Melt stability and fiberizing window of stone wool compositions
Zheng, Qiuju; Solvang, M.; Yue, Yuanzheng
Melt stability and fiberizing window of stone wool compositions

Qiuju Zheng¹, Mette Solvang², Yuanzheng Yue¹

¹Section of Chemistry, Aalborg University, 9000 Aalborg, Denmark
²ROCKWOOL International A/S, Hovedgaden 584, 2640 Hedeusene, Denmark

Abstract

To determine the fiberizing window of a glass melt, it is important to know the melt stability (MS), i.e., the stability of a melt against crystallization during cooling. The MS regime of a melt refers to the supercooled liquid range $T_l - T_c'$, where $T_l$ is the liquidus temperature and $T_c'$ is the onset temperature of crystallization during cooling at a given rate. In the fiber production line, fiberization of a glass-forming melt usually takes place slightly above its liquidus temperature. In this paper, we show that $T_c'$ could be used as the lower temperature limit for fiberizing processes. We establish a link between melts stability and melt spinnability, by which the fiberizing window of several stone wool compositions can be determined based on the viscosity-temperature relationship and the MS data. The fiberizing window is much wider compared to that determined by the traditional way. We propose a spinnability parameter ($K_Y$) for describing the fiber spinnability. Furthermore, we clarify the correlation between $K_Y$ and melt fragility for several series of stone wool compositions. $K_Y$ of each series of these compositions is inversely correlated with melt fragility and in general $K_Y$ decreases with an increase of melt fragility. We have found an empirical constant ratio between $T_c'$ and $T_l$ for the studied compositions.