SUSTAINABLE DEVELOPMENT GOALS

Reutilization of pyrite-rich alkaline leaching tailings as sorbent must consider the interplay of sorption and desorption

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Abstract: Sustainable schemes favor the reutilization of waste over direct disposal. In the case of mine waste from mineral processing (tailings), the reutilization of such waste as sorbents of contaminants in water can be advantageous, considering that tailings have already a plan for disposal. In this article, a methodology to evaluate the convenience of using residual minerals as sorbents is presented. The sorption ability of pyrite-based tailings using synthetic solutions containing copper ions (Cu+2) is followed and contrasted to the sorption ability of minerals before processing (feed). In the case of as-received samples, tailings show a higher capacity for copper removal in batch tests (1.3 vs. 0.4 mg Cu/g for tailings and feed, respectively). This large difference is associated with (a) the smaller particle size distribution for tailings, and (b) the ability of tailings to increase the pH and favor precipitation of metals. Interestingly, tailings were found also to release smaller amounts of undesired elements such as arsenic and cadmium. Tests using defined particle sizes for feed and tailings demonstrate that copper removal was around 0.45 mg Cu/g in batch experiments and 0.68 mg Cu/g in recirculation experiments. In all cases, copper sorption follows pseudo-second-order kinetics, suggesting a mechanism where copper is chemisorbed, forming copper sulfides according to X-ray photoelectron spectroscopy (XPS) measurements.

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More importantly, sorption experiments were complemented with simultaneous measurements of metal ion release from the minerals into solution. The metals released during batch sorption are mainly Pb and Zn, in the respective amounts of 0.79 and 0.32 mg/g (feed) and 0.75 and 2.19 mg/g (tailing). Thus, even though the use of mineral residues as sorbents is possible, the metal release should be considered to determine the overall convenience of the process.

Keywords: Sorption; Copper; Sulfide; Tailings; Reutilization of waste.

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Model to Increase the Productive Capacity of an Sme in the Beverage Sector Applying 5s Tools, Autonomous Maintenance, Plant Distribution and Automation

Authors: Rebeca Torres Jacome; Johan Ramirez Flores; Javier Catillo Tejada; Cesar Nunura Nunura

Abstract: The high productive times of the processes has led to the production costs within a company to increase. Due to this, many authors proposed the use of different tools that can solve this problem. This research proposes the use of tools as: autonomous maintenance, 5's, layout and industrial automation to improve the filling process of a bottled water company. The objective of this research is to increase the productive capacity of this process by reducing unproductive times and organizing the worker's position. To do this, several methods have been applied to find and select the best tools that can solve the causes that cause this problem. Accordingly, it was possible to design a solution that covers all the causes that reduce the productive capacity of the process. With the proposed design, it was possible to increase the OEE of the filling machine by 54.21%, reduce the rate of products delivered out of time by 37.54%, increase the efficiency of the machine by 19.16% and reduce the workload of the worker by 39.44%. At the end of the implementation, the model must be validated in the Arena simulator.

Model to Increase the Productive Capacity of an Sme in the Beverage Sector Applying 5s Tools, Autonomous Maintenance, Plant Distribution and Automation

Keywords: Author Tags: 5S; Water industry; Arena simulator; layout; Time reduction; industrial automation; autonomous maintenance

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Optimization of water use in residential buildings

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Abstract: Accelerated urban growth is a factor driving demand for residential buildings, especially in developing countries, and global indicators show that population growth is increasing at a rate of 80 million people a year, implying the construction of buildings for new citizens. Likewise, said population growth generates an increase in the demand for fresh water, since the consumption of the resource is approximately 64 billion cubic meters per year. In this context, there is the unsustainable use of natural resources, since most houses are built without evaluating the incorporation of techniques that help reduce environmental impact. Water is one of the essential resources for life and its global demand is estimated to increase by 30% in the coming decades. In addition, the construction sector is responsible for 16% of the world's extraction of water resources. Therefore, the sustainable management of water use in homes is a pillar to counteract this shortage and one measure is the construction of sustainable buildings that efficiently consume this resource throughout the life of the project. In this way, this research develops an efficient system through techniques such as the reuse of gray water, rainwater and efficient equipment for new residential buildings that are based on the international BREEAM, LEED and EDGE certifications, and the use of MHS1 software to verify the possible savings in water consumption in the operational stage of the building.

Optimization of water use in residential buildings

Keywords: Author Keywords: environmental impact; sustainable techniques; LEED,; BREEAM; EDGE

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