

催化、动力学与反应器

苯酚液相原位加氢合成环己酮和环己醇

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摘要

基于吸热的甲醇水相重整制氢反应和放热的苯酚液相催化加氢反应使用相同类型的催化剂，比较接近的反应温度和压力，且都在液相状态下进行的特点，提出在Raney Ni催化剂的作用下，将甲醇水相重整制氢反应产生的氢气原位地应用于苯酚加氢合成环己酮和环己醇的反应，实现了水相重整制氢和液相催化加氢两个反应的耦合。消除了传统方法中需要专门的氢气制备、存储和输送等环节，简化了工艺、降低了生产成本。通过这两个反应的耦合，甲醇水相重整过程中甲醇转化率和氢气选择性都得到明显提高；同时，在Raney Ni催化剂[JP2]作用下实现了苯酚的高选择性还原(环己酮和环己醇总选择性达99%以上)，比传统的氢气还原法具有更好的效果。

关键词

[苯酚](#) [液相原位加氢](#) [环己酮](#) [环己醇](#) [Raney Ni](#)

分类号

Liquid phase in-situ hydrogenation of phenol for synthesis of cyclohexanone and cyclohexanol

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Abstract

Based on the combination of the methanol aqueous-phase reforming (APR) and catalytic hydrogenation of phenol, a novel reaction system of liquid phase *in-situ* catalytic hydrogenation of phenol for the synthesis of cyclohexanone and cyclohexanol, in which hydrogen is produced from methanol aqueous-phase reforming in the same reactor over the Raney Ni catalyst, is proposed. The production, preservation and transportation of H₂ in the traditional hydrogenation process could be eliminated, which leads to the decrease of cost and enhancement of safety significantly. In this coupling process, methanol is the raw material of the aqueous-phase reforming reaction. It is the solvent of the liquid-phase hydrogenation of phenol, on the other hand. While hydrogen is the product of the aqueous-phase reforming of methanol, it is at the same time the raw material of phenol hydrogenation reaction. The active hydrogen generated from the aqueous-phase reforming of methanol could be quickly removed from the active sites of the catalyst, through the in-situ hydrogenation of phenol, which could improve the selectivity of hydrogen for the APR process of methanol. Furthermore, highly selective hydrogenation of phenol to the aimed products cyclohexanone and cyclohexanol could be realized over the Raney Ni catalyst (100% of the total selectivity to cyclohexanone and cyclohexanol), which is superior to the traditional catalytic hydrogenation method by using H₂.

Key words

[phenol](#) [liquid phase in-situ hydrogenation](#) [cyclohexanone](#) [cyclohexanol](#) [Raney Ni](#)

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