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Preface

Recent advances in rare earth chemistry

Rare earth chemistry has recently become an exciting area of research. Located in group 3, the rare earth elements occupy positions between the alkaline earths (Be, Mg, Ca, Sr, Ba) and elements in group 4 (Ti, Zr, Hf). There is significant difference in the chemical behavior of alkaline earth elements and those of group 4, and interestingly, the rare earths show the characteristics of both groups. For example, rare earth halides are hard Lewis acids, while rare earth alkoxides sometimes behave as Lewis bases. In utilizing these unique characteristics, rare earths have been applied to many transformations involving catalysis, coordination chemistry as well as many other reactions based on fundamental organic and organometallic chemistry.

I am delighted to point out that many chemists who are working at the frontier of rare earth chemistry have participated in this Tetrahedron Symposium-in-Print on Recent Advances in Rare Earth Chemistry. The symposium covers rather wide areas, including basic organic chemistry, organic synthesis, catalysis, organometallic chemistry, polymer chemistry, bioorganic chemistry and molecular recognition.

Diiodosamarium is a unique reagent now commonly used in organic synthesis. An overview of this reagent as well as new chemistry using diiodosamarium are presented in this Symposium. Some low-valent lanthanides show interesting properties, which have been utilized in many useful transformations. The use of rare earths as Lewis acid catalysts occupies one of the most important parts of rare earth chemistry, and several timely topics in this field are featured here. While individual lanthanides as well as scandium and yttrium are covered, attention is also given to the catalytic activity of an alloy of the light lanthanides. The use of rare earths in polymer synthesis and DNA cleavage is highlighted, as are topics on radical chemistry using rare earths. Finally, work is introduced on the catalytic action of organometallics and lanthanide complexes.

Rare earths are relatively plentiful, and most of them are inexpensive and non-toxic. I hope that the basic research work presented in this Symposium-in-Print will be of interest to investigators in diverse fields, and that their use will be applied to the chemical and pharmaceutical industry in the near future.

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