How Pure is Pure? Metal Complexation Studies Directed Towards Pharmaceutical Drug Purification

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**Motivation:**
Catalytic processes play critical roles in the modern-day industrial syntheses of many commonplace materials such as plastics, fuel production, electronics, and pharmaceuticals. Transition metal catalysts may become homogeneously embedded within solid nanomaterials during their synthetic scheme, which may result in many deleterious effects on both the construction and durability of the material and its intended functionality. Traditional purification methods of these materials rely upon harsh reaction conditions that may either affect or allow for specific functionalities.

**Background:**
Originally, Jensen\(^1\) synthesized the (ATF) ligands and metal complexation studies were reported by Krebs, and Bechegaard\(^2\) citing complexes of Palladium (Pd), Platinum (Pt), Copper (Cu), and Nickel (Ni) metals. Intense absorption changes were noted and X-ray crystallography revealed a 2:1 ligand-to-metal (bis) complexation ratio. Few variations of the original ligands (again by Krebs) were developed with slight further advancement or applications.\(^3\)

This project has been directed towards developing new variations of the original (ATF) ligand synthesized by Jensen, as well as studying chelation of the original ligand with transition metal catalysts utilized during pharmaceutical synthesis.

**UV-Visible Absorbance Spectra and Analyses:**

**Future Studies:**
Additional metal complexation studies will be carried out with various transition metals with the modified ligands already synthesized. Synthetic modifications to the original ligand will be carried out in the future, with an interest in developing a new class of semi-perfluorinated and hydrophobic ATF ligands. This will potentially enable enhanced metal extraction from a multitude of immiscible phases (aqueous, organic, and a distinct fluorous phase). Further chelation studies will be carried out on atom-transfer radical polymerization (ATRP) initiated polymers, carbon nanotubes, and metal impurities in solution. Eventually, studies will be directed towards providing an improved method of recycling catalytic materials and various metals.

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**References:**