Physical and physico-chemical separation techniques used in urban mine to separate recyclable products

Nour-Eddine Menad

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Physical and physico-chemical separation techniques used in urban mine to separate recyclable products

N Menad
Bureau de Recherche Géologie Minière, France

Urban mining is the process of reclaiming compounds and elements from products, building and wastes. It contains recyclable metals, organics ceramics and wood. The physical and physico-chemical separation techniques are needed to concentrate those products for recycling in a good way. According to physical and physico-chemical properties of different products present in urban mine, the physical separation techniques permit to separate or isolate them, for re-use or appropriate treatment or disposal. These techniques were used in mineral processing such as classification (hydrocyclone), gravity, magnetic, eddy current, electrostatic, flotation and Sink-float separations. For example: gravity and sink float separation techniques are used to separate different plastics by density, the flotation to separate different products according to their surface properties, and magnetic for products having different magnetic properties. Effluents are treated by using the flocculation, centrifugation and flotation techniques. Most of these techniques are used in recycling industries to separate different components such as plastics, metals, wood and to purify the effluents. Several processes were developed to improve the quality of the recovered products. Currently, the sensor sorting technique is integrated in these processes, such as REDWAVE device which is integrated in a waste of electric and electronic equipment (WEEEs) separation process to recover purified fractions of various plastics. REDWAVE separation is based on a NIR spectrometry identification of the main polymers of the plastics, followed by the particle air-blasting to a dedicated container. This equipment can be programmed to isolate one or more specific polymers in a global flux passing past the sensor.

N.Menad@brgm.fr

High-efficiently simultaneous oxidation of organo-arsenic and immobilization of arsenic in Fenton enhanced plasma system

Ping Hu and **Jingtang Zheng**
China University of Petroleum, China

Roxarsone (ROX) is heavily utilized in agricultural applications and poses a risk to the environment. The applicability of glow discharge plasma (GDP) for simultaneous oxidation of organo-arsenic and immobilization of arsenic is unprecedentedly evaluated in this study. The results show that ROX can be effectively oxidized to inorganic arsenic and this performance is evidently dependent on energy input. Adding Fe(II) significantly enhances the oxidation of ROX mainly because of the additional production of •OH via Fenton reaction in GDP, accompanied with which the generated arsenic can be immobilized in one process. Arsenic immobilization can be favorably obtained at pH 4.0-6.0 and Fe(II) concentration from 500 to 1000 mM. Based on the mineral compositions and the analysis (XRD/FTIR/XPS) of precipitate, a mechanism can be proposed that the oxidation of Fe(II) by H2O2 generated *in situ* in GDP significantly accelerates ROX transformation to the ionic As(V), which can immediately co-precipitate with Fe(III) ions or be adsorbed on the ferric oxyhydroxides, forming amorphous ferric arsenate-bearing ferric oxyhydroxides. Consequently, the Fenton enhanced GDP process exhibits as an economical and versatile strategy for organo-arsenic oxidation and arsenic immobilization, holding a premise for the remediation of organic arsenic wastewater.

huping13upc@163.com

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