

8<sup>th</sup> International Conference and Exhibition on

## MATERIALS SCIENCE AND ENGINEERING

May 29-31, 2017 Osaka, Japan

**Deactivation of nickel-based catalysts during steam reforming of naphthalene in the presence of hydrogen chloride****Andrei Veksha**

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Gasification of municipal solid waste (MSW) is one of the measures to minimize landfilling and generate electricity. Gasification converts the waste into gaseous fuel (syngas), which can be used to generate electricity in gas turbines or gas engines at high net electrical efficiencies. However, the removal of tar compounds, which cause equipment fouling and pipe plugging, is required prior to syngas utilization. Among available technologies for the reduction of tar levels in syngas, catalytic tar reforming is considered the most promising. Unlike the syngas from traditional biomass sources, the syngas from MSW contains high levels of hydrogen chloride. The objective of this study was to investigate the influence of HCl on the activity of nickel-based catalysts during catalytic reforming of naphthalene, one of the most stable tar compounds in syngas. Two commercial alumina catalysts containing nickel (Cat. 1 and Cat. 2) and a catalyst prepared by impregnation of limestone with a nickel salt (Cat. 3) were tested at 790 °C in the absence and presence of HCl (2000 ppmv).

Regardless of HCl presence, commercial alumina catalysts converted ~90-100% of naphthalene into a mixture of H<sub>2</sub>, CO and CO<sub>2</sub>. Limestone catalyst had the lower conversion efficiency in the absence of HCl (~80%), which remained stable during the testing period. However, in the presence of HCl, the catalyst rapidly deactivated due to the reaction of support with HCl as revealed by SEM/EDX. Although the conversion of naphthalene over alumina catalyst was stable for 6 h in the presence of HCl, the composition of product gas has changed during this period. Specifically, the production of CO increased while the concentration of CO<sub>2</sub> decreased due to the loss of water-gas shift activity of nickel in the presence of HCl. The decrease in activity was attributed to the enlargement of nickel nanoparticles.

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