

## CATALYSIS

Shared tools and expertise



## SERVICE OFFERING

Axel'One offers a complete set of shared tools for catalysts or solid up-scaling:

- Screening of solid catalysts in heterogeneous catalysis in parallel reactors
- Synthesis of molecular catalyst library and screening in homogeneous catalysis
- Production of batches of catalysts at kilogram scale for catalytic processes
- Extrapolation et validation of new catalyst preparation methods
- Up-scaling facilities to operate in ATEX conditions and in the presence of aqueous and/or organic solvent
- R&D services and access to tools with a dedicated operator

## EXPERTISE

Part of our service offering is based on the expertise of IFP Energies nouvelles, IRCELYON and C2P2 in the field of:

- Acidic, metallic and bifunctional heterogeneous catalysis
- Kinetic modelling in heterogeneous catalysis
- Heterogeneous and homogeneous catalysts synthesis
- Heterogeneous catalysts shaping processes
- Catalysts performance test

### Catalysts synthesis line

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- Automated synthesis unit under inert atmosphere (12 x 100 ml ; Chemspeed)
- Jacketed autoclaves 10 L:
  - Stainless steel (40 bar) and glass reactors
  - Solid/liquid separation and filtration (glass Nutsche type filter)

### Shaping line

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- Spray dryer with an evaporation capacity of 90kg/hour with mixing tank:
  - Spray dryer unit 10,5 m high and 2 m diameter
  - Operating configurations: air or nitrogen
- Mixer up to 5 kg
- Single screw extrusion up to 5 kg,  $\varnothing$  0,8 - 5 mm
- Instrument tablet press from mg to kg
- Incipient wetness impregnation on porous solids up to 5 kg in controlled atmosphere and temperature
- Thermal treatment up to 900 °C:
  - Fixed or moving beds
  - Operating configurations: air or nitrogen

### Catalytic test line

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- Continuous 24/7 homogeneous catalysis pilot unit with distillation / fractionation section
- Medium / high throughput catalytic tests:
  - Avantium test unit, heterogeneous catalysis
  - Chemspeed test unit, homogeneous catalysis



CONTACT



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## EQUIPMENT FOCUS

### Heterogeneous catalysis

Two Florence™ (Avantium) units operating in fixed bed, covering a wide range of applications and reaction conditions with only 1g of catalyst:

- Vapour phase unit
  - 8 reactors in parallel
  - Catalysts: powders, extruded, balls up to 4mm diameter
  - T=50-750°C, P= 2-40 bars
  - On-line analysis by gas chromatography or other
- Vapour-liquid phase unit
  - 16 reactors in parallel
  - Catalysts: powders, extruded, balls up to 2mm diameter
  - T=50-750°C, P= 2-40 bars
  - Collection of the condensable fraction for off-line analysis
  - On-line analysis by gas chromatography

### Homogeneous catalysis

An ISYNTH AUTOPLANT POSYCAT platform (Chemspeed) operating automatically in an inert atmosphere (argon):

- ISYNTH unit for the synthesis of molecular / molecular supported catalysts
  - 12x100 mL
  - -20/+150°C ; reduced pressure / atm.
  - Associated filtration module (10 x)
  - Can also be used for catalytic tests (homogeneous catalysis)
  - Liquid / viscous liquid substrates (up to 15 Pas)
- Catalytic test unit (homogeneous catalysis / polymerization catalysis)
  - 3 x 250 mL independently controlled autoclaves (T, P)
  - Catalysts: solution or solid (weighting up to 0,1 mg (+/- 0,01) with SWILE system)
  - Liquid and gaseous substrates (2 x) ; continuous addition under pressure
  - -20/+150°C ; reduced pressure / up to 50 bar



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