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Cobalt Recovery in the DR Congo: Industrial and Artisanal Practices – Challenges, Opportunities, and Future Directions for Sustainable Development

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Cobalt is an essential metal in the modern world, particularly in making rechargeable batteries employed for multiple applications (e.g., smart phones, laptops, and electric vehicles). About 70% of the global cobalt production is mined at the DR Congo, the southern part of the country. The process selection for recovering cobalt is largely dependent on ore mineralogical properties. In large mining industries, oxide ores are generally processed using the hydrometallurgical approach, followed by the solvent extraction and electrowinning (SX-EW) processes, like the flowsheets at Ruashi, Metalkol, and Mutanda mines. The froth floatation process followed by pyrometallurgy is mostly applied when the ore is composed of sulphide minerals. For complex ores containing oxides and sulphides, flotation and hydrometallurgy can be applied, followed by pyrometallurgy. Other potential techniques to recover cobalt from their ores, are heap leaching, high pressure leaching, and bioleaching. Mostly, the cobalt recovery by the artisanal and small-scale miners in the DRC involves: mining, crushing and grinding, washing/panning, sorting, and then packaging, ready for trading. The recent amendments made to the DRC mining legislation (2018/2025) has greatly helped to enhance the national economy. However, the government should strengthen the law enforcement mechanisms to ensure both large and artisanal mines comply. Also, major investments in electricity generation and transmission are required to attract the copper/cobalt refinery industry within the DRC. Hence, boosting the national economy while also achieving the Sustainable Development Goals.