

Study Guide – Chem 531: Survey of Organic Reactions

- Distinguish between and give examples of chiral-auxiliary mediated asymmetric induction and catalytic enantioselective processes.
- Define and give examples of stereochemically “matched” and “mismatched” transformations in which a chiral substrate interacts with a chiral catalyst or substrate containing a chiral auxiliary.
- Use transition state geometries to rationalize the stereochemical outcomes in Claisen and Cope rearrangements, as well as asymmetric aldol, alkylation, allylation, and Diels-Alder reactions.
- Be able to utilize key alkene-forming reactions to prepare mono-, di-, tri-, and tetrasubstituted olefins. Mechanistically define and explain the scope and limitations of olefin metathesis in preparing cyclic olefins.
- Mechanistically define and show the utility of transition-metal catalyzed cross-coupling and Heck reactions for preparing complex molecules.
- Define and give examples of ligand-accelerated catalysis, especially with regard to asymmetric oxidation and reduction processes; Be able to utilize the Sharpless and Jacobsen mnemonics for predicting the stereochemical outcomes of asymmetric epoxidation and dihydroxylation processes.
- Define and give examples of kinetic resolution, dynamic kinetic resolution, and desymmetrization processes.
- Define and give the current scope and limitations of organocatalysis for preparing optically enriched materials for asymmetric synthesis.
- Define and give examples of the utility of C-H activation processes.