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July 23, 2003

B00/0509PCSG IB/XS/cca

Removal of formic acid from aqueous solutions

Abstract

A method of at least partly removing formic acid from an aqueous solution comprising formic acid, cyclohexanone and cyclohexanol comprises decomposing the formic acid over a basic metal oxide of metals of groups 2, 4, 5, 12 and/or 14 or over a noble metal of groups 8-11 on an oxidic support as decomposition catalyst.

The method is preferably used for the further processing of reaction products from the oxidation of cyclohexane in a process which comprises the following steps:

- (i) extraction of the product gas mixture obtained in the oxidation of cyclohexane using an aqueous scrubbing liquid to give an aqueous solution comprising carboxylic acids
- (ii) separation of the aqueous solution comprising carboxylic acids obtained in step (i) into an aqueous solution comprising formic acid, cyclohexanone and cyclohexanol together with further minor organic components and a carboxylic acid mixture by distillation, with the carboxylic acid mixture being able to be processed further in a customary manner to give 1,6-hexanediol,
- (iii) at least a partial removal of the formic acid from the aqueous solution comprising formic acid, cyclohexanone and cyclohexanol obtained in step (ii) by decomposition of the formic acid over a basic metal oxide of metals of groups 2, 4, 5, 12 and/or 14 or over a noble metal of groups 8-11 on an oxidic or nonoxidic support as decomposition catalyst,
- (iv) further processing of the aqueous solution comprising cyclohexanone and cyclohexanol obtained in step (iii) to give epsilon-caprolactam,
or
use of the aqueous solution comprising cyclohexanone and cyclohexanol obtained in step (iii) as scrubbing liquid in step (i).