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### Study on Desulfurization of SO<sub>2</sub> by Desulfurization Agent of Attapulgite Compounded with Calcium Oxide

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## Study on Desulfurization of SO<sub>2</sub> by Desulfurization Agent of Attapulgite Compounded with Calcium Oxide

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**Key words:** Attapulgite, CaO, desulfurization, SO<sub>2</sub>, adsorption, catalysis

**Abstract.** Sulfur dioxide is one of the major pollutants resulting from fuel combustion. In this study, CaO and attapulgite were utilized as raw material for synthesizing CaO/attapulgite(CaO/ATP) desulfurizer. The performance of samples was studied in dynamic conditions. Major factors affecting the desulfurization such as weight ratio of CaO to total, types of modifiers, desulfurizer particle size, bed temperature were investigated. The desulfurization agent synthesized under optimal synthesis conditions with an CaO content of 30 wt% and an NaOH modifier, and the desulfurization reaction processed under optimal synthesis conditions with water content of 20~30wt%, a particle size of 1/10 of desulfurization tower diameter and room temperature, exhibit sulfur tolerance of 17.97wt%.

### Introduction

Lime/gyp method is a conventional dry desulfurizing method, which uses CaO or Ca(OH)<sub>2</sub> as desulfurizers. The lime/gyp method is considered to be more effective and cheaper than other desulfurizing methods, such as activate carbon adsorption and Claus recycle, etc.. But the calcium-based desulfurizer has a big problem: It was easily scaling during the process of desulfurization, because CaSO<sub>4</sub>, whose molar volume is three times as much as CaO, was generated, and the micro pore of desulfurizer would soon be jammed by CaSO<sub>4</sub>, which prevented the reaction and decreased SO<sub>2</sub> removal efficiency [1-4].

The attapulgite (ATP) is a chain material with structural formula [(OH)<sub>2</sub>]<sub>4</sub>(Mg,Al,Fe)<sub>5</sub>(OH) • 2Si<sub>8</sub>O<sub>20</sub>] • 4H<sub>2</sub>O. The structure of ATP results in zeolite-like channels. The researchers had studied its properties[5-7], and some concerned about the aspect of modifying material of compound material[8]. Because of its structural morphology, ATP has received considerable attention with regard to the adsorption on the clay surfaces and to their use as support for catalysts [9,10]. The studies of using attapulgite as a desulphurizer had less reported. In this study, a kind of new desulfurizer, made of ATP and CaO, was prepared, and its properties were studied.

### Experimental

**Material.** Attapulgite clay was produced from Linze, Gansu, China(60-mash sieve, specific surface area 110~150m<sup>2</sup>/g), with ATP content of 31%~57%, illite and kaolinite content of 18%~23%, quartz and feldspar content of 15%~25%, dolomite and montmorillonite content of trace. The other reagents supplied by their manufacturers was all analytical pure.

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