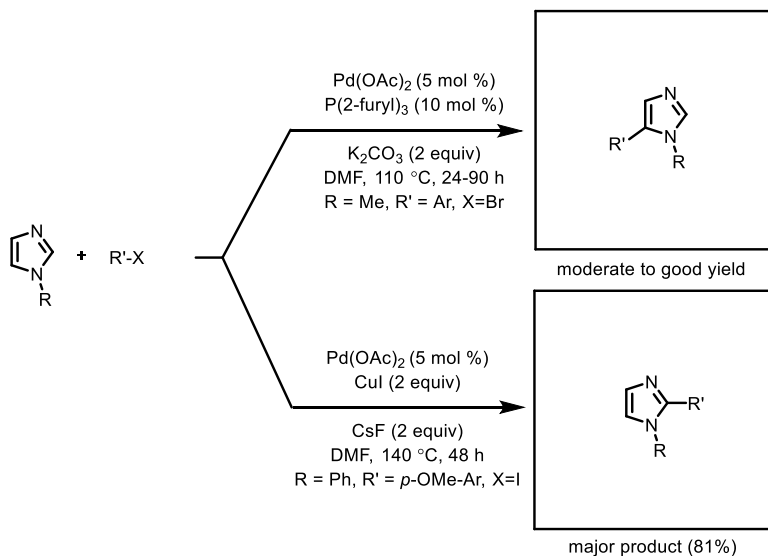


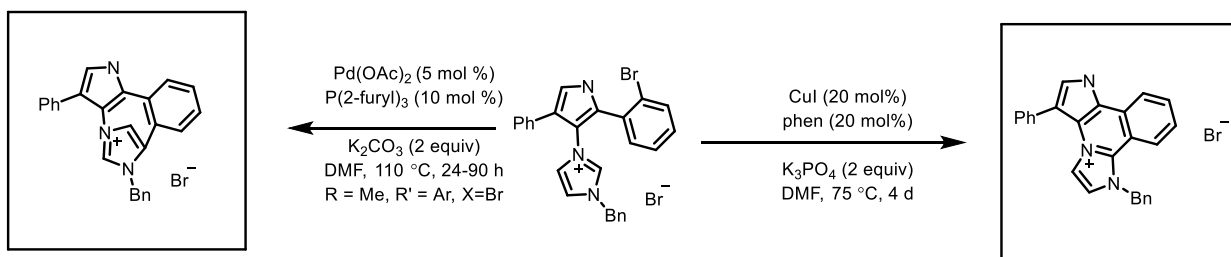
Engle Lab - Short Problem Set (12.13.2018)

1. Tuning regioselectivity by metal coordination: (*Organometallics*, **2012**, 31, 794-797; *J. Org. Chem.*, **2011**, 76, 2680-2693; *Eur. J. Org. Chem.*, **2006**, 693-703). For each of the transformations below:

- Predict the major products.
- Propose the mechanism.

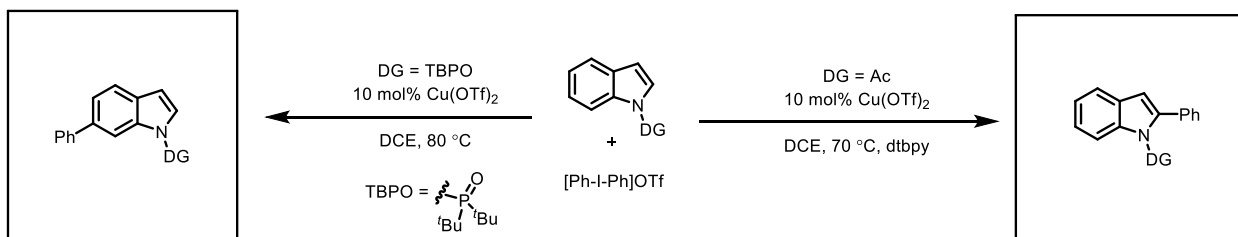


- Predict the major product under the following conditions. (*J. Org. Chem.*, **2017**, 82, 616-623)



2. Directing group mediated site-selectivity: (*Org. Lett.*, **2018**, 20, 6502-6505; *J. Am. Chem. Soc.* **2008**, 130, 8172; *J. Am. Chem. Soc.* **2016**, 138, 8734)

- Predict the major product.



- Propose the Cu-coordinated metallacycle transition state for each reaction.

1.b. (*Eur. J. Org. Chem.*, **2006**, 693-703)

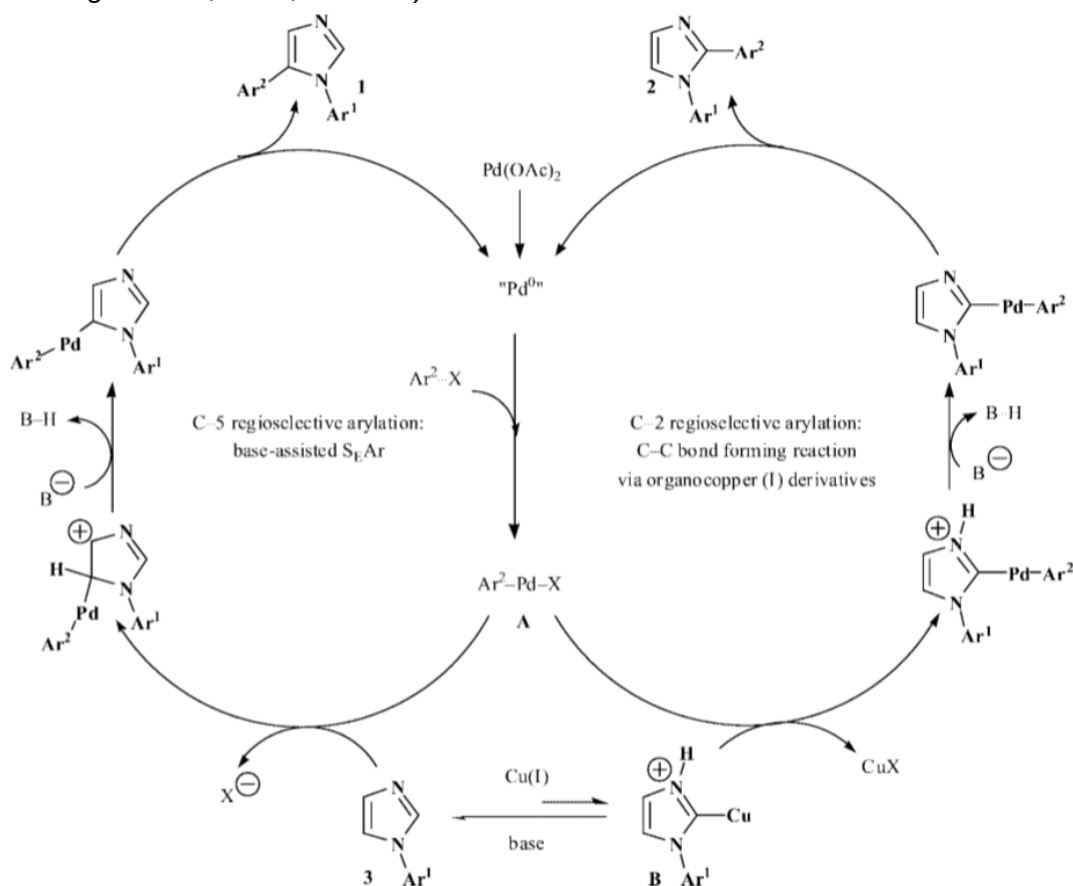


Figure 4. Mechanisms for the Pd- and Cu-mediated C-2 arylation and the Pd-catalysed C-5 arylation of 1-aryl-1H-imidazoles 3.

2.b. (*Org. Lett.*, **2018**, 20, 6502-6505)

