About the TUHH pilot plant

The TUHH pilot plant for aerogel production comprises of two high-pressure units (64 L & 25 L capacity) to perform the supercritical carbon dioxide (CO₂) drying needed for aerogel production.

The unit is enclosed in a ventilated cabin satisfying the ATEX norms. Each unit is operated independently in closed loop setting with CO₂ recycling. Aerogel particles, beads and monoliths can be processed (100's of liters) for product prototyping.

Customized aerogel processing and parameter settings investigations can also be carried out upon request.

Supercritical carbon dioxide (CO₂) drying

Supercritical CO₂ drying is a methodology that allows to remove the solvent inside the gel without collapsing the intrinsic pore structure of the gel network. Several industrially available solvents such as ethanol, propanol, methanol, acetone, ethyl-acetate, DMSO and others can be extracted with this technique. The modern version of supercritical carbon dioxide drying is carried out between 40-65 °C and 90-120 bar pressure. The drying time mainly depends on the gel dimensions, gel chemistry and the solvent choice. Initial supercritical CO₂ drying feasibility tests with proprietary formulations can be checked upon request.

Aerogel processing

Aerogel production is a three step process involving
1. Gel production
2. Solvent exchange (for water based gels)
3. Supercritical CO₂ drying

Gels can be processed as particles (<100 µm), beads (0.1-3.0 mm) or in monolithic form.

If gels are processed in solvents incompatible with supercritical CO₂ (example: water); solvent exchange to a compatible solvent (example: ethanol) is necessary. Solvent recycling (>95 %) feasibility can also be demonstrated with ethanol-water systems.
CONTACT

Coordinator:
Hamburg University of Technology (TUHH)
Institute of Thermal Separation Processes
Prof. Irina Smirnova | irina.smirnova@tuhh.de
Eißendorfer Str. 38, 21073 Hamburg

Industrial leader:
BASF Polyurethanes GmbH
Dr. Wibke Lölsberg | wibke.loelsberg@basf.com
Dr. Marc Fricke | marc.fricke@basf.de
Dr. Dirk Weinrich | dirk.weinrich@basf.de
Elastogranstr. 60, 49448 Lemförde