

SOLUBILITY CONTROLLING MECHANISMS OF MINERAL WOOL AND MINERAL WOOL WASTE PHASE

Bauer, S.¹, Sattler, T.¹, Vollprecht, D.¹

¹Montanuniversität Leoben, Franz-Josef-Str. 18, 8700 Leoben, Austria
e-mail: theresa.sattler@unileoben.ac.at

Mineral wool is a man-made vitreous fibre (MMVF) manufactured mainly from glass or igneous rocks. Stone and glass wool, the most important mineral wools, are made from different raw materials using different processes of manufacturing. Mineral wools are primarily used as thermal and acoustical insulation materials. At the end of the life cycle, mineral wool products become mineral wool waste but respirable fractions occur during handling of both e.g., at construction sites or during deconstruction of buildings where former products consequentially become waste. Thus, the inhalation of MMVF fibres from products as well as from waste into the human respiratory system is possible. In fact, health issues are more likely the longer the fibres persist. Fibres can even reach the alveolar region of the human lungs if they have certain geometrical dimensions. These fibres can lead to inflammation and possible formation of tumours if the fibres do not dissolve or can be removed mechanically. Hence, fibres should easily dissolve under pulmonary conditions. There are quality labels such as the German RAL or the European EUCEB certificate which guarantee that the fibres dissolve in a short period of time and can therefore be called bio-soluble. GULDBERG et al. (2002) developed stone wool fibres with high alumina and low silica which dissolve more rapidly than former fibres. At least the alumina content has to be within a certain range. One aspect of the faster dissolution is the formation of complexes with aluminium (BARLY et al., 2019; GULDBERG et al., 2002). For glass wool there has not been as much research as on stone wool but it is supposed that boron plays a similar role in the dissolution of glass wool as aluminium does for stone wool. It is likely that the solubility of mineral wool is linked to the chemical composition and vitreous structure.

However, the dissolution mechanisms regarding mineral fibres are not known completely and the distinction between hazardous and non-hazardous mineral wool waste has significant implications for waste management (SATTLER et al. 2020). Therefore, the aim of this study is to close the gap. At first a literature research was done and then leaching behaviour tests with 13 different mineral wools were performed following European standard EN 14429. The analysed samples included both products and waste with a variation of different compositions. In order to identify the solubility controlling mechanisms the results were modelled hydrogeochemically with the software LeachXSTM. The models may give some information about precipitates at the surface of the leached fibres because such newly formed solids can influence the dissolution process (FRANKEL et al., 2018). The leaching tests and the modelling are currently in progress.

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