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Short communication

High pressure hydrogen sulphide adsorption on silica–aluminas

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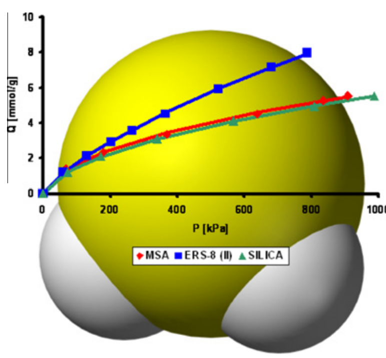
HIGHLIGHTS

- ▶ We provide H_2S adsorption isotherms on different silica–aluminas.
- ▶ Results point to prominent role of micropores in determining adsorption performances.
- ▶ Single-gas (H_2S, CO_2, CH_4) descriptors evidence separation opportunities.
- ▶ A sample is proposed for H_2S bulk removal from natural gas.

GRAPHICAL ABSTRACT



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ABSTRACT

Applicability of amorphous silica–alumina to hydrogen sulphide bulk removal from natural gas has been discussed on the basis of thermodynamic descriptors obtained from single-gas adsorption tests. Experiments performed at 303 K within a pressure range from vacuum to 1000 kPa have shown the prominent role of narrow micropores in determining key adsorption performances, regardless to sample chemical composition. A specific microporous silica–alumina has been proposed as suitable adsorbent according to its (i) hydrogen sulphide Henry's selectivity over methane; (ii) hydrogen sulphide specific capacity at 500 kPa; (iii) hydrogen sulphide working capacity, assuming an isothermal depressurisation from 500 kPa to 50 kPa; and (iv) textural stability. Activity involving experiments with mixtures resembling raw natural gas has to be planned in order to confirm these promising clues.

1. Introduction

Natural Gas (NG) consumption grew significantly (+7.5%) in 2010, in spite of the World economical crisis [1]. Furthermore, NG share of the global energy demand is foreseen to grow unabated for decades to come [2].

Such scenario is due to (i) implementation of more efficient transportation systems; (ii) remarkable reserves found; and (iii) NG clean-burning characteristics. Producers have till now developed the simplest and cheapest fields. In future, however they will have to contend with reservoirs containing increasingly *sour gas*. In fact, some 40% of remaining NG reserves is sour, with about 10 Gm^3 containing more than 10 vol% hydrogen sulphide and at least 20 Gm^3 containing more than 10 vol% vol carbon dioxide [3]. In most cases hydrogen sulphide and carbon dioxide accompanies one to each other. As a consequence, energy companies are

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