Kinetics of crystallization in Li₂O-Al₂O₃-SiO₂ (LAS) Glass System by thermal analysis

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This paper presents results and observations obtained from a study of crystallization behavior in Li₂O-Al₂O₃-SiO₂ (LAS) glass powders. Variable kinetic parameters have been obtained in order to investigate the crystallization behavior by using non-isothermal differential thermal analysis. LAS glass powders including B₂O₃ which induce a low firing process have been melted and crushed to obtain coarse and fine glass powder. In case of coarse particles with 88μm, the crystallization have been started at 649~699℃, the crystallization of fine particles with < 44μm have been observed at 640~684℃ according to heating rate. In order to obtain the activation energy of crystallization (Eₐ) and Avrami constant (n), Kissinger and Ozawa equations have been used. From several plotting, we have calculated that the average activation energy of crystallization in Li₂O-Al₂O₃-SiO₂ (LAS) glass was 49.31 kcal/mol by Kissinger equation and Avrami constant (n) was 1.45. Finally, we have concluded that the glass powder of Li₂O-Al₂O₃-SiO₂, have crystallized primarily by surface crystallization. Also, we have seen a clear indication of this result from SEM (Scanning Electron Microscopy) results.

Keywords: Crystallization Kinetics, Crystallization, LAS glass, Sintering.