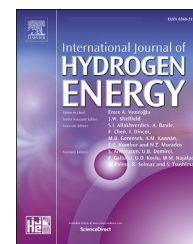


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# Ammonia decomposition over nickel catalysts supported on alkaline earth metal aluminate for H<sub>2</sub> production

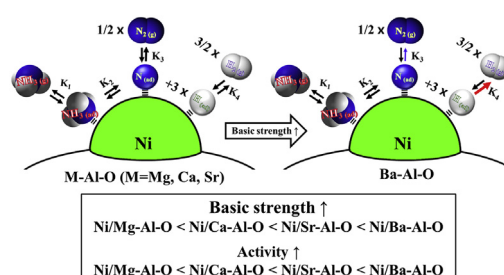
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## HIGHLIGHTS

- Ni/M-Al-O (M = Mg, Ca, Sr, Ba) catalysts were synthesized for NH<sub>3</sub> decomposition.
- Ni/Ba-Al-O catalyst exhibited the best catalytic performance.
- Basic property of the catalysts was related to their alkaline earth metal ions.
- Strong basic property of the catalyst reduced H<sub>2</sub> inhibition effect.

## GRAPHICAL ABSTRACT



## ARTICLE INFO

### Article history:

Received 12 May 2020

Received in revised form

30 June 2020

Accepted 1 July 2020

Available online 1 August 2020

### Keywords:

Ammonia decomposition

Hydrogen carrier

Hydrogen production

Alkaline earth metal aluminate

## ABSTRACT

The Ni catalysts supported on alkaline earth metal aluminate compounds, Ni/AM-Al-O (AM = Mg, Ca, Sr, Ba) were synthesized to investigate the influence of their basic property on NH<sub>3</sub> decomposition activity. The basic strength of the catalysts was confirmed to correspond to that of added alkaline earth metal in the support materials (Ni/Mg-Al-O < Ni/Ca-Al-O < Ni/Sr-Al-O < Ni/Ba-Al-O) from CO<sub>2</sub>-TPD measurement. This basic strength of the catalysts could influence the catalytic activity for NH<sub>3</sub> decomposition, which increased in order of the Ni/Mg-Al-O < Ni/Ca-Al-O < Ni/Sr-Al-O < Ni/Ba-Al-O catalysts. NH<sub>3</sub>-TPSR showed that the strong basic property weakened H<sub>2</sub> adsorption but slightly strengthened N<sub>2</sub> adsorption for the catalysts except for the Ni/Mg-Al-O catalyst. From the kinetic analysis, the absolute value of the H<sub>2</sub> reaction order decreased with increasing basic strength of the catalysts, indicating that the strong basic property of the catalysts could alleviate the H<sub>2</sub> inhibition in ammonia decomposition.

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<https://doi.org/10.1016/j.ijhydene.2020.07.014>

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