



BLOOH SOLUTION
LTD.

BS – RUTHENIUM CATALYSTS FOR
GREEN AMMONIA SYNTHESIS

EFFICIENT CHEMICAL CONVERSION FOR
LOW-EMISSION FERTILIZER AND
ENERGY SYSTEMS



RUTHENIUM: A PATHWAY TO CLEANER SYNTHESIS

Ruthenium, a rare metal from the platinum group, is gaining prominence due to its exceptional catalytic performance at low temperatures and pressures. Originally explored in the context of advanced battery materials, its role has expanded into catalytic processes essential for a sustainable industrial future.

At BS, we recognized the strategic potential of Ruthenium early on—especially in environmentally friendly ammonia production. Its application allows us to significantly reduce energy requirements for nitrogen fixation while increasing yield and process stability. This technology enables scalable, on-site fertilizer production as well as hydrogen-rich energy carriers with real market relevance.

BS is driving innovation at the intersection of rare elements and applied chemistry—delivering clean chemical solutions where they're most needed.

BS CATALYSIS ADVANTAGE

BS's ruthenium catalyst systems are engineered using cutting-edge materials science, surface modification, and dynamic process validation. At the core are highly dispersed ruthenium nanoparticles on porous support structures—designed to maximize interaction with hydrogen while maintaining structural integrity under continuous reaction conditions.

In addition to material refinement, BS integrates real-time process monitoring technologies that enable continuous performance analysis and adaptive control. Our catalytic systems are built for long operational lifespans and consistent activity under real-world conditions—emphasizing reusability, energy efficiency, and CO₂ reduction across the entire value chain.



Up to 40% lower reaction pressure compared to traditional Haber-Bosch methods.



PRECISION CATALYSIS DESIGNED FOR A GREENER WORLD

BS catalysts are already in use across renewable energy parks, mobile green ammonia units, and pilot plants for decentralized hydrogen utilization. Our approach merges precise chemistry with sustainable engineering—for maximum efficiency and minimal environmental impact. This synergy enables both cost-effective and scalable solutions for tomorrow's energy applications.

BS TECHNOLOGICAL HIGHLIGHTS:

- Modular catalyst cartridges for on-site scalability
- Self-healing oxide layers for prolonged activity
- Real-time monitoring to control thermal equilibrium
- Surface tuning to prevent reaction bottlenecks

Ruthenium-based ammonia catalysts can reduce CO₂ emissions by over 60% compared to conventional fossil-hydrogen-based systems.

PORTFOLIO

MODEL RU-CAT SYN90

A highly efficient ruthenium catalyst for modular ammonia production with reduced energy consumption and stable process control.

Active Metal: 1–2% Ruthenium

Support Material: Magnesium oxide or activated carbon

Operating Pressure: <100 bar

Temperature Range: 350–450 °C

Selectivity: >90% under low-pressure conditions

Lifespan: >5,000 hours before regeneration



APPLICATION AREAS



On-site green ammonia production



Fertilizer plants in renewable energy zones



Chemical hydrogen storage

BENEFITS



Energy savings through lower process thresholds



Faster start-up and reaction kinetics



Durable, regenerable system with stable activity

PORTFOLIO

MODEL RU-CAT AGRI

A highly robust catalyst for agricultural ammonia production with optimal integration into bio-based systems.

Active Metal: 1.5% Ruthenium

Operating Pressure: ~85 bar

Selectivity: >88%

Support Material: Porous carbon composite

Temperature Range: 360–420 °C

Lifespan: ~4,800 hours



APPLICATION AREAS



Hybrid fertilizer plants
powered by renewable energy



Containerized ammonia units
for agriculture



Water-neutral, ammonia-based
fertilization

BENEFITS



Local value creation in
agriculture



Low maintenance
requirements



High compatibility with
solar-powered hydrogen
sources



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PORTFOLIO

MODEL RU-CAT H2X

A next-generation catalyst for integrated systems enabling simultaneous production of green hydrogen and ammonia.

Active Metal: Ruthenium alloy

Support Material: Thermally stable silica hybrid

Operating Pressure: 90–110 bar

Temperature Range: 380–460 °C

Selectivity: >93%

Lifetime: >6,000 hours continuous operation



APPLICATION AREAS



Integrated energy-to-chemistry systems



Grid-connected chemical storage solutions



Transition modules from pilot to full-scale plants

BENEFITS



Highly efficient with electrolysis coupling



Minimizes hydrogen losses in process



Future-proof under dynamic load conditions



DRIVING INNOVATION FORWARD!



**FOR MORE INFORMATION
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