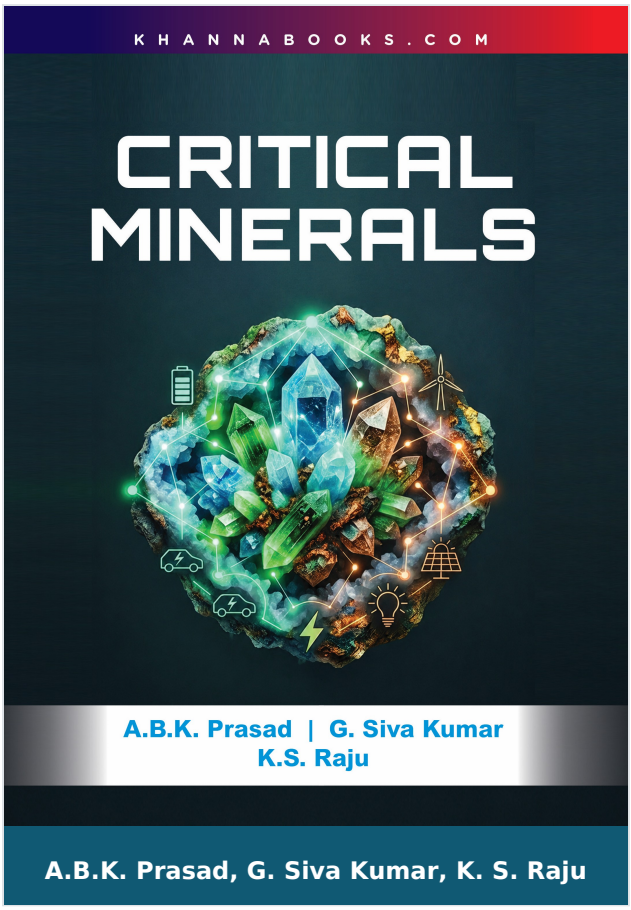

Critical Minerals

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The global transition from fossil fuel energy to green energy heavily relies on critical minerals containing lithium, nickel, cobalt, copper and Rare Earth Elements (REEs). Critical minerals provide a comprehensive guide to these essential resources, detailing their geological occurrence, mining techniques and processes. It highlights their indispensable role in manufacturing modern technologies from electric vehicle (EV) batteries, wind turbines to advanced digital electronics and strategic defence systems. Beyond the technical aspects, the book critically examines the geopolitical landscape, addressing market monopolies, price volatility, and supply chain uncertainties. It also sheds light on the environmental concerns of mining and India's strategic push for self-reliance through the National Critical Mineral Mission. Written with clarity, it serves as a highly useful resource for university students pursuing engineering, geology, metallurgy, and material sciences, as well as industry professionals navigating this vital sector. Salient Features Strategic Classification: Classifies critical minerals based on economic importance and global supply Rare Earth Elements: Covers the occurrence and complex chemical extraction processes of REEs Lithium Processing: Details advanced extraction techniques from hard rock pegmatites and continental brines Analytical Methods: Explains the use of advanced analytical instruments like ICP-MS, XRF, and LIBS for precise elemental analysis and mineral identification Green Energy: Explores the use of critical minerals and their compounds in EV motors, wind turbines, and solar panels Geopolitics: Analyses international trade policies, market monopolies and supply chain vulnerabilities India’s Initiatives: Details the National Critical Minerals Mission and domestic resource potential Environmental Impact: Discusses the ecological footprints of mining and processing operations and need for sustainabilit.

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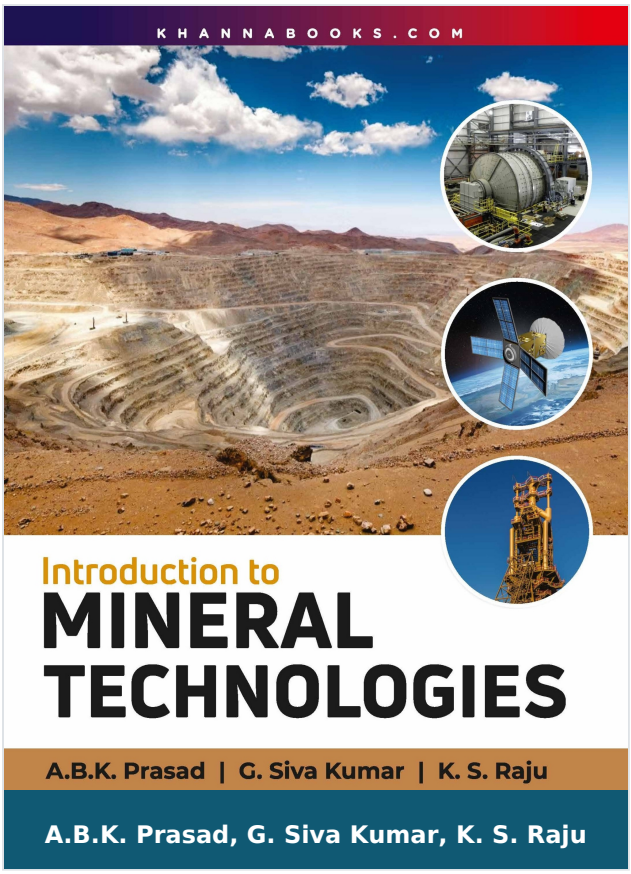

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