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The Life Cycle of Rare Earth Elements

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by Cristobal Carambo

Modern society depends on a wide range of industries and commercial processes to produce the many products and systems that we rely on. In recent years a group of elements known as the Rare Earth Elements (REE) have become central to our information, electronics and "green energy" industries. Although REEs have become indispensable components of nearly all of our modern technologies, their extraction and refining processes possibly cause harm to the environment, the living organisms in the ecosystems where they are mined, and the workers that process them.

Understanding the complete life cycle of the technologies that are meant to save our environments is critically important to our students because "green technologies" will likely become more widely used in their future. The Life Cycle Assessment is a structured process that takes a holistic approach and provides a complete view of the environmental impacts over the entire life cycle of a process or product. The Life Cycle Assessment by virtue of its "cradle to grave" analysis of product systems is perfectly suited for this endeavor. This unit, written for the 10-grade chemistry or environmental science curriculum, uses Life Cycle Assessment processes to analyze the environmental impact of Rare Earth Elements.

(Developed for Honors Chemistry, grade 10; recommended for Chemistry, grade 10)