

beneficial to be able to produce solely the oxirane compound such as propylene oxide.

A process has now been found which makes it possible to prepare oxirane compounds without the need to prepare further compounds at the same time.

The present invention relates to a process for the preparation of oxirane compounds, which process comprises:

- (i) oxidation of an alkylaryl to obtain an alkylaryl hydroperoxide,
- (ii) contacting at least part of the alkylaryl hydroperoxide obtained in step (i) with olefin in the presence of a catalyst to obtain an oxirane compound and alkylaryl hydroxyl,
- (iii) separating oxirane compound from reaction product of step (ii),
- (iv) contacting at least part of the reaction product from which the oxirane compound has been separated, with hydrogen to obtain alkylaryl at least part of which is recycled to step (i),

in which process the alkylaryl ~~is an alkylaryl compound comprising more than 1 alkyl substituent~~ compound is di(isopropyl) benzene.

It has been found that the use of an ~~alkylaryl compound comprising more than 1 alkyl substituent~~ in di(isopropyl) benzene a process as described above makes that the amount of alkylaryl can be smaller than in a similar process in which ethylbenzene or cumene are used. Without wishing to be bound to any theory, it is thought that an ~~alkylaryl substituent containing more than 1 alkyl substituent~~ di(isopropyl) benzene does not only have the option to carry more than 1 hydroperoxide group, but that furthermore the alkyl substituents which are present are converted faster into a hydroperoxide group, measured as number of hydroperoxide groups per litre of alkylaryl per hour oxidation time.

~~The alkylaryl compound employed in the process according to the present invention is an alkylaryl compound comprising more than 1 alkyl substituent. If a mixture of alkylaryl compounds is present in the process according to the present invention, the mixture of alkylaryl compounds is to have on weight average more than 1 alkyl substituent. Preferably, the alkylaryl compound for use in the present invention comprises more than 1 alkyl substituent, at least one of which is a branched alkyl substituent comprising from 3 to 10 carbon atoms. An alkylaryl compound containing several substituents has the advantage that it can contain several hydroperoxide groups. However, in view of potential side reactions, it is preferred that there are no more than 3 substituents. The alkylaryl compound or mixture of alkylaryl compounds preferably has, on weight average, of from 1.5 to 2.5 substituents. Most preferably, the alkylaryl compound contains about 2 alkyl substituents. Most preferably, the alkylaryl compound is di(iso propyl)benzene. Although mixtures of different alkylaryl compounds can be employed, a single type of compound is preferred in order to be able to optimise the process conditions for this specific compound.~~

Preferably, the alkylaryl for use in the present invention is prepared in a process for preparing cumene in which process propene is reacted with benzene in the presence of a suitable catalyst. Such processes have been described in EP-A-361755 and in EP-A-371738. These processes generally have di-isopropylbenzene as a by-product. Conventionally, the crude reaction product is sent to a first distillation column where benzene is separated off. Subsequently, the bottom product of the first column is sent to a second column where cumene is separated off, and finally, the bottom product of the

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1. Process for the preparation of oxirane compounds,  
which process comprises:

(i) oxidation of an alkylaryl to obtain an alkylaryl  
hydroperoxide,

5 (ii) contacting at least part of the alkylaryl  
hydroperoxide obtained in step (i) with olefin in the  
presence of a catalyst to obtain an oxirane compound and  
alkylaryl hydroxyl,

10 (iii) separating oxirane compound from reaction product  
of step (ii), and

(iv) contacting at least part of the reaction product  
from which an oxirane compound has been separated, with  
hydrogen to obtain alkylaryl at least part of which is  
recycled to step (i),

15 in which process the alkylaryl ~~is an alkylaryl compound~~  
~~comprising more than 1 alkyl substituent~~ compound is  
di(iso-propyl)benzene.

20 ~~2. Process according to claim 1, in which process the~~  
~~alkylaryl compound is an alkylbenzene in which the alkyl~~  
~~substituent is a branched alkyl substituent comprising~~  
~~from 3 to 10 carbon atoms.~~

~~3. Process according to claim 1 or 2, in which process~~  
~~the alkylaryl compound is an alkyl aryl compound~~  
~~containing about 2 alkyl substituents.~~

25 ~~4. Process according to claim 3, in which process the~~  
~~alkylaryl compound is di(iso propyl)benzene.~~

~~5. 2. Process according to any one of claims~~ claim 1 to  
4, in which in step (ii) alkylaryl hydroperoxide is  
contacted with propene at a temperature in the range of  
30 from 0 to 200 °C, and a pressure in the range of from 1

to  $100 \times 10^5 \text{ N/m}^2$  in the presence of a catalyst comprising titanium on silica and/or silicate.

5     6. 3. Process according to ~~any one of claims~~ claim 1 to  
5 or 2, in which the hydrogenation of process step (iv)  
is carried out at a temperature of from 180 to 330 °C,  
and a pressure of from 0.1 to  $50 \times 10^5 \text{ N/m}^2$ .