

Migratory Insertion of Quinoid Carbene: Useful Tool for Step-Economic Construction of Azaheterocycles

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Abstract:

The diazo quinone or quinone diazide compounds have been extensively utilized to introduce phenol/naphthol moieties into hydrocarbons or nitrogen-containing heterocycles under transition metal catalysis. The reactions proceed via C–H insertion or migratory insertion of metal carbenes.¹ Due to site-selectivity issues, directed C–H metalation, metal–quinoid carbene formation followed by migratory insertion has achieved considerable attention.² In this presentation, regioselective arylation of quinoline scaffolds to provide 8-azaBINOL,³ methyl-arylation,⁴ based on the migratory insertion of quinoid carbenes will be discussed. Next, a mild *N*-arylation using the similar strategy will also be presented.⁵ Finally, the racemic synthesis of important phosphine ligands like QUINAP, METHOX, PINAP, PHENAP etc will be discussed.

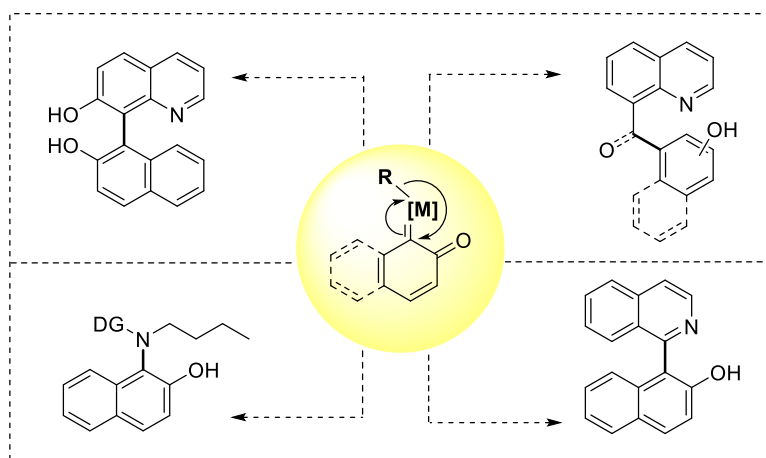


Figure: Migratory insertion of quinoid carbene for the site-selective arylation

References and Notes:

1. Hu, F.; Xia, Y.; Ma, C.; Zhang, Y.; Wang, J. *Chem. Commun.* **2015**, 51, 7986-7995.
2. Bera, S.; Sarkar, S.; Samanta, R. *New J. Chem.* **2021**, 45, 10135-10149.
3. Ghosh, B.; Biswas, A.; Chakraborty, S.; Samanta, R. *Chem Asian J* **2018**, 13, 2388-2392.
4. Ghosh, B.; Samanta, R. *Chem. Commun.* **2019**, 55, 6886-6889.
5. Bera, S.; Roy, S.; Pal, S. C.; Anoop, A.; Samanta, R. *ACS Catal.* **2021**, 11, 10847-10854.

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Specialization: Transition Metal Catalysis, Asymmetric Synthesis, Natural Product Synthesis

Current Research Interest:

- Development of transition metal catalyzed step economic transformations especially using diazo compounds via formation of metallocarbenes/nitrenes.
- Synthesis of bioactive natural products using those developed methods.
- Direct late stage modifications of various complex heterocyclic molecules in catalytic way.
- Development of step-economic methods for the construction of heteroatom containing organic extended π -conjugated systems and screening their activity in biological assays as well as organic material.