

## Investigation of Catalytic Activity and Carbon Deposition for Steam Reforming of Toluene

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### Extended Abstract

In the printing and the painting factories, a large amount of solvent which is a volatile organic compound is used in the process of painting the paint on the product. The solvent used in the painting process is exhausted into the atmosphere or burned out [1]. During the combustion process of exhausted solvent, nitrogen oxides, such as NO<sub>x</sub>, are generated and exhausted to the atmosphere. Nitrogen oxides act as a cause of ultrafine dusts. Therefore, this study was conducted to convert these materials into energy without generating secondary air pollutants during the treatment of organic solvents [2-5].

Most of the organic solvents used in the painting process are thinner, and the main ingredient of the thinner is well known as toluene. In this study, a catalyst for the conversion of toluene into syngas by steam reforming reaction was prepared and the catalytic activity of the prepared catalyst according to the reaction temperature and S/C ratio was investigated. In this study, Rh and Ni were used as main active materials of catalyst and alumina was used as a catalyst support material. The formation behavior of coke, which is formed on the catalyst surface and lowers the catalytic activity, is also investigated. Hydrogen and carbon monoxide were produced from the reforming of toluene, and the contents of hydrogen and carbon monoxide in the thermodynamic equilibrium were about 60% and 20%, respectively. The content of hydrogen and carbon monoxide in the product obtained from the experimental results was similar to the thermodynamic equilibrium. However, the conversion of toluene was significantly different depending on the reaction temperature and S/C ratio. The performance difference of Ni and Rh catalysts was small under the space velocity of 7000 ml/g<sub>cat</sub>.h. While, it was confirmed that the conversion of toluene was increased with the addition of Rh as the space velocity was increased. On the other hand, carbon deposition occurred at 750 °C below S/C ratio of 2.5, and Ce used as the catalytic promoter suppressed carbon deposition to some extent.

### References

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