Environmental Engineering and Management Journal, September 2002, Vol.1, No.2, 139-146
http://omicron.ch.tuiasi.ro/EEMJ/

"Gh. Asachi" Technical University of Iasi, Romania

HIGH TEMPERATURE DESULPHURIZATION OF HYDROGEN SULPHIDE CONTAINING GASES ON ZINC OXIDE ABSORBENTS

Ion Untea*, Eugen Pincovschi, Madeleine Dăncilă

Politehnica University of Bucharest, Faculty of Industrial Chemistry, Polizu Str.No.1, Bucharest, ROMANIA

Abstract

Solid absorbents able to remove hydrogen sulphide from gases at high temperatures mainly consist of metal oxides. Zinc oxide shows superior thermodynamic properties and exhibits a high desulphurization yield for the temperature range 350-450^{0}C. In strongly reducing atmospheres at high temperatures, zinc oxide is slowly reduced to volatile metallic zinc. The low thermal stability, low reaction rate with hydrogen sulphide and poor regenerability cause bulk zinc oxide to be less favourable for industrial applications. In order to ameliorate its thermal stability, increase reaction rate with hydrogen sulphide and to improve the absorbent regenerability, zinc oxide-alumina and zinc oxide-alumina-titanium oxide absorbents have been developed. The desulphurization performances of the absorbents are strongly influenced by the preparation conditions and by the ZnO:Al_2O_3:TiO_2 molar ratios. Alumina induces an important increase of surface area and pore volum of the absorbent and TiO_2 increase the stability of zinc oxide in reducing atmospheres at high temperatures and prevent $ZnSO_4$ formation in regeneration step. The absorbent structure is more stable and the sulphur retention capacity is higher, the utilisation degree of zinc oxide increasing from aproximatively 40% to more than 90%. The absorbents regeneration by air oxidation at 700^{0}C is complete and no $ZnSO_4$ formation takes place.

Keywords: high temperature desulphurization, hydrogen sulphide, zinc oxide

* Author to whom all correspondence should be addressed: Politehnica University of Bucharest, Faculty of Industrial Chemistry, Polizu Str.No.1, Bucharest, ROMANIA, Tel. 0040-21-2129960, 0040-21-2129970 / 120, 122; E-mail: untea@haste.ctap.pub.ro