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The Preparation of Macrocyclic Ligands for Use in the Sythesis of Oxygen Carriers

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**THE PREPARATION OF MACROCYCLIC LIGANDS FOR USE IN THE
SYNTHESIS OF OXYGEN CARRIERS**

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Extensive research has been pursued in the area of developing synthetic oxygen carriers. There have been numerous successful molecules already synthesized, many of which are structurally and functionally similar to the active sites of hemoglobin and myoglobin, which occur naturally in blood. Hemoglobin serves as a model for these syntheses because of its natural oxygen transport ability. At the hemoglobin active site, dioxygen binds reversibly to an iron metal center in the oxygen rich environment of the lungs. The oxygen is then carried through the blood to areas in the body that are low in oxygen, such as the muscles. Synthetic forms of these molecules are of considerable interest for use in applications in dioxygen purification and enrichment, oxygen storage and transportation, and possibly even in production of synthetic blood. By designing these molecules with certain electron donating substituents, it is possible to control and adjust the redox potential of the metal center to alter its reactivity. This will dictate how well the oxygen is able to bind reversibly to the metal center. A delicate balance of the electronic properties of the metal is required for reversible dioxygen binding. If the potential on the metal is too positive, the dioxygen molecule fails to bind to the metal. On the other hand, if the potential is too negative, dioxygen will bind irreversibly. It is also important to design a molecule with adequately sized ligand substituents to eliminate autoxidation, which is a process in which the dioxygen binds to another metal center, producing a metal-oxygen-metal 'sandwich'. With all of this in mind, we have attempted to design macrocyclic ligands with sufficiently bulky and electron donating substituents. These macrocycles are a precursor to the final product of the oxygen carrier in that the metal has not yet been introduced.

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