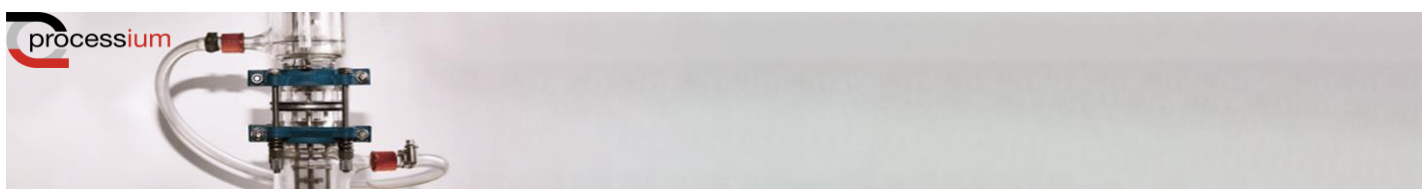


MEASUREMENTS

<p>Static-synthetic / Total Pressure Technique</p> <p>Operating range:</p> <ul style="list-style-type: none"> • Temperature: -20 to 200 °C • Pressure: 0.1 mbar to 1 bar • Material of construction: Glass <p>Applications:</p> <ul style="list-style-type: none"> • Pure component and mixture boiling point measurements • Bubble point measurements 	<p>Dynamic-analytic / Ebulliometry</p> <p>Operating range:</p> <ul style="list-style-type: none"> • Temperature: < 250 °C • Pressure: 5 mbar to 1 bar • Material of construction: Glass <p>Applications:</p> <ul style="list-style-type: none"> • Pure component boiling point measurements • Vapour-liquid equilibrium measurements • Vapour-liquid-liquid equilibrium measurements • Degradation kinetics
<p>Static-analytic Technique</p> <p>Operating range:</p> <ul style="list-style-type: none"> • Temperature: < 280 °C • Pressure: 0.1 to 100 bar • Material of construction: Sapphire <p>Applications:</p> <ul style="list-style-type: none"> • Pure component boiling point measurements • Vapour-liquid equilibrium and vapour-liquid-liquid equilibrium measurements with phase analysis, for sizing and separation units • Can be used with a total pressure technique • Reaction kinetic rates for reactor sizing 	<p>Dilutor</p> <p>Operating range:</p> <ul style="list-style-type: none"> • Temperature: 25 to 90 °C • Pressure: 1 bar • Material of construction: Glass <p>Applications:</p> <ul style="list-style-type: none"> • Solvant selection for absorption and stripping processes • Measures the activity coefficient at infinite dilution – key variable for sizing separation units designed for high purity operations
<p>DSC and Calorimetry</p> <p>Operating range:</p> <ul style="list-style-type: none"> • Temperature: < 300 °C for calorimetry, -80 to 700 °C for DSC • Pressure: 1 to 500 bar • Material of construction: Stainless steel <p>Applications:</p> <ul style="list-style-type: none"> • Thermal stability (Tonset, TMRad) • Heat of reaction (batch, fed batch or continuous mode) • Kinetic conversion curve for Homogeneous and Heterogeneous Reaction (liquid-gas, liquid-solid, catalyzed) 	<p>Reactor with on-line Analysis</p> <p>Operating range:</p> <ul style="list-style-type: none"> • Temperature: < 280 °C • Pressure: 1 to 100 bar • Material of construction: Sapphire <p>Applications:</p> <ul style="list-style-type: none"> • Homogeneous reaction kinetic measurements for reactor sizing • Thermal stability or reaction monitoring to identify degradation kinetics and product



MEASUREMENTS

Liquid Solubility Cell

Operating range:

- Temperature: 0 to 100 °C
- Pressure: 1 bar
- Material of construction: Glass

Applications:

- Determination of extractive solvent selectivity
- Liquid-liquid equilibrium measurements
- Solid-liquid equilibrium measurements
- Decantation kinetics rates

Reactor

Operating range:

- Temperature: <300 °C
- Pressure: 1 to 200 bar
- Material of construction: Hastelloy

Applications:

- Homogeneous reaction kinetics
- Heterogeneous reaction kinetics (liquid-gas, liquid-solid, catalyzed)

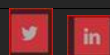
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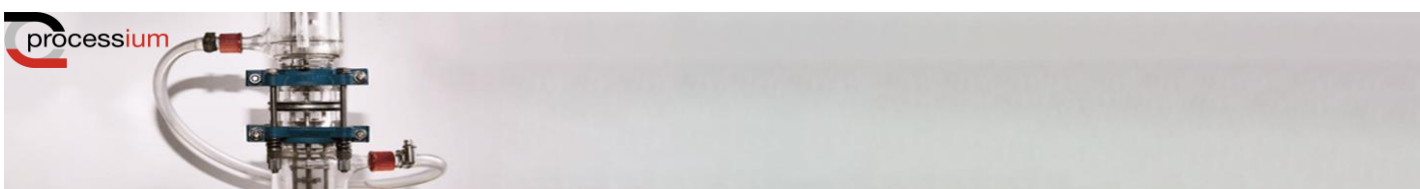
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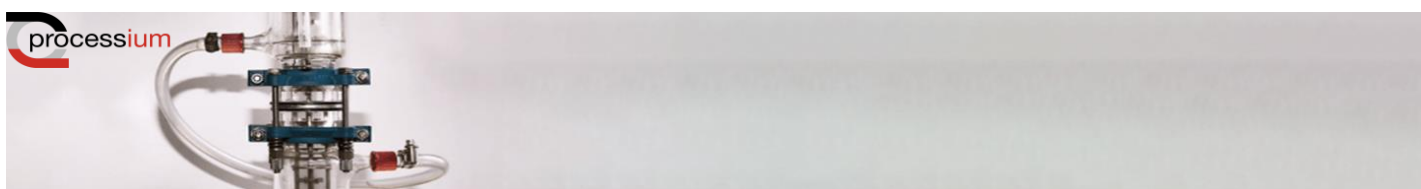
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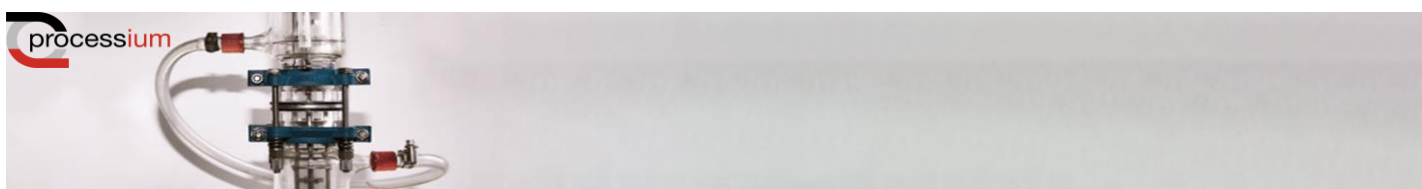
ANALYSIS

<p>High Pressure Liquid Chromatography</p> <p>Characteristics:</p> <ul style="list-style-type: none"> • Agilent 1260 with UV & DEDL detectors • Agilent 1260 with DAD & RID detector 	<p>Gas Chromatography</p> <p>Characteristics:</p> <ul style="list-style-type: none"> • Agilent 6890 and 7890 (5) • FID & TCD detectors
<p>GC-MS gas Chromatography</p> <p>Characteristics:</p> <ul style="list-style-type: none"> • EI 70 eV • Simple quad 	<p>Water Analysis</p> <p>Characteristics:</p> <ul style="list-style-type: none"> • Karl Fisher
<p>Spectrophotometer UV-Vis</p> <p>Characteristics:</p> <ul style="list-style-type: none"> • GENESYS™ 10S UV-Vis 	



REACTION

<p>Batch Reactor</p> <p>Operating range:</p> <ul style="list-style-type: none"> • 800 mL to 5 L • Up to 1 bar • Liquid • Liquid/Liquid • Liquid/Solid 	<p>Batch or continuous reactor</p> <p>Operating range:</p> <ul style="list-style-type: none"> • 1 L • Up to 20 bar • Liquid • Liquid/Liquid • Liquid/Solid • Gas/Liquid/Solid
<p>Batch Reactor</p> <p>Operating range:</p> <ul style="list-style-type: none"> • 400 mL • From -20 to 300 °C • Up to 70 bar • Liquid • Liquid/Liquid • Liquid/Solid • Gas/Liquid/Solid 	<p>High Pressure Microwave Reactor 2,45 GHz</p> <p>Operating range:</p> <ul style="list-style-type: none"> • 200 mL to 1 L • Up to 20 bar • Continuous or Batch with double jacket • Stainless steel or quartz stirred tank • Liquid • Liquid/Liquid • Liquid/Solid
<p>Lab Scale Glass Microwave Reactor 2,45 GHz</p> <p>Operating range:</p> <ul style="list-style-type: none"> • Continuous or Batch • Frequency 2,45 GHz • 200W-kit • U waveguide 	<p>Pilot Scale Glass Microwave Reactor 915 MHz</p> <p>Operating range:</p> <ul style="list-style-type: none"> • Continuous or Batch • Frequency 915 MHz • 600W monomode line • MW solid state generator
<p>2 G/L Oxygen and Hydrogen flow reactors</p> <p>Operating range:</p> <ul style="list-style-type: none"> • Up to 200° C • Up to 50 bar 	<p>Kobelco FlowReactor</p> <p>Operating range:</p> <ul style="list-style-type: none"> • Up to 200 °C • Up to 50 bar
<p>G/L FlowReactor for chlorination</p>	



SEPARATION AND PURIFICATION

<p>Liquid-Liquid Extraction Column</p> <p>Operating range:</p> <ul style="list-style-type: none"> • 0 to 150 °C • 1 bar • 8 to 25 L/h • 4 to 8 theoretical stages 	<p>Batch Distillation</p> <p>Operating range:</p> <ul style="list-style-type: none"> • 20 to 300 °C • 1 to 1000 mbar • 100 mL to 1 L • Up to 40 theoretical stages
<p>Pressure Distillation</p> <p>Operating range:</p> <ul style="list-style-type: none"> • 20 to 250 °C • 1 to 20 bar • Batch mode • 300 mL • Up to 15 theoretical stages 	<p>Short Path Distillation</p> <p>Operating range:</p> <ul style="list-style-type: none"> • 20 to 250 °C • Down to 10 - 3 mbar • Up to 2 l/h continuous
<p>Wiped Film Evaporator</p> <p>Operating range:</p> <ul style="list-style-type: none"> • 20 to 250 °C • Down to 1 mbar • Up to 2 L/h continuous • With rectification column if required 	<p>Microfiltration / Ultrafiltration / Nanofiltration / Reverse Osmosis</p> <p>Ceramic & organic membranes</p>
<p>Batch Crystallization</p> <p>Operating range:</p> <ul style="list-style-type: none"> • 0 to 150 °C • 50 to 1000 mbar • Batch mode • 800 mL to 7 L 	<p>Pilot Scale Glass Microwave Reactor 915 MHz</p> <p>Operating range:</p> <ul style="list-style-type: none"> • Continuous or Batch • Frequency 915 MHz • 600W monomode line • MW solid state generator
<p>Adsorption Column</p> <p>Operating range</p> <ul style="list-style-type: none"> • Continuous • 0 to 150°C • 1 to 5 bar 	<p>Melt Crystallization</p> <p>Operating range</p> <ul style="list-style-type: none"> • Batch mode-30 to 80°C • 300 mL
<p>Stripping Column</p> <p>Operating range</p> <ul style="list-style-type: none"> • Gas/vapor between 25 and 150°C • 1 bar 	<p>Micro-distillation</p> <p>Operating range</p> <ul style="list-style-type: none"> • Batch mode • 20 to 250 mL • 20 to 250°C • 1 to 1000mbar • Up to 80 theoretical stages

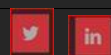
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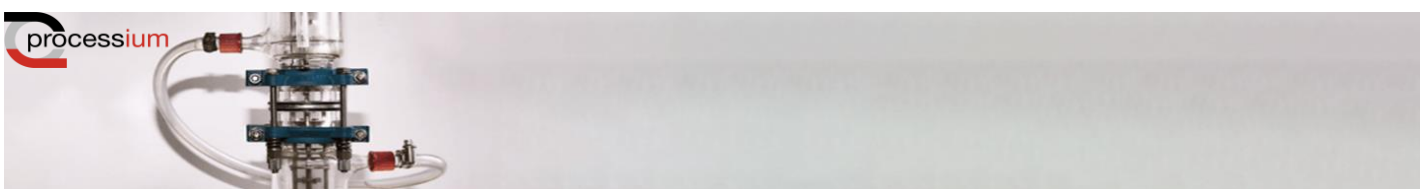
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SEPARATION AND PURIFICATION

Batch Centrifuge Operating range <ul style="list-style-type: none">• Up to 16500 g• Between -20 / 40°C• 50mL to 1 L	Vacuum dead-end filtration Operating range <ul style="list-style-type: none">• Batch mode• 50 mL to 3L
Pressure dead-end filtration Operating range <ul style="list-style-type: none">• Batch mode• Up to 6 bar• Up to 150°C• Up to 2.5 L	Drying Operating range <ul style="list-style-type: none">• Batch mode• Up to 250°C• 1 bar to 1 mbar• 1 L

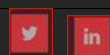
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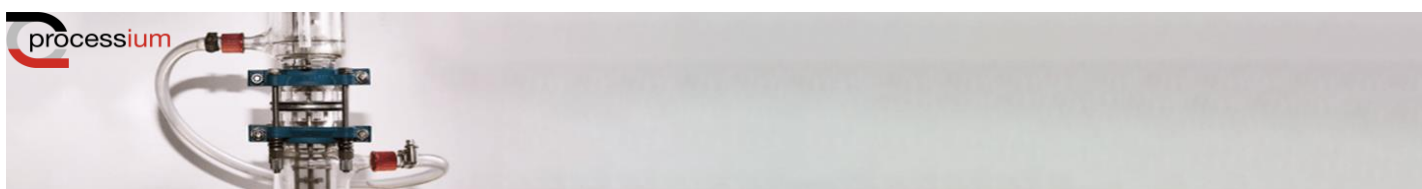
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PILOTS

<p>Continuous Vacuum Distillation</p> <p>Operating range:</p> <ul style="list-style-type: none"> • Up to 3 L/h continuous • 20 to 200 °C • 10 to 1000 mbar • up to 45 theoretical stages 	<p>Reactive Continuous Distillation</p> <p>Operating range:</p> <ul style="list-style-type: none"> • 1 to 20 bar
<p>Continuous Pressure Distillation</p> <p>Operating range:</p> <ul style="list-style-type: none"> • Up to 5 L/h continuous • 20 to 220 °C • 1 to 20 bar • Up to 20 theoretical stages 	<p>Pilot Scale glass Microwave Reactor 915MHz</p> <p>Operating range:</p> <ul style="list-style-type: none"> • Continuous or Batch • Frequency 915 MHz • 600W monomode line • MW solid state generator
<p>Batch Distillation</p> <p>Operating range:</p> <ul style="list-style-type: none"> • 5 L to 8 L • 20 to 300 °C • 1 to 1000 mbar • Up to 40 theoretical stages 	