

CHEM 454: Organometallic Chemistry

Topic: Organometallic Compounds

Name: _____ Roll No. _____ Submission date: _____

Organometallics and Named Reactions

The broad goal of this assignment is to introduce you to a variety of organometallic compounds and the synthetic utility available to organic chemists beyond the reagents shown in the textbook. You will practice describing a named reaction starting with the substrate, the reagents used in the transformation, and the product pointing out the bonds that are broken/formed. This assignment will improve both your research and communication skills.

Choose one of the following reactions/catalysts (based on your birthdate) and obtain the following information:

- Identify the organometallic compound(s) as reagent(s), catalyst(s), or intermediate(s) involved in the reaction, and write its structure. Provide the generic reaction/mechanism and describe what the overall chemistry is (for example, carbon-carbon bond formation, hydrogenation of a double bond, etc.).
- Using GoogleScholar, search for two papers regarding the reaction/catalyst. The first must be by the original chemist and the second one by another researcher who has cited the first paper in their work. The second paper may be found using the related citations feature in GoogleScholar.
- From each paper, provide an example of a specific reaction including reagents used. Create a five-minute presentation (3–6 slides) based on the information above to present to the class. The presentation should be created in PowerPoint with all structures drawn using ChemDraw.
- Prepare a handout (assignment) of the same and submit.

Reactions/Catalysts

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|----------------------------------|--|------------------------------|
| 1. Adam's Catalyst | 12. Noyori Annulation | 21. Stephen Reduction |
| 2. Barbier Coupling | 13. Nozaki-Hiyama-Kishi Coupling | 22. Stephens-Castro Coupling |
| 3. Buchwald-Hartwig Coupling | 14. Pauson-Khand Reaction | 23. Stille Coupling |
| 4. Cadiot-Chodkiewicz Coupling | 15. Reformatsky Reaction | 24. Suzuki Coupling |
| 5. Grubbs Catalyst | 16. Rosenmund-von Braun Reaction | 25. Tebbe Reagent/Reaction |
| 6. Heck Coupling | 17. Sharpless Aminohydroxylation | 26. Ullman Coupling |
| 7. Jacobsen-Katsuki Reaction | 18. Sharpless Asymmetric Dihydroxylation | 27. Wacker Oxidation |
| 8. Kharasch Reaction | 19. Sharpless Asymmetric Epoxidation | 28. White catalyst |
| 9. Lindlar Catalyst | 20. Sonogashira Coupling | 29. Wilkinson's Catalyst |
| 10. Miyaura Coupling | | 30. Zhan catalyst |
| 11. Monsanto Acetic Acid Process | | 31. Ziegler-Natta Catalyst |