

# **BINDER LEACHING OF NATURALLY HYDRAULIC LIME MORTARS**

**Alan M Forster<sup>1</sup> and Ewan Szadurski<sup>2</sup>**

*<sup>1</sup>School of the Built Environment, Heriot-Watt University, Edinburgh, Scotland, EH144AS*

*<sup>2</sup>School of the Built Environment, Heriot-Watt University, Edinburgh, Scotland, EH144AS*

## **ABSTRACT**

Masonry built in lime mortar is one of the principle building materials used in traditional construction. This form of construction can convey the appearance of strength and stability and could be argued to epitomise built homogeneity. This may however not reflect reality due to deterioration of the wall core resulting in an alteration in the effective thickness. Predicted future climate change models for northern regions, indicate more instances of heavy rainfall. This will undoubtedly result in materials used in mass masonry structures becoming saturated for extended periods, increasing instances of binder migration (binder leaching). The leaching process involves the deterioration of binder structure via dissolution and removal of calcium into the pore fluid. This can, in many cases, result in reprecipitation of calcium on the external skin of the structure. The effect of this phenomenon on the physical properties and performance of lime mortar has not yet been fully investigated but early stage results indicate a reduction in mechanical strength and an alteration of the materials moisture handling characteristics. The current EPSRC funded research project (EP/G064865/1) aims to ascertain the extent of binder leaching by inducing an artificially accelerated leaching environment. Leaching trials have been carried out on a variety of natural hydraulic limes (NHL), both carbonated and uncarbonated, representing those potentially found on mass masonry structures. The present work aids our collective understanding of this fundamental deterioration process enabling prediction of mortar condition and performance to be achieved. Determining traditional building resilience has never been as important, especially given the broader context of climate change.

Keywords: binder, dissolution, leaching, lime, mortar

## **INTRODUCTION**

An estimated 446,000 pre 1919 dwellings, totalling 20% of the building stock, exist in Scotland today. The vast majority of these are believed (McKinney, 2007, Urquhart, 2006) to be constructed of stone. More specifically, it has been estimated that there are some 24,000 traditional built stone facades in Glasgow alone, requiring approx £500M to repair (Urquhart, 2006). Of course, structures constructed in traditional mass masonry are not restricted to Scotland or to tenement forms, with innumerable

<sup>1</sup> a.m.forster@hw.ac.uk

<sup>2</sup> ems5@hw.ac.uk













