ACTIVATION AND USE OF HYDROALKYLATION CATALYSTS

PRIORITY CLAIM

[0001] This application claims priority to U.S. Provisional Application Serial No. 61/712,980 filed October 12, 2012, the disclosure of which is fully incorporated herein by reference.

FIELD

[0002] The present invention relates to the activation of hydroalkylation catalysts and to the use of the activated catalysts in producing cycloalkylaromatic compounds, in particular cyclohexylbenzene.

BACKGROUND

[0003] The production of cycloalkylaromatic compounds, such as cyclohexylbenzene, is a commercially important process since the latter has utility as a solvent and a source of chemical intermediates, such as, for example, phenol and cyclohexanone, which are important intermediates in the production of, for example, phenolic resins, bisphenol A, ε-caprolactam, adipic acid and plasticizers.

[0004] One process for producing cycloalkylaromatic compounds, such as cyclohexylbenzene, involves the catalytic hydroalkylation of aromatic compounds, such as benzene, over a bifunctional catalyst. The bifunctional catalyst may comprise an alkylation component comprising a solid acid, such as a molecular sieve, or amorphous silica-alumina, or any suitable solid acid, and a hydrogenation component, such as a Group 8-10 metal. The hydrogenation component may be introduced into the catalyst by impregnation with a solution of a water-soluble salt of the relevant Groups 8-10 metal. The catalyst may also comprise promoters, such as, for example, alkali or alkali-earth metals, Group 3 or Group 4 metals, Zn, Sn, Re, halogens, etc. The impregnated catalyst is then dried and calcined in air, typically at a temperature of 250°C to 550°C. To bring the catalyst into its active form, the catalyst is then heated in the presence of hydrogen primarily to reduce the hydrogenation component to its active metallic form. This activation process may also serve to remove adsorbed water that would inhibit the alkylation reaction.

[0005] An example of such a process is described in, for example, U.S. Patent No. 3,760,017, which discloses a method for the catalytic hydroalkylation of benzene to cyclohexylbenzene using a bifunctional catalyst followed by the conversion of the cyclohexylbenzene to cyclohexanone and phenol by air oxidation and acid decomposition. The bifunctional catalyst comprises a metal in Groups 8-10 of the Periodic Table selected