Title: A study on the deactivation and reactivation of a Ni/Al_2O_3 aldehyde hydrogenation catalyst: Effects of regeneration on the activity and properties of the catalyst

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A study on the deactivation and reactivation of a Ni/Al_2O_3 aldehyde hydrogenation catalyst: Effects of regeneration on the activity and properties of the catalyst

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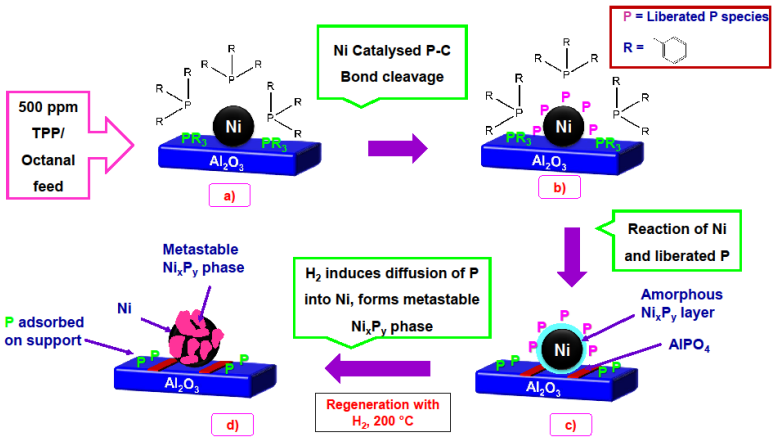
Graphical abstract



Highlights

- Poisoning of Al_2O_3 supported nickel hydrogenation catalyst with triphenylphosphine.
- Hydrogenation of octanal to octanol is presented.
- Three regeneration methods are proposed for the poisoned catalyst.
- Effective regeneration achieved with tandem octanol washing and hydrogen treatment
- Regeneration does not remove phosphorus from the catalyst

Abstract

The effectiveness of different experiments for the regeneration of a phosphorus poisoned 15 wt.% Ni/Al_2O_3 catalyst was investigated during the time on stream hydrogenation of octanal to octanol. The catalyst was deactivated after being exposed to feed contaminated with 500 ppm of triphenylphosphine. Regeneration of the catalyst was attempted by either treating the poisoned catalyst with hydrogen, washing the catalyst with octanol or conducting a combined octanol wash-hydrogen treatment experiment, all at elevated temperatures and at atmospheric pressure. The combined regeneration experiment was the most effective, since the conversion