DESCRIPTION

TITLE: Process for preparing a compound of formula RSH by hydrosulfurization

Summary

In one aspect, the present disclosure refers to a method for preparing a compound of formula RSH where R represents an alkyl group, by gas-phase catalytic reaction of hydrogen sulfide with a compound of formula ROH, in the presence of a solid catalyst, characterized in that the reaction is performed in the presence of a catalyst which comprises or consists of one or several pure or mixed rare-earth oxide(s), one or several pure or mixed rare-earth sulfide(s), or one or several pure or mixed rare-earth oxysulfide(s), provided that when the rare earth is lanthanum, said catalyst is a mixed oxide of lanthanum and of at least one metal selected from rare earths or not and when the rare earth is cerium, said catalyst is supported.

Detailed Description

The invention concerns a method for gas-phase catalytic hydrosulfurization of an alcohol into the corresponding thiol. More particularly, it is described for the production of methanethiol from methanol and hydrogen sulfide, without its scope being restricted thereto.

The hydrosulfurization reaction of methanol into methanethiol through a gas-phase catalytic route is known. Usually, this is carried out in the presence of a catalyst based on an oxide of tungsten and of an alkaline metal supported on an alumina, as described for example in the patent WO2013092129A1.

Nevertheless, there are some researches covering alternative catalysts in the literature. Thus, the works of Plaisance and Dooley (Catalysis Letters, 2009, 128, 449-458) describe the use of catalysts based on different oxides of metals such as tungsten (WO_3), lanthanum (La_2O_3) or titanium (TiO_2) supported on various solids. Amongst all of these, tungsten oxide is most active one. These works highlight the fact that the activity of each of the tested catalysts depends on different parameters and that it is hard to determine optimum conditions that are common to several catalysts. In addition, with the catalyst based on lanthanum oxide supported on alumina (La_2O_3/Al_2O_3), a high methanol conversion is obtained, but this is accompanied with a very low methanethiol selectivity, which makes this catalyst incompatible with an application on an industrial scale.

Moreover, Ziolek *et al.* (Journal of Molecular Catalysis A: Chemical, 1997, 97, 49-55) describe the influence of the adsorption of hydrogen sulfide during the hydrosulfurization reaction of methanol in the presence of different catalysts based on oxides of magnesium (MgO), titanium (TiO_2), zirconium (ZrO_2), cerium (CeO_2) and aluminum (Al_2O_3). In particular, the authors have observed the highest adsorption of hydrogen sulfide on ceria and have correlated this phenomenon with increased methanethiol and dimethyl sulfide selectivities. Nevertheless, with an average methanol conversion, this catalyst generates a large amount of methane, at the expense of the methanethiol selectivity, such that methane becomes the predominant product of the reaction under some conditions.

It turns out that, to date, there is still the need to develop conditions of a catalytic hydrosulfurization reaction of methanol in a gas phase, at the level of the catalyst as well as the parameters of the process, which features both a high