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PREVENTION OF THE EARTH POLLUTION WITH THE WASTES AS ONE OF THE PRINCIPAL TRENDS OF THE MODERN MINING AND METALLURGICAL INDUSTRIES

Vsevolod Mymrin, Kirill Alekseev, Monica A Avanci, Alfredo Iarozinski N and Rodrigo E Catai

The Federal Technological University of Paraná (UTFPR), Brazil

Earth pollution, according to many leading scientists is approaching a critical level. Mining and metallurgical industries wastes, in terms of number and hazard level, occupy a leading position in this process. The main objective of our research group studies is to restrain environmental pollution from industrial and municipal wastes, usually stored in industrial dumps. The results of our studies, over more than 50 years, convincingly proved that they can be used with a very high environmental and economic efficiency as valuable raw material for the production of market materials such as conventional and refractory ceramics, bricks, boards, blocks, etc. for the production of road bases, airports, municipal and industrial landfill bases, dam core; thermal and acoustic insulation; new types of fuel with high calorific value; decorative materials. Among the mining and processing wastes, it was studied about bauxite red mud; aluminum anodizing slurry; ornamental stones; extraction of hazardous rocks with high heavy metals content; phosphorus gypsum waste from the processing of apatite and phosphorite rocks; overburdened soils from open pit mining development; dredging sludge from seaports; fine and ultrafine powder from mineral coal extraction; weathered rocks. Metallurgic wastes were also studied, such as all types of ferrous and non-ferrous slags; hazardous electric-ark metallurgy filter dust (EAFD); lead automotive accumulator remelting's slag; foundry sands; galvanic processes' heavy metal sludge; printed circuit manufacturing sludge. The values of mechanical properties (axial and flexural resistance, dilatation and expansion, water absorption and water resistance) of the developed ceramics and concrete without Portland cement significantly exceeded the demands of Brazilian civil engineering standards. The study of the physicochemical processes of the formation of the new composite's structure by complementary methods (XRD, RXF, SEM, EDS, LAMMA, Mapping, AAS) showed strong heavy metal bonding under chemically insoluble condition by mainly amorphous new formations with small inclusions of new crystalline structures.

seva6219@gmail.com