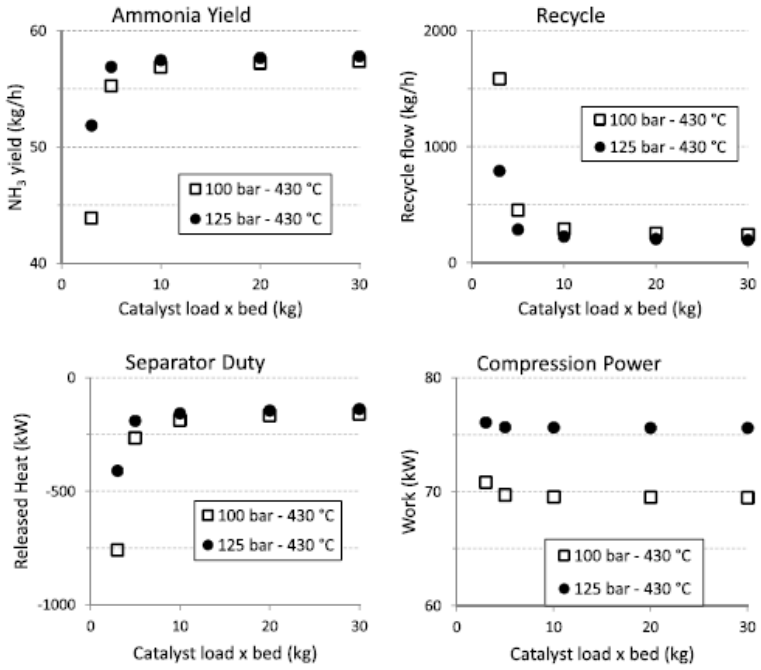
Present challenges of NH_3 production

Ilenia Rossetti

Chemical Plants and Industrial Chemistry Group, Dipartimento di Chimica, Università degli Studi di Milano (Italy)

Ammonia synthesis represents one of the milestones of industrial chemistry. Nevertheless, huge efforts are still needed to improve productivity and lowering production costs. These challenging issues involve on one hand catalyst formulation, to solve some intrinsic limitations of the commercial Fe-based ones. On the other hand, process intensification is needed to optimise productivity while lowering the energy consumption, which mainly means the search for low pressure ammonia synthesis options. Some of these points will be reviewed in light of the most recent advancements in research, both from the point of view of materials and processes design.



Selected Readings

- M. Appl, Ammonia. Principles and Industrial Practice. 1999. Wiley-VCH. This text is a comprehensive description of the whole ammonia synthesis process, from the production of syngas to its use (purified) for ammonia synthesis, to ammonia storage and safety/transportation issues. Attention is also paid to reactors and energy management.
- J. R. Jennings. Catalytic Ammonia Synthesis: Fundamentals and Practice. 1991. Springer Science+Business Media, LLC. This text focuses mainly on the catalyst features, from the fundamental design, to deactivation, including the commercially available materials and also non commercial promising candidates.
- A. Nielsen. Ammonia. Catalysis and Manufacture. 1995. Springer-Verlag. This text focuses mainly on the catalysts properties and requirements, but includes an interesting overview of the thermodynamics of the reaction.
- H. Liu. Ammonia Synthesis Catalysts. Innovation and Practice. 2013. World Scientific Publishing. Focused on the catalyst, with very detailed description of the characterisation and of microkinetic modelling, it includes a perspective chapter with non conventional approaches to ammonia synthesis.