

Seeding: a new method for studying the resumption of glass alteration

M. FOURNIER*, P. FRUGIER AND S. GIN

CEA, DEN-Marcoule, DTCD/SECM, F30207, Bagnols-sur-Cèze, France (*correspondence: maxime.fournier@cea.fr)

Under hyper-alkaline pHs and relatively high temperatures, a resumption of alteration — i.e. a sudden acceleration of the glass corrosion rate — can occur [1]. This phenomenon is almost always associated with zeolites precipitation.

Understanding the cause of resumption of alteration is a crucial issue for predicting long-term behavior of glass. In laboratory, when resumption of alteration occurs, the incubation period preceding the phenomenon can take days to years depending on experimental conditions [2]. Seeding — inspired by industrial processes for zeolites synthesis — can be of great interest to accelerate and study resumption of alteration. Contrasting results of previous studies [3, 4] have highlighted the importance of the seeds nature.

Identification and quantification of the alteration products formed during a resumption of alteration has been performed on a simple borosilicate glass at 90°C and pH \approx 11. Synthesis of seeds having the same crystalline structure than the zeolites neoformed during glass alteration was undertaken. As shown below, seeding almost totally by-passes the incubation period.

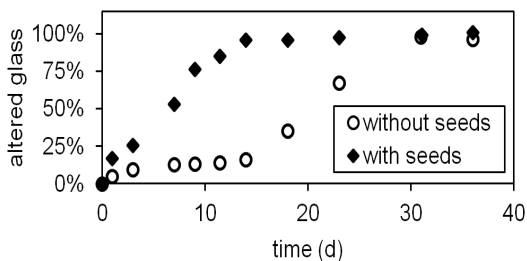


Figure 1: Effect of seeds having the same crystalline structure as the neoformed zeolites on glass alteration rate.

Results obtained using this method provides a powerful tool for understanding the role of zeolites on glass alteration and for geochemical modeling of resumption of alteration.

[1] Gin & Mestre (2001) *J. Nucl. Mater.* **295**, 83-96. [2] Buechele *et al* (2000) *Ceram. Trans.* **107**, 251-259. [3] Wronkiewicz & Arbesman (1999) *Mater. Res. Soc. Symp. Proc.* **608**, 745-750. [4] Fournier *et al* (2013) *Proc. Earth Planet. Sci.* **7**, 264-267.