

# Improved Productivity and Savings

with RediSep Rf Gold™ Columns

## Abstract

The RediSep Rf Gold™ high performance columns now provide organic chemists with more resolving capability in their flash chromatography purification through the utilization of smaller, spherical media. Finer particle sizes (20–40 μm) easily purify compounds that were previously unresolved with classic flash grade silica (40–60 μm, 60Å).

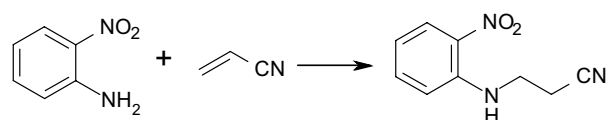
RediSep Rf Gold high performance columns are filled with spherical media that enhance resolution while lower back pressures allow higher flow rates and shorter run times. The properties of the RediSep Rf Gold high performance columns used on the CombiFlash® Rf system will result in an average of 30% or greater laboratory savings of time and solvent.

When used on the CombiFlash Rf system, RFID tags recognize the purification power of the RediSep Rf Gold high performance columns and provide the option of separating with “Gold Resolution” for compounds with a ΔRf of ≤0.1 or with “Gold Speed” for compounds with a ΔRf of >0.1 which shorten the run time and increase flow rate. Shorter runs also help purify compounds that are sensitive to silica.

Examples are shown to compare the faster purification times of RediSep Rf Gold high performance columns to standard 40–60 μm silica gel flash columns and also 20–40 μm irregular particle, high performance columns.

## Results and Discussion

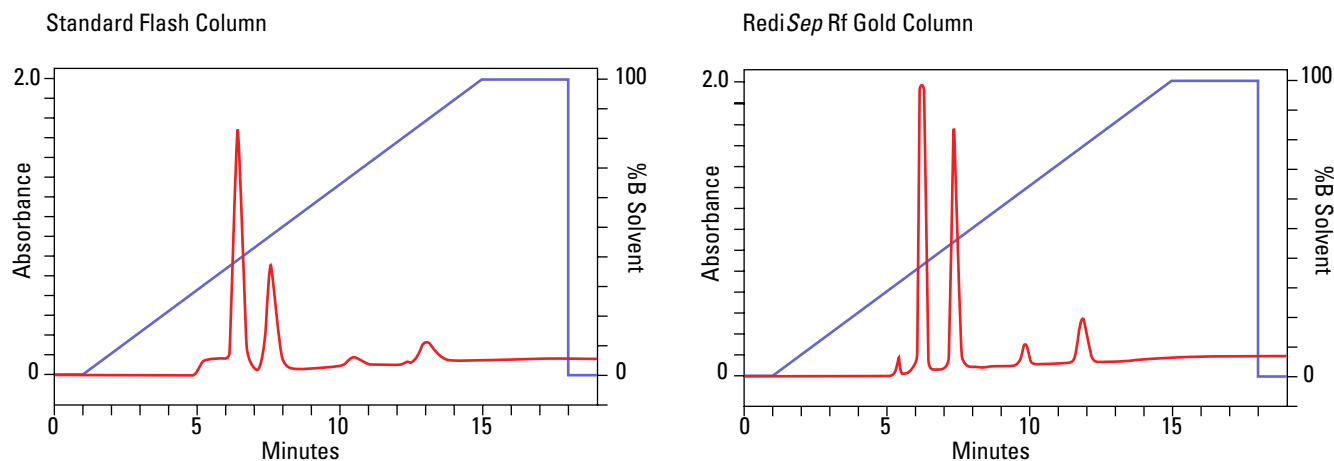
Fast purification of 3-(2-nitrophenyl amino) propionitrile



3-(2-nitrophenyl amino) propionitrile was synthesized and the reaction product adsorbed onto celite. This was purified on a CombiFlash Rf using both a standard flash column and RediSep Rf Gold high performance silica gel column. Both columns gave baseline purification of the product but the RediSep Rf Gold column provided improved resolution.

**Table 1: Run conditions for Figure 1**

Column size:	40 g
Load:	0.4 g (1% load)
Solvents:	Hexane and acetone
Gradient:	0 to 100% acetone
Detection wavelength:	229 nm
Flow rate:	40 mL/min
Run time:	19 min



**Figure 1: Purification of 3-(2-nitrophenyl amino) propionitrile** on a 40 gram standard flash column (left) and a RediSep Rf Gold column (right) using the standard CombiFlash Rf parameters.

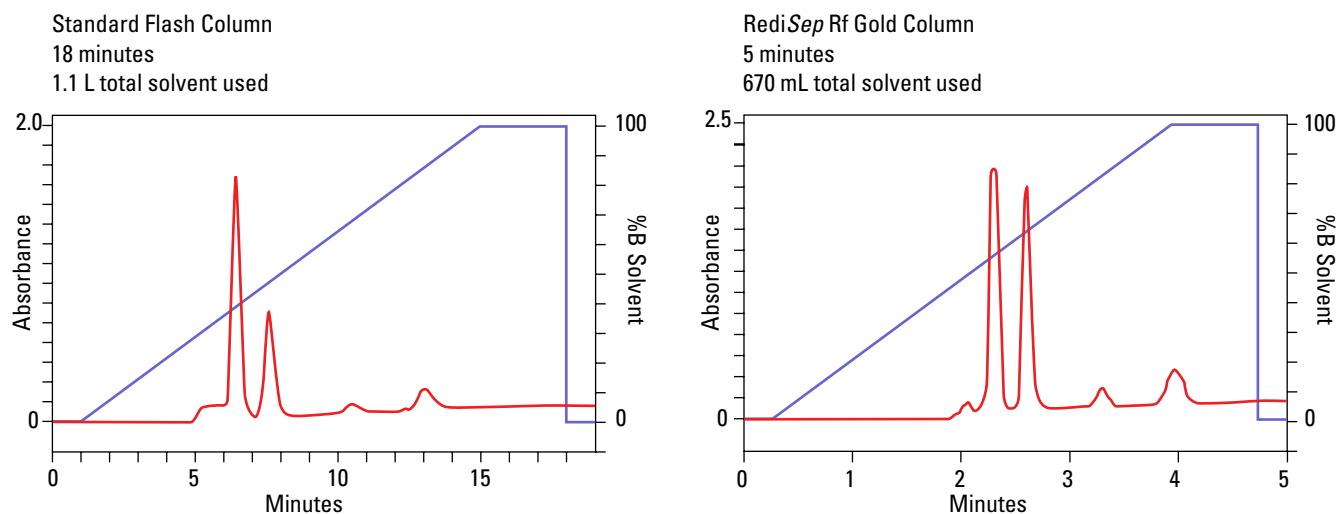
This higher, “excess” resolution was employed to reduce the run time of the purification. The run time was shortened by adjusting the gradient slope and increasing the flow rate. The resulting run time of Gold Speed optimized method for RediSep Rf Gold column is only 5 minutes versus 18 minutes with a standard flash column. Figure 2 shows purification on the RediSep Rf Gold columns with dramatically less time and solvent. Because of the spherical packing of the RediSep Rf Gold column, the backpressure was only 65 psi even at the high flow rates of 80 mL/minute. The backpressure of smaller particle size, irregular particle columns exceeded the pressure capabilities of the columns and system.

Entire purification time from start to finish is 29 minutes for the standard method, including the column equilibration and post-run air purge. This is reduced to only 10 minutes by using Gold Speed method optimized for the RediSep Rf Gold high performance columns. Actual run time was 18 minutes versus 5 minutes.

Reducing the run time saved 430 mL of solvent compared to the standard method. The CombiFlash Rf system recognizes the RediSep Rf Gold high performance column through RFID technology, and loads the Gold Speed parameters. At a click of a button labs can save 30–50% on their solvent usage and greatly reduce purification time. Greater savings are seen with larger columns.

**Table 2: Run conditions for Figure 2**

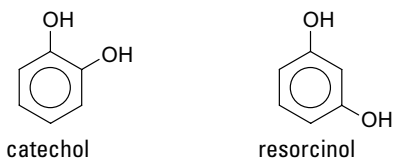
Column size:	40 g
Load:	0.4 g (1% load)
Solvents:	Hexane and acetone
Gradient:	0 to 100% acetone
Detection wavelength:	229 nm
Flow rate:	40 mL/min : 80 mL/min
Run time:	18 minutes for the standard flash column; 5 minutes for the RediSep Rf Gold high performance column



**Figure 2: Gold Speed Purification of 3-(2-nitrophenyl amino) propionitrile** on a 40 gram standard flash column (left) and a RediSep Rf Gold high performance column (right) with Gold Speed parameters

## Comparison to Irregular High Performance Silica

Spherical silica shows higher resolution when compared to similar size irregular silica when run with the Gold Speed methods. Figure 3 shows a purification of catechol and resorcinol using a column packed with irregular high performance silica gel (20–40  $\mu\text{m}$ ) compared to a RediSep Rf Gold high performance column.

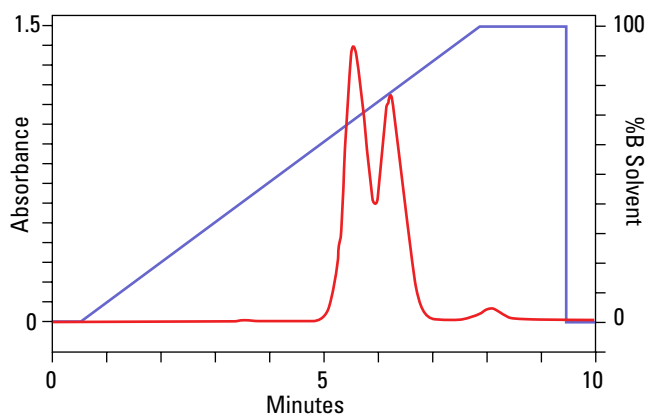


Under the same conditions, the RediSep Rf Gold high performance column achieved near baseline resolution of both compounds. The irregular particle, high performance column has unresolved products and runs under conditions that are in excess of recommended pressure capabilities of the column and system.

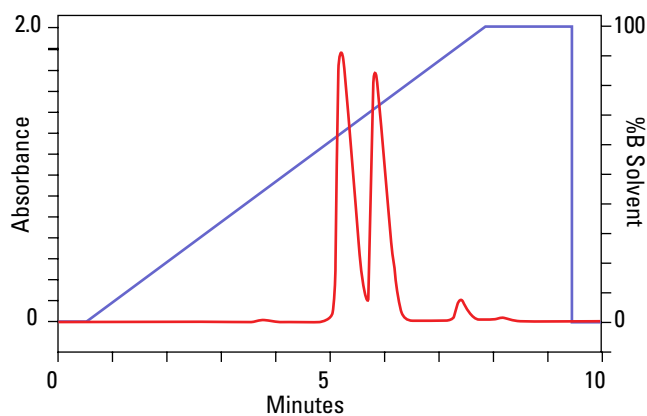
**Table 3: Run conditions for Figure 3**

Column size:	400 g
Load:	0.40 (1.0% load)
Solvents:	Hexane and ethyl acetate
Gradient:	0 to 100% ethyl acetate
Detection wavelength:	275 nm
Flow rate:	40 mL/min
Run time:	10 minutes (both columns)

Irregular High Performance Column



RediSep Rf Gold Column



**Figure 3: Gold Speed** Comparison of irregular, high performance column (20–40  $\mu\text{m}$ , left) to RediSep Rf Gold high performance column (right) purifying catechol and resorcinol.

## Conclusion

The RediSep Rf Gold high performance columns provide superior resolution compared to standard silica flash columns and irregular particle high performance flash columns. This enhanced resolution can be used to purify closely eluting compounds using the Gold Resolution methods on the CombiFlash Rf or reduce the total run time with the Gold Speed methods. The CombiFlash Rf system allows easy setup and choice between the performance options via the RFID tags.

Reducing the total run time shows 30–50% savings in time and solvent usage. Indirect savings from the use of RediSep Rf Gold columns include reduced solvent waste and time savings due to the reduced number of fractions that need to be processed. Since the peaks are sharper, fractions are collected in fewer test tubes. This reduced the time to evaporate the solvent from these fractions by almost two-thirds.

### RediSep Rf Gold Ordering Information:

Part Number	Description
69-2203-344	RediSep Rf Gold RediSep Rf Gold Column, 4 g, pkg of 14
69-2203-345	RediSep Rf Gold RediSep Rf Gold Column, 12 g, pkg of 14
69-2203-346	RediSep Rf Gold RediSep Rf Gold Column, 24 g, pkg of 10
69-2203-347	RediSep Rf Gold RediSep Rf Gold Column, 40 g, pkg of 10
69-2203-348	RediSep Rf Gold RediSep Rf Gold Column, 80 g, pkg of 6
69-2203-349	RediSep Rf Gold RediSep Rf Gold Column, 120 g, pkg of 6
69-2203-359	RediSep Rf Gold RediSep Rf Gold Column, 220 g, pkg of 4
69-2203-369	RediSep Rf Gold RediSep Rf Gold Column, 330 g, pkg of 3
69-2203-427	RediSep Rf Gold RediSep Rf Gold Column, 750 g, pkg of 3
69-2203-428	RediSep Rf Gold RediSep Rf Gold Column, 1500 g, pkg of 2

*RediSep Rf Gold is a trademark of Teledyne Isco Inc. CombiFlash, and RediSep are registered trademarks of Teledyne Isco, Inc. All other trademarks are the property of their respective holders.*

*Last modified March 20, 2009*

#### Teledyne Isco, Inc.

P.O. Box 82531, Lincoln, Nebraska, 68501 USA  
Toll-free: (800) 228-4373 • Phone: (402) 464-0231 • Fax: (402) 465-3091  
E-mail: [iscoinfo@teledyne.com](mailto:iscoinfo@teledyne.com)

