NRC FORM 7 (8-2007) 10 CFR 110

U.S. NUCLEAR REGULATORY COMMISSION

# APPLICATION FOR NRC EXPORT/IMPORT LICENSE, AMENDMENT, OR RENEWAL

*(See Instructions on Page 5)*

APPROVED BY OMB: NO. 3150-0027 EXPIRES: 06/30/2009

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| PART A FOR NRC USE ONLY | | DATE RECEIVED |
|---|---|---|
| LICENSE NUMBER XMAT 410 | DOCKET NUMBER 11005754 | CONTROL/ACCESSION NUMBER |

## PART B. TO BE COMPLETED FOR ALL LICENSES, AMENDMENTS, RENEWALS OR NOTIFICATIONS

(If more space is needed to complete any of the items, use Pages 3-4 first, and then attach additional sheets, if necessary.)

| 1. NAME AND ADDRESS OF APPLICANT/LICENSEE | 1a. NAME OF APPLICANT'S CONTACT | 1b. APPLICANT'S REFERENCE NUMBER |
|---|---|---|
| Sigma-Aldrich Corp. and subsidiaries<br>6000 North Teutonia Avenue<br>Milwaukee, WI 53209 | Jim Sanders | None |
| | 1c. PHONE NUMBER<br>(414) 438-3850 | 1d. FAX NUMBER<br>(414) 438-4235 |
| | 1e. E-MAIL ADDRESS<br>jim.sanders@sial.com | |

2. TYPE OF ACTION REQUESTED *(Check One)*

- [x] EXPORT (Parts B, C, E)
- [ ] NOTIFICATION OF EXPORT OF INCIDENTAL RADIOACTIVE MATERIAL (PART C, E)
- [ ] IMPORT (Parts B, D, E)
- [ ] COMBINED EXPORT/IMPORT (Parts B, C, D, E)
- [ ] AMENDMENT/RENEWAL Existing License Number: _____

| 3. CONTRACT NUMBER(S) | 4. FIRST SHIPMENT DATE | 5. LAST SHIPMENT DATE | 6. PROPOSED EXPIRATION DATE |
|---|---|---|---|
| None | 12/01/2008 | 12/31/2011 | 12/31/2011 |

## PART C. TO BE COMPLETED FOR EXPORT ONLY OR COMBINED LICENSES, AMENDMENTS, OR RENEWALS

(If more space is needed to complete any of the items, use Pages 3-4 first, and then attach additional sheets, if necessary.)

| 7. NAME(S) / ADDRESS(ES) OF SUPPLIERS AND/OR OTHER PARTIES TO THE EXPORT | 8. NAME(S) / ADDRESS(ES) OF INTERMEDIATE FOREIGN CONSIGNEE(S) | 9. NAME(S) / ADDRESS(ES) OF ULTIMATE FOREIGN CONSIGNEE(S) |
|---|---|---|
| None | None | Please see foreign consignee information on Page 3 |
| **7a. FUNCTION(S) PERFORMED/SERVICE(S) PROVIDED** | **8a. INTERMEDIATE USE(S)** | **9a. ULTIMATE END USE(S)** |
| Information on Page 3 | None | Information on Page 3 |

| 10. DESCRIPTION OF RADIOACTIVE MATERIALS, SEALED SOURCES, NUCLEAR FACILITIES, EQUIPMENT, OR COMPONENTS; FOR NUCLEAR EQUIPMENT INCLUDE TOTAL DOLLAR VALUE OF EQUIPMENT FOR EXPORT | 10a. MAX TOTAL VOLUME / ELEMENT WGT (KG), OR TOTAL ACTIVITY (TBq) | 10b. MAX ENRICHMENT OR WGT % | 10c. MAX ISOTOPE WGT (KG) |
|---|---|---|---|
| Deuterium in the form of:<br>1. Deuterated compounds (see attached document for product examples)<br>2. Deuterium Oxide<br>3. Deuterium gas | 5,000 KG as deuterium | N/A | N/A |

11. FOREIGN OBLIGATIONS (BY COUNTRY AND BY PERCENTAGE OF MAXIMUM TOTAL VOLUME)

Deuterium is of Canadian origin (88%) and Indian origin (12%)

RECD 12-08 EK



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# APPLICATION FOR NRC EXPORT/IMPORT LICENSE, AMENDMENT, OR RENEWAL (Continued)

XMAT 410 [redacted] 1100575Y [redacted]

## PART D. TO BE COMPLETED FOR IMPORT ONLY, OR COMBINED LICENSES, AMENDMENTS, OR RENEWALS

(If more space is needed to complete any of the items, use Pages 3-4 first, and then attach additional sheets, if necessary.)

| 12. NAME(S) / ADDRESS(ES) OF FOREIGN SUPPLIERS AND/OR OTHER PARTIES TO IMPORT | 13. NAME(S) / ADDRESS(ES) OF INTERMEDIATE CONSIGNEE(S) | 14. NAME(S) / ADDRESS(ES) OF ULTIMATE CONSIGNEE(S) |
|---|---|---|
| N/A | N/A | N/A |
| 12a. NRC EXPORT LICENSE NUMBER(S) (If applicable) | 13a. LICENSE NUMBER(S) / EXPIRATION DATE(S) | 14a. LICENSE NUMBER(S) / EXPIRATION DATE(S) |
| N/A | N/A | N/A |
| | 13b. INTERMEDIATE USE(S) | 14b. ULTIMATE END USE(S) |
| | N/A | N/A |

| 15. DESCRIPTION OF RADIOACTIVE MATERIALS, SEALED SOURCES, NUCLEAR FACILITIES | 15a. MAX TOTAL VOLUME / ELEMENT WGT (KG), OR TOTAL ACTIVITY (TBq) | 15b. MAX ENRICHMENT OR WGT % | 15c. MAX ISOTOPE WGT (KG) |
|---|---|---|---|
| N/A | N/A | N/A | N/A |

16. FOREIGN OBLIGATIONS (BY COUNTRY AND BY PERCENTAGE OF MAXIMUM TOTAL VOLUME)
N/A

## PART E. TO BE COMPLETED FOR ALL LICENSES, AMENDMENTS, OR RENEWALS

| 17. ADDITIONAL INFORMATION PROVIDED ON PAGES 3, 4, AND/OR ON SEPARATE SHEETS? | ☑ YES ☐ NO | 17a. COPIES OF RECIPIENTS' AUTHORIZATIONS PROVIDED? | ☐ YES ☑ NO |
|---|---|---|---|

18. CERTIFICATION: I, the applicant's authorized official, hereby certify that this application is prepared in conformity with Title 10, Code of Federal Regulations, and that all information provided is correct to the best of my knowledge.

| 18a. PRINT NAME AND TITLE OF AUTHORIZED OFFICIAL | 18b. SIGNATURE – AUTHORIZED OFFICIAL | 18c. DATE |
|---|---|---|
| Jim Sanders<br>Compliance Supervisor, Sigma-Aldrich | James A Sanders | 10/30/2008 |

REED RESPS

[redacted]

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U.S. NUCLEAR REGULATORY COMMISSION

# APPLICATION FOR NRC EXPORT/IMPORT LICENSE, AMENDMENT, OR RENEWAL (Continued)

XMAT410 11005754

ADDITIONAL INFORMATION *(Reference applicable block numbers from page 1 and/or page 2 for each entry)*

## ULTIMATE CONSIGNEES IN FOREIGN COUNTRY

**(for distribution into the medical, pharmaceutical, chemical and industrial markets for non-nuclear end use.)**

1. **Sigma-Aldrich Japan KK**
   **2-2-24 Higashi-Shinagawa**
   **Shinagawa-Ku 140002**
   **Japan**

2. **Taiyo Nippon Sanso Corporation**
   **Toyo Bldg, 1-3-26 Koyama**
   **Shinagawa-Ku**
   **Tokyo, 1428558**
   **Japan**

3. **Sigma-Aldrich Japan KK**
   **368 Oomachi**
   **Chiba-Ken 272**
   **Ichikawa**
   **Japan**

**Box 7a. Function(s) Performed / Service(s) Provided**

**Sigma-Aldrich plans to sell the various deuterium compounds to the ultimate consignees above for further distribution into the Japanese medical, pharmaceutical, chemical and industrial markets. The consignee's customers in Japan typically use these materials in relatively small quantities (i.e. less than 1 kilogram) for scientific research. This type of research may include identification of chemicals in reaction pathways, metabolic studies or environmental analysis.**

**Most products are sold in prepackaged units (see attached Product Examples); however, some deuterium is sold to Taiyo Nippon Sanso (listed above as one of the Ultimate Foreign Consignees) for subsequent container relabeling and/or packaging changes prior to further distribution in Japan. No material is to be used in any activity related to isotope separation, heavy water production or in the fabrication of nuclear fuel.**

REC'D NM 12/6/07

SIGMA-ALDRICH®

sigma-aldrich.com

3050 Spruce Street, St. Louis, MO 63103 USA
Tel: (800) 521-6956 (314) 771-5765 Fax: (800) 325-5052 (314) 771-5757

October 30, 2008

U.S. Nuclear Regulatory Commission
Attn: Deputy Director
Office of International Programs
11555 Rockville Pike
Rockville, Maryland 20852

Dear Mr. Moore:

Sigma-Aldrich is a life science and high-technology company. We have a broad line of organic and biochemical products to serve laboratory and research needs around the world. One of our important lines of research products is the deuterated material used by the medical, pharmaceutical, and chemical industries.

Along with this cover letter, please find a completed, signed original NRC Form 7 (Application for Export License) for Sigma-Aldrich Corporation.

Previously, Sigma-Aldrich was granted a Specific License (XMAT0401) for deuterium exportation to Japan. License XMAT0401 has expired therefore this application is for a new specific license to replace the expired one. Sales of deuterium to our Japanese consignees have risen slightly over the past few years but we have recently experienced an unanticipated increase in demand which has forced us to reevaluate our future export needs as they relate to the NRC Specific License quantity. To supply our consignees with the deuterium they now require over the course of the next three years, we are submitting this application with a higher license quantity.

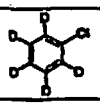
If you have any questions or require any additional documents or clarification, please contact Sarah Hinkle, the Product Compliance Specialist located at the St. Louis office, by phone at 314-236-8977 or by email at sarah.hinkle@sial.com

Sincerely,

Sarah Hinkle
Product Compliance
Sigma-Aldrich
2838 Olive Blvd
St. Louis, MO 63103
Ph: 314-236-8977
Email: sarah.hinkle@sial.com

RECD 12-8-08

# Product Examples

| Structure | Name and CAS | Product Number | Packaging | Isotopic Purity | MW | Refractive Index | BP | Density | Each |
|---|---|---|---|---|---|---|---|---|---|
|  | Chlorobenzene-$d_5$ [3114-55-4] | 176605 | 1, 5 g in ampule | 99 atom %D | 117.60 | n20/D 1.522(lit) | 130-130.5 C (lit) | 1.157 g/ml at 25C (lit) | [redacted] |
| $CDCl_3$ | Chloroform-d [865-49-6] | 151858 | 10, 50 g in glass bottle | 99.96 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | [redacted] |
| $CDCl_3$ | Chloroform-d [865-49-6] | 453285 | 10 x 0.25 mL in ampule | 99.96 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | [redacted] |
| $CDCl_3$ | Chloroform-d [865-49-6] | 236918 | 10 x 0.5 in ampule | 99.96 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | [redacted] |
| $CDCl_3$ | Chloroform-d [865-49-6] | 444731 | 10 x 0.75 mL in ampule | 99.96 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | [redacted] |
| $CDCl_3$ | Chloroform-d [865-49-6] | 423092 | 10 x 1mL in ampule | 99.96 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | [redacted] |
| $CDCl_3$ | Chloroform-d [865-49-6] | 494275 | 10, 50 g in ampule | 99.96 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | [redacted] |
| $CDCl_3$ | Chloroform-d [865-49-6] | 494283 | 10 x 0.75 mL in ampule | 99.96 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | [redacted] |
| $CDCl_3$ | Chloroform-d [865-49-6] | 431915 | 10, 50 mL in ampule | 99.96 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | [redacted] |
| $CDCl_3$ | Chloroform-d [865-49-6] | 151823 | 1, 1.5 kg in glass btl 150 g in Sure/Seal™ 250 g in glass btl 50, 100 g in glass btl | 99.8 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | [redacted] |
| $CDCl_3$ | Chloroform-d [865-49-6] | 522015 | 10 x 0.6 mL in ampule | 99.8 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | [redacted] |
| $CDCl_3$ | Chloroform-d [865-49-6] | 441333 | 10 x 0.75 mL in ampule | 99.8 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | [redacted] |
| $CDCl_3$ | Chloroform-d [865-49-6] | 236896 | 5x1, 10x1 mL in ampule | 99.8 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | [redacted] |
| $CDCl_3$ | Chloroform-d [865-49-6] | 225789 | 100 g in glass btl 150 g in Sure/Seal™ 500 g in glass btl | 99.8 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | [redacted] |
| $CDCl_3$ | Chloroform-d [865-49-6] | 423661 | 10 x 1 mL in ampule | 99.8 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | [redacted] |
| $CDCl_3$ | Chloroform-d [865-49-6] | 612200 | 100 g in glass btl | 99.8 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | [redacted] |
| $CDCl_3$ | Chloroform-d [865-49-6] | 434876 | 100 g in glass btl 150 g in Sure/Seal™ 500 g in glass btl | 99.8 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | [redacted] |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $CDCl_3$ | Chloroform-d [865-49-6] | 151831 | 150 g in Sure/Seal™ 250 g in glass btl 50, 100g in glass btl | 99.8 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | |
| $CDCl_3$ | Chloroform-d [865-49-6] | 416754 | 100, 250 g in glass btl | 99.8 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | |
| $CDCl_3$ | Chloroform-d [865-49-6] | 530735 | 100, 250 g in glass btl | 99.8 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | |
| $CDCl_3$ | Chloroform-d [865-49-6] | 569569 | 5x1, 10x1 mL in ampule | 99.8 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | |
| $CDCl_3$ | Chloroform-d [865-49-6] | 570699 | 50 g in glass btl | 99.8 atom % D | 120.38 | n20/D 1.444(lit) | 60.9 C (lit) | 1.500 g/mL at 25C (lit) | |
| | Cyclohexane-$d_{12}$ [1735-17-7] | 151866 | 1, 5, 10 g in ampule | 99.6 atom % D | 96.23 | n20/D 1.421(lit) | 80.7 C (lit) | 0.893 g/mL at 25C (lit) | |
| | Cyclohexane-$d_{12}$ [1735-17-7] | 269735 | 10 x 1 mL in ampule | 99.6 atom % D | 96.23 | n20/D 1.421(lit) | 80.7 C (lit) | 0.893 g/mL at 25C (lit) | |
| | Decahydronaphthalene-$d_{18}$ [28788-42-3] | 217131 | 1 g in ampule | 98.0 atom % D | 156.40 | n20/D 1.475(lit) | 193 C (lit) | 1.012 g/mL at 25C | |
| $D_2O$ | Deuterium oxide [7789-20-0] | 191701 | 10 g in ampule 50 g in glass btl | 99.990 atom % D | 20.03 | n20/D 1.328(lit | 101.4 C (lit) | 1.107 g/mL at 25C (lit) | |
| $D_2O$ | Deuterium oxide [7789-20-0] | 453366 | 10 x 0.5 mL in ampule | 99.990 atom % D | 20.03 | n20/D 1.328(lit | 101.4 C (lit) | 1.107 g/mL at 25C (lit) | |
| $D_2O$ | Deuterium oxide [7789-20-0] | 192341 | 10, 30 g in serum btl | 99.96 atom % D | 20.03 | n20/D 1.328(lit | 101.4 C (lit) | 1.107 g/mL at 25C (lit) | |
| $D_2O$ | Deuterium oxide [7789-20-0] | 151890 | 1, 4 kg in glass btl 10, 50 g in glass btl 125 g in Sure/Seal™ 20 kg in poly drum 250 g in glass btl | 99.96 atom % D | 20.03 | n20/D 1.328(lit | 101.4 C (lit) | 1.107 g/mL at 25C (lit) | |
| $D_2O$ | Deuterium oxide [7789-20-0] | 269786 | 10 x 0.5 mL in ampule | 99.96 atom % D | 20.03 | n20/D 1.328(lit | 101.4 C (lit) | 1.107 g/mL at 25C (lit) | |
| $D_2O$ | Deuterium oxide [7789-20-0] | 441368 | 10 x 0.75 mL in ampule | 99.96 atom % D | 20.03 | n20/D 1.328(lit | 101.4 C (lit) | 1.107 g/mL at 25C (lit) | |
| D—Br | Deuterium bromide [13536-59-9] | 486515 | 5 L in steel cyl | 99 atom % D | 81.92 | Vapor pressure = 334.7 psi (21C) | -67 C (lit) | 2.71 (20C, vs air) | |
| DCl | Deuterium chloride [7698-05-7] | 488682 | 5 L in steel cyl | 99 atom % D | 37.47 | Vapor pressure = 613 psi (21.1C) | -85 C (lit) | 1.3 (vs air) | |

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