



Accelerating the Green Hydrogen Economy
Catalysts for Ammonia Decomposition

Storage and Recovery of Hydrogen

The decarbonization of our economy represents one of the biggest challenges of our times. In the context of the energy transition, renewable hydrogen energy technologies are becoming more and more relevant.

Hydrogen transportation, however, suffers from major drawbacks and new carrier systems need to be developed to ensure a safe, affordable and efficient distribution of this critical resource.

AMMONIA AS HYDROGEN CARRIER

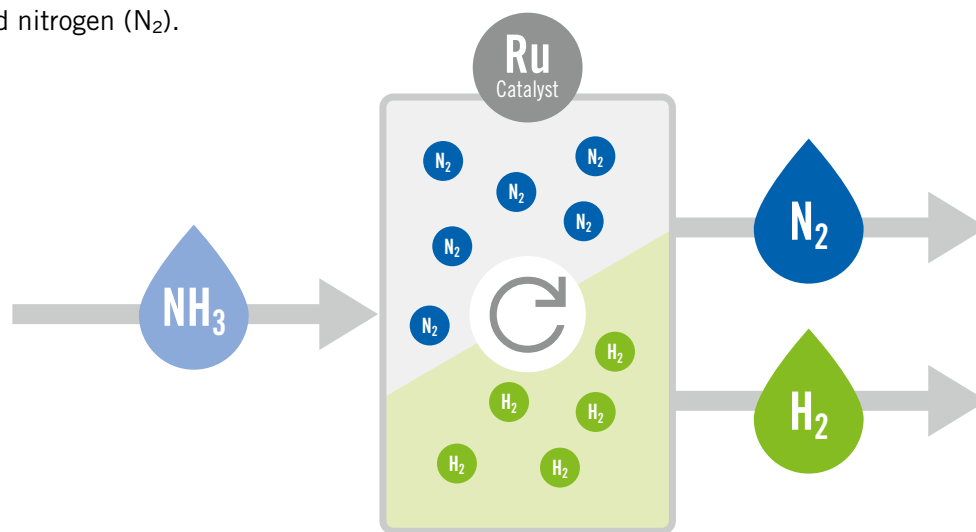
Ammonia is considered a promising hydrogen carrier, thanks to many advantages such as:

- high energy density
- ease of manufacture and transport
- long-term storage ability

At the point of demand, ammonia can either be used in its pure form or split into hydrogen via the ammonia decomposition reaction, also known as ammonia cracking.

AMMONIA CRACKING

Ammonia cracking is the reverse reaction of ammonia synthesis and involves the dissociation of the ammonia molecule (NH_3) into two basic components – hydrogen (H_2) and nitrogen (N_2).

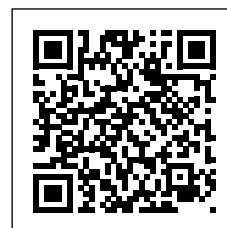


RECOMMENDED READING

Ruthenium-based Catalysts and Ammonia Cracking

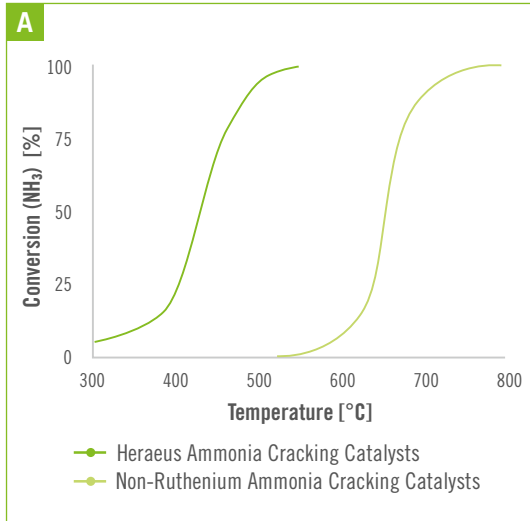
Publication by Santiago Casu in
The Catalyst Review – December 2022

herae.us/catalystreview_ammoniackracking



Ruthenium-Catalysts for Efficient Ammonia Cracking

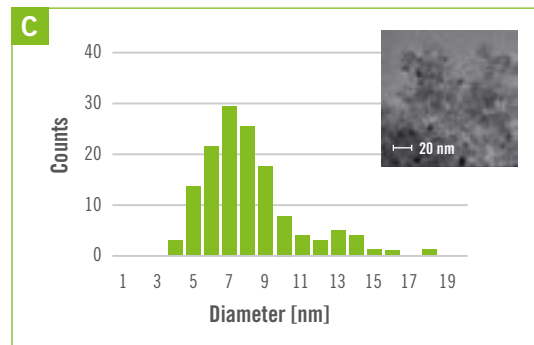
Ammonia cracking is an endothermic reaction. In the presence of a catalyst, the temperature that is necessary to decompose ammonia is significantly reduced.



Ruthenium has been found to be the most active metal for the ammonia cracking reaction, strongly outperforming non-ruthenium catalysts **A**.



The remarkable performance of ruthenium-based catalyst systems may be attributed to two factors: i) A well-defined distribution of the active material, as is shown in **B** (Ruthenium is primarily located in the outer shell of the pellet), and ii) a narrow nanoparticle size distribution, as is evident in **C**.



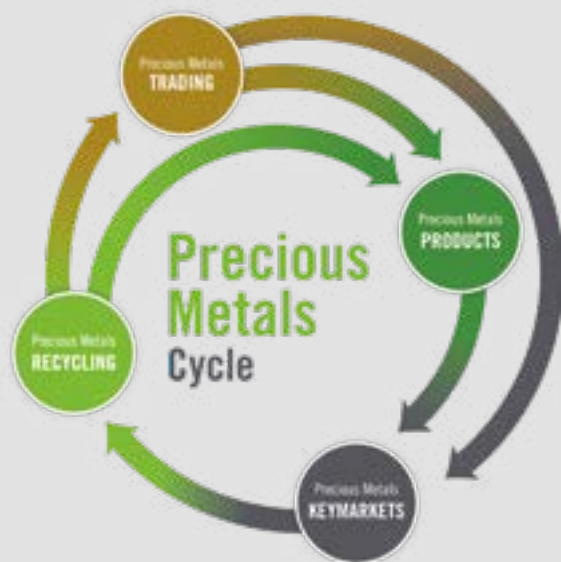
HERAPUR® K-045 SERIES – RUTHENIUM CATALYSTS FOR AMMONIA SYNTHESIS & AMMONIA CRACKING



Heraeus Precious Metals offers ruthenium catalysts with **precious metal loadings starting between 0.1 and 2 wt%** and in **different geometries**.

The catalyst shown here is only an example. Heraeus excels in fast and flexible prototyping, resulting in tailor-made solutions. Please do not hesitate to contact us to see how this can be realized for your applications.

Save time and money with Heraeus Precious Metals as a qualified partner and accelerate your process.



CLOSING THE LOOP WITH PRECIOUS METALS RECYCLING

As specialists in the handling of spent precious metal catalysts, Heraeus offers the fastest possible precious metal recovery and the highest yield. The reclaimed precious metal can be used again for the manufacture of new catalysts. Catalyst recycling is not only cost competitive, but also ecological. The recycled secondary precious metal can reduce the carbon footprint by up to 98% in comparison to primary precious metal from mining.

ABOUT HERAEUS PRECIOUS METALS

Heraeus Precious Metals is globally leading in the precious metals industry. The company is part of the Heraeus Group and covers the value chain from trading to precious metals products to recycling. It has extensive expertise in all platinum group metals as well as gold and silver.

With about 3,000 employees at 15 sites worldwide, Heraeus Precious Metals offers a broad portfolio of products that are essential for many industries such as the automotive, chemicals, semiconductor, pharmaceutical, hydrogen and jewelry industry.

By 2025 Heraeus Precious Metals will be the first company in the industry that operates carbon neutral.

Heraeus Precious Metals

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