

Preface

The expanding population, economic growth, and desire for new technologies are driving the demand for rare earth elements which are critical. This growth requires new production of rare earths that is secure and environmentally sustainable. There are hundreds of rare earth deposits in the world at different stages of development, from exploration to proven mineral reserves, and detailed engineering.

Canada has a significant proportion of these resources. Canada has significant, high-quality, and unique rare earth deposits across the country and has a long history of mining and metallurgical processing, and mineral development and production. The rare earth sector is just emerging in Canada; therefore we need to ensure that Canada has the capability to develop these resources to their highest value. High-purity rare earth element production is a critical component in commercial defence and other high-value applications.

The rare earth needs for the economy are wide and complex. Customers include manufacturers of rare earth functional materials, such as magnets, catalysts, metallurgical additives, batteries, polishing powders, phosphors, glass additives, and ceramics. These customers supply products that are used in a wide variety of industries including health care; hybrid, electric, and other vehicles; defense; wind power; communications; lighting; fiber optic; and other applications. These products and services are enabled by rare earth materials to provide solutions to manufacturing needs.

Mineral processing and hydrometallurgy, including separation, of rare earths are critical for Canada to advance the development of resources to contribute to the supply chain and acquire greater economic benefits from the emerging rare earth sector. Canada has more than 50 % of the world's demonstrated rare earth resources, with a number of projects at advanced stages compared to other jurisdiction in the world. This is an opportunity for Canada to enhance its expertise in exploration, development, mining, and metallurgy to develop the rare earth industry that will generate substantial value.

The Saskatchewan Research Council has taken the initiative to develop expertise, capabilities, and facilities to enable the rare earth industry to succeed with the development and delivery of timely solutions needed for Canada's emerging rare earth sector. This includes the entire rare earth production cycle from exploration, processing, and separation of the rare earth elements. The purpose of this book is to provide the background and basis for the advancement of separation hydrometallurgy in Canada. From this basis we can develop and advance our capabilities to enable Canada and other parts of the world to successfully build supplies of these critical rare earth elements for the future.

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Separation Hydrometallurgy of Rare Earth Elements

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2016, XVI, 259 p. 104 illus., 5 illus. in color., Hardcover

ISBN: 978-3-319-28233-6