



## The kaolinite rock in coal bearing stratum, China

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### Abstract

The proved reserves of kaolinite in coal measures in China is very rich, most of which are excellent industrial materials, and that most are associated with the Permo-Carboniferous strata of North China. There are three types of kaolinite rocks in the present research area: the first type (be called tonsteins) occurs in the roofs, partings and floors of coal seams, normally called tonsteins, which are thinner and widespread; the second type, usually 2~6 m thick, is not adjacent to the coal beds, usually in the lower part of coal measures of Upper Permian, similar to the flint clay in North America; the third type is soft kaolin clay of 0.5~5 m in thickness and associated with surficial weathered coals. Results of XRD, IR, DTA and SEM studies show that the content of kaolinite minerals is in general more than 70% and up to 90%~100% in some good quality rocks. The elements of Mo, W, Zr, Hf, Th, Ag and Sb are very rich in kaolinite rocks in the study area, with their average contents being higher than those in the earth's crust, basalt and granite. It is suggested that tonsteins formed from the in situ alteration of air fall volcanic ashes, second type of kaolinite have formed mainly on the adjacent landmass, but some crystallization of gels within the basin is not ruled out, third type of kaolinite is related to weathering of coals.

**Key words:** Kaolinite rock, Coal bearing stratum, China

### 1. Introduction

The explored reserve of kaolinite rocks of coal-bearing strata in China is about 1.6 billion tons, most of which is located in the Permo-Carboniferous strata of North China. The study of coal-measures kaolin in China started from the early 1950s. Qingxuan Chen first found kaolinite in Inner Mongolia Daqingshan Carboniferous coal-bearing strata in 1953. Yonghe Shen proposed formally to use "kaolinite" as sedimentary rock types, which was mainly composed by kaolinite and other related

minerals in 1959. Since the early 1980s, Zhi Zheng et al., have investigated the rock kaolinite clay of Carboniferous-Permian coal measures in Shanxi, Inner Mongolia, Hebei, Shandong. It was found that kaolinite usually existed in the upper part of sedimentary cycle, deposited vertically, which was formed in the hydrodynamic environment form powerful to weak. Yiping Zhou (1983) made an analysis of kaolinite tonstein in the Upper Permian xuanwei formation coal in eastern Yunnan. We can draw a conclusion that the sedimentary alteration of volcanic ash may be the main formation mode of kaolinite tonstein, but not the only one. After studying kaolinite in Carboniferous-