What Does Eichrom’s Quality Control System Do For You?

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Eichrom Technologies, LLC

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Outline

• QC Goals
• Standard Testing
  – Finished Product Testing
  – Individual Constituent Testing
• QC Progression of a New Resin
• System Improvements
• Upcoming QC Upgrades
Eichrom’s
Key QC Goals

1. Ship at least 98% of line items by the customer’s required delivery date.
   - 97% (To Date)

2. Implement one or more improvements in product quality, measurement systems of product quality, or efficiency quarterly. (2010 highlights)
   - Shelf Life Study Completed for DGA, Sr, TRU, TEVA, & UTEVA
   - Reformulation of Tritium Columns
Finished Product Testing

• Dry Weight Distribution Ratio ($D_w$)

  – Since the formation of Eichrom, an essential feature of our quality control system was the measurement of $D_w$ for each batch of new resin manufactured.

  – radioactive or Stable Elements
Dry Weight Distribution Ratio

\[ D_w = \frac{A_0 - A_s}{w(\text{g})} \div \frac{A_s}{v(\text{mL})} \]
Finished Product Testing (cont.)

Column Elutions

- DGA
  Am & U

- Sr
  Ba, Ca, Sr, & Y

- TEVA
  Pu & Th

- TRU
  Am & Pu

- UTEVA
  Th & U
Individual Constituent Testing

- Extractants & Diluents
  - Solvent Extraction
    - CMPO/TBP (TRU Resin)
    - Aliquat-336 (TEVA Resin)
    - DAAP (UTEVA Resin)
Individual Constituent Testing (cont.)

- Support Resin
  - Flow Rate
    - A-Grade Specs (0.6-0.8mL/min.)
  - Particle Characterization
    - New Lot
QC Progression of a New Resin

• Development of the Resin

• QC Testing Based on Application of Resin

• Collaborating w/ Input from Client
  – Ensuring the resin will meet their needs.

• Development of a Standard QC

• Setting of Performance Specifications
QC Improvements

- Constantly Striving to Deliver the Best Product
- New Material
- Change of Material Supplier
- Inconsistent Data
New Material

• Resolve Filters

  – Supplier Changed Manufacturing Process
  – Did Not Meet Needs
  – Designed a rugged enough QC to differentiate between materials.
  – Finally found a material that was comparable.
New Material

- Tritium Columns
  - Supply of 100-200 mesh Diphonix was low, almost non-existent.
  - Batch Uptakes
  - Performance Directly Related to Flow Rate
  - 50-100 mesh Diphonix Did Not Perform Well
  - Mixed Particle Diphonix + S-Grade Pre-Filter
  - Reformulation/Collaborations with Clients => Better Product (Better Results/Faster)
Supplier Change

• CMPO (TRU Resin)
  – New Supplier After 15+ Years
  – Ensure Quality/Purity
  – Th-227 Column Elution
    • Extremely High Specific Activity
Inconsistent Data

- Sample From Larry’s Trunk
- Matt O’Hara Collaboration
  - Inconsistent Results Using DGA
- Original QC: Column Elution w/Eu-152
- New QC: Column Elution w/ Am-241 & U-233
- Inconsistency Observed w/ U-233 => Purifying Extractant
  - Consistent Resin

Load: 3M HNO₃  U Strip: 0.5M HNO₃  Am Strip: 0.5M HCl
Upcoming QC Upgrades

- LN QC Procedure
- Anion Procedure
  - Increase Ruggedness
  - New Needs
    - Client
    - Field Changes
  - Interferences
Conclusions

- Standard testing is done to ensure the consistency of a product before the end user receives it.
- Eichrom always has open ears. If there is a comment or concern, please share.
- Specifications associated with the QC performed on the major resins are in the handout.
- CoAs Online
# Standard QC Specifications

<table>
<thead>
<tr>
<th>DGA-Normal Resin</th>
<th>$^{233}$Am Strip</th>
<th>$^{241}$Am Breakthrough</th>
<th>$^{233}$U Strip</th>
<th>$^{238}$U Breakthrough</th>
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<tr>
<td><strong>Mean (%)</strong></td>
<td>97</td>
<td>1</td>
<td>97</td>
<td>1</td>
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<tr>
<td><strong>Minimum (%)</strong></td>
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<td><strong>Maximum (%)</strong></td>
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<td>$^{138}$Ba Resin</td>
<td>$^{137}$Ba Strip</td>
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<td><strong>Mean (%)</strong></td>
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<td><strong>Minimum (%)</strong></td>
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<td><strong>Maximum (%)</strong></td>
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<tr>
<td>Sr Resin</td>
<td>Ba Breakthrough</td>
<td>Ca Breakthrough</td>
<td>Sr Strip</td>
<td>Y Breakthrough</td>
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<tr>
<td><strong>Mean (A-Grade%/S-Grade%)</strong></td>
<td>0.5/0.25</td>
<td>0.25/0.15</td>
<td>85/85</td>
<td>0.25/0.15</td>
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<td><strong>Minimum (A-Grade%/S-Grade%)</strong></td>
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<tr>
<td><strong>Maximum (A-Grade%/S-Grade%)</strong></td>
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<td>0.75/0.25</td>
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<td>0.75/0.25</td>
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<td>TEVA Resin</td>
<td>$^{239}$Pu Strip</td>
<td>$^{239}$Pu Breakthrough</td>
<td>$^{232}$Th Strip</td>
<td>$^{236}$Th Breakthrough</td>
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<tr>
<td><strong>Mean (%)</strong></td>
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<td><strong>Minimum (%)</strong></td>
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<td>TRU Resin</td>
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<td>UTEVA Resin</td>
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<td><strong>Mean (%)</strong></td>
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<td><strong>Minimum (%)</strong></td>
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WARNING:

BE CAREFUL WHAT YOU GET OUT OF LARRY’S TRUNK!