materials (amorphous) are measured and modeled using adequate morphologic or structural models. Mechanisms of aggregation and crystallization have been evaluated in the case of the Al and Fe(III) hydrolysis.

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Speciation resulting from fast hydrolysis of dilute ferric chloride salt (0.05-0.1M) was studied versus the hydrolysis ratio n = 3.5 and at different aging times from t = 400sec to 15 days. In-situ X-ray Absorption spectroscopy (XAS) and Small-Angle X-ray Scattering were used to investigate the structure and kinetics of nucleation of the early precursors, the size of polycations and the structure of the aggregates. XAS data show a large proportion of dimers and trimers take place before the formation of large polycations. Oxo bridges are formed in the trimers and in the large polycations. The polycations have a B\(\text{FeOOH}\) like local structure. The polycation is equivalent to a sphere of 1.6nm diameter. From n = 1.5, the polycations cluster in linear aggregates of 10mm long. When n > 1.5 the aggregates are more and more branched and fractal with a fractal dimension \(D_f = 1.7\) (2.0<n<2.5) and \(D_f = 2.0\) for n>2.5.

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Alteration Sequence of Metamorphic rocks in the Minnesota River Valley. P. BRAENDELLEIN, C. HARVEY, H. MURRAY, Indiana Univ., Dept. of Geological Sciences

Three profiles plus a series of outcrop samples were taken in the Minnesota River Valley near Redwood Falls/Minneapolis. The outcrop samples are unweathered igneous and metamorphic rocks, which are the parent rocks of the two sampled weathering profiles. The third profile is a sedimentary kaolinite. All the minerals of these profiles were examined by SEM, BEM, Microprobe, X-ray diffraction, chem. Analysis, opt. Micr., standard procd. of Appl. Clay Min. Results are showing major changes of textures, structures, min. Compo. The stability sequence of the minerals is plag<sm<ch<ka<espar. Abundant clay mineral is kaolinite in different crystallisation stages.

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Redox Reactions of Fe in a Mixed-layer Kaolinite/Smectite, G. BRUNO* and A. DECARREAU, Univ. of Poitiers, France, and J.W. STUCKI, Univ. of Illinois.

An industrial clay from France, consisting of a mixed-layer kaolinite/smectite admixed with significant amounts of hectorite (plagioklase), was chemically reduced with sodium dithionite (D) for different lengths of time in a citrate-bicarbonate (CB) buffer solution (CBT treatment). The presence of iron oxides in the system influenced the effect of oxidation state on the swelling of the clay in water, and the properties of reoxidized samples were markedly different from those of the original oxidized material because of the reductive dissolution of the Fe oxides by the CBD treatment. The clay also exhibited unusual color-change behavior because of its multi-phase composition. Upon reduction, the clay changed from yellow-brown to dark blue-green, as is observed with ferruginous smectite. But the color is actually a composite of coexistent black, dark blue, and light grey phases in which the Fe(II) content decreases in the same order. These results may indicate that the Fe, smectite, and kaolinite phases in the original clay became separated as a result of Fe reduction.

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XANES and EXAFS spectroscopy have been used to examine the coordination environment of Cu(II) within ion-exchanged clays. The alteration of the coordination sphere of the copper ion has been followed as the clay absorbs protic solvents such as water, methanol, and ethylene glycol. The nature of the coordination sphere and its dimensions change as the solvent enters the clay. The specific changes of these changes will be presented. The effect of the absorption of non-coordinating solvents is also being investigated.

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Lead-contaminated soils ranging from a few percent downward are found at process industry sites, some originating from lead organometallics in gasoline antiknocks. Detailed knowledge of the lead species now present is vital to assessing the hazard that these levels represent and what remediation approaches may be fruitful. Whether conventional analytical techniques would alter speciation and whether they would be responsive to strongly adsorbed forms is uncertain. Instead we carried out x-ray absorption spectroscopy on whole soils at the Pb L-III edge (13035 eV) with no alteration except for freezing. Useful results were obtained to below 1000 ppm Pb. As expected, understanding the higher concentrations is best approached in terms of bulk Pb compounds, but not at low levels. Striking throughout is responsiveness to sulfur.

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Isotopic Studies of Clay Authigenesis in Soil Profiles: New Aspects in Dating and Tracing. N. CLAUSER and S.S. CHAINAY, Geo cat\(\text{G}\)\(\text{O}\)c hy c\(\text{e}\)m\(\text{y}\) de la Surface, Strasbourg, France.

Small but significant variations exist in the oxygen isotopic composition of kaolinites from different depths of a weathering profile developed on gneisses in Western Africa. The fractions are not in isotopic equilibrium with each other or with the present-day waters. The results suggest specific crystallization conditions for each type of kaolinite in more or less closed micro-environments. A RbSr isotopic study made on untreated and 1N HCl leached kaolinites from different depths of another profile in the same region, confirms the existence of micro-environments. If the Sr isotopic composition of the leachates can be assumed to be representative of these micro-environments, it is possible to date the different types of kaolinites. A preliminary attempt suggests that continental weathering of the gneissic basement of West Africa could have occurred about 150 Ma ago.

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Soil samples were collected from the Ap horizon of a loess soil (type hapludalf) on which K fertilization trials are conducted since about 20 years. Clay mineralogy and K-Ca exchange properties were determined on fine and coarse clay fractions. The soil without K supply showed a vermiculitic pattern whereas the 1.4 mm peak was much reduced for the other treatment. Such vermiculitisation illlusion process under cultivation is often referred in the literature to explain K dynamics after fertilization and though it was demonstrated to occur in pot trials with exacerbated K deficiencies or excesses, it has been rarely detected in natural field conditions. Despite these mineralogical changes, we didn't notice any difference in the exchange properties and the K availability induced by the fertilizer. This would be in favor of a complete reversibility of the illite illlusion process by cultivation. Fine and coarse clay fractions also exhibit similar K selectivity.

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