

freeslate jr.

Process chemistry

Walk up, set up your run and walk away. Freeslate jr. turns reaction screening and process optimization into totally routine activities. Build a system for reaction screening and plow through hundreds of modifications per week. Deck one out with real-time sampling to fine tune your chemistry pathways. Freeslate jr. lets you dive deep so you know exactly what tweaks to make next.

Applications

- Process optimization
 - Identify high yield conditions
 - Reaction screening and optimization
- Screen continuous variables such as equivalents, concentrations, temperatures, pressures and time
- Screen discrete variables such as catalyst precursors, ligands and solvents
- Optimize and screen new synthetic routes
- Improve yields and impurity profiles
- Optimize catalyst loading
- Map process robustness

Key features

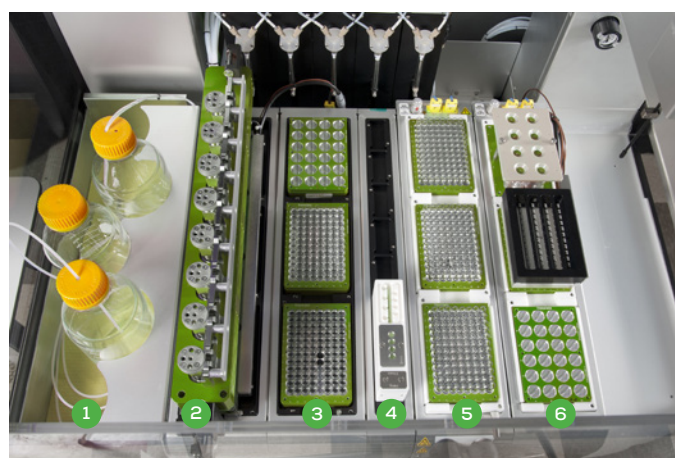
- Rapid, real-time reaction kinetics
- Process control of 8 individual reactions with independent pressure and temp control
- Fully automated *in-situ* reagent addition and slurry sampling under pressure
- Execute up to 96 pressurized reactions such as hydrogenation (with optional SPR or DSPR)
- Overhead stirring for complete reaction mixing
- Accurate and automated dosing of small quantities of solid, liquid or slurry reagents
- Control heating, stirring, and vortexing in vials or microtiter plates
- Provide an inert atmosphere for air-sensitive chemistries



freeslate jr. configured for reaction optimization



Optimization sampling reactor (OSR)



Example freeslate jr. deck configured for reaction optimization

- | | |
|--------------------------------|--------------------------------|
| 1 Solvent tray | 4 Wash station |
| 2 OSR | 5 Heating/cooling/stirring bay |
| 3 3-position vortexing station | 6 3-position plate rack |

Available options

Heated 4-tip liquid dispenser – extended tip

Heated reservoir volume per tip: 1 mL
 Reservoir temperature: Up to 120 °C
 Temperature uniformity: ± 2 °C (across tips)
 Tip pitch: 9 mm
 Extendible tip: 1
 Syringe sizes: 50 μ L – 2.5 mL (standard supplied)

Heated single-tip liquid dispenser

Heated reservoir volume: 1 mL
 Reservoir temperature: Up to 120 °C
 Syringe sizes: 1–2.5 mL (standard)
 Needle size: 16 gauge, non-piercing

Vortexing station – 3 positions

Orbital: Up to 2000 rpm
 Maximum vortexing mass: 860 g

pH measurement

Configuration: Single or 4-channel probe
 Measurement time per 96-well plate: ~34 minutes
 Range: pH 1–13
 Resolution: 0.01 pH units
 Repeatability: ± 0.1 pH units

Deck screening pressure reactor (DSPR)

Max pressure rating: 200 psi @ 180 °C
 Pressure drop: <5 psi/hr

Heated single-tip liquid dispenser

Heated reservoir volume per tip: 1 mL
 Reservoir temperature: Up to 120 °C
 Syringe sizes: 1–2.5 mL (standard)
 Needle size: 16 gauge, non-piercing

Optimization sampling reactor and sampling arm

Temperature rating: -20–200 °C
 Reactors: 8 independent reactors
 Possible delta between adjacent reactors: >80 °C
 Heating and cooling rate: >10 °C/min
 Pressure rating: Ambient to 400 psi
 Maximum overhead stirring speed: 750 rpm
 Reactor total volume: 40 mL
 Reactor working volume: 25 mL

Solid dispense

Dispense technology: Dispense algorithm dynamically controls the dispensing head to adjust for powders with different densities, particle sizes, particle shapes and static charges

- **Classic powder dispense:** Traditional stirrer dispense mechanism
 - Hopper volume range: 10–100 mL
- **Storage vial (SV) powder dispense:** Unique vibratory dispensing mechanism for highly precise dispensing of small amounts as low as 0.5 mg
 - Hopper volume: 4 mL

Balance with integrated camera

Maximum weight:

- Standard: 1200 g
- High-sensitivity option: 220 g

Sensitivity:

- Standard: 0.1 mg
- High sensitivity option: 0.01 mg

Resolution:

- Standard: 0.1 mg
- High-sensitivity option:
 - 0.01 mg (0–110 g)
 - 0.1 mg (110–220 g)

Repeatability:

- Standard:
 - High weight (measured >200 g): 0.25 mg
 - Low weight (measured up to 200 g): 0.15 mg
- High-sensitivity option:
 - High weight (measured at 200 g): 0.15 mg
 - Low weight (measured at 10 g): 0.04 mg

Response time: <22s

Camera resolution: 1032 pixels (max wide) x 779 pixels (tall)

Off-deck third-party instrument integration

- HPLC
- GC

Other systems available for virtual integration.

Please contact Unchained Labs for a full list of systems.

Facilities requirements

Physical:

With integrated enclosure:

105 cm W x 90.4 cm D x 140 cm H, ~150 kg

With integrated table option:

167 cm W x 90.4 cm D x 200 cm H, ~240 kg

Electrical:

freestate jr.:

120–220 V ± 10 %, 50–60 Hz, 16 A

Computer:

US: 115 V ± 10 %, 60 Hz

EU: 220 V ± 10 %, 50 Hz

Compressed dry air: 0.5 MPa to 0.9 MPa (70–130 psi), 16 L/min (8 mm hose)



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