

CombiFlash NextGen Flash Methods: Better, Faster, Greener



Chromatography Technical Note
TN47

Overview

With the addition of the NextGen to the CombiFlash line of products, the default methods were reevaluated in order to maximize efficiency by balancing resolution with speed and cost. When combined with our RediSep Rf Gold line of columns, solvent, cost and time-savings are maximized to give greener, faster, more efficient separations.

Included in these updates was a standardization of flow rates in order to maintain the same linear velocity for the various column sizes. As a result of this standardization, we increased flow rates for most columns without sacrificing resolving power. We also optimized the gradient profile of all of our default methods eliminating delays and unnecessary re-equilibration steps, thereby minimizing purification time and solvent use. These changes result in faster, more efficient separations that use less solvent resulting in greener chromatography.

Additionally, both the Speed and Resolution method options have been maintained if using our premium RediSep Rf Gold® media of fine spherical silica gel. The improved resolution realized by the smaller spherical particles provides twice the resolving power of similar sized columns with irregular larger silica particles.

The RediSep Rf Gold Resolution method doubles the resolving power in the same amount of time as irregular silica media. The RediSep Rf Gold Speed option allows the user to take advantage of the RediSep Rf Gold media to maximize time and cost savings for compounds that are more easily separable. Not only do RediSep Rf Gold columns offer superior chromatography, but they also allow for shorter gradients resulting in greener separations by using less solvent.

Further information regarding RediSep Rf Gold can be found in our poster reprint: “Spherical Silica Increases Loading Capacity” and Application Note #70 “Higher Resolution Results with RediSep Rf Gold® Silica Column”. These can both be found on teledyneisco.com

NextGen 300/300+ Flow Rates to the Next Level

Flow rates of previous generation flash systems maxed out at 200 mL/min. The NextGen 300 and 300+ breaks through this limit offering flow rates up to 300 mL/min, allowing similar linear velocities across column sizes up to 330 g. Additionally, the increased pressure limits on the NextGen 300/300+ allow the use of more viscous solvent mixtures that allow for greener aqueous reverse phase separations.

Table 1: Comparison of Flow Rates on older Rf+ versus new NextGen RediSep Gold Resolution and Speed methods

RediSep Gold Resolution and Speed Flow Rates (mL/min)			
Size (g)	Rf+ Default	NextGen RediSep Gold Resolution and RediSep Default	NextGen RediSep Gold Speed
4	18	13	23
12	30	30	55
24	35	40	75
40	40	60	110
80	60	80	150
120	85	110	205
220	120	215	300
330	200	300	300

Time Savings of New Methods

The increased flow rates and optimized gradient profiles offer faster methods, increasing lab efficiency and throughput.

Time savings of 20 to 50% (depending on column size) are seen using the NextGen’s optimized RediSep default or RediSep Rf Gold Resolution methods compared to the previous CombiFlash models. Even greater time saving improvements of 25 to 60% can be seen when comparing the new RediSep Rf Gold Speed methods to the previous CombiFlash Rf+. A comparison of the same separation using a RediSep Gold Resolution vs Speed method is shown below in Figures 1 and 2.

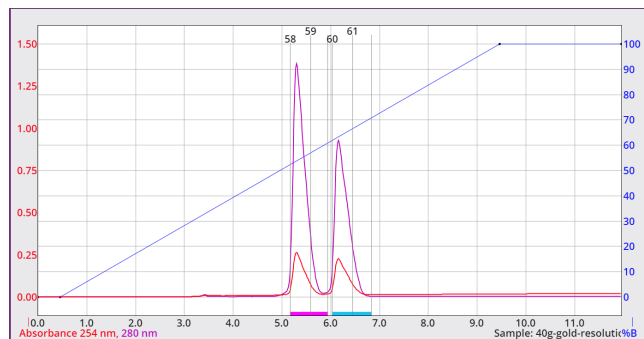


Figure 1: RediSep Gold Resolution Method on 40 g column

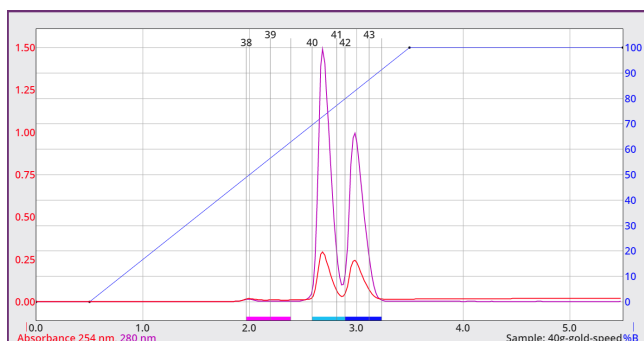


Figure 2: RediSep Gold Resolution Method on 40 g column

Table 2: Comparison of Method Time on older Rf+ and new NextGen

Size	RediSep Rf Default and RediSep Rf Gold Resolution			RediSep Rf Gold Speed		
	Rf+ Time (min)	NextGen Time (min)	Time Savings	Rf+ Time (min)	NextGen Time (min)	Time Savings
4	14.9	11.4	23%	N/A	N/A	N/A
12	15.7	8.3	47%	8	3.3	59%
24	15.4	11	29%	7.3	4.5	38%
40	19.2	11.9	38%	8.3	5.5	40%
80	33.3	17	49%	12.5	6.4	49%
120	36.1	18.4	49%	10.2	7.1	30%
220	35.6	17.5	51%	13.4	8.9	34%
330	35.4	18.92	47%	17.7	13.4	24%

Solvent Savings of New Methods

Not only do the NextGen methods offer faster separations, the improved gradient profiles offer methods that use less solvent. Solvent savings of up to 50% (depending on column size) are seen using the NextGen's optimized RediSep default or RediSep Rf Gold Resolution methods compared to the previous CombiFlash Rf+. Solvent saving improvements up to 25% can be seen when comparing the new RediSep Rf Gold Speed methods to the previous CombiFlash Rf+.

Table 3: Comparison of Solvent Savings of new NextGen vs. older Rf+ models

Size (g)	Default and Gold Resolution			Gold Speed		
	Rf+ Solvent Use (mL)	NextGen Solvent Use (mL)	Solvent Savings	Rf+ Solvent Use (mL)	NextGen Solvent Use (mL)	Solvent Savings
4	268.2	148.2	45%	N/A	N/A	N/A
12	471	249	47%	240	181.5	24%
24	539	440	18%	255.5	337.5	-32%
40	768	714	7%	415	550	-33%
80	1998	1360	32%	1000	960	4%
120	3068.5	2024	34%	1530	1455.5	5%
220	5340	3762.5	30%	2680	2670	0%
330	7080	5676	20%	3540	4020	-14%

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