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Some considerations of the influence of source clay material and synthesis conditions on the properties of Al-pillared clays

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Abstract

Al-pillared clays were prepared from naturally occurring bentonite without separation of accessory minerals, quartz, cristobalite or feldspars. The method generally accepted for cross-linking of montmorillonite was used, the formation of Al-polyhydroxy species in solutions of aluminium chloride partially neutralized by NaOH and then mixed with suspension of bentonite. By heating the complex obtained to the temperature of dehydration, Al-pillared clay was formed. The influence of $A1^{3+}$ concentration, the OH/AI ratio, the temperature of ageing of the Al-complex, the Al/bentonite ratio, the content of bentonite in thé suspension and the grain size on the position of thé X-ray basai reflection were investigated.

It was found that a material with a grain size of < 45 ^m and a concentration of bentonite up to 0.5 wt% produced a pillared clay that bas the same properties as material of a small grain size ($< 2\ \mu m$) and diluted solutions.

1. Introduction

Factors influencing the formation of cationic hydroxy metal complexes with smectite clays, e.g. Al-polyhydroxy-montmorillonite for the preparation of cross-linked or pillared clay, are the concentration of aluminium ions, the ratio of Al/ OH, pH, the temperature of aging of the polyhydroxy species, the temperature of dehydration necessary for alumina clusters to be formed as interlayer linking elements, and the nature, structure and grain size of bentonite clay. The resulting interlayer spacing, specified surface area, adsorption and catalytic properties are determined by the nature of the source material and the procedure of its treat-