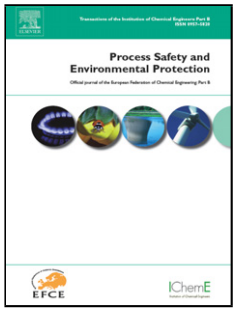

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Assessment of environmental compatibility of glass–ceramic materials obtained from galvanic sludge and soda–lime glass residue

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Abstract

In this study, we evaluated the environmental compatibility of glass–ceramic materials produced from galvanic sludge and soda–lime glass to understand the occurring phenomena in the investigated ceramic system and to find an environmentally compatible way to recycle the materials. The formulated compositions were homogenised (with 1, 5, 10, and 20 wt% of galvanic sludge), compacted, and fired at various temperatures (750–1050 °C). The chemical composition, particle size, thermal behaviour, structure (via X-ray diffraction (XRD)*, and microstructure (via SEM) of the raw materials, samples, and obtained glass–ceramic materials were evaluated. The ceramic materials were submitted to leaching and solubilization assays. We successfully produced environmentally compatible ceramic bodies using the formulations with 1 and 5 wt% galvanic sludge. Harmful elements could be successfully immobilised. The findings are significant mainly when extended to the industrial scale where the strategic reuse of this waste type is a concern.*

Keywords: galvanic sludge, immobilization, environmental compatibility.

1. Introduction

Industrial processes of all types generate waste which is sometimes toxic and dangerous; thus, waste disposal and reuse have become strategic-management topics. Electroplating is a frequently used industrial process that produces galvanic sludge waste which requires proper disposal. According to the NBR 10004, identification code F006 [1], galvanic sludge is usually classified as hazardous waste (Class I).