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C2Po2B-06: Study on the factors influencing the catalytic performance of Ortho-Para hydrogen catalysts

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This study is based on a self-developed test device that achieves catalytic performance testing of Ortho-Para hydrogen catalysts in the liquid nitrogen temperature region. The hydrogen samples are pre-cooled to liquid nitrogen temperature and then flow through a packed bed converter filled with Ortho-Para hydrogen catalyst for isothermal conversion at liquid nitrogen temperature. The converted hydrogen samples were finally measured for parahydrogen concentration by a gas chromatograph equipped with a thermal conductivity detector. First, the compressed high-purity hydrogen and the hydrogen produced by electrolysis of water in a hydrogen generator were respectively used as carrier gases for the analysis of the same catalyst to compare the effects of the two types of hydrogen on the results of gas chromatography. Then, the catalysts were filled into the packed bed converters with the same inner volume, and the same reactivation method was used for the converters filled with catalyst samples of different particle sizes, and finally, the effect of particle size on the catalytic performance of Ortho-Para hydrogen catalysts was investigated experimentally. Furthermore, an experimental study on the effect of filling method on the catalytic performance of packed bed for Ortho-Para hydrogen conversion was conducted to compare the effect of loosely filled and tightly filled catalyst samples of the same volume on the catalytic performance. This study can provide relevant experimental data for the design of Ortho-Para hydrogen converters in actual hydrogen liquefaction systems and optimize the design and fabrication of Ortho-Para hydrogen converters.

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