Process for the alkylation of phenols

Description

The present invention relates to a process for the preparation of 2,6-di-tert-butyl phenol by reacting phenol with an isobutylene comprising stream, which stream additionally comprises higher amounts of 1-butene and/or 2-butene, in presence of an aluminum phenoxide catalyst.

2,6-di-tert-butyl phenol is used industrially as UV stabilizer and antioxidant for hydrocarbon-based products ranging from petrochemicals to plastics, and also as a starting material for the preparation of various antioxidants for plastics, like Irganox® 1010 or Irganox® 1076.

The preparation of 2,6-di-tert-butyl phenol usually results in the formation of undesired by-products, like 2-tert-butyl phenol, 2,4-di-tert-butyl phenol, 2,5-di-tert-butyl phenol and 2,4,6-tri-tert-butyl phenol and there is still a need to selectively react isobutylene with phenol in order to reduce the formation of such by-products and to produce 2,6-di-tert-butyl phenol in high yields.

In addition, isobutylene comprising streams usually also comprise 1-butene and/or 2-butene which, when reacted with phenol, lead to the formation of the undesired by-product 2-sec-butyl-6-tert-butyl phenol.

WO-A-2011/069052 discloses a process for the preparation of 2,6-di-tert-butyl phenol by reacting phenol with an isobutylene stream, containing low amounts of 1-butene and/or 2-butene.

However, common isobutylene streams from olefin steam crackers or refineries usually contain higher amounts of 1-butene and/or 2-butene. For such streams the higher amount of 1-butene and/or 2-butene may lead to the formation of higher amounts of the undesired by-product 2-sec-butyl-6-tert-butyl phenol.

Therefore, there is still a need for a process for the preparation of 2,6-di-tert-butyl phenol, wherein also common isobutylene streams can be used and which result in low amounts of by-products and high yields of 2,6-di-tert-butyl phenol.

Accordingly, in an aspect, there is provided a process for the preparation of 2,6-di-tert-butyl phenol by reacting phenol with isobutylene in presence of an aluminum phenoxide catalyst, comprising