

HYDROMETALLURGICAL TREATMENT OF PRIMARY AND SECONDARY MATERIALS IN THE PRODUCTION OF THE CRITICAL METAL OXIDES

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The new list of critical raw materials from 2017 features 27 raw materials: Antimony, Beryllium, Borates, Cobalt, *Coking Coal, Fluorspar, Gallium, Germanium, Indium, Magnesium, Natural Graphite, Niobium, Phosphate Rock, Silicon Metal, Tungsten, Platinum Group Metals, Light Rare Earths and Heavy Rare Earths, Baryte, Bismuth, Hafnium, Helium, Natural Rubber, Phosphorus, Scandium, Tantalum, and Vanadium. It is hoped that the list will help incentivize the European production of critical raw materials through enhancing recycling activities and when necessary to facilitate the launching of new mining activities. It is very difficult to replace these critical metals by other metals. Because of the high application, the demands of these metals are increased, but the production cannot follow its increased consumption in electronics, catalysis, and medicine. The selective production of rare earth element oxides is the most important aim in the processing of raw materials. The hydrometallurgical treatment (dissolution of ores, concentrates and waste materials under atmospheric and high pressure, purification of solution through neutralization, filtration, precipitation) and thermal decomposition of the oxides were mostly applied for the selective metal oxide production from ores and secondary materials. The hydrometallurgical treatment makes possible to limit the environmental impacts like residual waste producing, energetic expenditure and reagent consumption. Hydrometallurgy offers an alternative to pyrometallurgical treatment, but the combination of pyrometallurgical and hydrometallurgical treatment offers the best research strategy for the formation of critical metal oxides. In this study, the role of a hydrometallurgical treatment in the production of the critical metal oxides shall be presented mostly for the recovery of rare earth elements, and partially for cobalt.

Keywords: hydrometallurgy, rare earth elements, cobalt, oxides.