

Oxygen speciation in silicate glasses and melts

H.W.NESBITT¹, G.M. BANCROFT², G.S. HENDERSON³

¹Department of Earth Sciences, University of Western Ontario, Canada

²Department of Chemistry, University of Western Ontario, Canada

³Department of Earth Sciences, University of Toronto, Canada

While the oxygen environments in silicate oxide glasses and melts have generally been divided into Bridging oxygens (BO) and Non-bridging oxygens (NBO), we have recently shown that the oxygen speciation is more complex. Bridging oxygens have one or more alkalis attached to them increasing the oxygen coordination from 2 to 3, 4 or possibly 5 [1, 2]. Furthermore “free oxygen” (O^{2-}) is also present in mol% amounts [3, 4] in many glasses. The presence of the latter remains controversial, however, it is clear that it may play a critical role in the melting and crystallization of non-framework silicate minerals [5]. We will review the evidence for the presence of the different oxygen species and highlight the role of free oxygen in the melting of chain silicates and other types of silicate phases.

[1] Nesbitt *et al.* (2015) *Journal of Non-Crystalline Solids*, **409**, 139-148. [2] Nesbitt *et al.* 2017, *Chemical Geology*, in press. [3] Nesbitt *et al.* (2011) *Journal of Non-Crystalline Solids*, **357**, 170-180. [4] Nesbitt *et al.* (2015) *American Mineralogist*, **100**, 2566-2578. [5] Nesbitt *et al.* (2017) *American Mineralogist*, **102**, 412-420.