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Fraunhofer Center for Chemical-
Biotechnological Processes CBP

Chemical processes



High-Pressure Unit

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Fraunhofer CBP in Leuna, central Germany, closes the gap between the lab and industrial implementation.”

The Fraunhofer Center for Chemical-Biotechnological Processes CBP in Leuna, central Germany, develops and scales up chemical and biotechnological processes for the utilization of renewable raw materials. By providing infrastructure, pilot plant facilities and a staff of highly qualified experts, the CBP closes the gap between laboratory and industrial implementation and enables partners from research and industry to scale up processes to production-relevant dimensions, and thus accelerate process developments.

The Chemical Processes working group focuses on the process-technological development of chemical processes to produce biobased basic and fine chemicals for further processing in the chemical, pharmaceutical or food industries. In addition to new process concepts, the optimization of the resource and energy efficiency of existing processes also plays an important role here. Established processes can be adapted and optimized from the ecological and economic viewpoint. In doing this, we both consider biobased raw materials and also examine conventional processes for manufacturing petrochemical products.

Portfolio

The high-pressure unit is a flow tube reactor for the continuous processing of liquid reaction mixtures. This system is suitable for performing both homogeneous and heterogeneous catalytic reactions under pressures of up to 300 bar in the aqueous phase.

Technical data

- Flow tube reactor 2.15 liters
- Dwell times approx. 5–30 minutes
- Pressure max. 300 bar
- Temperature max. 380°C
- Dosing pump max. 20 kg/h
- Phase separator

*Lignin cleavage
product after
depolymerization*



Process

Base-catalyzed degradation of lignin

In the first step, a lignin-NaOH solution is mixed in a 300-liter tank, fed into the high-pressure dosing pump and compressed to an operating pressure of max. 300 bar. At the same time a mass flow rate between 5 and 20 kg/h is selected in order to regulate the retention times in the reactor.

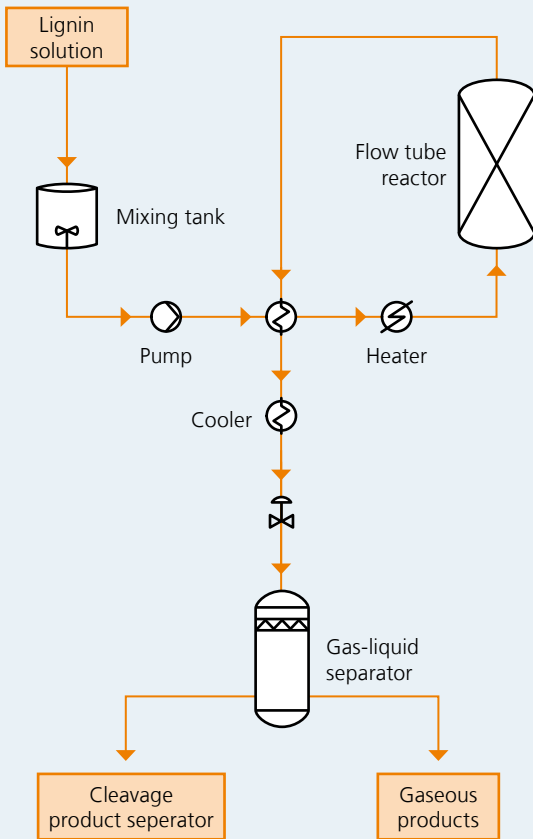
Next, the feed is preheated with the hot reaction product to recover heat, brought to a reaction temperature between 250°C and 350°C in the heater and fed into the reactor. The approx. 2 meter long flow tube reactor is heated by a 5-zone split tube oven.

After the reaction, the cleavage product solution is cooled down to ambient temperature and the pressure is decreased. Then the gaseous reaction products are separated and collected.



Flow tube reactor embedded in a hinged tube furnace

Flow chart of the high-pressure unit



Contact

Dipl.-Ing. Jakob Köchermann
Group manager Chemical Processes
Phone +49 3461 43-9105
jakob.koechermann@igb.fraunhofer.de

Robert Röver M.Eng.
Project manager Chemical Processes
Phone +49 3461 43-9115
robert.roever@igb.fraunhofer.de

Fraunhofer Center for Chemical-
Biotechnological Processes CBP
Am Haupttor (Gate 12, Building 1251)
06237 Leuna
Germany
www.cbp.fraunhofer.de