Chemical durability of lead and alkali glazes in H_2SO_4 solutions

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This paper reveals influence of aqueous sulphuric acid in deterioration of lead and alkali glazes. During our previous study weathered glazes have been identified in some tiles from a building in Budapest. Our goal is to observe how the weathering process acts on the surface and chemical components migrate.

Laboratory experiments H_2SO_4 solutions of pH2 and pH4 lasted 14 days. XRD, SEM-EDS and Raman spectroscopy were used to determine the precipitated phases and EPMA analysis was used for quantitative analysis. The recovered solutions were measured with ICP-OES to quantify extent of the ion exchange.

Solution of pH2 induced greater ion exchange. Alkali and alkaline earth metals exhibit the most intensive dissolution, altought newly formed phases composed of these elements were not identified on the glazes. On the other hand, although lower lead content was detected in the recovered solutions, lead sulphate, anglesite, has newly appeared on the corroded glaze parts, and 15-200 μm sized pits are clearly seen on the surface of the glaze as a sign of the corrosion.