

***Experimental tests on a high-temperature
H₂S removal bench scale system***

Caterina Frau^(*), Francesca Ferrara, Alberto Pettinau,
Alessandro Orsini, Carlo Amorino, Mario Porcu

Sotacarbo S.p.A. – Grande Miniera di Serbariu, 09013 Carbonia, ITALY

Abstract

Hydrogen sulphide is the most abundant sulphur compound in coal syngas and involves the need to introduce removal systems in order to meet the emission regulations and to preserve the equipment from corrosion. Gasification of a high sulphur coal, in particular for hydrogen production, requires the use of highly efficient desulphurisation systems. Moreover, depending on the plant configuration, the use of a hot gas desulphurization system (instead of a conventional cold gas desulphurisation process) could allow to increase the overall efficiency of a power generation plant. Regenerable metal oxides sorbents are the best candidates for hydrogen sulphide removal from hot coal syngas.

Sotacarbo is currently engaged in a research project regarding the development and optimization of coal-to-hydrogen technologies for distributed power generation. In this field, a series of experimental tests has been planned to characterize different commercial zinc oxide based sorbents to be used in the hot gas desulphurisation system included in the Sotacarbo coal-to-hydrogen pilot plant.

This paper shows the main results of the preliminary experimental tests carried out in a bench scale fixed bed reactor in the Sotacarbo Laboratories. The behaviour of commercial sorbents based on zinc oxide has been investigated as high temperature desulphurising agents from non-reducing gaseous streams containing 1.5% (in volume) of H₂S diluted in N₂. In particular, the effects of space velocity and temperature on the sulphidation reaction have been analysed.

Keywords: hot gas desulphurisation, zinc oxide, H₂S removal, bench scale reactor.

* Corresponding author:

email: c.frau@sotacarbo.it
phone: +39 0781 670444
fax: +39 8781 670552