



# GreenHouse Parallel Synthesiser™

24 position personal synthesiser for parallel solution phase and solid supported reagent based chemistry



- GreenHouse Parallel Synthesiser
- Full Parallel System Integration
- Lollipop Phase Separator
- Genevac Evaporator
- Stacker Parallel Purification



The GreenHouse brings all the benefits in productivity of multiple parallel synthesis to the organic chemist at a fraction of the cost of automated systems.

The patented GreenHouse (designed by scientists\* at GlaxoSmithKline) allows chemists to perform 24 reactions in parallel, with a reaction volume of 0.5 to 3ml per reaction tube. The GreenHouse's removable reaction block holds 24 glass reaction tubes and has the same footprint as a standard micro titer plate. This allows the rapid transfer of samples to and from micro titer plates with a multi-channel pipettor or robotic system. The reaction block is also designed to fit directly into all of the Genevac Vacuum Centrifuges.

## Technical Specifications

- Developed with and tested by chemists at GlaxoSmithKline Stevenage.
- The GreenHouse's removable reaction block holds 24 glass reaction tubes and has the same footprint as a standard micro titer plate. This allows the simple and rapid transfer of samples to and from micro titer plates with a multi-channel pipettor or robotic system.
- 24 x 7ml glass reaction tubes and glass walled gas enclosure allow visualisation of the individual reaction positions during synthesis.
- Low cost reaction tubes allow a disposable option.
- Each of the reaction tubes has a typical reaction volume of 0.5ml to 3ml of reaction solvent.
- The GreenHouse is designed to mount on a standard IKA or Carousel Stirring stirring hotplate, utilising the single rotating magnetic field to vigorously stir individual PTFE magnetic stirring bars in each of the 24 glass reaction tubes.
- Radleys "V-Mag" technology uses a vertically positioned stirring bar to maximise the uniformity of the stirring within each reaction tube.
- Heats evenly all 24 glass reaction tubes using a standard IKA or Carousel stirring hotplate (ambient to +150°C solution temperature), with an accuracy of +/-0.5°C achievable when using the optional Carousel Digital Temperature Controller.
- Chilled reactions to -70°C are achieved using the optional cooling reservoir filled with acetone and dry ice (or other solvent and dry ice combinations). The removable cooling reservoir fits between the stirrer and GreenHouse assembly, allowing simultaneous stirring and cooling.

\* Developed by medicinal chemists at GlaxoSmithKline Medicines Research Centre and engineers from GlaxoSmithKline's UK Applied Technology department.

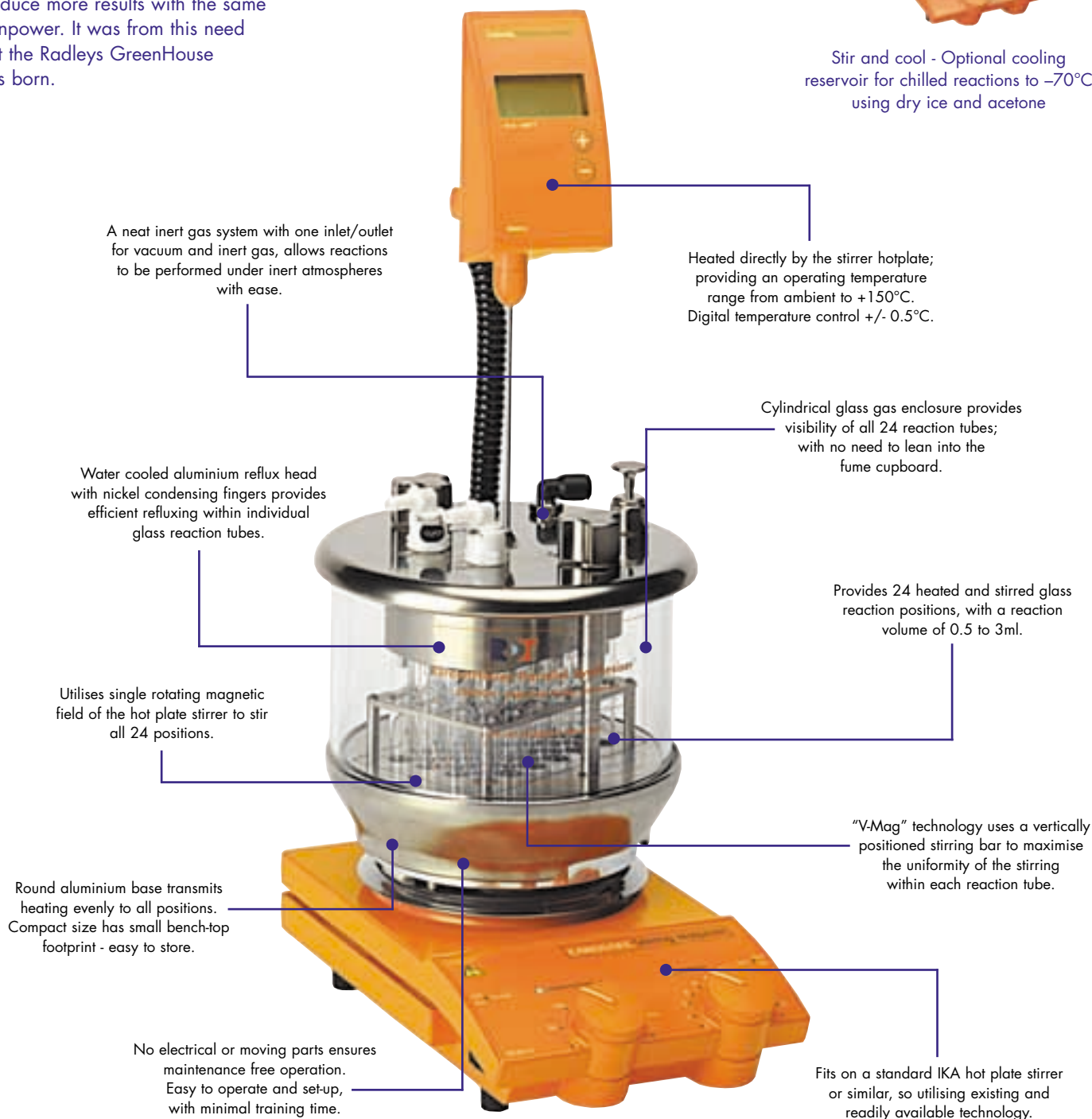
# GreenHouse Parallel Synthesiser™

## 24 position personal synthesiser for parallel solution phase and solid supported reagent based chemistry

In the competitive market of drug and compound discovery, there is a demand to speed-up the research process. Organic chemists are now under even more pressure to produce more results with the same manpower. It was from this need that the Radleys GreenHouse was born.



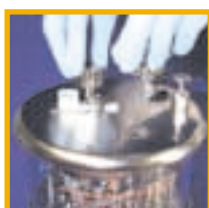
Stir and cool - Optional cooling reservoir for chilled reactions to  $-70^{\circ}\text{C}$  using dry ice and acetone





GreenHouse with Additions Head

The GreenHouse's lightweight and compact design may be easily lifted on or off the stirring hotplate.



Carousel Fuzzy Logic Digital Temperature Controller offers accuracy of +/-0.5°C

## Technical Specifications - continued

- The GreenHouse has clearly numbered reaction positions 1 to 24, on the reflux top, reaction block and reactor base.
- The GreenHouse's lightweight and compact design may be easily lifted on or off the stirrer, and is easily rotated for all-round visibility and access to all tubes without leaning into your fume cupboard.
- Its contoured exterior is easy to clean, with an all over nickel plating for superior chemical resistance.
- The water cooled Reflux Head with nickel condensing fingers provides highly effective refluxing within all 24 individual glass reaction tubes, and features quick release connectors for easy connection to your water supply.
- The solid nickel condensing fingers provide highly effective refluxing because they insert directly into each reaction tube, maximising the available cooling surface, which provides for an extremely efficient method of condensing the reaction vapours. Nickel also offers excellent resistance to aggressive vapours.
  - For cooled or ambient temperature reactions, such as Grignard reactions; where refluxing is not required, an optional Additions Head can be used which features individual Suba-Seal septa for the addition of reagents to individual reaction tubes whilst under inert conditions.
- A neat inert gas system with one inlet/outlet for vacuum and inert gas, allows reactions to be performed under inert atmospheres with ease. Also because there is no flow of gas through the chamber there is minimal evaporation of solvents during synthesis.
- Both GreenHouse heads feature a nickel plated safety pressure relief valve that vents at 4 to 6psi\*.
- The GreenHouse offers virtually maintenance free operation – free of electrical or moving parts, and is easy to operate and set-up.
- The GreenHouse's compact footprint takes up less space in the fume cupboard and is easy to store after use.

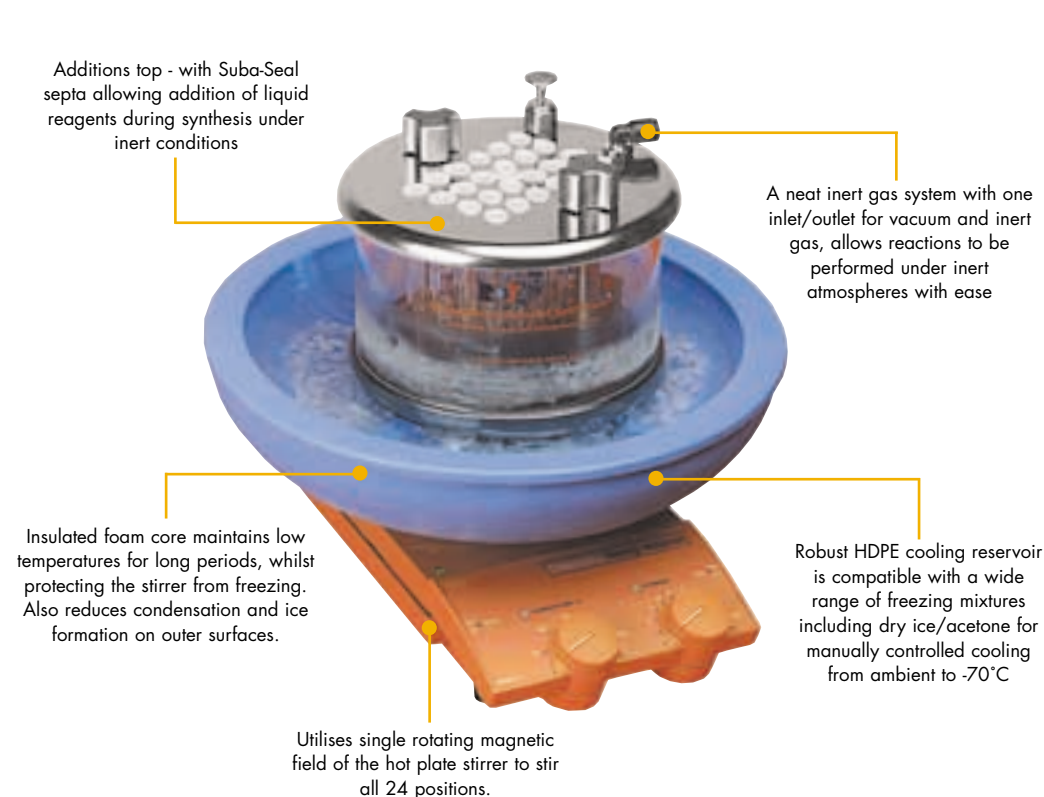


Cat No	Description	Pk Qty
RR99600	GreenHouse Parallel Synthesiser (includes Reflux Head, Additions Head and Two Reaction Blocks)	1
RR99602	GreenHouse Cooling Reservoir	1

\* Use only a regulated inert gas supply not exceeding 3psi. For efficient inert reactions you should require only a very slight positive pressure of inert gas, say 0.5 to 1 psi. Excessive gas pressures are dangerous and unnecessary.

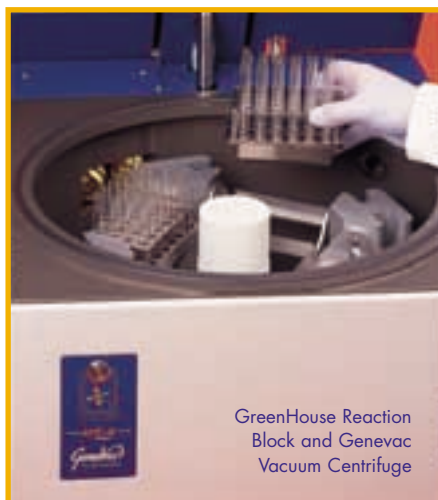
# GreenHouse™ Cooling Reservoir

Transform your GreenHouse to cooled personal parallel synthesiser for reactions from ambient to  $-70^{\circ}\text{C}$



- Simultaneously performs up to 24 cooled and stirred reactions.
- The circular GreenHouse Cooling Reservoir has a recess in the base that locates snugly around the top of the stirrer top plate. The GreenHouse then locates into moulded lugs in the Reservoir.
- **IMPORTANT NOTE** - The GreenHouse Cooling Reservoir cannot be heated and is not suitable for above ambient reactions.
- Use of the Cooling Reservoir does not interfere with the single rotating magnetic field of the stirrer to stir all the positions evenly and powerfully.
- The robust HDPE cooling reservoir is compatible with a wide range of freezing mixtures including dry ice/acetone for manually controlled cooling from ambient to  $-70^{\circ}\text{C}$ .
- Insulated foam core maintains low temperatures for long periods, whilst protecting the stirrer from freezing. Also reduces condensation and ice formation on outer surfaces.
- Additions top with Suba-Seal septa allowing addition of liquid reagents during synthesis under inert conditions.



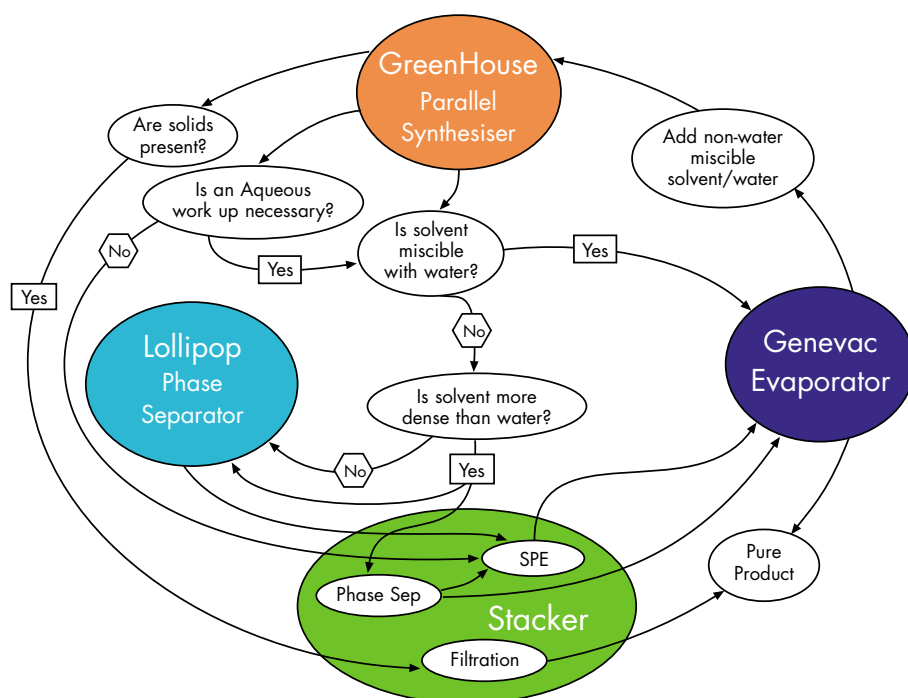


## Full integration with parallel purification and parallel evaporation systems, such as the Stacker, Lollipop and Genevac Vacuum Centrifuges.

It is essential to provide parallel solutions to post synthesis procedures to avoid downstream bottle-necks...

The GreenHouse is designed to optimise integration with other 24 well MTP (micro titer plate) formats. This greatly speeds up the transfer of samples between synthesis, separation, purification and evaporation stages.

- MTP format allows easy transfer of samples using standard format multi-channel pipettors and liquid handling systems.
- Reduced handling of individual tubes, avoiding the risk of confusion.
- Full integration with the Stacker for the parallel purification of samples in a standard 24 position MTP footprint. Using a multi-channel pipettor you can quickly transfer samples from the GreenHouse to the Stacker post synthesis, for parallel and sequential work-up of all 24 reactions via phase separation, SPE or filtration.
- Transfer samples from the GreenHouse tubes to the Lollipop Phase Separator for phase separation of organic and aqueous phases from a two phase mixture - works with solvents that are either denser or lighter than water.
- The GreenHouse's versatile reaction block is also designed to fit directly into the complete range of Genevac vacuum centrifuges. Allowing the user the ability to transfer directly from 'reactor to evaporator' without the hassle of reloading reaction tubes or the risk of mixing up samples.



# GreenHouse™ Accessories

Cat No	Description	Pk Qty
RR99601	GreenHouse Reaction Blocks	1
RR99603	GreenHouse Reaction Tubes	100
RR99604	Replacement Glass Cylinder	1
RR99605	Viton Gaskets (ideal for use with chlorinated hydrocarbons, not suitable for dry ice/acetone)	2
RR99606	Silicone Gaskets (supplied as standard - ideal for use with dry ice/acetone)	2
RR99607	GreenHouse PTFE Magnetic Stirring Bar	40
RR98076	Replacement Suba-Seals for Caps	100
<b>GreenHouse Cooling Reservoir &amp; Accessories</b>		
RR99602	GreenHouse Cooling Reservoir	1
RR99908	Dry Ice Scoop	1
RR99909	Cold Temp. Apron, 1060mm long, Waterproof	1
RR99910	Protective Faceshield	1
RR98024	Protective Cold Temperature Gloves	1
RR99905	Digital Thermometer (-250C to +400C) & 200mm Probe	1
<b>24 Well Micro Titer Collection Plates</b>		
T-9000U	Titan 24 x 9ml Conical Bottomed PTFE Plate	1
RR98020	Loose 7ml HDPE Pots	100
RR98021	24 Place Polycarbonate Pot Holder with Cover	1
RR99440	10ml x 24 Well Clear Polypropylene Micro Plate	25
<b>Impact<sup>2</sup> Multi-channel Pipettors</b>		
RR70048	Impact <sup>2</sup> 6 x 1250µl Multi-Channel Pipettor	1
RR70213	1250µl Extra-long Racked Pipette Tips	720
RR70051	Impact <sup>2</sup> Pipettor Stand	1
<b>Stacker Parallel Purification System &amp; Columns</b>		
RR99800	Stacker Parallel Purification System	1
RR99811	Silica 1.0g/6ml	30
RR99813	Aminopropyl 1.0g/6ml	30
RR99815	SCX 1.0g/6ml	30
RR99817	SAX Acetate 1.0g/6ml	30
RR99819	20µm PE Filtration 6ml	100
RR99821	Phase Separation 6ml	100



GreenHouse Reaction Block with Reaction Tubes



Impact<sup>2</sup> 6 Channel Electronic Pipettor



GreenHouse Cooling Reservoir



## Carousel Stirring Hotplate

The Carousel Stirring Hotplate is precision engineered for maximum performance and reliability, and is designed to fully integrate with a wide range of accessories.

Cat No	Description
RR98072	Carousel Stirring Hotplate 230 volt & UK Plug
RR98072/EURO	Carousel Stirring Hotplate 230 volt & Euro Plug
RR98072/SWISS	Carousel Stirring Hotplate 240 volt & Swiss Plug
RR98072/USA	Carousel Stirring Hotplate 115 volt & US Plug
RR98072/JAP	Carousel Stirring Hotplate 110 volt & Japanese Plug
RR98073	Carousel Digital Temperature Controller
<b>Accessories</b>	
RR98098	Spare Stainless Steel Sensor for Temperature Controller
RR98099	Optional Glass Coated Sensor for Temperature Controller
RR98100	Short Stainless Steel Sensor for Temperature Controller
RR98102	1 metre Extension Cable for remote temperature sensing
RR98103	Stainless Steel Bath with Handle
1 RR98104	Stainless Steel Bath
RR98105	Special Sand Bath Filling
RR98106	Boss Head
RR98107	Holding Rod
2 RR98108	Support Rod
RR98109	Side Support Bracket
RR98110	Holding Fork and clamp
3 RR98111	Supporting Plate, 200mm diameter
4 RR98112	Thermomag Circulator





Scientists at GlaxoSmithKline Medicines Research Centre were instrumental in the development of the GreenHouse Parallel Synthesiser.

## Technical Specifications

Base Diameter	176mm
Top Diameter	190mm
Height	180mm
Reaction Positions	24 (MTP format)
Well Diameter	12.5mm
Stirring Speed	0 to 1100rpm
Temp. Range	Ambient to +150°C (Ambient to -70°C)
Temp. Stability	Better than 0.5°C
Weight	4Kg (approx)
Heat up to max.	30 mins

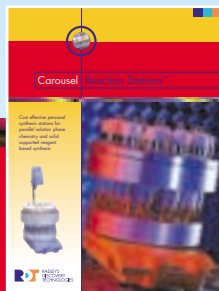
# NEW GreenHouse™ Systems

Save time and money when buying these popular GreenHouse Systems. Each of the systems includes the components and accessories required for cost effective and efficient parallel synthesis.

Cat No	Description
RR99655	System 5 - GreenHouse Parallel Synthesiser
	Comprising of the following:-
RR99600	1 x GreenHouse Parallel Synthesiser (Includes Reflux Head, Additions Head and Two Reaction Blocks)
RR99601	2 x Additional GreenHouse Reaction Blocks
RR99603	100 x GreenHouse Reaction Tubes
RR99606	2 x Spare Silicone Gaskets
RR99607	40 x GreenHouse PTFE Magnetic Stirring Bars
RR99602	1 x GreenHouse Cooling Reservoir
RR99908	1 x Dry Ice Scoop
RR99909	1 x Cold Temp. Apron, 1060mm long, Waterproof
RR99910	1 x Protective Faceshield
RR98024	1 x Protective Cold Temperature Gloves
RR99905	1 x Digital Thermometer (-250C to +400C) & 200mm Probe
RR98076	100 x Replacement Suba-Seals for Caps
RR98072	1 x Carousel Stirring Hotplate
RR98073	1 x Carousel Digital Temperature Controller
RR99656	System 6 - GreenHouse Parallel Synthesiser (Basic)
	Comprising of the following:-
RR99600	1 x GreenHouse Parallel Synthesiser (Includes Reflux Head, Additions Head and Two Reaction Blocks)
RR99603	100 x GreenHouse Reaction Tubes
RR99606	2 x Spare Silicone Gaskets
RR99607	40 x GreenHouse PTFE Magnetic Stirring Bars
RR98076	100 x Replacement Suba-Seals for Caps
RR98072	1 x Carousel Stirring Hotplate
RR98073	1 x Carousel Digital Temperature Controller

Cat No	Description	Pk Qty
RR99800	Stacker Parallel Purification System	1
<b>Stacker Columns</b>		
RR99811	Silica 1.0g/6ml	30
RR99813	Aminopropyl 1.0g/6ml	30
RR99815	SCX 1.0g/6ml	30
RR99817	SAX Acetate 1.0g/6ml	30
RR99819	20µm PE Filtration 6ml	100
RR99821	Phase Separation 6ml	100

Please contact RDT or your local distributor for complete details on the Stacker Parallel Purification System.



Cost effective personal synthesis stations for parallel solution phase chemistry and solid supported reagent based synthesis



Rapid sequential and parallel purification in a 24 well micro titer plate footprint using standard filtration, phase separation & SPE

Radleys Discovery Technologies are specialists in combi-chem and parallel chemistry...

As a dynamic organisation Radleys Discovery Technologies are best able to react to the needs of this constantly developing market sector. Radleys Discovery Technologies specific areas of expertise is focused on parallel synthesis and parallel purification consumables and apparatus. The essential products that are the cornerstone of your parallel chemistry program.

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