
Characterization of glass produced from glass wool batch containing simulated end of life LCD waste glass

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Abstract

Due to the drastic growth of the liquid crystal display (hereafter LCD) industry in the last decade, lots of waste glass is being produced. There are three types of waste glass: 1) LCD cullet from LCD glass manufacturers, 2) LCD process waste glass (hereafter LPWG) from LCD panel manufacturers, and 3) end LCD waste glasses (hereafter designated EOL-LWG) from end-of-life LCD devices. Among them LCD cullet is being recycled into a raw material for commercial electric continuous fiber glass (E-glass). However, the recycling of LPWG and End of Life LCD waste glass (EOL-LWG) is limited due to various reasons such as contaminants, toxic components and inhomogeneous glass compositions etc. Especially, it seems to be difficult that EOL-LWG derived from glass produced before 2011 is recycled positively because it contains toxic components such as As₂O₅ and Sb₂O₅.

In this study, several alkali borosilicate industrial glass wool batches with three kinds of simulated EOL-LWG up to 20wt% of resulting glass were prepared. The simulated EOL-LWG was a mixture of different glasses produced before 2011. Some melt properties such as viscosity and liquidus temperature related with glass production were determined. Additionally a chemical stability of resulting glasses was estimated by the toxicity characteristic leaching procedure (TCLP) method of the U.S. Environmental Protection Agency (EPA).

According to results, the forming temperature corresponding to 10³ dPas and liquidus temperature showed no serious behavior within investigated range. In the solution extracted by TCLP method As and Sb were not detected. Under the control of compositional tolerance for EOL-LWG its recycling possibility is suggested as a raw material for glass wool.

Keywords: recycling, LCD waste glass, glass wool, toxic component, leaching

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