EXPERTISE

PRODUCT RECOVERY AND PURIFICATION

BIOMASS PRETREATMENT  BIOCATALYSIS  FERMENTATION  GREEN CHEMISTRY  PRODUCT RECOVERY AND PURIFICATION  ANALYTICAL CAPABILITIES
The equipment overview below gives an idea of the variety of modular unit operations we have available to perform your purification and product recovery processes. However, this list is not complete. If you are looking for specific equipment not listed below, do not hesitate to contact us.

**Equipment overview:**

**High speed disc stack centrifuges [60 L/h to 3 m³/h]:**
- Solid-liquid separators (ca. 7000 g)
  1. GEA: max. 60 L/h
  2. Alfa Laval: max. 100 L/h
  3. GEA: max. 500 L/h, Alfa Laval: max. 3 m³/h
  4. Nozzle centrifuge: max. 3 m³/h
- Liquid-liquid or 3 phase separator (ca. 12000 g)
  5. GEA: ATEX, ca. 1 m³/h

**Decanter centrifuges:**
- Alfa Laval: max. 500 L/h (ca. 3000 g)
- Alfa Laval: max. 3 m³/h (ca. 3000 g)
- Flottweg Sedicanter: max. 2.5 M³/h (ca. 10000 g)

**Basket centrifuges for crystal separation:**
- Pilot unit: 10 kg, 1850 rpm
- Pilot unit: 40 kg, 1700 rpm
- Heinkel inverting filter centrifuge: 52 L, 1940 rpm

**Cross flow membrane filtration [MF, UF, NF]:**
- Flat sheet pilot unit: testing of several membranes in parallel, max. 2 m²
- Multi-functional bench filtration unit (ca. 0.3 m²): spiral wound, ceramic, hollow fibre (MF, UF, NF)
- Spiral wound filtration (MF, UF, NF)
  1. NF, RO Bench scale unit: ca. 0.23 m²
  2. MF, UF unit: single 3.8-inch membrane unit, max. 5.7 m²
  3. MF, UF unit: twelve 3.8-inch membranes, max. 70 m²
  4. MF, UF unit: nine 6.3-inch membranes, max. 5 bar, max. 150 m²
  5. MF, UF, NF, RO unit: two 8-inch membranes, max. 40 bar, max 45 m²
  6. MF, UF, NF, RO unit: six 8-inch membranes, max. 40 bar, max 180 m²

- Ceramic filtration
  1. MF, UF bench scale unit: max. 0.032 m²
  2. MF, UF single unit for 1 or 3 membranes: 0.2 or 0.6 m²
  3. MF, UF pilot unit: 55 membranes x 0.2 m² = 11 m²
  4. MF, UF pilot unit: 110 membranes x 0.2 m² = 22 m²
  5. MF industrial unit (0.5 µm): 288 m²
- Hollow fiber filtration (MF, UF)
  1. MF, UF bench scale unit: 0.037 m²
  2. MF, UF pilot unit: 10 and 500 kDa, max. 12.4 m²
  3. MF, UF pilot unit: 150 kDa, max. 50 m²

**Dead-end filtration:**
- Chamber filter presses:
  1. Bench scale unit: cake volume 1.44 L, max. 822 cm² filtration area
  2. Pilot unit: cake volume 68 L, max. 2.5 m² filtration area
  3. Pilot unit: cake volume 120 L, max. 6.5 m² filtration area
  4. Large pilot unit: cake volume 352 L, max. 35 m² filtration area, cake squeezing
  5. Large pilot unit ATEX: cake vol. 100 L, max. 7.7 m² filtration area, cake squeezing
Filter dryer 1900 L for solvent extraction, (pre-coat) filtration and solids drying
- Plate and frame units with cardboard filters
- Candle filters
- Rotary vacuum drum filter RVDF (3 m²)
- See “Basket centrifuges for crystal separation”

Ion exchange and adsorption:
Columns for ion exchange, adsorption chromatography or activated carbon treatment
- Bench-scale glass columns: 300 mL
- Glass columns: 3 x 5 L resin, max. 1 bar
- Fiberglass columns: 3 x 30 L resin, max. 16 bar
- Fiberglass columns: 4 x 300 L; 4 x 1 m³; 1 x 1.3 m³; 4 x 1.9 m³; 2 x 3 m³ resin, max. 10 bar

Crystallization:
- Benchtop reactors 500 mL and 2 L for cooling and/or evaporation crystallization
- Various reactors from 20 L to 5.4 m³ (several ATEX) for cooling and/or evaporation crystallization
- Continuous cooling crystallization unit 50 L
- Crystallization line up to 1000 t/y equipped with crystallizer 4 m³, inverting filter basket centrifuge, rotary louvre dryer

Evaporation:
- Wiped film evaporator, up to 250 kg/h
- Spinning cone evaporator, up to 50 kg/h
- Falling film three-effect evaporator, 5 t/h
- Batch evaporation reactors for batch evaporation of water and organic solvents and condensation for solvent recuperation

Extraction ATEX:
- Filter dryer 1900 L for solid-liquid solvent extraction, (pre-coat) filtration and solids drying
- Karr column (6 L/h) for counter current liquid-liquid extraction
- Glass lined reactors, 500 L, 1000 L and 5400 L for solid-liquid and liquid-liquid extractions
- Phase separation with disc stack centrifuge, max. 2.5 m³/h
- Vibrating sieve (sieve decks of 100, 400 and 1000 µm)
- Single-screw expeller press, max. 25 kg/h

Drying:
- Louvre crystal dryer ca. 4 kg/h water evaporation
- Vacuum tray dryer, 300 L filling volume
- Filter dryer, 1900 L (ATEX)
- Drying oven, 2000 L
- GEA Spray dryer, ca. 15 kg/h water evaporation
- Lyophilizer, 8 kg water evaporation per drying cycle
- Access to external freeze- and spray drying facilities

Various:
- Multipurpose temperature-controlled process tanks up to 24000 L
- Bench-scale preparative chromatography unit (GRACE)
- Storage and process buffer tanks up to 50 m³
- Solvent tanks ATEX 4 x 30 m³
- High-pressure homogenizer, cell disruptor (GEA, 10 L/h, max 1200 bar)
- High-pressure homogenizer, cell disruptor (APV, 850 L/h, max 1200 bar)
- Ball mill (bench unit)
- Access to a wide range of rental equipment
- Cleanroom with a metal detector for detection of ferro, non-ferro and stainless steel contamination in packaged powders (450 mm width x 250 mm height).
- Lab sonicator (batch, 1-250 mL) and pilot sonicator (continuous, 1000 L/day)
What we offer:

- Expertise in development, scale-up and demonstration of product recovery and purification processes
- A broad range of processing equipment for aqueous and solvent-based applications
- Flexibility in setting up custom process lines
- Food grade production (FSSC22000)
- Warehouse at ambient temperature with a storage capacity of 200 pallets
- Cool room at 4°C with a storage capacity of 130 pallets.

Expertise:

BBEPP has more than 10 years of experience in purifying various metabolites from fermentation processes, as well as in purification of products from biomass via biorefinery or biocatalytic processes. The experienced team helps our customers to develop and scale their purification process from lab to commercial scale.

For more information: please visit www.bbeu.org
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