

Converting Methods from Gravity Columns to Cartridges

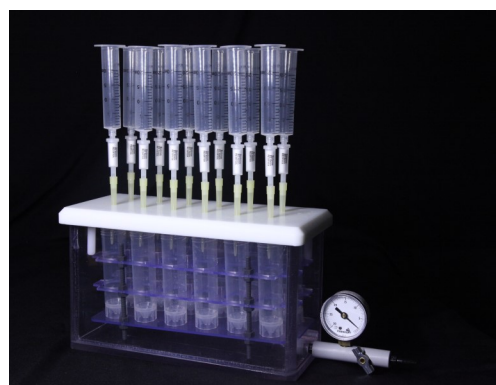
Summary Performing separations using Eichrom 2 mL pre-packed cartridges on a vacuum box system offers many advantages over gravity flow columns, including faster flow rates, improved chromatographic resolution, and the ability to stack multiple cartridges and measure multiple analytes from one sample aliquot. Converting separations methods from gravity flow columns to Eichrom cartridges is normally simple:



1) Obtain a 12-Hole or 24-Hole vacuum box, vacuum pump and tubing.



5) Sample aliquots may be collected in individual 50 mL centrifuge tubes or collectively in the vacuum box liner.



6) Change cartridge reservoirs and inner and outer tips prior to elution of each analyte to improve purity.

- 2) Add cartridges appropriate for the separation.
- 3) Run separation procedure using the same solutions and volumes as the column method, adjusting the vacuum to achieve the optimal flow rate:
 - 1 to 2 mL/min for sample load and rinses.
 - 1 mL/min for stripping steps.

4) Drawing air through the cartridges for a short time (<5-10 minutes) between elution steps will not adversely impact the separation. Some samples will run faster than others.

7) The Eichrom vacuum box can also be used for CeF₃ microprecipitation source preparation using resolve filters.



Table 1. TEVA Resin Performance (2006-2017)*

Parameter	2 mL Cartridge 50-100 μm	2 mL Column 100-150 μm
^{230}Th % yield	99.3 \pm 0.5	99.1 \pm 0.7
^{239}Pu % yield	98.3 \pm 1.6	98.1 \pm 1.5
^{239}Pu % impurity in Th	0.2 \pm 0.1	0.2 \pm 0.1
^{230}Th % impurity in Pu	0.3 \pm 0.2	0.3 \pm 0.2

*Eichrom Quality Method QA-0213

Vacuum Box -12 Hole (AR-12-BOX)

Includes:

- Rack for 50mL c-tubes (AR-12-RACK)
- Vacuum Gauge (AR-01-GAUGE-PVC)
- Vacuum Box Lid (AR-12-LID)
- White Inner Support Tubes (25)
- Yellow Outer Tips (25)
- Vacuum Box Manifold Plugs (50)
- Cartridge Reservoir, 10 mL (25)

Optional:

- Inner Liner (AR-12-LINER)
- Top Support (AR-12-TS)

Vacuum Box -24 Hole (AR-24-BOX)

Includes:

- Rack for 50mL c-tubes (AR-24-RACK)
- Vacuum Gauge (AR-01-GAUGE-PVC)
- Vacuum Box Lid (AR-24-LID)
- White Inner Support Tubes (50)
- Yellow Outer Tips (50)
- Vacuum Box Manifold Plugs (50)
- Cartridge Reservoir, 10 mL (25)

Optional:

- Inner Liner (AR-24-LINER)
- Top Support (AR-24-TS)

Additional Equipment

- Vacuum Pump (Fisher no. 01-092-25 or equivalent)
- Tubing Tygon 1/4 in. I.D., 7/16 in. O.D.
(Fisher no. 14-169-1K, or equivalent)
- White Inner Support Tubes (AR-1000-TUBE-PE)
- Yellow Outer Tips (AR-1000-OT)
- Stopcock, Polycarbonate (12) (AR-12-PC)
- 10 mL Cartridge Reservoir (200) (AR-200-RV10)
- 20 mL Cartridge Reservoir (200) (AR-200-RV20)

Table 2. TRU Resin Performance (2006-2017)*

Parameter	2 mL Cartridge 50-100 μm	2 mL Column 100-150 μm
^{241}Am % yield	99.4 \pm 0.4	99.4 \pm 0.6
^{239}Pu % yield	97.2 \pm 0.6	97.7 \pm 0.7
^{239}Pu % impurity in Am	0.3 \pm 0.2	0.3 \pm 0.1
^{241}Am % impurity in Pu	0.3 \pm 0.2	0.4 \pm 0.2

*Eichrom Quality Method QA-0212

Table 3. UTEVA Resin Performance (2006-2017)*

Parameter	2 mL Cartridge 50-100 μm	2 mL Column 100-150 μm
^{230}Th % yield	99 \pm 3	99 \pm 3
^{233}U % yield	99 \pm 4	99 \pm 4
^{233}U % impurity in Th	0.2 \pm 0.1	0.1 \pm 0.1
^{230}Th % impurity in U	0.1 \pm 0.1	0.1 \pm 0.1

*Eichrom Quality Method QA-0214

Table 4. Sr Resin Performance (2006-2017)*

Parameter	2 mL Cartridge 50-100 μm	2 mL Column 100-150 μm
Sr % yield	93 \pm 3	95 \pm 3
Ba % impurity in Sr	0.2 \pm 0.1	0.2 \pm 0.1
Ca % impurity in Sr	< 0.02	< 0.02
Y % impurity in Sr	< 0.01	< 0.01

*Eichrom Quality Method QA-0215

Comparison of Elution Curves for Sr^{2+} for Two Particle sizes of Sr Resin
Elutrient 3.2 M HNO_3 , 23-24°C

