Improving the Hydrogen Release Capacity of $NaBH_4$ Via Mediation of Catalysts with Rare Metal Compounds

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This paper reports on doping with the catalysts consist of rare metal compounds like Co_2B, $La(NO_3)_3$, $Ce(SO_4)_2$, $Ti(SO_4)_2$, $CeCl_3$, $LaCl_3$ and mixed catalysts for improving hydrogen release capacity of $NaBH_4$. The results show that the hydrogen generation volume (HGV) is about 10ml and the hydrogen generation rate (HGR) is very low when doping with $La(NO_3)_3$, $Ce(SO_4)_2$, $Ti(SO_4)_2$, $CeCl_3$ and $LaCl_3$. Comparatively, Co_2B presents favorable catalytic effect on hydrogen generation properties of $NaBH_4$. The study on the mixed catalysts find that the HGV of the samples doped with mixed catalyst of Co_2B and $Ce(SO_4)_2$ is the largest. Among all doped samples, the HGV of sample doped with $5Co_2B\backslash 2Ce(SO_4)_2$ is the largest about 317ml. Compared to all samples doped with mixed catalysts, the samples doped with mixed catalysts of Co_2B, $Ce(SO_4)_2$, $Ti(SO_4)_2$ and $CeCl_3$ presents the best properties of hydrogen release. However, compared to Co_2B, doping with other catalysts makes the hydrogen release time of $NaBH_4$ longer. Overall, $NaBH_4$ doped with the mixed catalysts of Co_2B, $Ti(SO_4)_2$ and $CeCl_3$ present the optimal HGV and HGR than doped with any other catalysts.

Keywords: Hydrogen Release Capacity, Rare Metal Compounds, Mixed Catalysts, Catalytic Effect

Acknowledgments

This research was supported by the National Youth Science Foundation of China (Grant No. 11404112). This paper was also supported by the college students innovation project of North China University of Water Resources and Electric Power in 2014.

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Paper number: M201529