Pilot plants for chemistry and biotechnology

- VTT has advanced and versatile pilot plant facilities for scale-up of chemical and biochemical products and processes.
- Pilot plants consist of specialized units for:
  - Process chemistry,
  - Fermentation and bioprocesses,
  - Food processing and brewing.
- In addition to research in their own specific areas, the pilot plants have profiled as leading integrated facilities for development of biomass-based chemicals and materials.
- We are a skilled partner in research projects and serve customers ranging from large international food and chemical companies to small local biotechnology start-up enterprises.

Additional information:
Mika Härkönen, Pilot plant coordinator
Tuulamari Helaja, Process chemistry
Tiina Nakari-Setälä, Cell factory
Niklas von Weymarn, Bioprocessing
The pilot plants specialised for process chemistry are located in Rajamäki and Otaniemi both near Helsinki.

We offer a combination of relatively large multi-purpose pilot scale reactors integrated to versatile downstream processing units.

Research into biomass-based materials and chemicals has been a major focus area for more than 10 years.

We can also carry out versatile process development, and scale-up and toll manufacturing services to help our clients commercialize new products.

You will find us a skilled, experienced and enthusiastic partner in helping you develop your business.
Process chemistry pilot plant at Rajamäki

The Rajamäki pilot facilities are designed for diverse chemical reactions and processing of various types of biomass raw materials, chemicals, polymers and slurries.

Main equipment:
- Multi-purpose stainless steel reactors, 400 - 1800 dm³
- Special reactors for viscous materials, 50, 250 and 430 dm³
- Smaller steel reactors 2 - 10 dm³
- Separation units: decanter centrifuge, separators
- Filters: rotary vacuum filter, ultra and micro filters
- Dryers: vacuum contact, spray and rotary dryers
- Falling film evaporator
- Extruders for plastic processing and reactive compounding
- Ex-classified pilot hall.

Additional information
Pertti Tiitola, Rajamäki pilot operations
Mika Härkönen, Team Leader
The Otaniemi pilot is specially designed for chemical and polymer synthesis.

Equipment allow also e.g. extractions and distillations, and if needed the Rajamäki downstream processing units can be used.

Main equipment:
- Büchi 1-5 dm³ and glass reactors 1 - 10 dm³
- Distillation unit up to 15 dm³
- Glass lined reactors of 60, 160 and 500 dm³
- Seitz filter (200 dm³)
- Small scale equipment for compounding and processing of polymers and material testing
- Reaction calorimeter
- Ex-classified pilot hall.

Additional information
Pia Willberg-Keyriläinen, Otaniemi pilot operations
Janne Hulkko, Team Leader
Fermentation pilot plant

- The pilot plant specialized for fermentation and other bioprocesses is located in Otaniemi.
- High quality equipment and skilled personnel serve as the interface between scientific research and industrial production. Some research examples:
  - Maximize productivity in laboratory fermenters: scale up and out from "blind" laboratory flasks to controlled-environment fermentation.
  - Study your process in batch, fed-batch and continuous cultivation with bacteria, yeasts or filamentous fungi.
  - Learn to know and understand your process! Computer connection is used for datalogging and for the development of interactive process control algorithms.

Additional information
Michael Bailey,
Fermentation pilot operations
Jaana Uusitalo
Team Leader
Fermentation pilot plant

- Pilot fermenters 30-1200 dm³ and laboratory fermenters 0.5-20 dm³
- For scale-up, production of batches for testing of DSP alternatives, pre-clinical API production, enzymes, antibodies, chemicals or biomass, product marketing studies.
- Downstream processing alternatives:
  - Primary separation by continuous centrifugation, vacuum or pressure filtration,
  - Product polishing by membrane microfiltration
  - Cell disruption by high pressure homogenization
  - Protein concentration by plate-and-frame or tubular ultrafiltration
- Freeze-drying on site, e.g. vacuum evaporation at the VTT pilot hall in Rajamäki

Additional information
Michael Bailey, Fermentation pilot operations
Jaana Uusitalo, Team Leader
VTT has versatile equipment at Otaniemi for food process optimization, proof of concept trials and for small scale production:

- Plant material milling and dry/wet fractionation
- Extrusion, pre-conditioning, enzyme reactors and high-pressure processing
- Lyophilisation (freeze-drying), fluidized bed- and spray-drying
- Complete barley-to-beer chain in the pilot brewery
- Test bakery

The pilot equipment is available for contract research and is used and maintained by skilled personnel.

Characterization of chemical composition, sensory properties, microbiological quality and satiety effects can be performed in-house.

Additional information:

Juhani Sibakov, Food processing pilot
Annika Wilhelmson, Brewery pilot
Pekka Lehtinen, Team Leader
Food processing pilot plants

Research examples:

- Development of novel fractionation technology for oat beta-glucan
- Optimization of gluten-free and high dietary fiber baking processes
- Production of test products for clinical interventions
- Grain germination in controlled conditions
- Technologies for fermented and fiber-enriched beverages

Additional information

Juhani Sibakov, Food processing pilot
Annika Wilhelmson, Brewery pilot
Pekka Lehtinen, Team Leader