




# Dissolution of amphibole asbestos in modified Gamble's solution at pH 4.5: a combined ICP-OES, XPS and TEM investigation

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This study analyzes the dissolution reactions, and the corresponding surface modifications, of two amphibole asbestos incubated for 1, 24, 48, 168 and 720 h in a modified Gamble's solution at pH 4.5. The investigated samples are UICC crocidolite from Koegas Mine, Northern Cape (South Africa), and fibrous tremolite from Montgomery County, Maryland (USA). Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES) was used to monitor the ion release into solution, X-Ray Photoelectron Spectroscopy (XPS) was performed to unveil the chemistry of the leached surface, and High Resolution Transmission Electron Microscopy (HR-TEM) was exploited for monitoring the structural modifications of the fibres.

An incongruent cation mobilization was observed in both samples. Fe mobilization was detected only in UICC crocidolite, due to the occurrence of Fe-bearing accessory phases in the sample (siderite, iron carbonate, and minnesotaite, an iron-bearing phyllosilicate). Notably, tremolite lifetime is shown to be roughly ten times that of UICC crocidolite under the same experimental conditions. This result agrees with previous dissolution studies at pH 7.4 indicating a higher dissolution and surface alteration for UICC crocidolite with respect to tremolite.

**How to cite:** pacella, A., nardi, E., monteriali, M. R., fantauzzi, M., rossi, A., viti, C., and ballirano, P.: Dissolution of amphibole asbestos in modified Gamble's solution at pH 4.5: a combined ICP-OES, XPS and TEM investigation, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-11407, <https://doi.org/10.5194/egusphere-egu2020-11407>, 2020