Formation of Halloysite from Feldspar: Low Temperature, Artificial Weathering Versus Natural Weathering

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Abstract: Weathering products formed on surfaces of both potassium and plagioclase feldspar (An_{70}), which were continuously leached in a Soxhlet extraction apparatus for 140 days with 7 · 21 of distilled water per day at a temperature of approximately 78 ° C, are morphologically identical to natural products developed on potassium feldspars weathered under conditions of good drainage in the humid tropics. The new products, which first appear as tiny bumps on the feldspar surface, start to develop mainly at exposed edges but also at apparently random sites on flat cleavage surfaces. As weathering continues, the bumps grow outward from the feldspar surface to form tapered projections, which then develop into wide-based thin films or sheets. The thin sheets of many projections merge laterally to form one continuous flame-shaped sheet. The sheets formed on potassium feldspars may then roll to form tubes that are inclined at a high angle to the feldspar surface. Etch pits of triangular outline on the artificially weathered potassium feldspars serve as sites for development of continuous, non-rolled, hollow tubes. It is inferred from its morphology that this weathering product is halloysite or its primitive form. The product of naturally weathered potassium feldspars is halloysite · $4H_2O$.

The flame-shaped films or sheets formed on artificially weathered plagioclase feldspar do not develop into hollow tubes, but instead give rise to a platy mineral that is most probably boehmite. These plates form within the flame-shaped films, and with continued weathering are released as the film deteriorates. There is no indication from this experiment that platy pseudohexagonal kaolinite forms from any of these minerals under the initial stage of weathering.

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