Synthesis of Al-La-Pillared Clays Using Microwave Irradiation

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Introduction

Pillared aluminum-lanthanum clays were synthesized using microwave irradiation during the cationic exchange. Bentonite was used as a natural source from clay. Ratio (Al/clay) of 5 mmol/g was employed. Pillars of Al-La were prepared by a novel route using microwave irradiation. XRD, specific area (BET), FT-IR and TGA analysis were performed to characterize these materials. Preparation times were shorter as compared to the conventional method.

Results and discussion.

In this work, we tested the intercalation of bentonite with Al-La pillars employing a novel method of preparation, via microwave irradiation \cite{1} in both stages: pillars preparation and pillaring, in order to reduce the time of preparation of intercalating solution from 120 to 5 h, comparing with the methods reported by Starter and Kloprogge \cite{2}. For the intercalated bentonite the time of preparation was also reduced from 18 h to 10 min.

Table 1 presents the experimental preparation data of intercalating clays, synthesized with 5 and 30 Al/La molar ratio and 1, 3 and 5 hours of irradiation. The specific BET-area and basal spacing of samples exhibited in table 1 indicate that the bentonite was intercalated with the Al-La hydrated polioxocation.

Figure 1 shows the XRD patterns of bentonite and pillared bentonite with Al-La. As was observed the pillared bentonite keeps the same structure, indicating a more thermal stability than the bentonite.

Table 1

<table>
<thead>
<tr>
<th>Sample</th>
<th>Al/La Molar ratio</th>
<th>Al Conc. (M)</th>
<th>Meq Al/g clay</th>
<th>ts\textsuperscript{1} (h)</th>
<th>BET-area (m\textsuperscript{2}/g)</th>
<th>Basal spacing (Å)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BENT</td>
<td>-</td>
<td>-</td>
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<td>-</td>
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<td>5</td>
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<td>5</td>
<td>168</td>
<td>24.7</td>
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</tbody>
</table>

\textsuperscript{1} ts: time preparation of intercalating solution
Fig. 1 XRD patterns: Bentonite and pillared Al-La-Bentonite, calcined at 500 °C for 5 h

References