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IMPROVED PROCESS FOR SELECTIVE OXIDATION OF SULFIDE GROUPS TO SULFONE BY SILSESQUIOXANE CATALYSTS

Patent
ES2415529

Code

QUI_UAH_05

Application areas

- Other Industrial Technologies
- Biological Sciences
- Environment and risk prevention

Type of Collaboration

- Technical cooperation
- Commercial agreement with technical assistance
- License agreement

Main Researchers

Prof. Tomás Cuenca Agreda

CONTACT

OTRI Universidad de Alcalá
Escuela Politécnica Superior
Campus Científico-Tecnológico
28805, Alcalá de Henares
(Madrid)
(+34) 91 885 45 61
otriuah@uah.es

@otriuah

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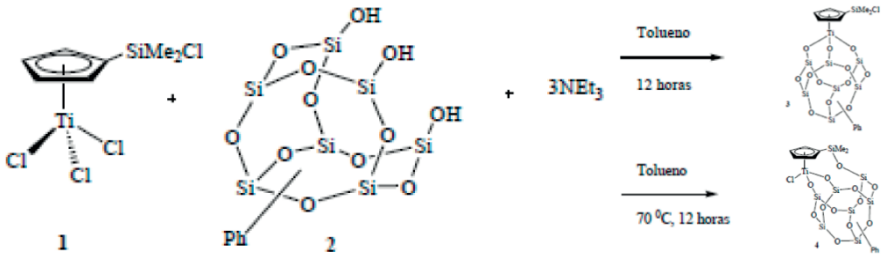

ABSTRACT

The present invention is based on the synthesis of titanium silsesquioxane compounds and its applications in oxidation catalyst of organic sulphur compounds using as oxidant tert-Butyl hydroperoxide and hydrogen peroxide.
In a first aspect, the present invention relates to the synthesis of the catalysts. The general procedure consists in the reaction of the titanium compound (1) with the partially condensed silsesquioxane compound (2) in the presence of a base such as trimethylamine all dissolved in an apolar solvent such as toluene.
The Catalyzing of oxidation of sulphides is the oxidation of the functional sulfide group to the functional sulfoxide group or sulfone, or both. It is carried out in presence of a titanium catalyst and a peroxide as a source of oxygen that could be TBHP o H2O2. It is used as a solvent, a nonpolar or aprotic medium, if the peroxide is TBHO or a polar or protic medium if the peroxide is H2O2. The process is carried out at atmospheric pressure and room temperature. On the assumption that both oxidation products are obtained, by adding another equivalent of peroxide, the reaction evolves over time toward the maximum oxidation product, which is sulfone.
The products are obtained in high capacity and purity

ADVANTAGES AND INNOVATIONS

- The catalysts are easy to synthesize and in the synthesis process is generated triethylammonium chloride, an inert inorganic salt, as the only byproduct derived therefrom. This salt is easily disposable by filtration.
- The catalysts are resistant to degradation under the conditions of catalysis.
- The titanium catalysts are slightly toxic. According to the International Agency on Cancer Research, titanium is not classified as a carcinogen element to humans.
- The Catalysis process can be performed without an inert atmosphere.
- The process shows improvements in the selectivity of the process, reaching capacities of a 100% in obtaining the sulfoxide.
- Once the sulfoxide has been generated, the same catalyst can be used for the synthesis of the sulfone.
- The oxidant used, preferably H202, is safe for the environment. Since the byproduct generated is water.
- The conditions of pressure and temperature are easily accessible.
- The procedure is simple, efficient and cheap, since the compound that would represent a higher cost, which is the catalyst, is used in a very low proportion.