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A MORE VALID CONFIRMATORY TEST FOR KAOLINITE IDENTIFICATION IN CLAY MINERALS INVESTIGATION BY XRDA.

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ABSTRACT

The identification of clay minerals is difficult and often becomes complicated in case of kaolinite where 0.72 nm peak of kaolinite is obscured by a strong second order (002) peak of Fe-rich chlorite which also diminishes on heating to 550°C, resulting in misidentification as kaolinite. As different heat treatments, to differentiate Fe-rich chlorite and kaolinite, were found unsatisfactory, a more valid technique, specific for kaolinite identification, was adopted which differentiated the first order peak of kaolinite (0.72 nm) by shifting it at 1.1 nm. This technique involved subsequent treatment of clay by Cesium Chloride (CsCl), Dimethyl sulfoxide.(DMSO), Hydrazine hydrate (HzHyd), and Potassium acetate (KOAC) before it was mounted on a glass slide for XRDA. Further, the peaks on de-intercalation were found more or less of the same pattern which means that the original structure of kaolinite on de-intercalation (by heating at 100°C) tends to be restored.

INTRODUCTION

Clay fraction (< 2 μm) is the most reactive fraction of a soil and is responsible for most of the physical & chemical processes that occur in the soil (Wilson and Pittman, 1978; Welton, 1984). Clay *al.*, 1986). This paper reports the validity of the technique for identifying kaolinite, and the effects of dimethyl sulfoxide (DMSO) intercalation on mineral structure.

MATERIALS AND METHODS

The procedure described by Lim *et al* (1981) was followed for this test. Bulk clay (<2 μm) was separated, by at least 20 strokes with a plunger, in one litre cylinder. The suspension was allowed to stand for a specific time before siphoning (20 hrs = 16 cm). The clay suspension after siphoning was centrifuged and the supernatants discarded. The clay so collected was dried and 40 mg of dry clay was mixed with 100 mg of CsCl by hand grinding in an agate pestle and mortar for three minutes. Another portion of 100 mg of CsCl was added to the previous mixture and grinding continued for another three minutes. The mixture was transferred to a 15 ml screw cap centrifuge tube, and 2 ml of 85% hydrazine monohydrate was added. The covered tubes were shaken and placed in an oven at 65°C overnight. The suspension was centrifuged and washed once with 8 N KOAC and a second time with 4 N KOAC. The clay was suspended in 2 ml of DMSO and warmed for about 20 minutes at 90°C in an oven before centrifugation and the decanted DMSO discarded.