

Understanding the formation of hydrobasaluminite nanoparticles tracking Al-oligomers and its polymerization

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According to non-classical growth assumptions, some minerals are formed by the accumulation of inorganic polymers and nanofractions of other minerals¹. Hydrobasaluminite ($\text{Al}_4\text{SO}_4(\text{OH})_{10} \cdot 12\text{-}36\text{H}_2\text{O}$) formation process has been tested under different conditions of concentration and pH. Water-media culture was analysed by several analytical techniques; ESI-TOF MS, Ferron Method, and NMR. ESI-TOF MS has been recently proved to be a good analytical technique for inorganic polymers². Thus, the technique has identified polymers formed during the precipitation of hydrobasaluminite. Comparing these results with those obtained from Ferron (Al-speciation) and NMR (particle coordination), several growth tendencies have been determined: 1) small polymers are initially predominant; 2) polymers get bigger and more complex during the nucleation process; 3) Sulfate polymers (Al_xSO_4^+) only appear in the solution during mineral precipitation; 4) the increase of pH and initial solute concentration accelerate the previously described pathway growth. All the results obtained from the use of these techniques support these observations.

¹G.I. Yucelen et al., (2011) J. Am. Chem. Soc. 133, 5397-5412.

²M. Becerra Herrera et al., (2019) J. of Mass Spect. (in press)