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ABSTRACT

The analysis of the conditions affecting clay colloid stability is needed to assess the relevance of bentonite erosion processes and of bentonite colloids transport in the frame of a high-level radioactive waste repository.

Clay colloids (< 1 μm particle size) were extracted from several bentonites or smectite-rich clays with different physicochemical properties (i.e., smectite content, main exchanging cation, layer charge, charge distribution, etc.), by dispersing them in deionized water and collecting the supernatant after centrifuging. First, colloids were characterized to evaluate their initial size and electrophoretic mobility (surface potential). Then, their aggregation behaviour upon the addition of Na^{+} or Ca^{2+} was studied, by analysing the evolution of both colloid size and electrophoretic mobility. The concentration of monovalent or divalent cation needed to start coagulation process (critical coagulation concentration, *CCC*) was estimated for each clay.

Despite the different initial clay colloids properties, their aggregation behaviour upon electrolyte additions was quite similar in all the cases. The aggregating power of Ca was observed to be much higher than that of Na, a Ca concentration of 0.3 mM being enough to aggregate any clay, compared to 1-20 mM of Na. The presence of Ca in solution is a critical and prevailing factor for clay particles aggregation, independently of other smectite bulk properties. The range of Na concentration needed to start the