

Partial Oxidation of hydrocarbons with hydrogen peroxide vapour using TS-1 catalysts

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TS-1 is an appropriate catalyst for a number of heterogeneously catalyzed oxidation reactions of different substrates with hydrogen peroxide. Up to now these reactions were carried out almost exclusively in liquid phase with the disadvantage of low space-time-yields and the necessity of using a solvent.

A gas phase process involving H_2O_2 vapour is extremely challenging, since (i) safe and stable evaporation of hydrogen peroxide is required, and (ii) precautions have to be taken to minimize the risk of explosions of the hydrocarbon/ H_2O_2 gas mixture. Both problems have been solved in the BMBF joint project DEMiS[®] by using microstructured devices. On the basis of laboratory measurements a pilot plant was engineered and operated at Degussa site Hanau-Wolfgang in Germany. The epoxidation of propylene with hydrogen peroxide vapour was selected as model reaction. The overall aim is the development of a technical reactor concept for the production of chemicals and intermediates by heterogeneously catalyzed gas phase reaction with at least 10.000 mt per year.

In the present contribution the following issues will be addressed:

1. Supply of hydrogen peroxide vapour.
2. Development strategy and design principles (see figure 1)
3. Potential of hydrogen peroxide vapour as oxidant
4. Process intensification

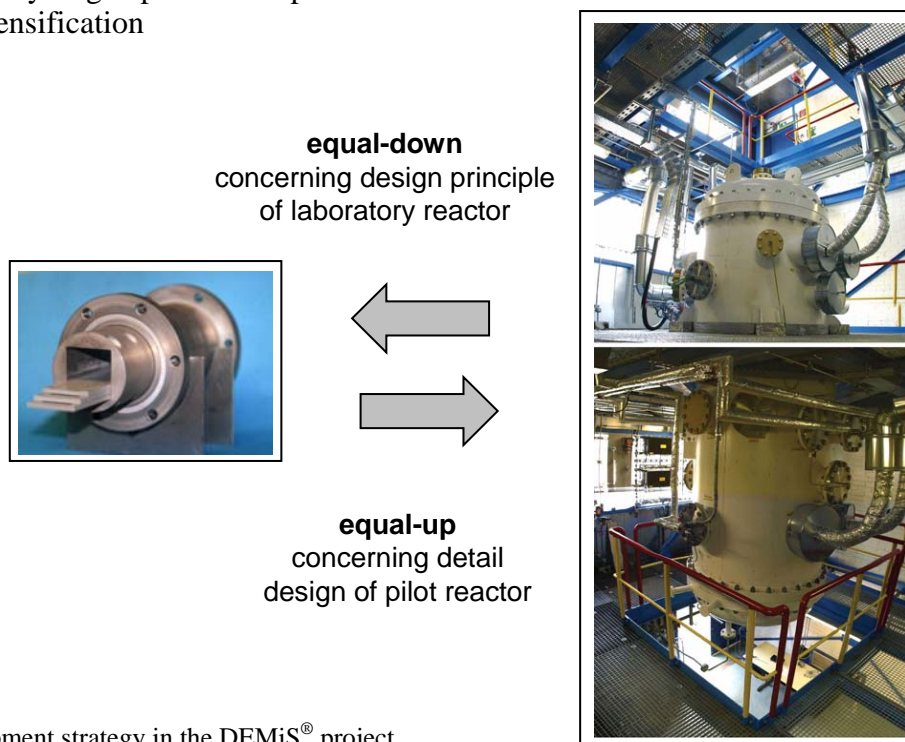


Figure 1: Development strategy in the DEMiS[®] project

References

- [1] G. Markowz, S. Schirrmeister, J. Albrecht, F. Becker, R. Schütte, K. J. Caspary, E. Klemm, *Chemie Ingenieur Technik*, **76**, No.5 (2004) 620.