Short Communication

Effect of ultrasonic vibration on the texture of chromia-alumina catalyst

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1. Introduction

During the last few years our understanding of the fundamental nature of catalyst surfaces has increased. It is now recognised that the intrinsic properties of a catalyst such as its electrical conductivity, acidity, basicity, etc., depend to a large extent on its textural properties such as surface area, pore size distribution, porosity, etc., besides the chemical composition of the catalyst and the method of its preparation and pretreatment. In many instances an unmistakable correlation was observed between the textural properties of a catalyst and its catalytic activity for a chosen reaction. In the case of chromia-alumina catalysts, their cracking activity was found to depend on the surface area. In fact in this particular case, the batch to batch variations in the activity of the catalysts could be estimated from their relative surface areas themselves. Several investigators[1-7] reported the influence of the method of preparation and pretreatment on the texture of the resulting catalyst. This is particularly so in the case of alumina-based catalysts where the temperature of activation has a pronounced influence on the texture and composition of the resulting catalysts. In view of the commercial importance of chromia-alumina catalysts for cracking reactions, the influence of ultrasonic vibration as a means of stirring was studied.

2. Results

Chromia-alumina catalyst was prepared both by mechanical stirring and ultrasonic vibration.

Specific surface area of the catalyst was determined by the EGME (ethylene glycol-monoethyl ether) adsorption method[8] and pore size distribution and pore volume by

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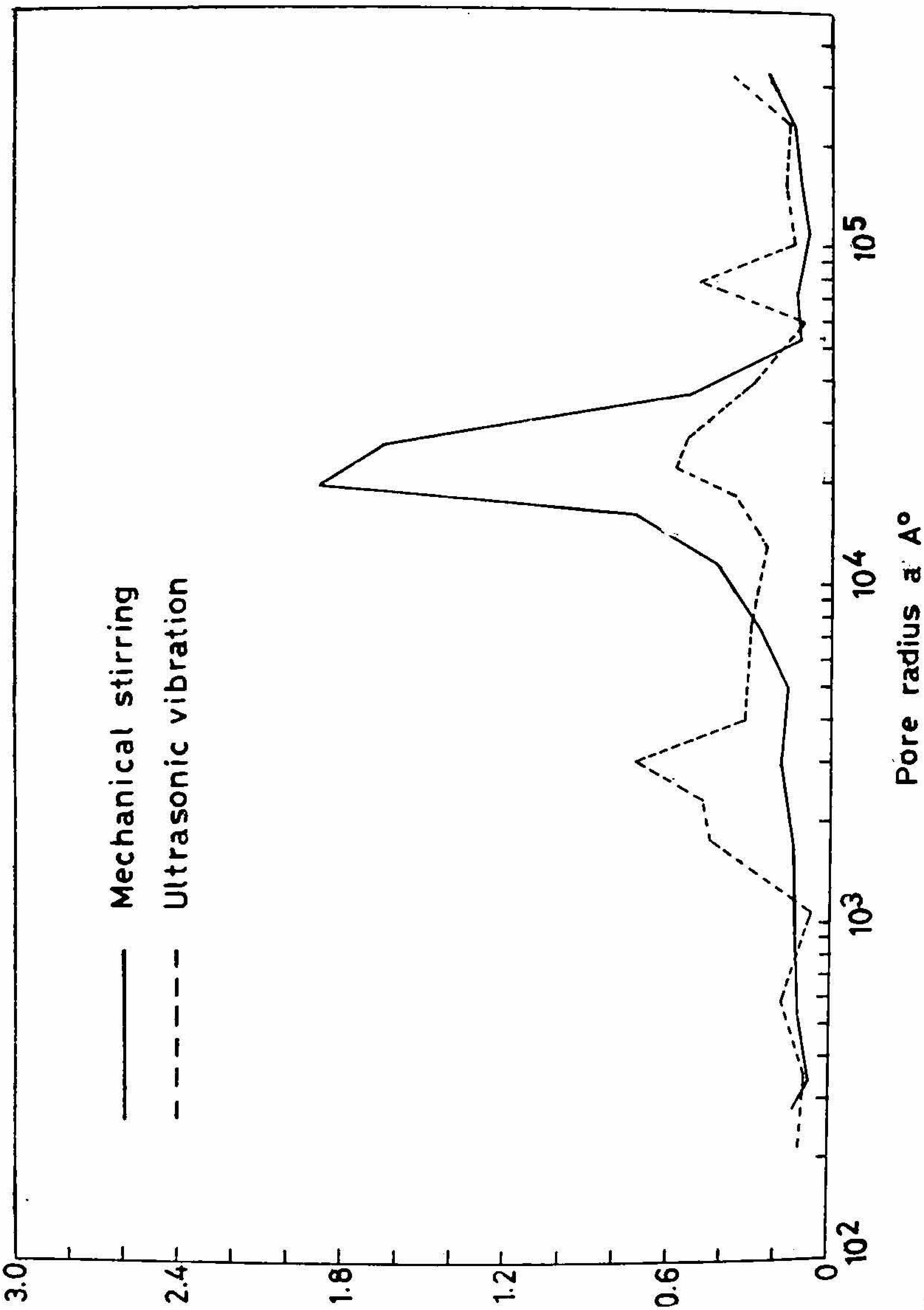

FIG. 1. Pore volume distribution of chromia-alumina catalyst.

Table I

Catalyst properties

Catalyst	Surface area sq m/g	Pore volume cc/g
Mechanical stirring	16·7	1·38
Ultrasonic vibration	23·5	1·50

High-pressure Mercury Porosimeter. The data are presented in Table I and the pore size distribution in Fig. 1. It can be seen from the table that ultrasonic vibration increases the surface area and pore volume of the catalyst by about 40 per cent and 9 per cent respectively. This increase could be traced to the change in the pore size distribution as evident from the figure. Thus ultrasonic vibration creates more fine pores thereby resulting in a more porous catalyst with increased surface area.

Detailed studies on the effect of ultrasonic vibration on the catalyst texture and the cracking activity of the resulting catalysts are under progress.

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