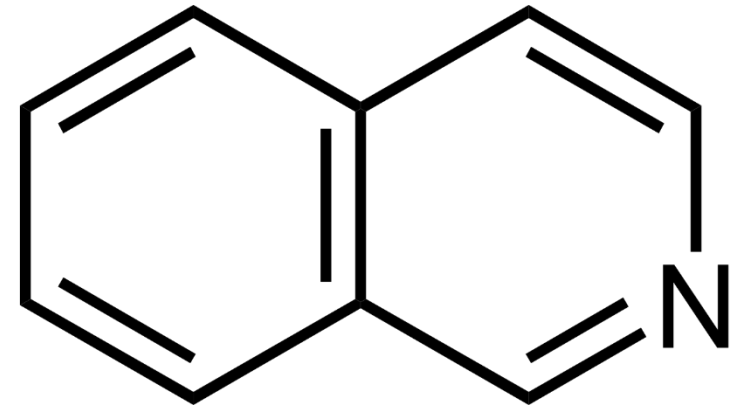


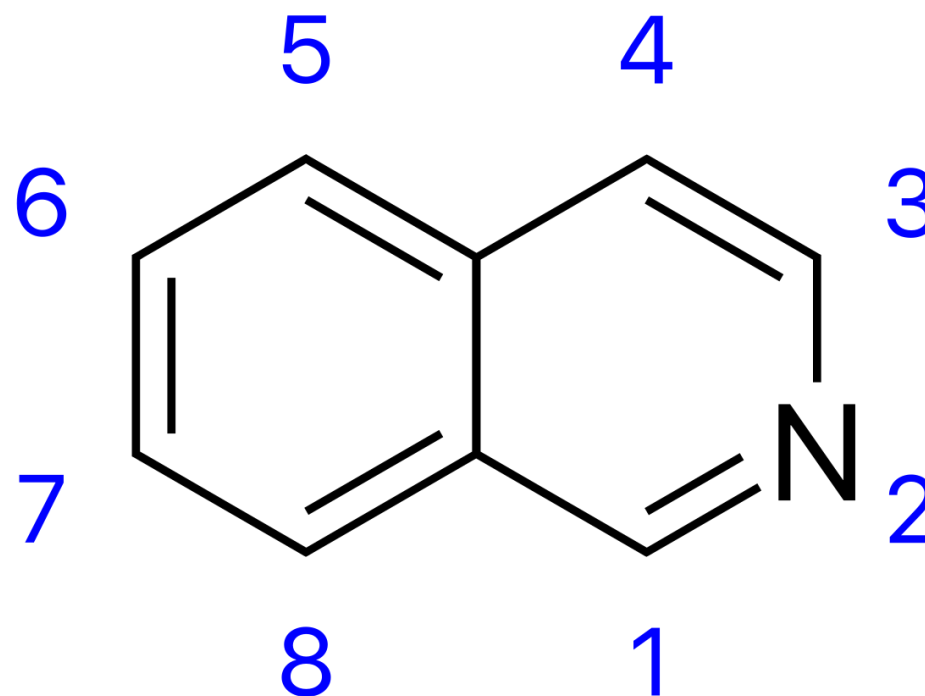
Preparation and Properties of Isoquinoline

Isoquinoline

- Isoquinoline consists of a benzene ring fused to the β - and γ -positions of a pyridine ring.
- Occurs in coal-tar and bone oil
- Isoquinoline is also found as part of the total structure of a number of alkaloids e.g., **papaverine and morphine.**

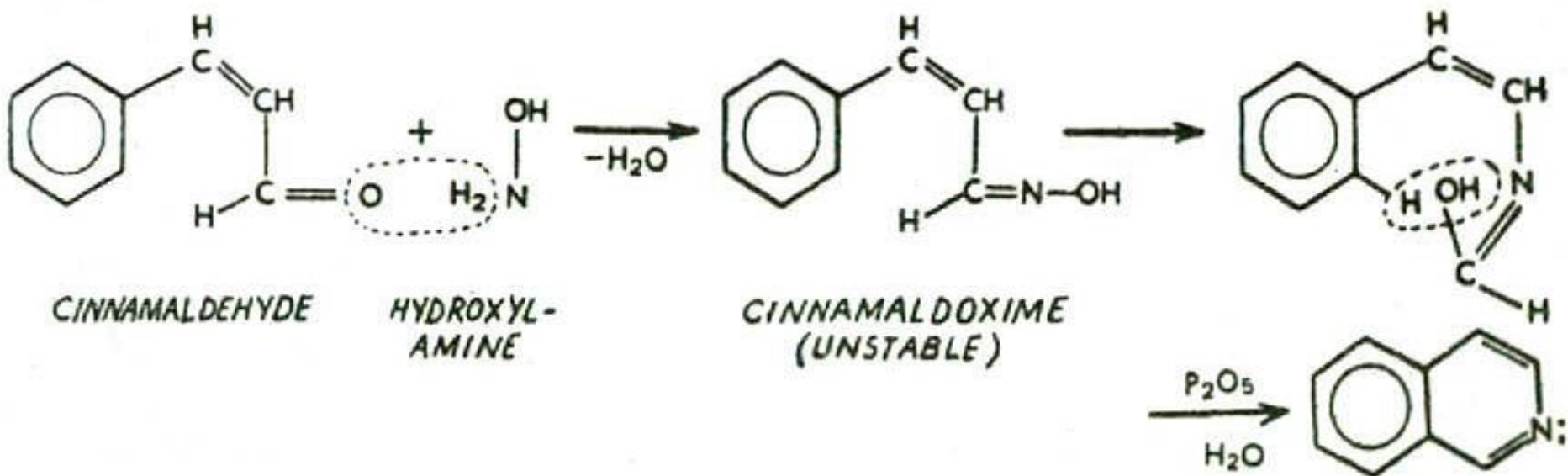


- Isoquinoline is one of the very few heterocyclic compounds in which numbering of the ring atoms does not start on the *hetero* atom.

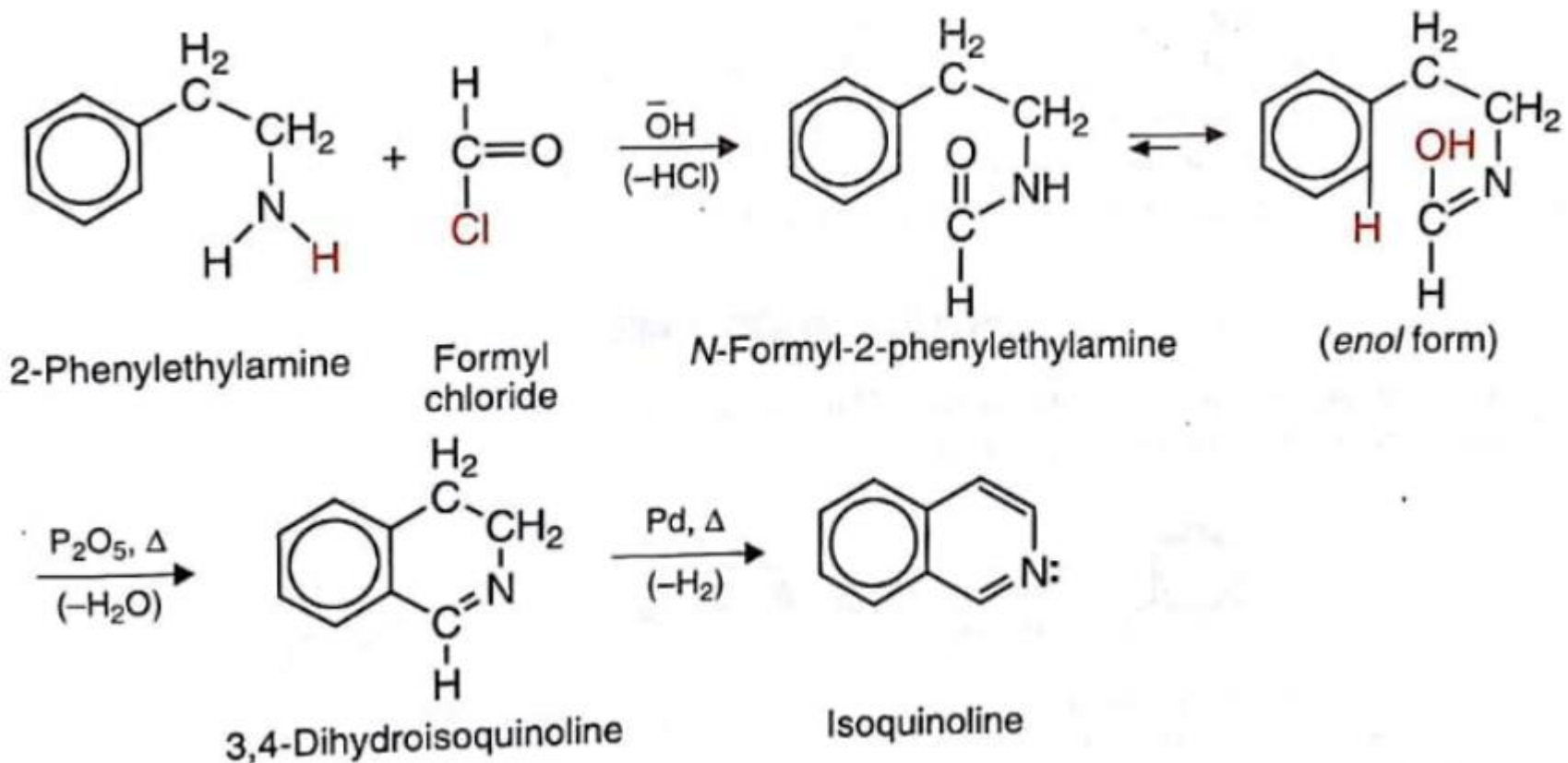


Preparation Methods

(1) From Cinnamaldehyde: This involves condensation of cinnamaldehyde with hydroxylamine to form the corresponding oxime. The oxime is then heated with phosphorus pentoxide to yield Isoquinoline. It is believed that the oxime first undergoes rearrangement which is then followed by ring closure.



(2) By Bischler-Napieralski Synthesis: In this reaction, 2-phenylethylamine is first treated with formyl chloride in the presence of a base to form N-formyl-2-phenylethylamine. This amide is next heated with phosphorous pentoxide in pyridine to give 3,4-dihydroisoquinoline which on oxidation (dehydrogenation) with palladium or selenium yields isoquinoline.



Physical properties of Isoquinoline

- Isoquinoline is a colorless solid
- (mp 26°C; bp 243°C)
- Smell like that of benzaldehyde (Almond like).
- It is sparingly soluble in water, and is soluble in many organic solvents.
- It turns yellow on normal storage.

Chemical properties of Isoquinoline

Isoquinoline resembles quinoline in most of its chemical properties.

1. Basic Character:

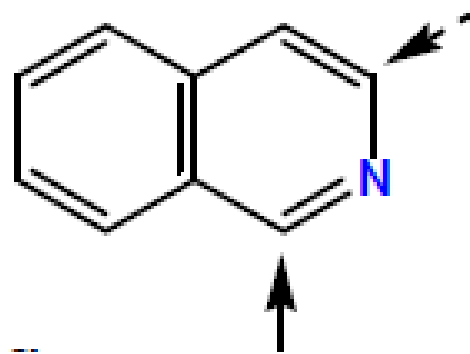
- Isoquinoline is a stronger base than quinoline. It forms stable salts with acids.

2. Electrophilic Substitution

Like quinoline, it undergoes electrophilic substitution at C-5 and C-8.

3. Nucleophilic Substitution

Isoquinoline undergoes nucleophilic substitution at C-1 or C-3 if C-1 is occupied.



4. Reduction

- **Mild Reduction:** Mild reduction of isoquinoline with tin and hydrochloric acid yields 1,2,3,4-tetrahydroisoquinoline
- **Catalytic Reduction:** Reduction with hydrogen and platinum catalyst produces decahydroisoquinoline

5. Oxidation:

- Oxidation with peracetic acid gives the N-oxide.
- It is also oxidized by alkaline potassium permanganate to give pyridine-3,4-dicarboxylic acid (Cinchomeric acid).