Clays and Clay Minerals, 1970, Vol. 18, pp. i–ii. Pergamon Press. Printed in Great Britain

CLAYS and CLAY MINERALS at a glance

Volume 18 **November 1970**

Scientific Contributions 187–232

Notes and News
Notes 233
News 237

MICA WEATHERING RATES AS RELATED TO MICA TYPE AND COMPOSITION

R. A. Leonard and S. B. Weed 187

Potassium release rates from micas varying widely in type and composition were measured. A sodium tetraphenylboron solution was used as the extracting agent. Muscovites were found to be two orders of magnitude more stable than a naturally occurring phlogopite and biotite. Synthetic fluorphlogopite was as stable as some muscovites. Lepidolite was the most stable mica. Primary factors affecting mica stability are thought to be: Hydroxyl bond orientation, isomorphous replacement of OH^- by F^-, the stronger Lewis base, and structural factors that lead to compression or stretching of the K—O bond.

EFFECTS OF POTASSIUM REMOVAL ON THE *b*-DIMENSION OF PHLOGOPITE

R. A. Leonard and S. B. Weed 197

Potassium was removed from 5 to 20-μ size fractions of two phlogopites by treatment with sodium tetraphenylboron and replaced with various exchange ions. The *b*-dimension of the mica increased with K^+ removal which suggests that the K^+ ion in phlogopite acts to constrain *b*. This being the case, the K – O bond in phlogopite must be lengthened and weakened relative to the K – O bond in dioctahedral micas.

METHYLENE BLUE ABSORPTION BY CLAY MINERALS. DETERMINATION OF SURFACE AREAS AND CATION EXCHANGE CAPACITIES (Clay-Organic Studies XVIII)

Pham Thi Hang and G. W. Brindley 203

Under appropriate conditions, both surface areas and cation exchange capacities of clay minerals can be measured by absorption of methylene blue from aqueous solutions. The method has been applied to two kaolinites, one illite, and one montmorillonite, all initially saturated with Na^+ ions. For Na-montmorillonite, the total area, internal plus external, is measured. For Ca-montmorillonite, entry of methylene blue molecules appears to be restricted by the much smaller expansion of the Ca-clay in water. X-ray diffraction data clarify the absorption behavior in Na- and Ca-montmorillonite, and in particular it is shown that two orientations of the methylene blue molecules are involved.

FORMATION AND STABILITY OF HYDROXY-Mg INTERLAYERS IN PHYLLOSILICATES

D. D. Carstea, M. E. Harward and E. G. Knox 213

A study was conducted to (1) determine the conditions of hydroxy-Mg interlayer formation with respect to type of clay mineral, acidity, and time; (2) evaluate the stability of this interlayer to dissolution treatments; and (3) ascertain the effects of such treatments upon the determination of clay minerals in soils and sediments. Hydroxy-Mg interlayers were formed in montmorillonite and vermiculite by adding $MgCl_2$ and NaOH in amounts to give a wide range of pH. The resulting chloritic intergrades were examined after 10 days, 6 months, and 1 yr.

Alkaline conditions favored the formation of hydroxy magnesium interlayers in phyllosilicates. Hydroxy-Mg interlayered montmorillonite which resulted from 10 days equilibration at pH 10·4 did not expand upon solvation with ethylene glycol and exhibited practically no collapse after K-saturation and heating at 550°C. A small amount of interlayer was formed between pH 6·8 and 9·8 (10 days). In contrast, vermiculite exhibited no evidence of interlayer formation at pH values up to 9·7 (10 days). Chloritic intergrades formed at pH 10·7 did not collapse after K-saturation and heating at 300°C but did so at 550°C. Hydroxy-Mg interlayers were not formed in either mineral by using a drying method. This method apparently failed to provide the required alkaline conditions for interlayer formation.

The amount of magnesium interlayers present in the phyllosilicate systems decreased with time. The inter-

https://doi.org/10.1346/CCMN.1970.0180401 Published online by Cambridge University Press

layers formed in vermiculite decreased more sharply than those in montmorillonite.

Sequential dissolution treatments including boiling 2% Na_2CO_3, buffered sodium citrate-dithionite, a second citrate-dithionite treatment, and boiling NaOH. Hydroxy-Mg interlayers in montmorillonite exhibited a higher stability to sequential treatments than the interlayers formed in vermiculite. A stable 14Å line was observed in interlayered montmorillonite after the dithionite-citrate and NaOH treatments.

The interlayers in montmorillonite showed a relatively high stability to HCl dissolution treatments. In contrast, most of the magnesium interlayer in vermiculite was removed by two HCl washings.

The reagents used in this study are sometimes used to remove coatings and cementing agents from soil surfaces prior to particle size and clay analysis. The present data show that these treatments also remove some hydroxy-Mg interlayers and produce changes in properties of clays. A proper interpretation of data for clay mineral identification and characterization must recognize these changes due to treatment.

SIMULTANEOUS X-RAY DIFFRACTION–DTA

James L. McAtee, Jr. 223

Simultaneous X-ray diffraction-differential thermal analysis equipment for an X-ray diffractometer was evaluated. A brief description of the apparatus and of the method of preparing the sample was given.

Simultaneous XRD–DTA was used to study various clay minerals and inorganic hydrates. It was found in the study of clays such as hectorite, montmorillonite, kaolinite, and attapulgite that information concerning the rate of removal of water and hydroxyl units at various temperatures could be correlated to changes in the X-ray diffraction pattern. Various inorganic hydrates such as barium chloride dihydrate, nickel sulfate hexahydrate, and potassium ferrocyanide trihydrate were examined under dynamic and static conditions of analysis along with vacuum conditions. It was found that good correlation could be obtained between the X-ray diffraction pattern and the loss of water from the hydrates as indicated by the DTA curves.

https://doi.org/10.1346/CCMN.1970.0180401 Published online by Cambridge University Press