

ACTION OF FULVIC ACIDS ON SILICOMAGNESIAN GELS AND MAGNESIUM SILICATES

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The effect of demineralized fulvic acids (FA) on silicomagnesian gels and on natural or synthetic magnesian silicates was studied. For that we used infrared spectroscopy and Differential Thermal Analysis (DTA).

With silicomagnesian gels, magnesium is released and complexed by FA. These complexes are characterized by DTA (peak at 520° C). Their formation increases the mobility of magnesium. In the same time, silica pass into solution and is able to form associations by hydrogen bonding with organic colloids; that makes the silica more stable in pseudosolution. This colloidal association is thermically stable up to 450° C (fig. 3).

With cristalline minerals the attack by FA is slower than with gel. Among magnesian silicates synthetized in the laboratory, forsterite is weathered easier than enstatite, as it happens with pure water. For the same initial FA/minerals ratio, pH at equilibrium is lower in presence of enstatite than in presence of forsterite; so the weathering products are not the same. After the attack of enstatite by FA, silica gel is formed and the whole magnesium released in the solution is complexed by FA. With forsterite, silicomagnesian gels is also formed beside silica gel. As this last gel, silicomagnesium gel forms associations by hydrogen bonding with FA. These bonds are broken down at about 300° C during the heating by DTA and that break induce the oxydation of a large part of organic matter.

With natural olivine, which also contains Fe-II, FA complex iron preferentially to magnesium. The nature of the weathering products depends ont the FA/mineral ratio. When this ratio is high (low pH), the weathering products are the same that those formed with enstatite. When this ratio is low, the weathering products are the same that those formed with forsterite.

In conclusion, in a well-drained environment, FA accelerate the weathering of magnesian minerals and increase the mobility of the products of alteration. In a confined environment, the complexation of magnesium by FA makes possible the formation of alteration products poorer in magnesium thas the initial minerals.

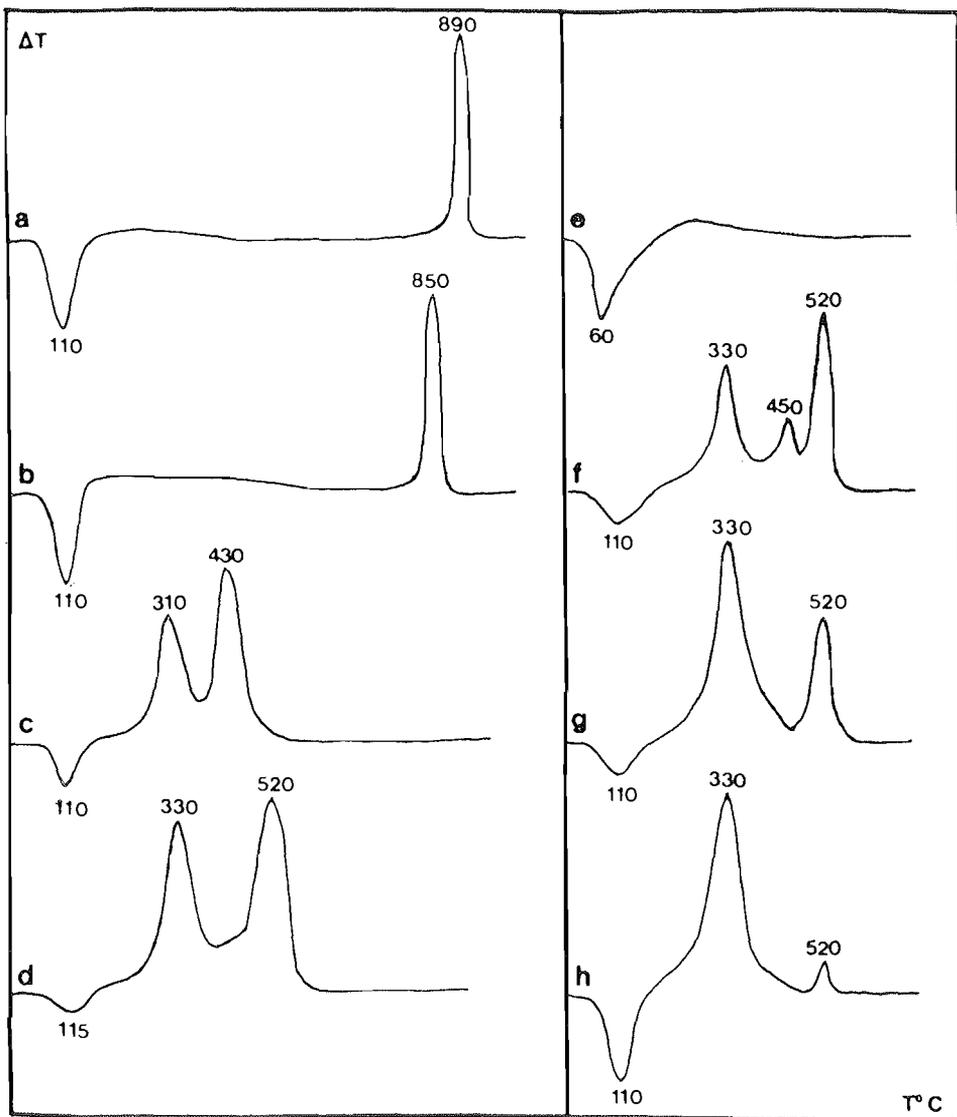


Figure 3 - DTA curves

— Initial products

- a - Silicomagnesium gel (Mg)/(Si) = 2
- b - Silicomagnesium gel (Mg)/(Si) = 1
- c - Fulvic acids
- d - AF-Mg complex
- e - Silica gel

— Products resulting from the attack of silicomagnesian gels by FA

- f - Lyophilized solution (pH 6.2)
- g - Lyophilized solution (pH 4.5)
- h - Insoluble fraction