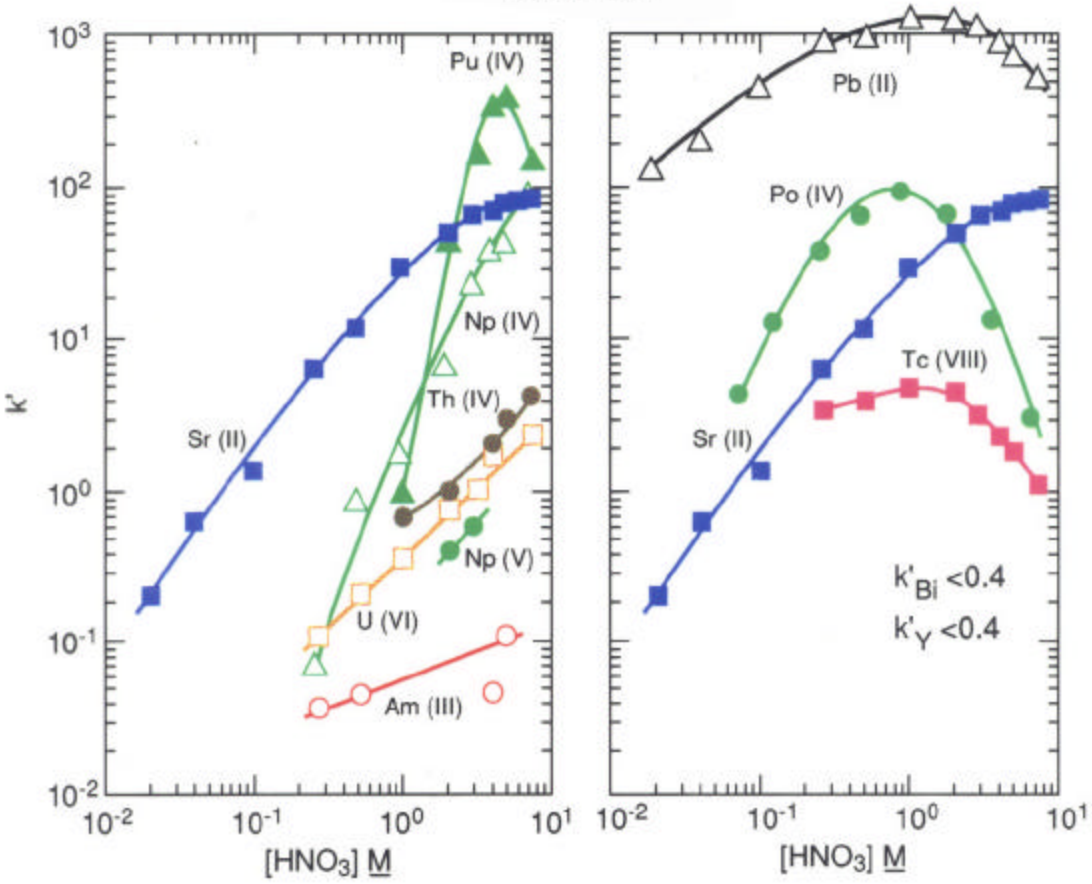
The Capacity Factor (k'): How it is measured and what it does not tell you.

E. Philip Horwitz

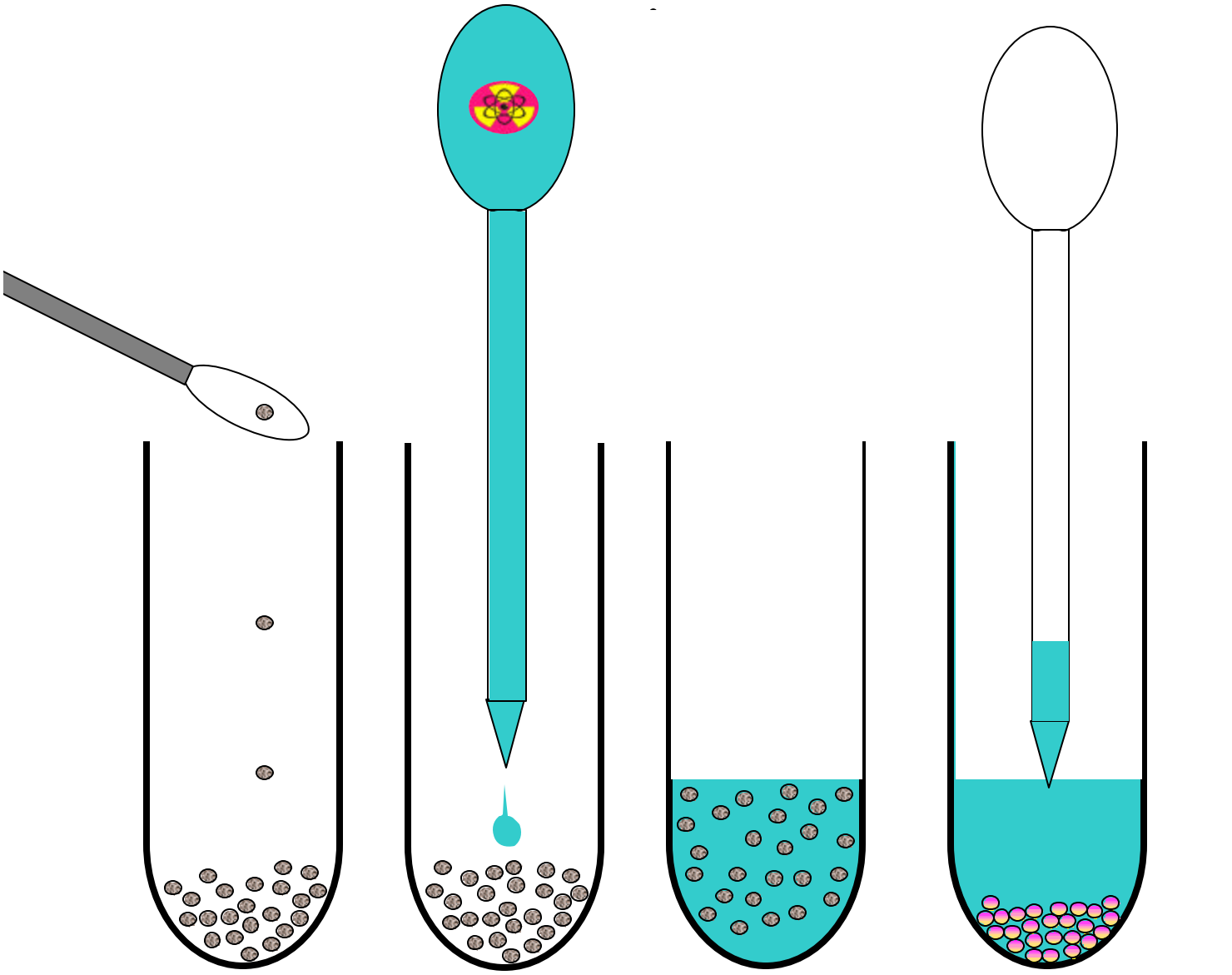
Senior Consulting Scientist
Eichrom Technologies, Inc.
Darien, IL 60561

Acid dependency of k' for various ions at 23-25°C.

Sr Resin



Dry Weight Distribution



Weigh Resin (g)

Add Volume (mL) of Solution with A_0

Mix

Withdraw Volume of Solution to Measure A_s

$$D_w \; ? \; \frac{A_0 - A_s}{w(g)} \Big/ \frac{A_s}{v(mL)}$$

How is k' calculated from D_w?

One needs to know:

1. **Density of the extractant or combination of extractants used to prepare a given resin.**

2. **Weight of extractant sorbed on the inert support.**

3. **Density of the loaded resin.**

4. **Packing density (weight of resin per unit volume of column).**

5. **Bed volume of column.**

Relationship Between k' and D_w

$$D_W = \frac{A_o - A_S}{A_S} \cdot \frac{mL}{g} \qquad (1)$$

$$\frac{D_W}{D} = \text{mL of stationary phase per gram of resin} \qquad (2)$$

$$k' = D \cdot \frac{v_S}{v_m} \qquad (3)$$

$$k' = D_w \text{ / Conversion Factor} \qquad (4)$$

D_w = weight distribution ratio
D = volume distribution ratio
k' = number of F.C.V. to peak maximum
$A_o - A_s$ = activity sorbed on g grams of resin
A_s = activity in mL of solution
v_s and v_m = volume of stationary and mobile phase, respectively, in a packed column

What k' does not tell you.

Breakthrough!

Breakthrough is a function of:

1. k'
2. Particle size
3. Flow rate
4. Temperature

Comparison of Elution Curves for Sr^{2+} for Two Particle sizes of Sr Resin

Elutrient 3.2 M HNO_3, 23-24° C