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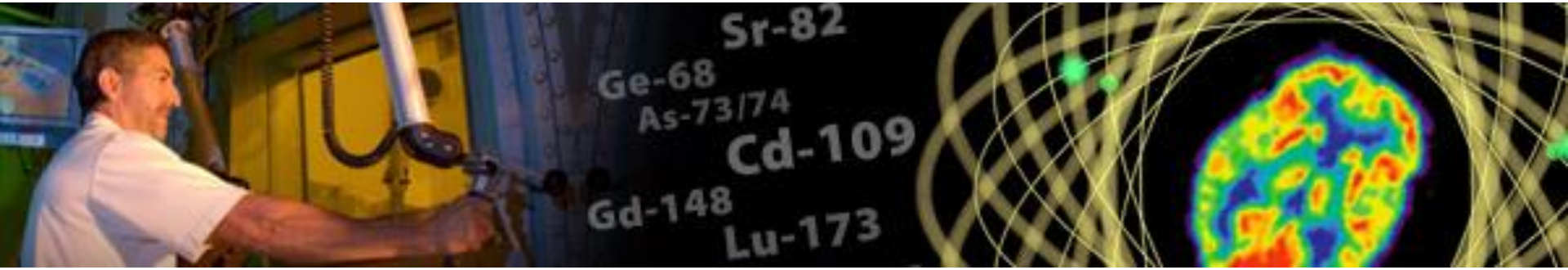
Response to 2015 Isotope Workshop and DOE IP Actions



5th Workshop on Isotope Federal Supply and Demand
November 9, 2016

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DOE Isotope Program
Office of Nuclear Physics, Office of Science, U.S. Department of Energy

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Summary of 2015 Results

Available from DOE IP – Submit Purchase Request		101
Not Available	Can Make – Submit New Product Request	15
	Investigating Production	6
	Need More Info	9
In Development by DOE IP		12
Available from Industry/Universities		24
Total Isotopes Identified in 2015		167

Available from DOE IP – Submit Purchase Request

- **Agencies identifying isotopes**
  - DHHS-NIH, DoD-DTRA, DoD-DARPA, DHS-DNDO, DHS-NTNFC, DOE-NNSA, DOE-SC-BES, DOE-SC-FES, DOE-SC-HEP, DOE-SC-NP
- **Radioisotopes identified**
  - Ac-225, Am-243, At-211, Cd-109, Cf-249, Cf-252, Cm-244, Cm-248, Cu-67, Fe-55, Na-22, Np-237, Pb-212, Pu-238, Pu-239, Pu-240, Pu-242, Ra-223, Ra-225, Rb-83, Tc-99, Th-227, Th-228, U-235, Y-88
- **Stable isotopes identified**
  - Ag-107, Ba-130, Ba-132, Ba-134, Ca-43, Ca-48, Cd-110, Cd-112, Cd-113, Cd-114, Cl-37, Cr-50, Cr-54, Cu-63, Cu-65, Dy-156, Dy-162, Er-168, Eu-153, Fe-54, Fe-57, Gd-158, Gd-160, Ge-76, Hf-180, Hg-202, In-113, Ir-193, K-41, Kr-78, Kr-86, Li-6, Lu-175, Mg-24, Mg-25, Mg-26, N-15, Nd-144, Ni-58, Ni-60, Ni-61, Ni-62, Ni-64, Os-192, Pb-206, Pb-208, Pd-110, Pt-196, S-32, S-33, Sb-123, Se-77, Se-80, Si-28, Si-29, Si-30, Sm-148, Sm-154, Sr-86, Te-125, Te-130, Ti-46, Ti-50, W-182, W-184, W-186, Xe-124, Xe-126, Xe-129, Xe-132, Xe-134, Xe-136, Yb-168, Yb-172, Zn-70, Zr-96

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Evaluate Stable Isotope Enrichment

- **Isotopes currently available, but**
  - Future demand exceeds current inventory, or
  - Desired enrichment not currently available
- **Stable isotopes identified**
  - Ba-134 DOE-SC-NP
  - Ca-48 DOE-SC-BES, DOE-SC-NP
  - Dy-156 DOE-SC-BES
  - Gd-157 DOE-SC-BES
  - Gd-158 DOE-SC-BES
  - Gd-160 DOE-SC-BES
  - S-36 DOE-SC-NP
  - Zr-96 DHS-NTNFC

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Can Make – Submit New Product Request

- **Ac-227**
  - DOE-SC-BES, DOE-SC-HEP
  - Ra-226(n,γ)Ra-227(β^-)Ac-227, recovery from AcBe sources
- **Cr-51**
  - DOE-NNSA, DOE-SC-NP
  - Cr-50(n,γ)Cr-51
- **D_2O**
  - DOE-SC-BES, DOE-SC-NP, DOC-NIST
  - In inventory
- **Eu-152**
  - DOE-SC-BES
  - In inventory
- **Fe-59**
  - DOE-SC-NP
  - Fe-58(n,γ)Fe-59

Can Make – Submit New Product Request

- **Hg-203**
  - DOE-NNSA
  - Hg-202(n,γ)Hg-203
- **La-140**
  - DOE-NNSA
  - La-139(n,γ)La-140
- **Pa-231**
  - DHS-NTNFC
  - Can recover from materials in inventory
- **Pb-210**
  - DOE-NNSA
  - Can recover from materials in inventory
- **Ra-226**
  - DOE-NNSA, DOE-SC-NP
  - Can supply small quantities for research from inventory

Can Make – Submit New Product Request

- **Sn-113**
  - DOE-NNSA
  - In-113(p,n)Sn-113, Sn-112(n,γ)Sn-113
- **Sr-85**
  - DOE-NNSA
  - Can recover from Sr-82 production
- **Te-123m**
  - DOE-NNSA
  - Sb-123(p,n)Te-123m, Te-122(n,γ)Te-123m
- **Th-230**
  - DHS-NTNFC
  - In inventory
- **U-233**
  - DoD-DTRA, DOE-NNSA, DOE-SC-BES
  - In inventory

Investigating Production

- **Be-10**
  - DOE-SC-NP
  - Be-9(n,γ)Be-10, need to find Be irradiated for decades
- **Bi-208**
  - DOE-NNSA
  - Pb-208(p,n)Bi-208
- **Ca-45**
  - DOE-SC-BES
  - Ca-44(n,γ)Ca-45
- **Ce-139**
  - DOE-NNSA
  - La-139(p,n)Ce-139
- **Mn-54**
  - DOE-SC-BES
  - Cr-54(p,n)Mn-54
- **Rb-86**
  - DOE-SC-BES
  - Kr-86(p,n)Rb-86, Rb-85(n,γ)Rb-86

In Development

- **Am-241**
  - DOE-NNSA, DOE-SC-BES, DOE-SC-FES,
  - Establishing recovery process from Pu wastes at LANL
- **Bk-249, Es-253, Es-254, Fm-255, Fm-257**
  - DOE-SC-BES, DOE-SC-NP
  - Currently produced in conjunction with Cf-252
  - Developing increased production capabilities to meet demand
- **C-14**
  - DOE-SC-NP, DOE-SC-HEP
  - N-14(n,p)C-14
  - Irradiating test target at HFIR
- **Cf-251**
  - DOE-SC-BES, DOE-SC-NP
  - Recovery from old Cf-252 sources

In Development

- **Mn-52**
  - DHHS-NIH
  - Cr-52(p,n)Mn-52
  - IP R&D grants
- **Np-236**
  - DHS-NTNFC
  - U-238(p,3n)Np-236
  - IP R&D grant to LANL and UW
- **Pu-244**
  - DHS-NTNFC, DOE-SC-BES, DOE-SC-NP
  - DOE-NNSA pursuing recovery from Mk-18A targets
- **Ru-96**
  - DOE-SC-NP
  - Production in new stable isotope enrichment plant

Isotopes Available from Industry/Universities

- **DOE Isotope Program assists in identifying suppliers**
- **Agencies identifying isotopes**
  - DOC-NIST, DHHS-NIH, DoD-DTRA, DoD-DARPA, DHS-DNDO, DOE-NNSA, DOE-SC-BES, DOE-SC-FES, DOE-SC-HEP, DOE-SC-NP
- **Isotopes identified**
  - B-10, B-11, C-11, C-13, Cl-36, Co-57, Co-60, Cs-136, Cu-64, H-2, H-3, Gd-153, I-124, Kr-85, Li-7, N-14, O-17, O-18, P-33, Se-75, Sr-90, Tc-99m, U-238, Zr-89

Federal Workshop Input Utilization

- **DOE sends questionnaires to federal agencies**
- **Federal agencies return completed questionnaires to DOE**
- **DOE compiles consolidated spreadsheet of all federal agency responses**
- **DOE schedules teleconferences with agencies to review their input**
  - Feedback to agencies on required actions (e.g., commercially available, submit purchase request or new product request)
- **DOE takes action to make needed isotopes available**
  - Schedule production
  - Evaluate availability of stable and long-lived isotopes
  - Evaluate production of unavailable isotopes
  - Request federal agencies to inform their grantees of actions required

Catalog

Mailing List

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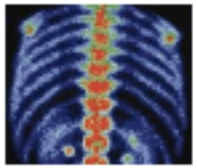
Product Catalog – Periodic Table View

NIDC NATIONAL ISOTOPE DEVELOPMENT CENTER



PRODUCT CATALOG

Product Catalog - Periodic Table

Please click on a dark gray box to see the products available for that element.

If you would like an isotope product that is not listed,
you can make a request by clicking here.

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														
		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	

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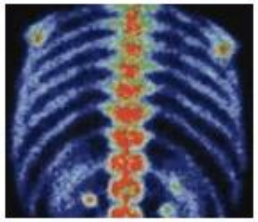
Product Catalog – New Product Request

NIDC NATIONAL ISOTOPE DEVELOPMENT CENTER



PRODUCT CATALOG

Product Catalog - Request a New Product

Step 1 - Enter the new product's criteria below.

Click here to access online help for Step 1.

Element Name

Mass Number (A)

Product Type
- (•) Stable Product
- ( ) Radio-Isotope Product

Submit New Product Values

Clear New Product Fields