
Trimethyl Phosphate Induced Decomposition of Kaolinite

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Abstract: The decomposition of kaolinite by treatment with trimethyl phosphate (TMP) and the composition of the new crystalline phase formed were studied. On hot treatment with TMP, kaolinite forms a crystalline white compound that is soluble in hot water. The X-ray diffraction pattern of the kaolinite treated shows both the typical reflections of kaolinite and, furthermore, a very strong reflection at 8.84 Å. After 30 days of treatment with TMP, the silicate structure of kaolinite is completely destroyed and a crystalline phase identical with that resulting from treatment of aluminium oxide (Al_2O_3) with TMP is formed. The results show that the compound in question is formed by hydrolysis of TMP, catalyzed by the hydration water of exchange cations of kaolinite, followed by removal of Al from the silicate structure by incompletely hydrolyzed TMP. The new crystalline phase thus formed is an aluminium alkyl phosphate of formula $\text{Al}(\text{CH}_3)_6(\text{PO}_4)_3$.

Key Words: Aluminium alkyl phosphate • Hydrolysis • Kaolinite • Kaolinite decomposition • Trimethyl phosphate

Clays and Clay Minerals; April 1994 v. 42; no. 2; p. 221-225; DOI: [10.1346/CCMN.1994.0420212](https://doi.org/10.1346/CCMN.1994.0420212)

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