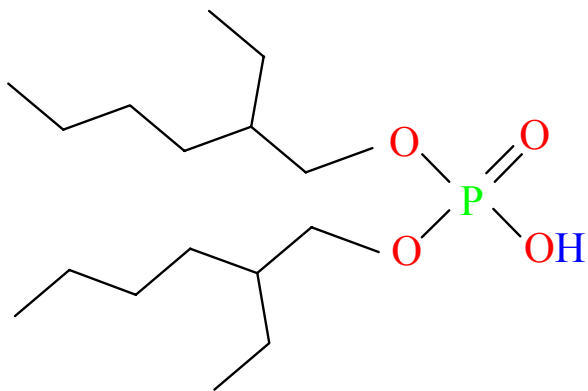


Eichrom's LN Series of Resins:  
Characterization and  
Novel Applications

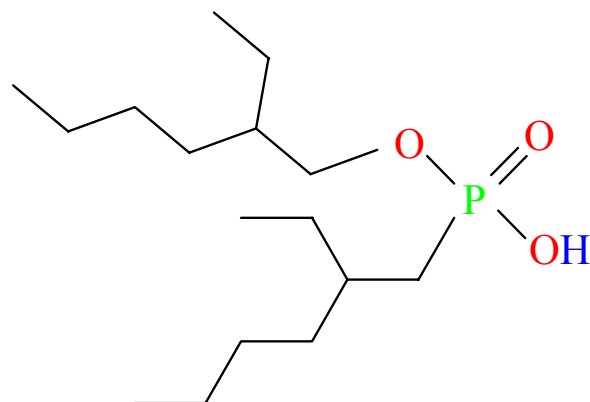
Phil Horwitz and Dan McAlister

PG Research Foundation, Inc.

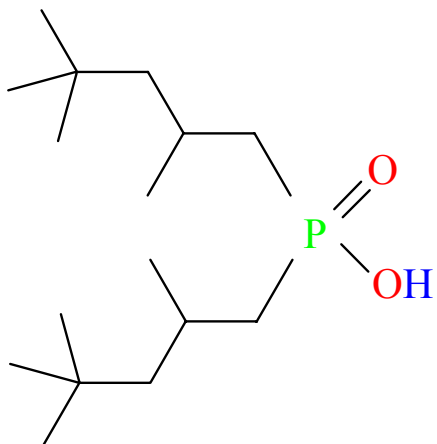
## The LN Series of Resins



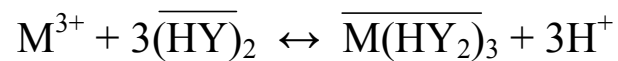
HDEHP (LN)

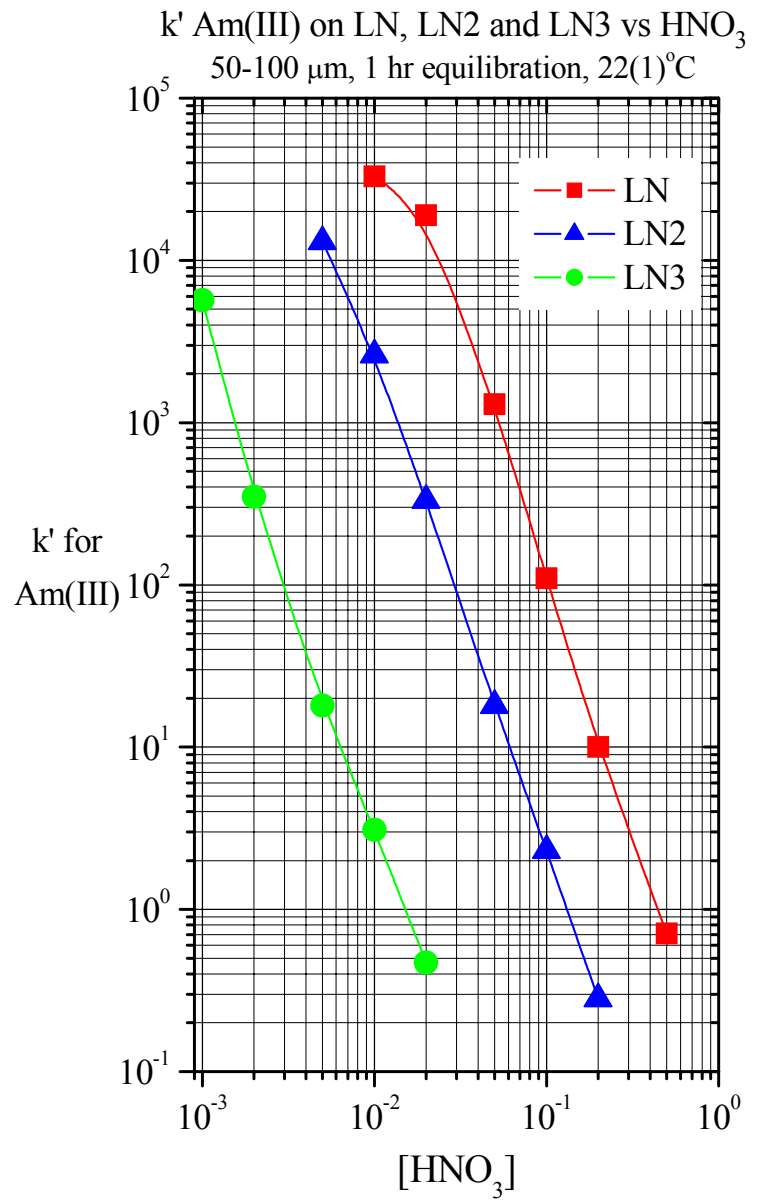


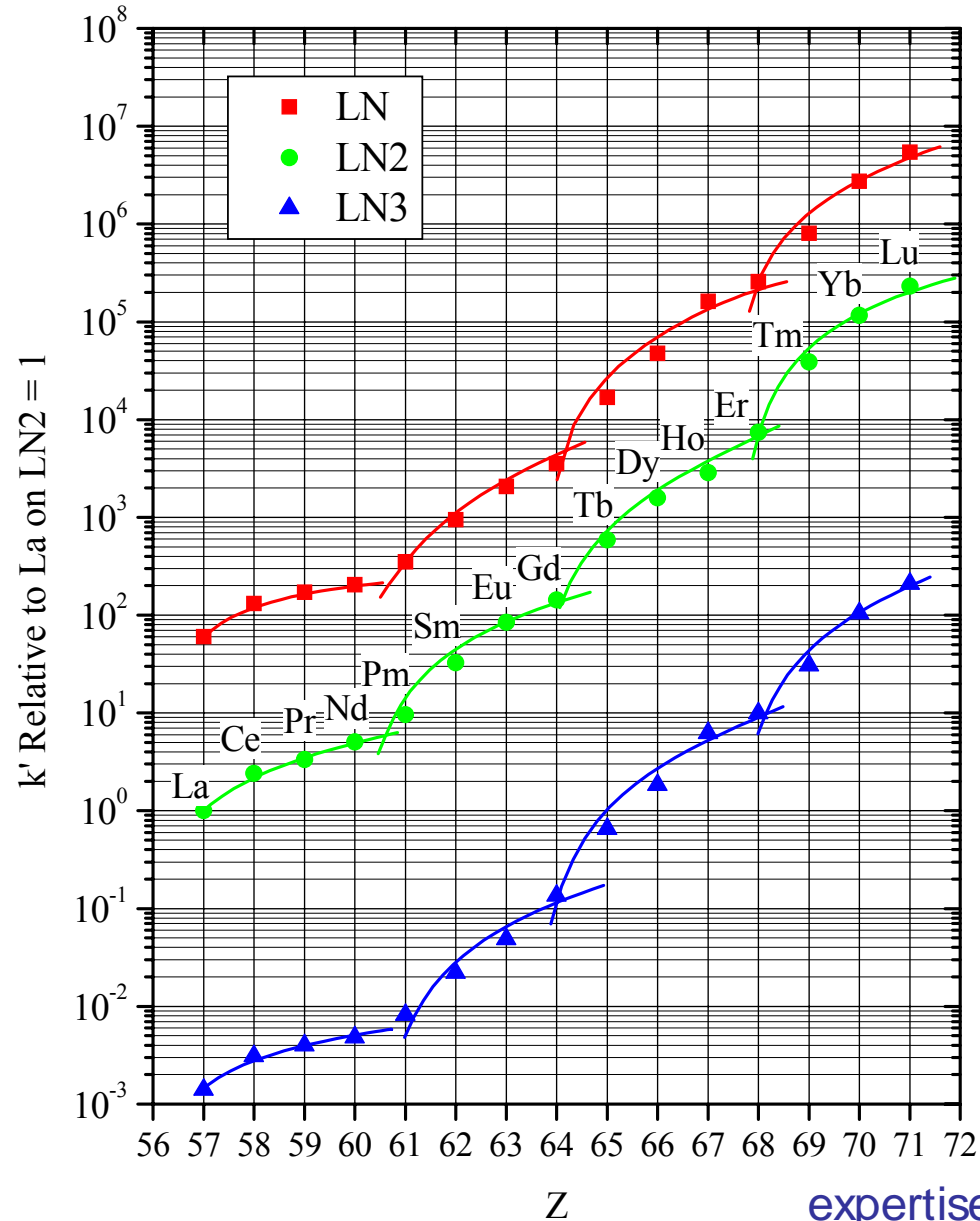
HEH[EHP] (LN2)



H[TMPeP] (LN3)



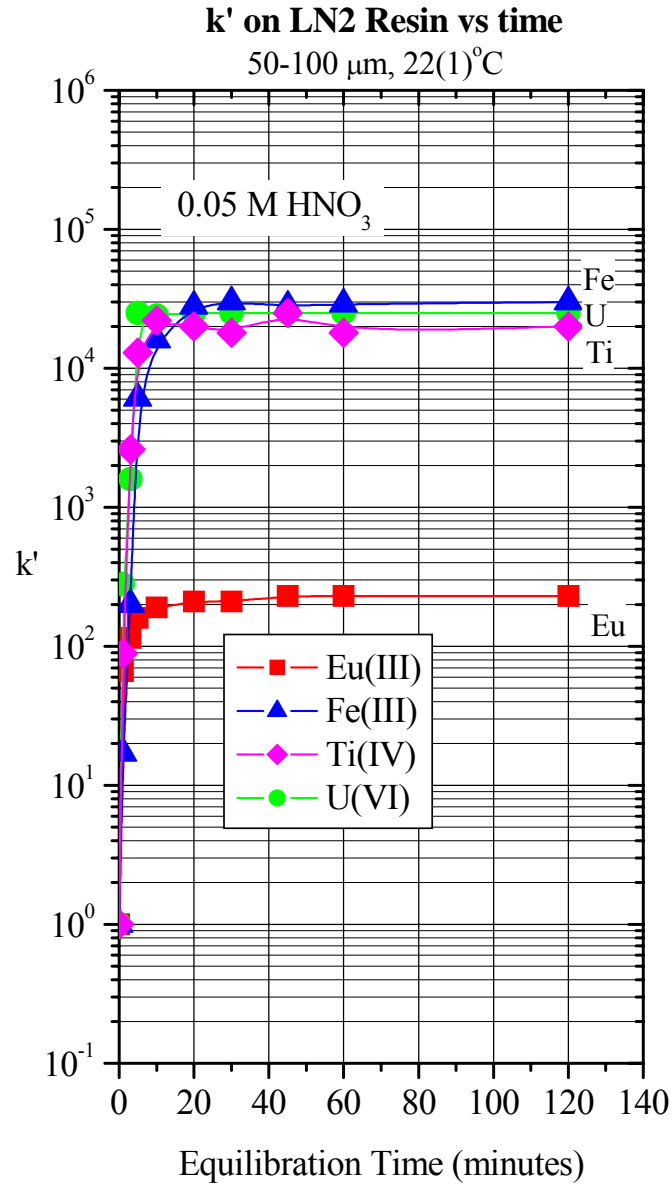


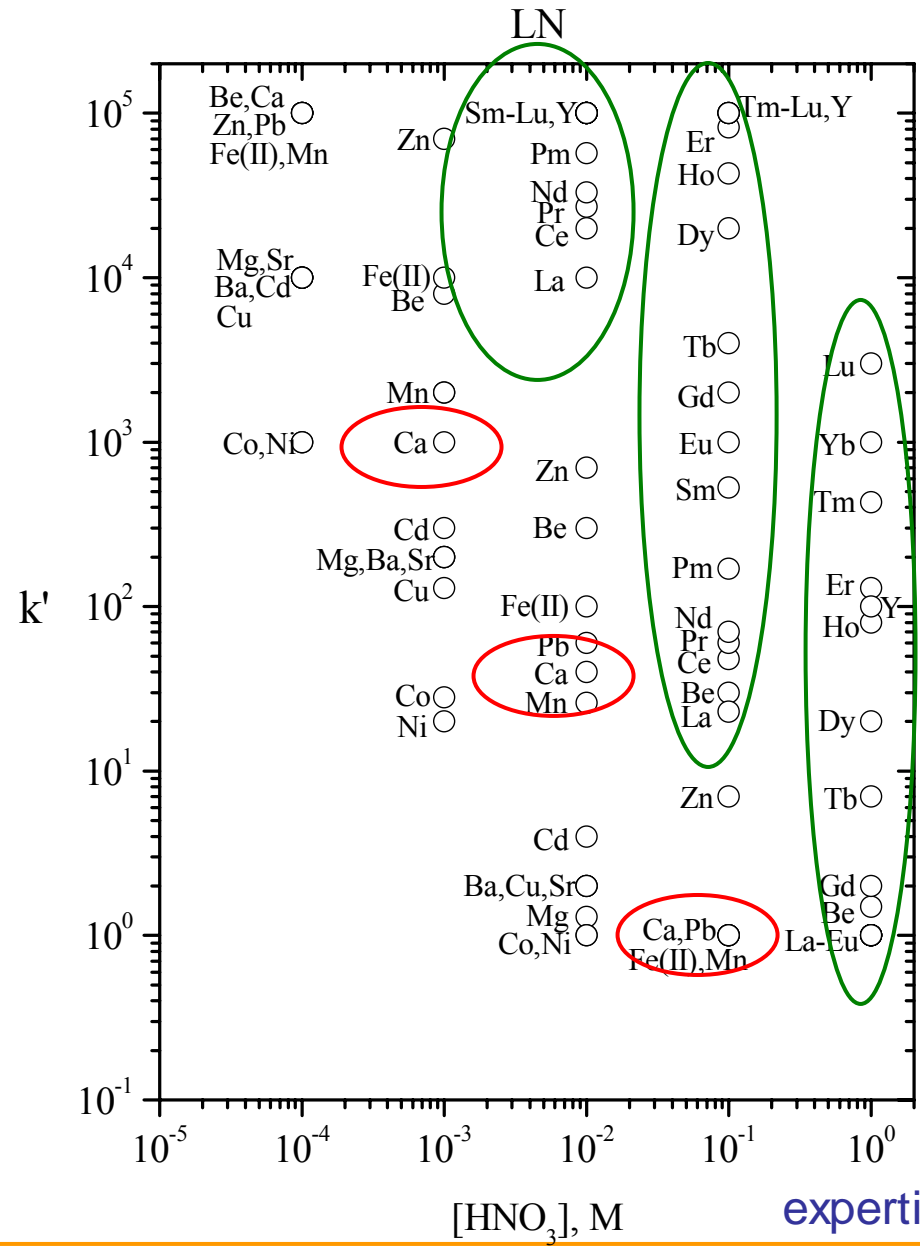


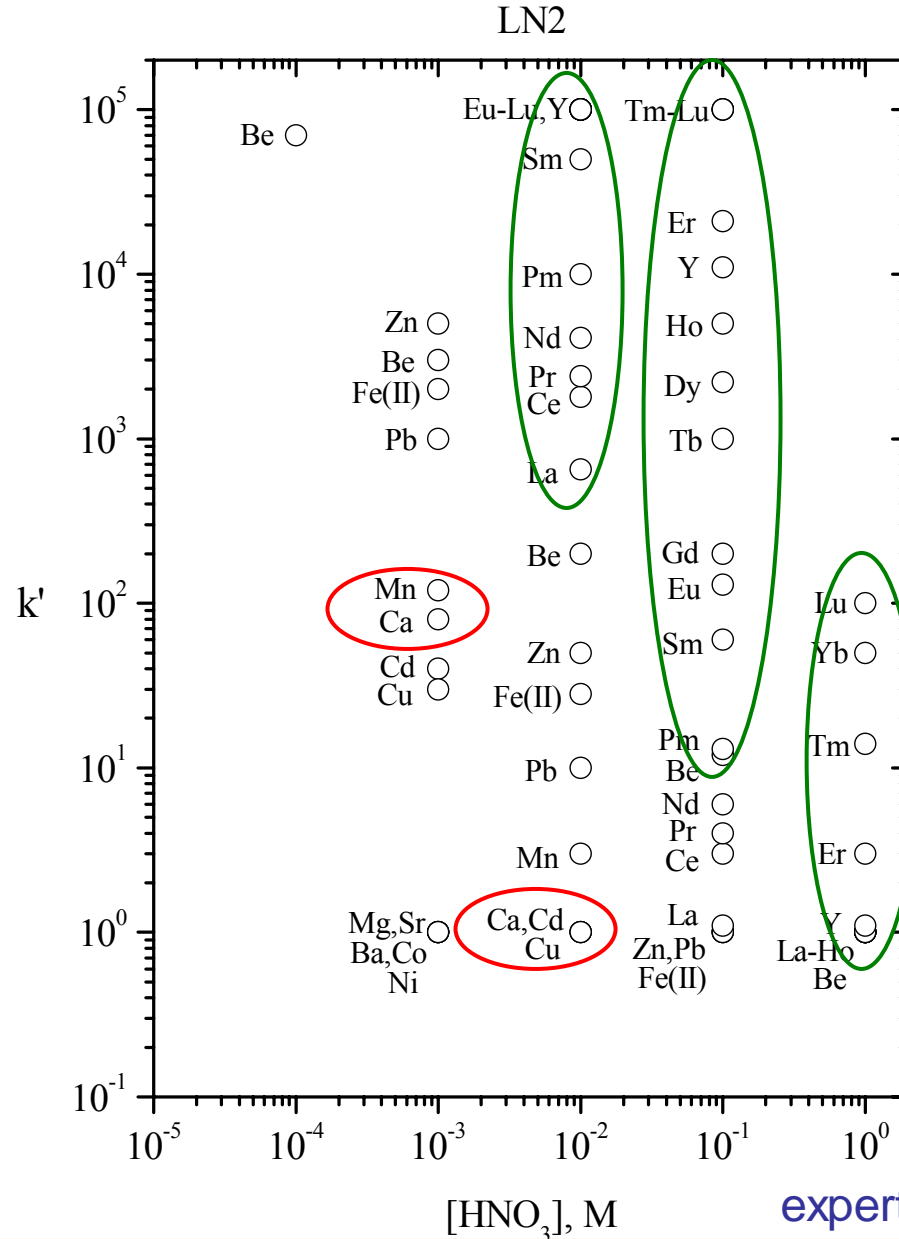
## Metal Ions Studied on LN Resin Series

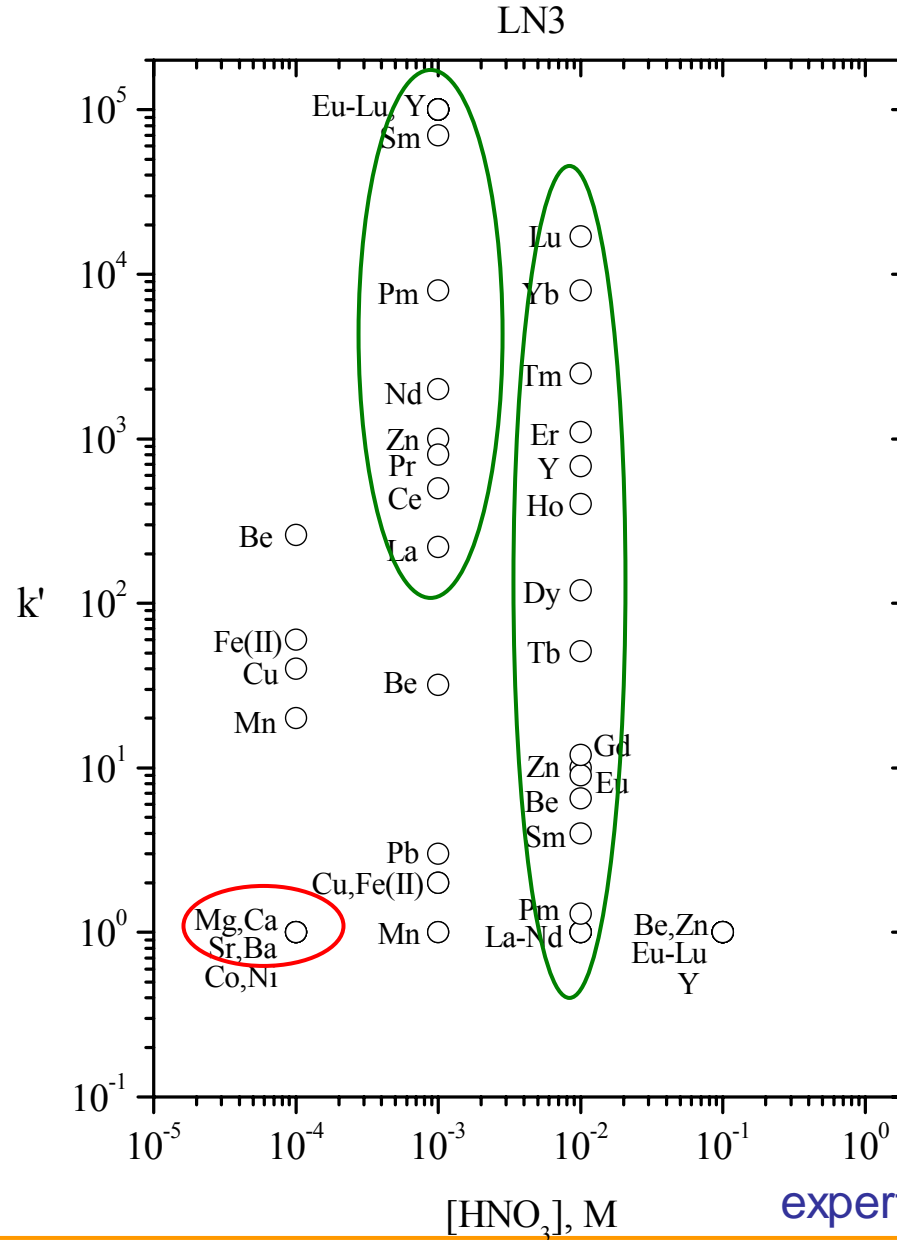
H																	He	
Li	Be											B	C	N	O	F	Ne	
Na	Mg											Al	Si	P	S	Cl	Ar	
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt										
			Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu		
			Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr		

HNO<sub>3</sub> HCl



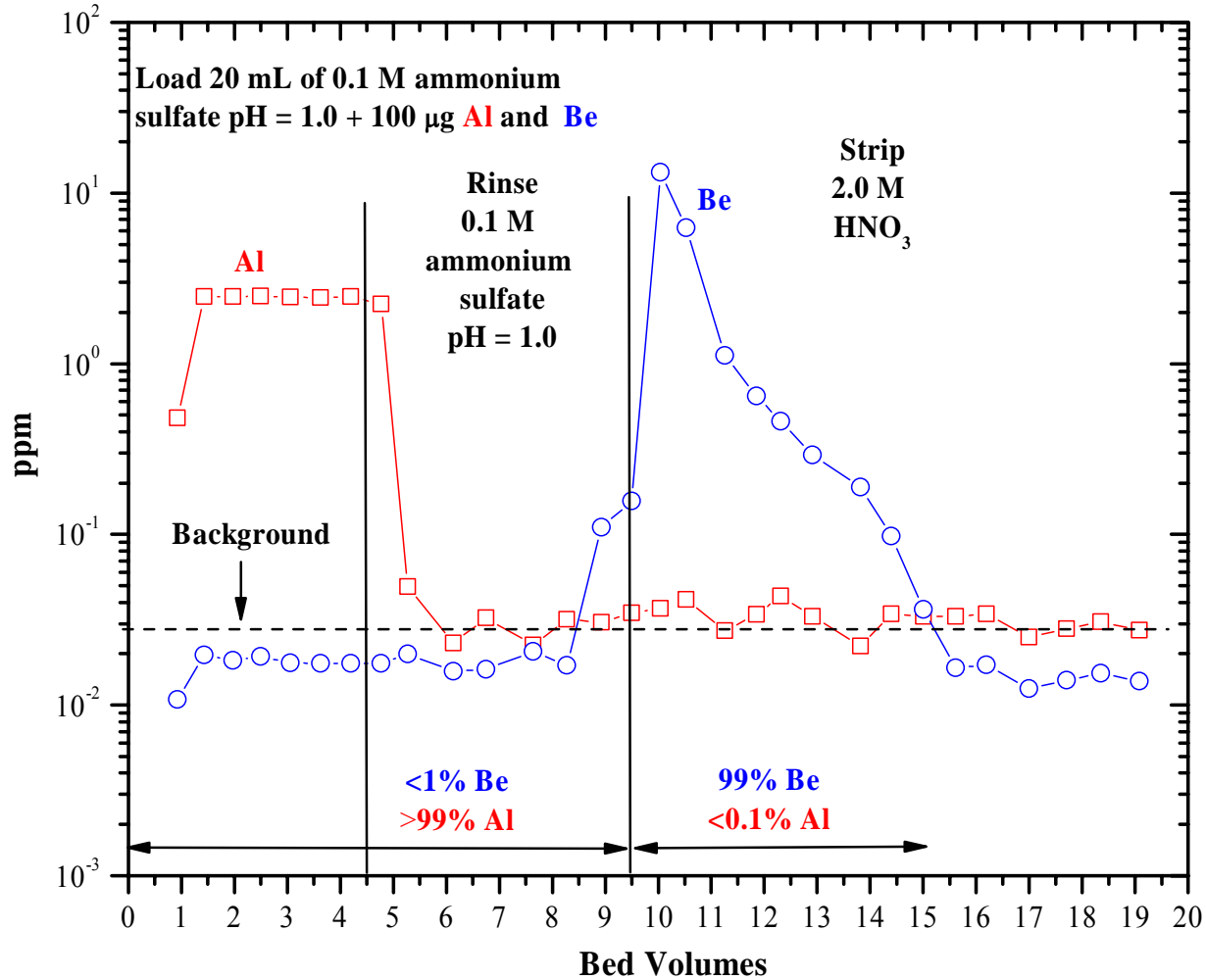




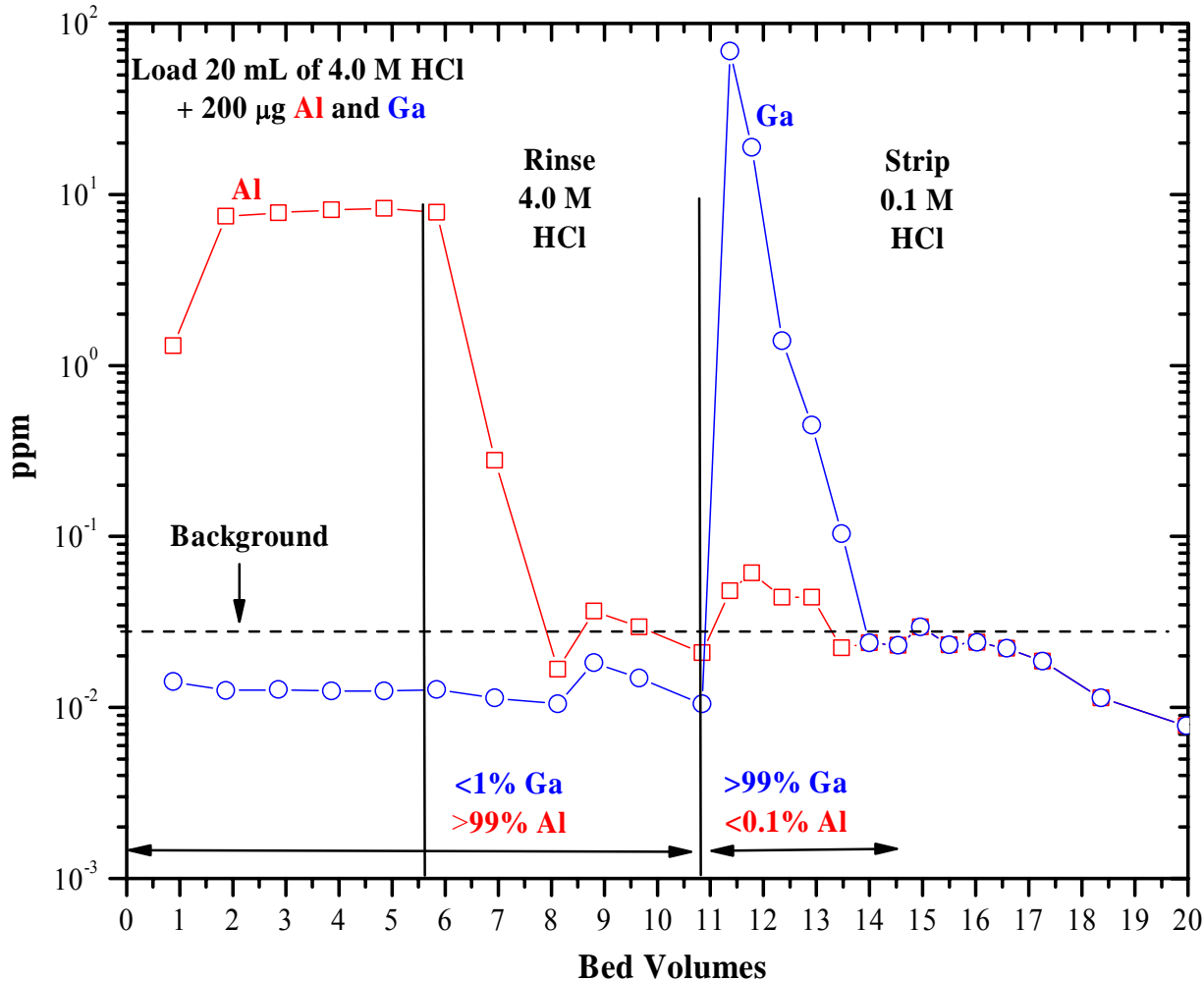


## ppm vs. Bed Volumes of Eluate

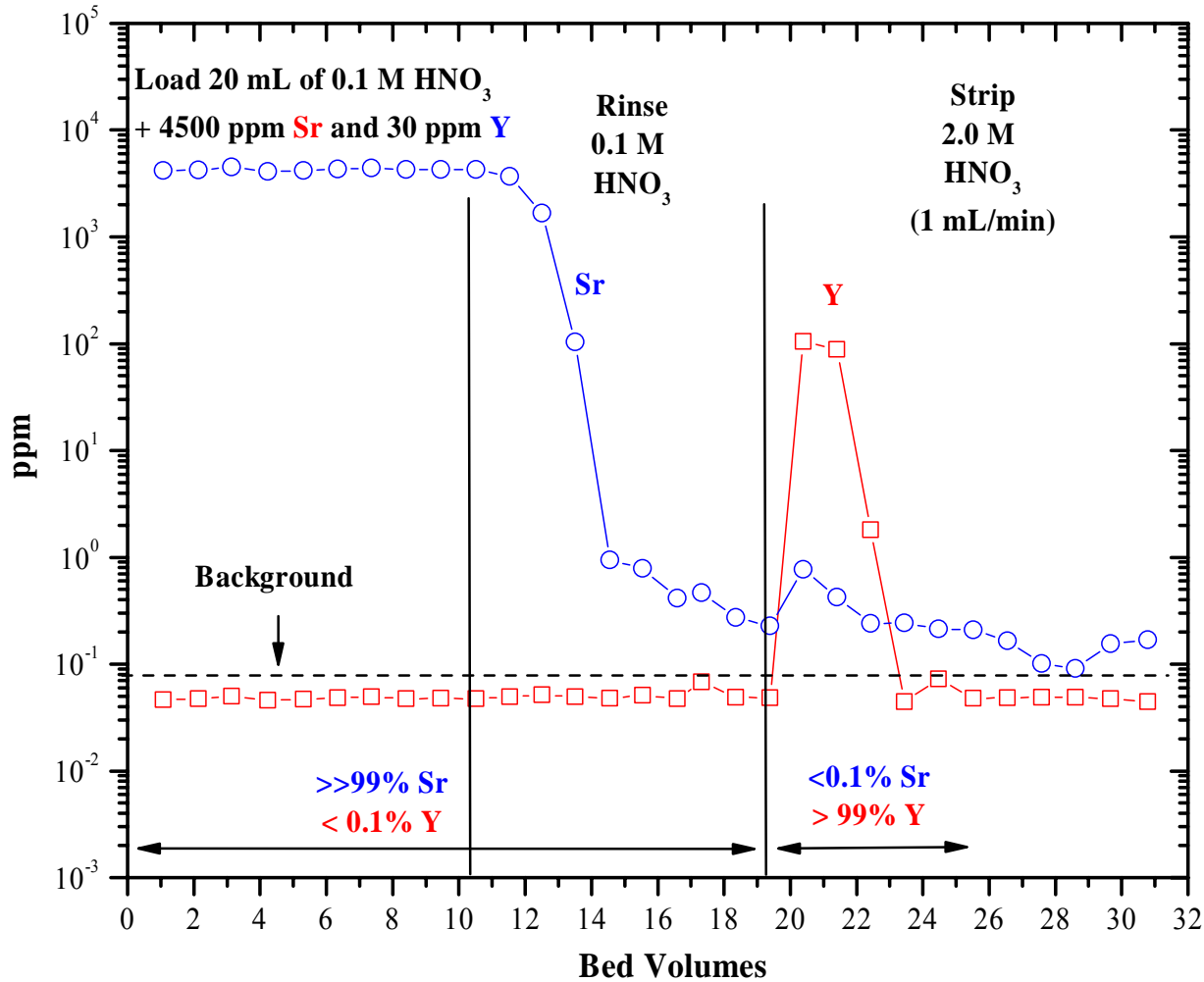
5 mL Column of LN2 Resin, 50-100  $\mu\text{m}$ , Assisted Gravity Flow 2 mL/min, 22(1)  $^{\circ}\text{C}$

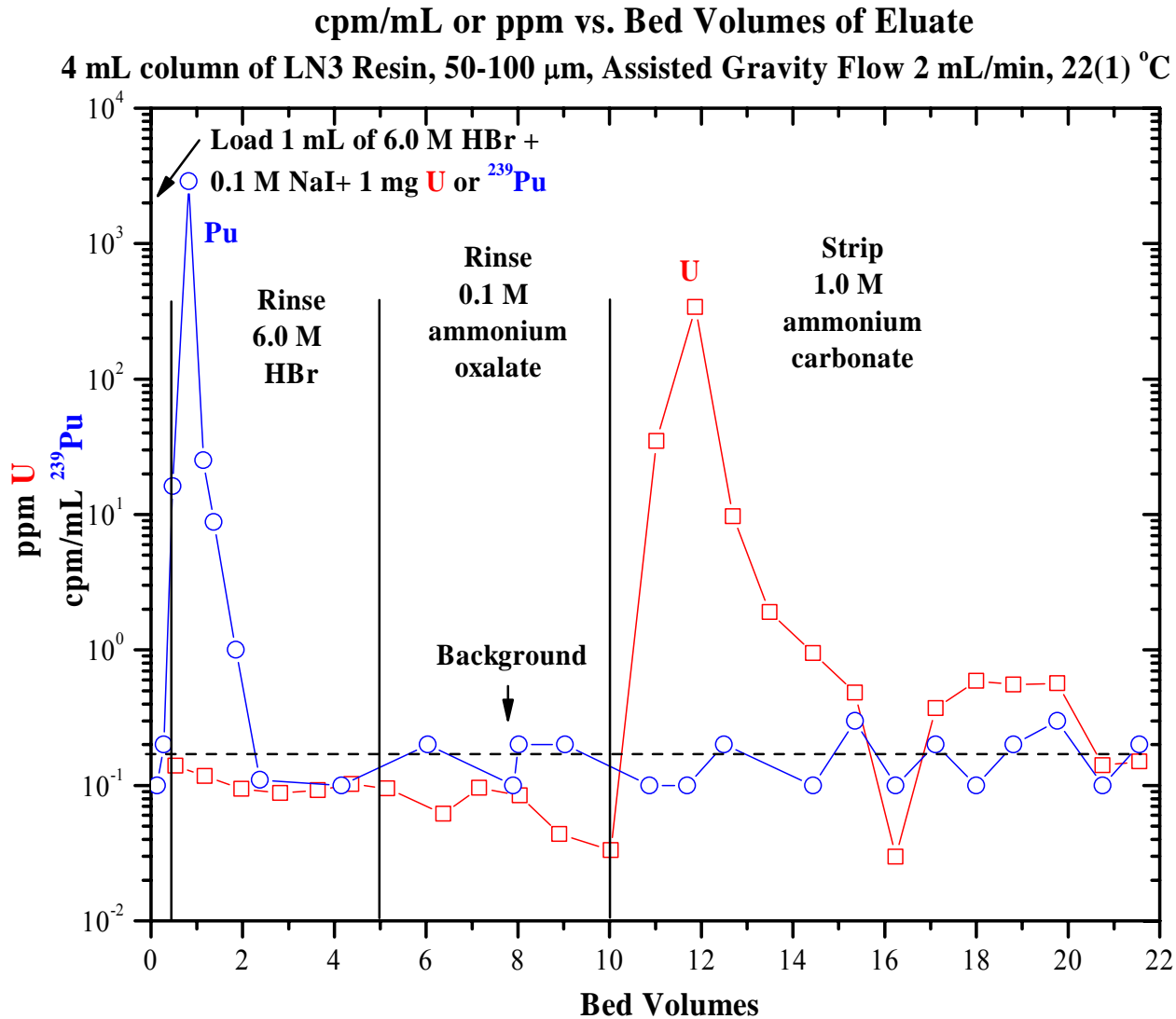


**ppm vs. Bed Volumes of Eluate**  
**4 mL Column of LN3 Resin, 50-100  $\mu$ m, Assisted Gravity Flow 2 mL/min, 22(1)  $^{\circ}$ C**



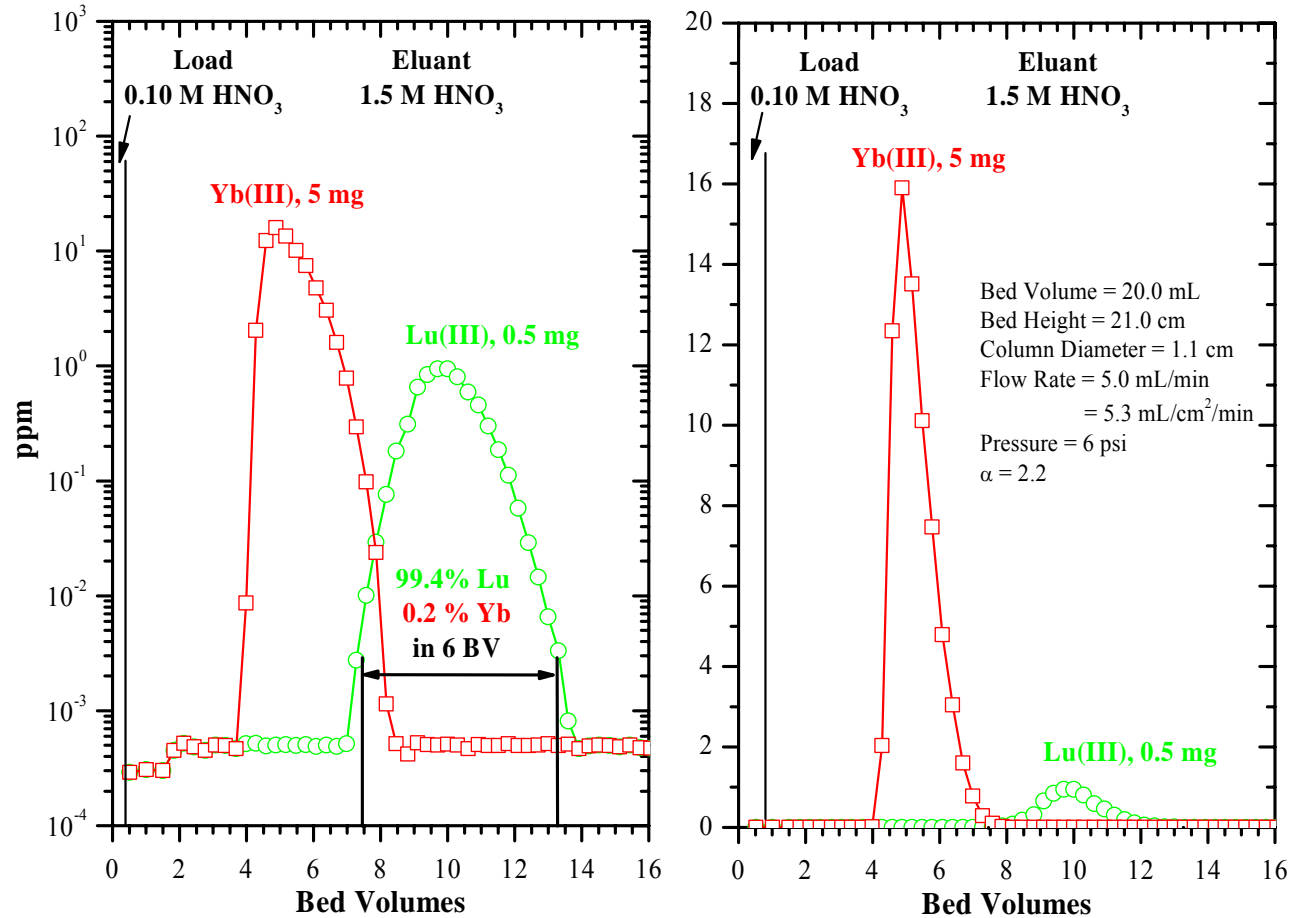
**ppm vs. Bed Volumes of Eluate**  
**2 mL Cartridge of LN2 Resin, 50-100  $\mu\text{m}$ , Assisted Gravity Flow 2 mL/min, 22(1)  $^{\circ}\text{C}$**





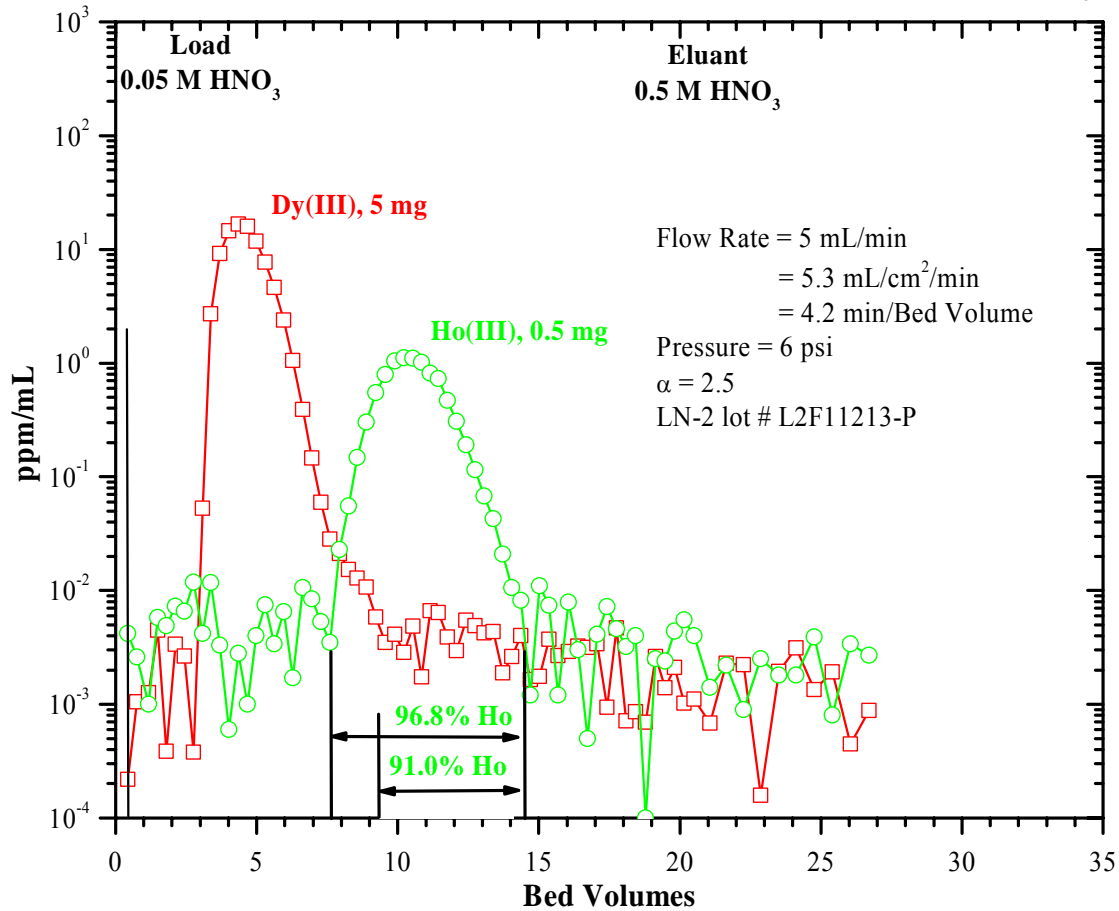
## Separation of Yb and Lu on LN2 Resin

Slurry Packed 25-53  $\mu\text{m}$  LN2 Resin, Operating Temperature 50(1)  $^{\circ}\text{C}$



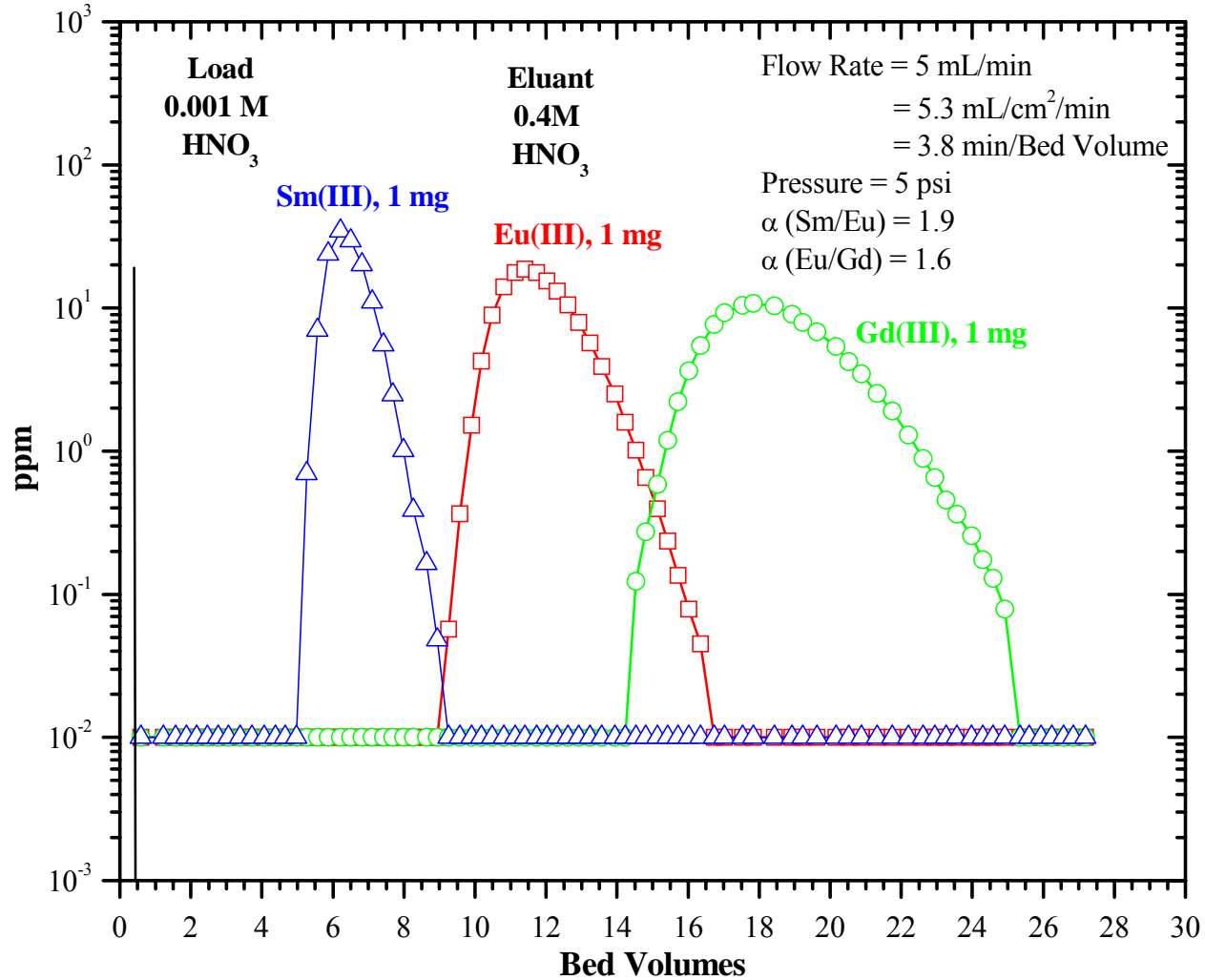
## ppm/mL vs. Bed Volumes of Eluate

Slurry Packed 25-53  $\mu\text{m}$  LN2 Resin (Post Lu/Yb), Preconditioned with 0.05 M  $\text{HNO}_3$ , 50(1)  $^\circ\text{C}$



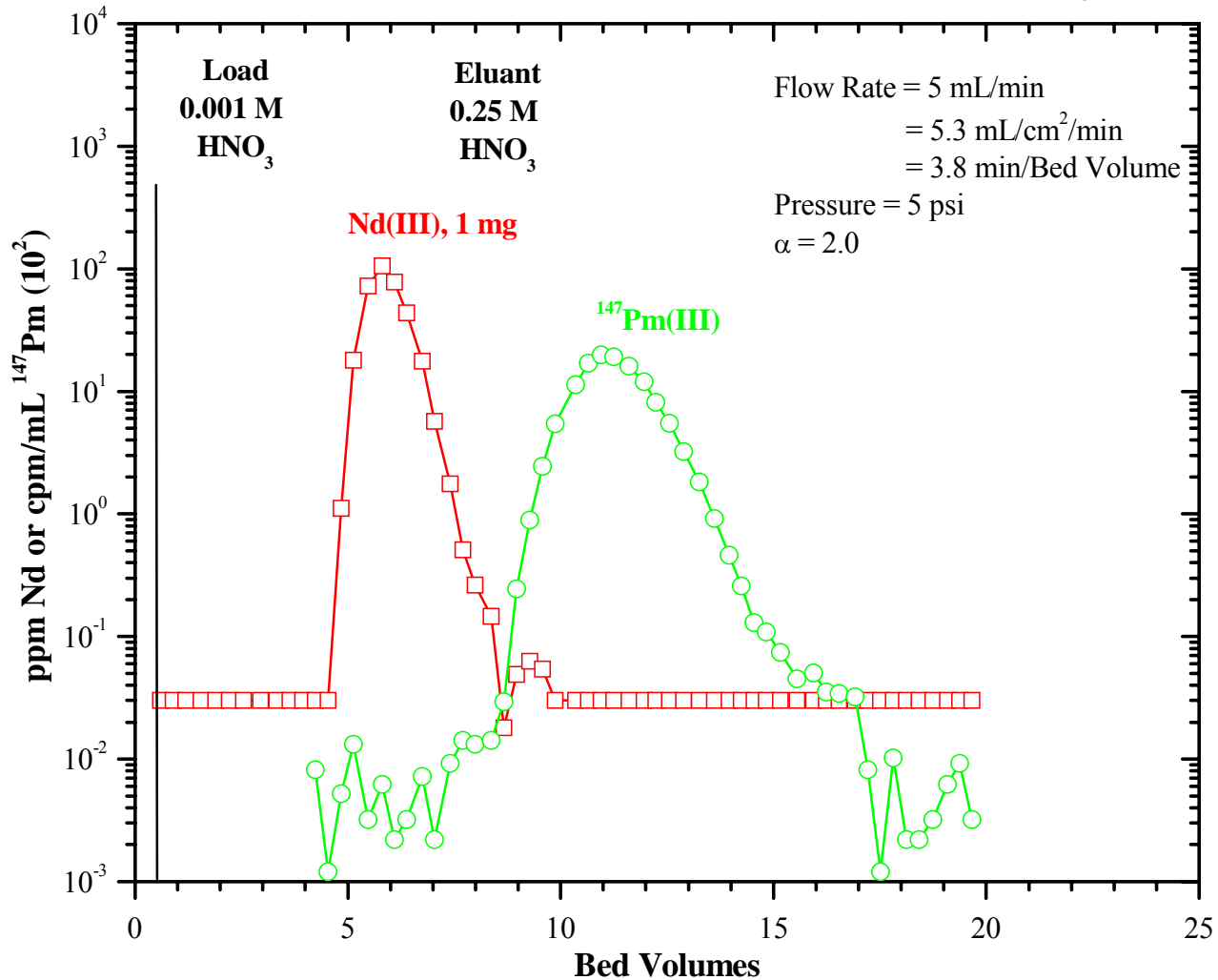
## ppm vs. Bed Volumes of Eluate

Slurry Packed 25-53  $\mu\text{m}$  LN Resin, Preconditioned with 0.001 M  $\text{HNO}_3$ , 50(1)  $^\circ\text{C}$



## ppm or cpm/mL vs. Bed Volumes of Eluate

Slurry Packed 25-53  $\mu\text{m}$  LN Resin, Preconditioned with 0.001 M  $\text{HNO}_3$ , 50(1)  $^\circ\text{C}$



## Physical Constants of Slurry-Packed Columns of LN Series Resins

	LN	LN2	LN3
Extractant Density (g/mL)	0.96	0.91	0.89
Bed Density (g/mL)	0.38	0.37	0.39
Resin Density (g/mL)	1.15	1.13	1.13
$V_s$	0.16	0.16	0.18
$V_m$	0.67	0.67	0.66
$V_s/V_m$	0.24	0.24	0.27
$D_v$ conversion factor ( $C_1$ ) <sup>a</sup>	2.39	2.27	2.22
$k'$ conversion factor ( $C_2$ ) <sup>b</sup>	0.57	0.55	0.60

$$^a D_v = D_w \times C_1$$

$$^b k' = D_w \times C_2$$

## Capacity for Trivalent Lanthanides and Actinides for LN Series

0.16 mmol/mL of bed for LN and LN2

0.18 mmol/mL of bed for LN3