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Exploitation of mining wastes by physical technologies coupled with hydrometallurgical operations to develop sustainable processes

The metals and industrial minerals contained in the tailings of mining and quarrying activities usually produce dangerous Acid Mining Drainage (AMD) generating several serious environmental impacts on the water ecosystem coupled with air pollution effects (dusts contamination due to the wind). The present work is focused to several cases under study in some geological place mainly present in Romania (i.e. Balan area) and other countries in the world. The objective of the experimental activities was to develop some general methodological approach to develop innovative and sustainable technologies for the treatment and exploitation of these kinds of mining tailings by using a combination of physical, biological and chemical processes. This general approach demonstrated the possibility to separate by physical processes (i.e. wifely table) several kind of minerals such as quartz, chamesite and gold-containing pyrite. In other cases gold is present in oxidized fraction of these kind of tailing. In these last cases thiourea or thiosulfate leaching processes could be a valid alternative to the conventional use of cyanide with several advantages on the environmental impact and on the sustainability of the developed processes: treatment of contaminated sites, reducing of water and air pollution, improving the economy of the interested regions with positive social impacts. Moreover, it should be considered that a conventional process very often shows operating limits in the case of auriferous refractory minerals. An important characteristic of thiourea and thiosulfate leaching process it is the best selectivity towards gold; they does not attack the majority of the gangue mineral constituents and more than 75-80% of gold recovery can be obtained under no severe process conditions with positive fall-out on CAPEX and OPEX of the industrial plants. Where chemical pre-treatment are necessary hydrometallurgical operation can be easily applied with the same chemical reagents (i.e. removal of copper before thiourea leaching). This study would like to present some practical case of exploitation of mineral tailings indicating some guidelines to approach the decontamination of these kind of very wide dumps or landfill producing at the same time economical values with social and environmental benefits.

Biography

Francesco Veglio is a Professor of "Theory and Development of Chemical Processes at University of L'Aquila. He has experience in the preparation and management of research projects, activity of R&D on the valorisation of raw materials and industrial wastes, chemical and biotechnological processes, environmental technologies and bio-hydrometallurgy. He is the President of Teaching Activities in Industrial Engineering in University of L'Aquila, member of the scientific committee of the "Foundation of University of L'Aquila" (2009-2011) and the Member of the International Academy of Ecology and Protection Sciences (IAELPS) number – 04706 – Russia.

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