Application of benzyltoluene in hydrogen energy storage

Is benzyltoluene a promising hydrogen storage media?
In this contribution we propose mixtures of the two LOHC systems benzyltoluene (H0-BT)/perhydro benzyltoluene (H12-BT) and dibenzyltoluene (H0-DBT)/perhydro dibenzyltoluene (H18-DBT) as promising hydrogen storage mediafor technical applications at temperatures below ambient.

What is a benzyltoluene-based liquid organic hydrogen carrier (LOHC) system?
The benzyltoluene-based liquid organic hydrogen carrier (LOHC) system enables the safe transport and loss-free storage of hydrogen. At least 26% of the lower heating value of the released hydrogen,however,has to be invested in form of heat to release the stored hydrogen.

Is benzyltoluene a good LOHC system?
LOHC technologies enable safe and efficient hydrogen logistics using the existent fuel infrastructure. This study presents benzyltoluene (H0-BT)/perhydro benzyltoluene (H12-BT) as a highly attractive technical LOHC system. Compared with the well-established LOHC systems toluene/methylcyclohexane and dibenzyl

Does benzyltoluene take up 12 h per carrier molecule?
Benzyltoluene (H0-BT) is an attractive LOHC that can take up 12 H per carrier molecule. The chemical equilibrium favors hydrogenation at lower temperatures and higher pressures. In this work,we study hydrogenation kinetics at 125-200 °C and 0.3-30 bar H 2.

How is benzyltoluene hydrogenated?
Main reaction steps of the hydrogenation of benzyltoluene (H0-BT) to perhydro benzyltoluene (H12-BT) via preferred hydrogenation of the main ring (MR) or the side ring (SR)as reported in the literature [16,26]. The main intermediate during the hydrogenation of H0-BT is H6-BT,where only one of the two aromatic rings has been hydrogenated.

Is dibenzyltoluene a suitable hydrogen storage media for winter applications?
High viscosity of perhydro dibenzyltoluene is a challenge for winter applications. Mixtures of benzyltoluene and dibenzyltoluene are suitable hydrogen storage media. Addition of 20 wt% H12-BT to H18-DBT reduces viscosity at 10 °C by 80%. H 2 -release productivity of this mixture is enhanced by 12-16% vs. H18-DBT.

Hydrogen is expected to play a major role in a carbon-neutral chemical industry, for long-term hydrogen storage, and as fuel for future heavy-duty and long-range mobility ...

This work provides foundational data and a reliable theoretical model to optimize hydrogen storage and dehydrogenation processes for BT + DBT mixtures. The results offer ...

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Abstract The benzyltoluene- and dibenzyltoluene-based liquid organic hydrogen carrier (LOHC) technology is approaching a level of maturity that enables its large-scale ...

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Abstract Liquid organic hydrogen carriers (LOHCs) can store and transport hydrogen by chemical bonding. Benzyltoluene (H0-BT) is an attractive LOHC that can take up ...

Liquid organic hydrogen carrier technology is a promising alternative for hydrogen storage and transportation. Benzyltoluene (BT) is a high-performance hydrogen storage carrier, but the ...

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Review on the thermal neutrality of application-oriented liquid organic hydrogen carrier for hydrogen energy storage and delivery Yikun Yang, Zhen Wu, Ruiqing Li, Huan Wang, Jianwei ...

The benzyltoluene (H0-BT)/perhydro benzyltoluene (H12-BT) LOHC system is very attractive for large-scale hydrogen storage and transportation applications due to its fuel ...

Monobenzyltoluene (H0-BT) is a promising liquid organic hydrogen carrier (LOHC), and continuous reaction process represents a more favorable approach in the large ...

The green hydrogen economy is evolving rapidly, accompanied by the need to establish trading routes on a global scale. Currently, several technologies are competing for a leadership role in ...

Liquid organic hydrogen carrier (LOHC) technology has the capability to overcome the limitations associated with conventional hydrogen storage technologies. To date, ...

It was shown that the catalytic hydrogen release can be accelerated by increasing the temperature, but low reaction temperatures are desired to increase the energy ...

Thermodynamics and kinetics determine the usability of liquid organic hydrogen carriers. Under feasible temperature and pressure conditions, benzyltoluene derivates can take ...

Hydrogen will play a key role in future for seasonal energy storage, as a fuel for heavy-duty mobility, an energy carrier for the transport of energy equivalents over wide ...

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