positions to equatorial positions and vice versa without breaking carbon-carbon bonds. The preferred conformer is determined by the relative steric cost of substituents.

### Unit V: Frequently asked questions

**Q: What is ring strain?**

A: Ring strain is the excess energy caused by bond-angle distortion, eclipsing interactions or non-bonded crowding in a cyclic molecule.

**Q: Why is a chair conformation important for cyclohexane?**

A: It gives favourable bond angles and staggered bonds, reducing angle and torsional strain.

**Q: Why do bulky substituents prefer equatorial positions?**

A: The equatorial position reduces close interactions with axial hydrogens and other groups.

### Unit V: Key takeaways

- Cycloalkane stability depends on strain and conformation.
- Ring flips change axial and equatorial positions but not connectivity.
- Bulky substituents usually prefer equatorial positions.

- Conformation helps explain stability and reactivity.
- Chemical structures are omitted for verified preparation by Moose.

## Unit V: Practical correlation

**Practical correlation: conformational analysis.** Comparing conformers can help explain physical properties and reaction accessibility. Any compound-specific conformational assignment should be checked against the prescribed text before use.