

Update: Determination of Radium Isotopes in Water Samples using MnO2 and DGA Resins

Terry O'Brien 2007 RRMC Jackson Hole, WY



Past Headlines

Radium Is Restoring Health to Thousands

Remarkable Discovery Brings Curative Powers of Radium Within the Reach of All

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the tissues and nerves to a normal soundition—and the next thing you know you are getting wall. Sold on a test properlion. You are theroughly satisfied it is helping you before the appliance is rear-source and the most wonderful fact about the appliance is that it is and reach of all, both yich and poor. No matter have bed your siltern of hew long starting, we will be pleased to have you try it at our risk. Tor full information and enume

today not tormercuw.

Thousands Have Proven The Marvelous Effects of Deg-nen's Radio-Active Solar Pad Without Risking a Penny.

Terms of thousands of people have tried out these pads, with the privilege of returning these in not ustimized. Read what people are septing these are extracts from just a few of the meany thousands of letters we are receiving all the time.



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And APPLIANCE CO.



GUARANTEE

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RADIO-ACTIVE SOLAR PAD

Radium Appliance Co., 1353 Bradbury Bidg., Los Angeles, Cal.

DEGNEN'S





Today's Headlines

- \$31.5 Million Radium removal project set to begin- Fond Du Lac Reporter Sep 30, 2007
- Lawrenceville, GA to reopen old wells due to drought. Three are known to have Radium- The Atlanta Journal-Constitution October 16, 2007
- Sycamore, IL to add third radium removal system to water supply system. Prior to treatment, radium concentrations averaging 8.25 pCi/L- PRNewswire October 22, 2007

eichrom

Two Resin Radium Method w/ Yield Monitors

- MnO2 Resin for pre-concentration
- DGA Resin for separation of Ac / Ra
- Benefits
 - Rapid pre-concentration using vacuum box
 - 10 mL/min flow rates or greater
 - Cerium added as actinium yield monitor
 - Ba-133 added as radium tracer
 - No precipitation required until source prep



Radium Separation Flow Chart Sample pre-concentration with MnO2 Resin





Radium / Actinium Separation with DGA resin





Updates to initial method

- Use of vacuum box for pre-concentration step
- Addition of Cerium carrier/tracer for actinium step
- Evaluation of Ce oxalate vs. Ce fluoride precipitation
- Confirmation of 10 mg cerium fluoride micro-precipitation



Column Loading-Savannah River Site





Yttrium and REEs Waters of Hydration

Thermal Gravimetric Analysis



metal oxalates.

- A. Gadolinium oxalate 10H₂O
- B. Europium oxalate 10H₂O
- C. Yttrium oxalate 9H₂O
- D. Holmium oxalate 10H₂O
- E. Erbium oxalate 6H₂O













Summary

- Improved 'two resin' radium method is rapid and reliable
- Recovery tracing of both Radium and Actinium procedures
- Reduced time for sample preparation and analysis



Future Work

- Modification to barium micro-precipitation
- Optimizing MnO2 Resin amount vs. sample size and TDS







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Questions

