

# PESTICIDE STANDARDS

## For Food & Environmental Analysis

- Certified Reference Materials (CRMs) *TraceCERT*®
- Certified Reference Materials (CRMs) Matrix Standards
- Isotope Labeled Standards
- Pesticide Metabolite Standards
- Proficiency Testing (PT)



The Sigma-Aldrich® pesticide standards product line is the most comprehensive portfolio available on the market. Under the well-known brands PESTANAL® and TraceCERT® we proudly offer more than 1700 high purity pesticide and pesticide metabolite standards and certified reference materials for food and environmental analysis. This brochure gives an overview of the current product offering including:

- Certified Reference Materials (CRMs) TraceCERT® ..... Page 3
- Certified Reference Material (CRMs) Matrix Standards ..... Page 5
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We continuously add new products to the portfolio in order to keep up-to-date with new developments in pesticide analysis. This brochure features a selection of our pesticide products; for more information, visit our website at:

[sigma-aldrich.com/pesticides](http://sigma-aldrich.com/pesticides)



## Certified Reference Materials (CRM) TraceCERT®

For ISO/IEC 17025 accredited labs, it is important to show traceability of all results, so for calibration, certified reference materials (CRMs) must be used. Our rapidly expanding TraceCERT product range includes an increasing number of CRMs for pesticides. These products are manufactured according to ISO/IEC 17025 and ISO Guide 34 double accreditation, which is the highest achievable quality level for reference material producers and which is also referred to as "the gold standard". All TraceCERT products are delivered with a comprehensive certificate according to ISO Guide 35 including properly calculated uncertainties taking into account homogeneity and stability of the material.

The neat CRMs are certified by quantitative NMR (qNMR) and traceable to NIST SRM. The CRM solutions are produced gravimetrically using NIST traceable weights for balance calibration.

The complete range of organic TraceCERT products can be found at [sigma-aldrich.com/organiccrm](http://sigma-aldrich.com/organiccrm). So far the following pesticide CRMs are available:



**Table 1. CRM TraceCERT® Pesticide Neats**

Cat. No.	Description	Package Size
90935	Atrazine	50 mg
96996	Biphenyl	100 mg
94114	Chlorpyrifos	100 mg
72765	λ-Cyhalothrin	50 mg
51991	Cypermethrin	50 mg
5995	Deltamethrin	50 mg
68486	Diazinon	100 mg
16785	Fipronil	50 mg

Cat. No.	Description	Package Size
91481	Malathion	50 mg
41231	Pentachlorobenzene	100 mg
64947	Prochloraz	50 mg
8896	2,4,6 Trichlorophenol	100 mg
89432	Glyphosate	100 mg
64148	Bromobutide	50 mg
79888	Carbendazim	50 mg



SRMS 001  
ISO Guide 34



STS 490  
ISO 17025



AR-1606  
ISO Guide 34



AT-1607  
ISO 17025

**Table 2. CRM TraceCERT® Pesticide Solutions**

Cat. No.	Description	Composition	Package Size
CRM48104	Chlorpyrifos solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	1 mL
CRM48460	Pesticide Surrogate Spike Mix solution	200 µg/mL in acetone each component (2,4,5,6-Tetrachloro- <i>m</i> -xylene; Decachlorobiphenyl)	1 mL
CRM48392	Triazine Pesticides Standards Mix solution	100 µg/mL in methanol each component (Simazine, Atrazine, Prometon, Ametryn, Propazine, Prometryn, Terbutryn)	1 mL
40330	2,4-D solution	5000 µg/mL in methanol	1 mL
40092	4,4'-DDD solution	5000 µg/mL in methanol	1 mL
40091	4,4'-DDE solution	5000 µg/mL in methanol	1 mL
40124	4,4'-DDT solution	5000 µg/mL in methanol	1 mL
40100	α-BHC solution	1000 µg/mL in methanol	1 mL
40220-U	Aldrin solution	5000 µg/mL in methanol	1 mL
48187	Atrazine solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	1 mL
40101	β-BHC solution	1000 µg/mL in acetone	1 mL
CRM48104	Chlorpyrifos solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	1 mL
40089	Chlordane solution	5000 µg/mL in methanol	1 mL
48282	DDT-Endrin Mix	500 µg/mL in methanol each component (4,4'-DDT; Endrin)	1 mL
40088	Dieldrin solution	1000 µg/mL in methanol	1 mL
40087	Endrin solution	5000 µg/mL in methanol	1 mL
40102	γ-BHC solution	1000 µg/mL in methanol	1 mL
40103-U	δ-BHC	1000 µg/mL in methanol	1 mL
CRM48198	Heptachlor epoxide Isomer A solution	1000 µg/mL in methanol	1 mL
40099	Heptachlor epoxide Isomer B solution	1000 µg/mL in methanol	1 mL
40098	Heptachlor solution	1000 µg/mL in methanol	1 mL
40572	Methyl parathion solution	1000 µg/mL in acetone	1 mL
48103	Toxaphene solution	1000 µg/mL in isooctane	1 mL
CRM48392	Triazine Pesticides Standards Mix	100 µg/mL in methanol each component (Ametryn; Atrazine; Prometon; Prometryn; Propazine; Simazine; Terbutryn)	1 mL
861275	Pesticide Surrogate Spike Mix	10 µg/mL in acetone each component (Decachlorobiphenyl; 2,4,5,6-Tetrachloro- <i>m</i> -xylene)	50 mL
861284	Pesticide Surrogate Mix	200 µg/mL in acetone each component (Decachlorobiphenyl; 2,4,5,6-Tetrachloro- <i>m</i> -xylene)	2 mL
861283	Organophosphate (OP) Pesticide Mix 2	1000 µg/mL in acetone each component (Alachlor; Atrazine; Bromacil; Butachlor; Metolachlor; Prometon; Simazine)	1 mL
861237	Organophosphate (OP) Pesticide Mix	100 µg/mL in <i>n</i> -hexane each component (Carbophenothion; Ethion; Malathion; Parathion)	1 mL
861359	EPN Mix	1000 µg/mL in methanol	5x1 mL
49138-U	Herbicides Mix 2	100 µg/mL in ethyl acetate each component (Benfluralin; Metolachlor; Oxadiazon; Profuralin; Propachlor; Propazine; Simazine; Vernolat)	1 mL
48141	EPA TCLP Herbicides Mix	1000 µg/mL in acetonitrile each component (2,4-D-methyl ester; Silvex methyl ester)	1 mL
48225-U	EPA 8011 EDB/DBCP Mix	2000 µg/mL in methanol each component (1,2-Dibromo-3-chloropropane; 1,2-Dibromoethane)	1 mL
44690-U	EPA 547 Glyphosate Solution	1000 µg/mL in H <sub>2</sub> O	1 mL
502154	EPA 508.1 Herbicides Mix	1000 µg/mL in acetone each component (Alachlor; Atrazine; Butachlor; Hexachlorocyclopentadiene; Metolachlor; Simazine)	1 mL
CRM48392	Triazine Pesticides Standards Mix	100 µg/mL in methanol each component (Ametryn, Atrazine, Prometon, Prometryn, Propazine, Simazine, Terbutryn)	1 mL

## CRM Matrix Standards

Sigma-Aldrich RTC pesticide matrix CRMs are available as either:

- “Real world” soil or sediment natural matrices or
- As natural matrices, in which selected analytes have been fortified to give analytical profiles that meet the needs of analysts

Most CRMs are method specific and are supplied with certificates that show an uncertainty, expanded uncertainty confidence interval and a prediction value, in addition to the mean value and standard deviation from the mean.

For more information about standard analytes and concentrations, please visit

[sigma-aldrich.com/ecrm](http://sigma-aldrich.com/ecrm)



**Table 3. Certified Reference Materials for Solids, Non-Potable and Drinking Water**

Cat. No.	Description	Package Size
<b>Soil</b>		
CRM107	BNAs/Pesticides/Nitroaromatics/Nitrosamine – Sandy Loam 9	100 g
SQC030	Carbamates in Soil	50 g
CRM825	Chlordane – Sandy Loam 2	50 g
CRM852	Chlordane – Sediment 1	50 g
SQC027	Chlordane in Soil	50 g
SQC009	Chlorinated Pesticides in Soil	50 g
CRM821	OP Pesticides – Sandy Loam 1	50 g
CRM827	OP Pesticides – Sandy Loam 2	50 g
CRM851	OP Pesticides – Sediment 1	50 g
CRM837	OP Pesticides – Silt Loam 1	50 g
SQC021	OP Pesticides	50 g
CNS391	PAH, PCBs, and Pesticides on Sediment	50 g
CRM847	Pesticides – Clay Loam 1	50 g
CRM818	Pesticides – Loam 1	50 g
CRM846	Pesticides – Loamy Sand 1	50 g
CRM860	Pesticides – Loamy Sand 2	50 g
CRM804	Pesticides – Sandy Loam 1	50 g
CRM805	Pesticides – Sandy Loam 2	50 g
CRM814	Pesticides – Sandy Loam 3	50 g
CRM824	Pesticides – Sandy Loam 4	50 g
CRM828	Pesticides – Silt Loam 1	50 g
CNS391	PAH, PCBs and Pesticides on Sediment	50 g
CRM853	Toxaphene – Clay 1	50 g

Cat. No.	Description	Package Size
CRM813	Toxaphene – Sandy Loam 1	50 g
CRM850	Toxaphene – Sediment 1	50 g
CRM829	Toxaphene – Silt Loam 1	50 g
CRM826	Toxaphene – Soil 2	50 g
<b>Toxaphene – Soil 2</b>		
QC1006	Carbamates – WP	2 mL
QC1092	Chlordane (Total) – WP	2 mL
QC1321	Low Level Pesticides – 1	2 mL
QC1491	Low Level Pesticides – 2	2 mL
QC1011	Nitrogen Pesticides	2 mL
QC1161	OP Pesticides 1 – WP	2 mL
QC1377	OP Pesticides in Water (Low Level) – WP	2 mL
QC1118	OP Pesticides – WI	2 mL
QC1280	Pesticides 1 – WP	2 mL
QC1201	Pesticides 2 – WP	2 mL
QC1094	Toxaphene – WP	2 mL
<b>Drinking Water</b>		
QC1507	Carbamate Pesticides – WS	2 mL
QC1326	Chlordane (Total) – WS	2 mL
QC1435	Diquat/Paraquat/Glyphosate in Drinking Water	2 mL
QC1537	Endothal in Drinking Water	2 mL
QC1400	Organonitrogen Pesticides – WS	2 mL
QC1550	Organochlorine Pesticides 1 – WS	2 mL
QC1595	Organochlorine Pesticides 2 – WS	2 mL
QC1544	Toxaphene (Total) – WS	2 mL

**SIGMA-ALDRICH®**

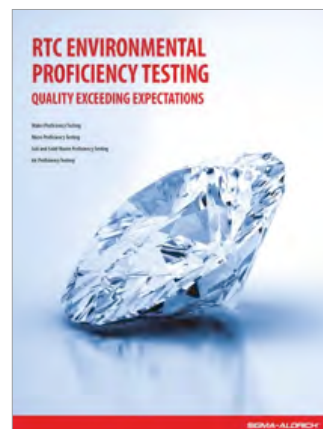
**LABCO L.L.C.**

## Proficiency Testing (PT)

ISO 17025 accredited laboratories are required to take part in proficiency testing (PT) programs to demonstrate performance and method validation. Sigma-Aldrich RTC is ISO 17043 accredited (general requirements for the competence of providers of proficiency testing schemes) and has many years of experience in developing and producing natural matrix samples for use as PT samples.

RTCs environmental PT programs cover pesticides in drinking water, waste water and soils. Laboratories can choose to participate in our quarterly or semi-annual PT programs, or simply purchase PT samples.

Find information about PT registration and schedule at [sigma-aldrich.com/pt](http://sigma-aldrich.com/pt) or order the “RTC environmental proficiency testing” brochure.



**Table 4. Proficiency Testing for Pesticides in Soil and Water**

Cat. No.	Description	Package Size	Cat. No.	Description	Package Size
<b>Water Supply / Drinking Water</b>			<b>Water Pollution / Wastewater (continued)</b>		
PE1507	Carbamate Pesticides – WS	2 mL	PE1326	Chlordane (Total) – WS	2 mL
PE1326	Chlordane (Total) – WS	2 mL	PE1161	Organophosphorus Pesticides – WP	2 mL
PE1486	Herbicides I – WS	2 mL	PE1280	Pesticides 1 – WP	2 mL
PE1310	Herbicides II – WS	2 mL	PE 1201	Pesticides 2 – WP	2 mL
PE1595	Organochlorine Pesticides Ampule 1 – WS	2 mL	PE 1904	Toxaphene – WP	2 mL
PE1400	Organonitrogen Pesticides – WS	2 mL	<b>Solids / Soils / Hazardous Waste</b>		
PE1544	Toxaphene (total) – WS	2 mL	SPE030	Carbamates in Soil – PT	50 g
<b>Water Pollution / Wastewater</b>			SPE027	Chlordane in Soil – PT	50 g
PE1092	Chlordane (Total) – WP	2 mL	SPE009	Chlorinated Pesticides in Soil – PT	50 g
PE1124	Herbicides – WP	2 mL	SPE004	Herbicides in Soil – PT	50 g
PE1321	Low Level Pesticides 1 – PT	2 mL	SPE021	Organophosphorus Pesticides – PT	50 g
PE1491	Low Level Pesticides 2 – PT	2 mL	SPE028	Toxaphene in Soil – PT	50 g
PE1377	Organophosphorus Pesticides (Low Level) – PT	2 mL			

## Isotope Labeled Standards

To determine matrix effects and result bias due to a loss of the analyte during the workup process, isotope dilution mass spectrometry is often applied. This technique takes advantage of the fact that isotope labeled compounds have nearly the same physical properties as the non-labeled analogues and thus the same behavior in the workup and sample preparation process. However, they can be distinguished in mass spectrometry. Therefore, by spiking the sample before workup with an isotope labeled analogue, material loss during workup can be determined and compensated. Below is a list of isotope labeled pesticide standards.

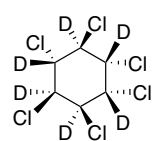


Figure 1. Molecular structure of deuterated  $\alpha$ -HCH

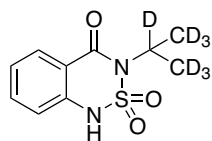


Figure 2. Molecular structure of deuterated Bentazon

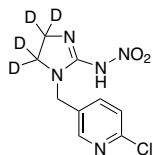


Figure 3. Molecular structure of deuterated Imidacloprid

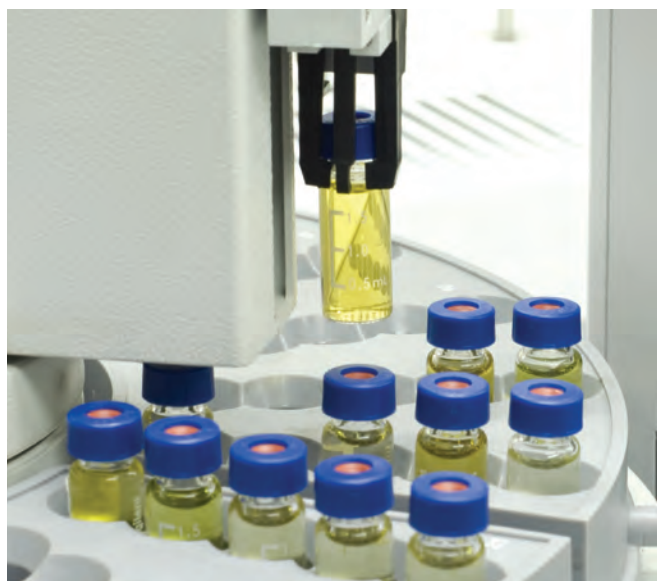


Table 5. Neats and Solutions for Isotope Labeled Pesticides

Cat. No.	Description	Package Size	Cat. No.	Description	Package Size
34571	2-(Diethyl-d <sub>10</sub> -amino)-6-methyl-4-pyrimidinol	10 mg	641456	2-Chloro-4-ethyl-d <sub>5</sub> -amino-6-isopropylamino-1,3,5-triazine (Atrazine-(ethyl-d <sub>5</sub> ))	on demand
74131	2-Imidazolidinethione-4,4,5,5-d <sub>4</sub>	10 mg	00291	Chloromequat-1,1,2,2-d <sub>4</sub> chloride	5 mg
34570	Acephate-(acetyl-d <sub>3</sub> )	10 mg	78321	Chlorpropham-(isopropyl-d <sub>7</sub> )	5 mg
39246	Acetamiprid-d <sub>3</sub>	50 mg	90047	Chlorpyrifos-(diethyl-d <sub>10</sub> )	5 mg
50728	Acetochlor-(2-ethyl-6-methylphenyl-d <sub>11</sub> )	5 mg	12607	Chlortoluron-(N,N-dimethyl-d <sub>6</sub> )	5 mg
34086	Alachlor-d <sub>13</sub>	10 mg	56816	Clothianidin-d <sub>3</sub>	50 mg
16966	Aldicarb-(N-methyl- <sup>13</sup> C, d <sub>3</sub> carbamoyl- <sup>13</sup> C)	5 mg	09148	$\lambda$ -Cyhalothrin-(phenoxy-d <sub>5</sub> )	5 mg
16966	Aldicarb-(N-methyl- <sup>13</sup> C, d <sub>3</sub> carbamoyl- <sup>13</sup> C) sulfone	5 mg	75253	cis-Cypermethrin-(phenoxy-d <sub>5</sub> )	5 mg
04175	Aldicarb-(N-methyl- <sup>13</sup> C, d <sub>3</sub> carbamoyl- <sup>13</sup> C) sulfoxide	1 mg	76168	Cymoxanil-(methoxy-d <sub>3</sub> )	5 mg
16202	Amitraz-(N-methyl-d <sub>3</sub> )	5 mg	14657	trans-Cypermethrin-(phenoxy-d <sub>5</sub> )	5 mg
16202	Amitraz-(N-methyl-d <sub>3</sub> )	5 mg	49814	Cypermethrin-(phenoxy-d <sub>5</sub> )	10 mg
32440	Amitraz Metabolite BTS 27271 (N-methyl-d <sub>3</sub> )	10 mg	34517	Cyprodinil-(phenyl- <sup>13</sup> C <sub>6</sub> )	10 mg
34053	Atrazine-d <sub>5</sub>	10 mg	80033	Cyprodinil-(phenyl-d <sub>5</sub> )	5 mg
89928	Azinphos-methyl-(dimethyl-d <sub>6</sub> )	5 mg	34021	4,4'-DDT-d <sub>8</sub>	10 mg
51949	Azoxystrobin-(cyanophenoxy-d <sub>4</sub> )	10 mg	32381	DEET-(diethyl-d <sub>10</sub> )	25 mg
32965	Bentazon-d <sub>7</sub>	10 mg	76112	Deltamethrin-(phenoxy-d <sub>5</sub> )	5 mg
34164	Bis(2-ethylhexyl)phthalate-3,4,5,6-d <sub>4</sub>	25 mg	74332	Diazinon-(diethyl-d <sub>10</sub> )	5 mg
74108	Butachlor-(2,6-diethylphenyl-d <sub>13</sub> )	5 mg	34169	Dibutyl phthalate-3,4,5,6-d <sub>4</sub>	25 mg
32413	Carbendazim-d <sub>3</sub>	10 mg	74867	Dichlorvos-(dimethyl-d <sub>6</sub> )	10 mg
49298	Carbendazim-(ring-4,5,6,7-d <sub>4</sub> )	5 mg	34233	Dicamba-d <sub>3</sub>	10 mg
34019	Carbofuran-d <sub>3</sub>	10 mg	34186	Dicyclohexyl phthalate-d <sub>4</sub>	25 mg

Cat. No.	Description	Package Size
32311	Diflubenzuron-(chlorophenyl- $C_6$ )	10 mg
59824	Dimethoate-( <i>O,O</i> -dimethyl- $d_6$ )	5 mg
32274	4-(3,6-Dimethyl-3-heptyl)phenol-3,5- $d_2$ solution, 100 $\mu$ g/mL in acetone	1 mL
34201	Dimethyl- $d_6$ phthalate	25 mg
89953	Dimethomorph-(dimethoxy- $d_6$ )	5 mg
34018	Diuron- $d_6$	10 mg
03627	Diquat dibromide-(ethylene- $d_4$ )	5 mg
79287	Ethoxyquin-(ethoxy- $d_2$ )	5 mg
34513	Etofenprox-(ethoxy- $d_2$ )	10 mg
75552	Fenhexamid-(methyl- $d_3$ )	5 mg
08973	Fenthion-( <i>S</i> -methyl- $d_3$ )	5 mg
75711	Fenvalerate-(phenoxy- $d_5$ )	5 mg
90667	Flufenacet-(phenyl- $d_4$ )	5 mg
06899	Fluorpyram-(benzamide ring- $d_4$ )	5 mg
34516	Folpet- $d_4$	10 mg
90007	Glyphosate-2- $^{13}C$	5 mg
90479	Glyphosate-2- $^{13}C$ , $^{15}N$	5 mg
91294	Hexaconazole-(butyl-2,2,3,3,4,4,4- $d_7$ )	5 mg
03811	$\alpha$ -HCH- $d_6$	5 mg
34559	Imazalil-(allyl- $d_3$ )	10 mg
34170	Imidacloprid- $d_4$	10 mg
74131	2-Imidazolidinethione-4,4,5,5- $d_4$	10 mg
34017	Isoproturon- $d_6$	10 mg
34523	Linuron-(methyl- $d_3$ , methoxy- $d_3$ )	10 mg
34541	Malathion diacid-(dimethyl- $d_6$ )	10 mg
34514	Malathion-(diethyl- $d_{10}$ )	10 mg
04311	Maleic hydrazide- $^{13}C_4$	10 mg
68405	MCPA-(methyl- $d_3$ )	10 mg
34505	Mecoprop-(4-chloro-2-methylphenoxy- $d_6$ )	10 mg
52485	Mepiquat- $d_{16}$ chloride	5 mg
78308	Mesotrione- $d_4$ (benzoyl-3- <i>d</i> , mesyl- $d_3$ )	5 mg
08963	Metalaxyl-(methoxyacetyl OMe- $d_3$ )	5 mg
32300	Methiocarb-( <i>N</i> -methyl- $d_3$ )	10 mg
37098	Methoxychlor- $d_{14}$ (bis(4-methoxyphenyl- $d_7$ ))	10 mg
08898	Methoxyfenozide-(methoxy- $d_3$ )	5 mg
32135	Methyl 4-hydroxybenzoate-(ring- $^{13}C_6$ )	10 mg
14638	Metrafenone-(2,3,4-trimethoxy- $d_3$ )	5 mg
14134	Metribuzin-( <i>S</i> -methyl- $d_3$ )	5 mg
34565	Monoquat iodide-(methyl- $d_3$ )	25 mg
34509	Monuron-(dimethyl- $d_6$ )	10 mg
05690	Morpholine-2,2,3,3,5,5,6,6- $d_8$ hydrochloride	5 mg
08977	Myclobutanil-(phenyl- $d_4$ )	5 mg
05567	<i>N</i> -Acetyl- $d_3$ -glufosinate	5 mg
32688	Nabam- $d_4$	10 mg
48715-U	Naphthalene- $d_8$ solution; 2000 $\mu$ g/mL in methylene chloride	1 mL
N5768	(+)-Nicotine- $d_3$ salicylate salt	5 mg, 10 mg
489077	DL-Nicotine-(methyl- $d_3$ )	50 mg

Cat. No.	Description	Package Size
05357	Nicosulfuron-( <i>N,N</i> -dimethyl- $d_6$ )	5 mg
68458	Nitrofen-(nitrophenyl- $d_4$ )	10 mg
73875	Oxybenzone-(phenyl- $d_5$ )	10 mg
93163	Oxyfluorfen-(phenyl- $d_5$ )	5 mg
19847	Paclbutrazol-(phenyl- $d_4$ )	10 mg
93103	Paraoxon-ethyl- $d_{10}$ (diethyl- $d_{10}$ )	5 mg
50636	Paraquat dichloride-(rings- $d_8$ ) hydrate	5 mg
34557	Paraquat diiodide-(dimethyl- $d_6$ )	25 mg
34561	Paraquat monopyridone iodide-(1-methyl- $d_3$ )	10 mg
33452	Parathion-ethyl- $d_{10}$	10 mg
08979	<i>trans</i> -Permethrin-(phenoxy- $d_5$ )	5 mg
34515	Phenmedipham-(methoxy- $d_3$ )	10 mg
05374	Phosmet-(dimethyl- $d_6$ )	5 mg
73879	Piperonylbutoxide-(butyl- $d_3$ )	10 mg
34209	Pirimicarb- $d_6$	10 mg
34536	Pirimiphos-methyl-( <i>O,O</i> -dimethyl- $d_6$ )	10 mg
68367	Prochloraz-(ethylene- $d_4$ )	10 mg
68326	Profenofos-(phenyl- $d_3$ )	10 mg
34502	Prometryn-( <i>N</i> <sup>2</sup> -isopropyl- $d_7$ )	10 mg
80757	Propamocarb-(propyl- $d_7$ )	5 mg
34483	Propazine-( <i>N</i> <sup>2</sup> -isopropyl- $d_7$ )	10 mg
55833	Propiconazole-(phenyl- $d_3$ )	5 mg
05351	Propoxur-(isopropoxy- $d_7$ )	5 mg
14465	Proquinazid-(propoxy- $d_7$ )	5 mg
78937	Pyraclostrobin-( <i>N</i> -methoxy- $d_3$ )	5 mg
75761	Pyrimethanil-(phenyl- $d_5$ )	5 mg
34054	Simazine- $d_{10}$	10 mg
34503	Secbumeton-(ethyl- $d_3$ )	10 mg
05585	Sulcotrione- $d_4$ (benzoyl-3- <i>d</i> , mesyl- $d_3$ )	5 mg
78827	TDCPP- $d_{15}$	5 mg
43293	Tebuconazole- $^{13}C_3$	5 mg
55639	Tebuconazole-( <i>tert</i> -butyl- $d_9$ )	5 mg
80814	Tembotrione-(methyl- $d_3$ )	5 mg
59603	Terbutryn-( <i>S</i> -methyl- $d_3$ )	10 mg
34572	Thiabendazole-(benzimidazole-3 <i>a</i> ,5,5,6,7,7 <i>a</i> - $^{13}C_6$ )	10 mg
30673	Thiacloprid-(thiazolidin ring- $d_4$ )	10 mg
30696	Thidiazuron-(phenyl- $d_5$ )	10 mg
75713	Thifensulfuron-methyl-(methoxycarbonyl- $d_3$ )	5 mg
38176	Thiamethoxam- $d_3$	25 mg
33853	Thionazin- $d_{10}$	10 mg
89947	Triadimenol-(4-chlorophenoxy- $d_4$ )	5 mg
43232	Triazophos-(phenyl- $d_5$ )	10 mg
34023	Trichloroanisole- $d_5$	50 mg
74913	Trichlorfon-(dimethyl- $d_6$ )	10 mg
34504	Trietazine-(monoethyl- $d_5$ -amino)	10 mg
34538	Trifluralin-(dipropyl- $d_{14}$ )	10 mg



## Pesticide Metabolite Standards

Active compounds of some pesticides may be converted by the target insects or plants or may be degraded in the environment. Therefore pesticide metabolites should be also monitored. We proudly offer our customers a wide range of pesticide metabolite neat standards and solutions in various solvents.

The complete portfolio can be found at [sigma-aldrich.com/pesticidemetabolites](http://sigma-aldrich.com/pesticidemetabolites)



**Table 6. Neats and Solutions for Pesticides and Their Metabolites**

Cat. No.	Description	Package Size	Cat. No.	Description	Package Size
<b>Acetamiprid</b>			<b>By-product in pesticide synthesis</b>		
32979	N-(6-Chloro-3-pyridylmethyl)-N'-cyano-acetamidine	10 mg	36627	1,2,4-Trichlorobenzene	1 g
<b>Acetochlor</b>			35831	1,2-dichloro-4-nitrobenzene	1 g
34145	Acetochlor ESA sodium salt	10 mg	36572	1,2-Dichloro-2-nitrobenzene	1 g
34144	Acetochlor OA	10 mg	<b>Carbofuran</b>		
<b>Alachlor</b>			MET754B	2,3-Dihydroxy-2,2-dimethyl-benzofuran-7-ol	1000 mg
34147	Alachlor ESA sodium salt	10 mg	37896	Carbofuran-3-hydroxy	10 mg
34146	Alachlor OA	10 mg	37895	Carbofuran-3-keto	10 mg
<b>Aldicarb</b>			<b>Carfentrazone</b>		
33387	Aldicarb-sulfone	100 mg	34079	Carfentrazone-ethyl	10 mg
31258	Aldicarb-sulfoxide	100 mg	<b>Chlorbenside</b>		
<b>Atrazine</b>			32231	Chlorbenside sulfone	25 mg
36629	Atrazine-desethyl	250 mg	<b>Chlorflurenol</b>		
36667	Atrazine-desethyl-desisopropyl	250 mg	45302	Chlorflurenol-methyl	250 mg
45613	Atrazine-desethyl-desisopropyl-2-hydroxy	250 mg	<b>Chlorothalonil</b>		
MET58C	2-Chloro-4,6-diamino-1,3,5-triazine	100 mg	88792	2,4,5-Trichloro-6-hydroxyiso-phthalonitrile	10 mg
45490	Atrazine-desethyl-2-hydroxy	100 mg	<b>Chlorpyrifos</b>		
36628	Atrazine-desisopropyl	250 mg	45396	Chlorpyrifos-methyl	250 mg
31523	Atrazine-desisopropyl-2-hydroxy	100 mg	45831	Chlorpyrifos-methyl solution, 100 µg/mL in acetonitrile	2 mL
36631	Atrazine-2-hydroxy	250 mg	MET418B	Chlorpyrifos-methyl O	50 mg
<b>Amitraz</b>			33972	3,5,6-Trichloro-2-pyridinol	100 mg
32442	Amitraz Metabolite BTS 27271	10 mg	<b>Clopyralid</b>		
<b>Benomyl</b>			36529	Clopyralid (2-hydroxyethyl) ammonium	250 mg
31189	2-Aminobenzimidazole	250 mg	<b>Cloquintocet</b>		
<b>Bensulfuron</b>			31678	Cloquintocet-mexyl	250 mg
37897	Bensulfuron-methyl	100 mg	<b>Chlordane</b>		
<b>Benzoylprop</b>			49042	Heptachlor epoxide, isomer B	100 mg
31476	Benzoylprop-ethyl	100 mg	35492	Heptachlor endo-epoxide, isomer A	50 mg
<b>Bromfenvinphos</b>			31557	Heptachlor endo-epoxide solution, 100 µg/mL in methanol, isomer A	2 mL
45816	Bromfenvinphos-ethyl	100 mg	34309	Heptachlor exo-epoxide, isomer B	50 mg
45815	Bromfenvinphos-methyl	100 mg	45861	Heptachlor exo-epoxide solution, 100 µg/mL in methanol, isomer B	2 mL
<b>Bixafen</b>			CRM48198	Heptachlor epoxide solution, 1000 µg/mL in methanol, isomer A	1 mL
34511	Bixafen Metabolite BYF00587	10 mg	48677	Heptachlor epoxide solution, 20 µg/mL in methanol, isomer B	1 mL
<b>Bromophos</b>			40099	Heptachlor epoxide solution, CRM, 1000 µg/mL in methanol, isomer B	1 mL
33399	Bromophos-ethyl	100 mg			
33400	Bromophos-methyl	100 mg			
<b>Bromoxynil</b>					
MET426B	Bromoxynil methyl ether	50 mg			
45356	Bromoxynil-octanoate	250 mg			
<b>Butachlor</b>					
34211	Butachlor ESA sodium salt	10 mg			

Cat. No.	Description	Package Size
<b>Cycloate</b>		
MET502A	N-Ethylcyclohexylamine	1000 mg
<b>Cypermethrin</b>		
46319	3-Phenoxybenzoic acid	250 mg
<b>Dalapon</b>		
45383	Dalapon-methyl	250 mg
47663	Dalapon methyl ester solution, 1000 µg/mL in methyl <i>tert</i> -butyl ether	1 mL
<b>2,4-DD</b>		
45732	2,4-D 1-butyl ester	250 mg
45416	2,4-D methyl ester	250 mg
MET754B	2,3-Dihydro-2,2-dimethyl-benzofuran-7-ol	1000 mg
<b>Deltamethrin</b>		
46319	3-Phenoxybenzoic acid	250 mg
<b>Demeton</b>		
34205	Demeton-O	100 mg
N12384	Demeton-S-methyl	50 mg
34234	Demeton-S-methyl solution; 100 ng/µL in acetonitrile	2 mL
45424	Demeton-S-methyl-sulfon	250 mg
N11581	Demeton O&S	100 mg
<b>Diazinon</b>		
MET90B	2-Isopropyl-6-methyl-4-pyrimidinol	1000 mg
MET90C	Diethyl phosphate	100 mg
<b>Dicamba</b>		
34102	Dicamba methyl ester	100 mg
<b>Dichlorprop</b>		
45437	Dichlorprop-methyl ester	250 mg
<b>Diclofop</b>		
45442	Diclofop-methyl	250 mg
<b>Difenzoquat</b>		
34331	Difenzoquat methyl sulfate	250 mg
<b>Dimethachlor</b>		
32632	Dimethachlor Metabolite CGA 373464	100 mg
32635	Dimethachlor Metabolite SYN 530561	100 mg
<b>Disulfoton</b>		
45871	Disulfoton-sulfone	100 mg
32635	Disulfoton-sulfoxide	100 mg
<b>Endosulfan</b>		
36674	Endosulfan alcohol	100 mg
36673	Endosulfan ether	100 mg
36675	Endosulfan lactone	100 mg
36676	Endosulfan sulfate	100 mg
48723-U	Endrin aldehyde solution, 20 µg/mL in methanol	1 mL
40097	Endrin aldehyde solution, 1000 µg/mL in methanol	1 mL
442579	Endrin ketone	25 mg
<b>Ethiofencarb</b>		
45811	Ethiofencarb sulfoxide	10 mg
45810	Ethiofencarb sulfone	10 mg
<b>Ethofumesate</b>		
33888	Ethofumesate-2-keto	10 mg
<b>Ethylene bisdithiocarbamate fungicides (EBDC)</b>		
45531	2-Imidazolidinethione	250 mg
31534	2-Imidazolidone	250 mg
<b>Fenamidone</b>		
34183	(S)-3-Anilino-5-methyl-5-phenylimidazolidine-2,4-dione	100 mg

Cat. No.	Description	Package Size
<b>Fenamiphos</b>		
46293	Fenamiphos-sulfoxide	100 mg
46292	Fenamiphos-sulfone	100 mg
<b>Fenoxaprop</b>		
45518	Fenoxaprop-ethyl	250 mg
<b>Fenoxaprop-P</b>		
36851	Fenoxaprop-P-ethyl	250 mg
<b>Fensulfathion</b>		
34533	Fensulfathion oxon	25 mg
34530	Fensulfathion sulfone	25 mg
<b>Fenthion</b>		
32373	Fenthion oxon sulfone	25 mg
32374	Fenthion oxon sulfoxide	25 mg
<b>Fentrazamide</b>		
33951	Fentrazamide Metabolite solution; 100 ng/µL in acetonitrile	2 mL
<b>Fipronil</b>		
41865	Fipronil-desulfinyl	25 mg
32333	Fipronil sulfone	50 mg
<b>Flamprop</b>		
45497	Flamprop-isopropyl	250 mg
45752	Flamprop-M-isopropyl	250 mg
<b>Flonicamid</b>		
34566	Flonicamid metabolite TFNG	25 mg
34567	Flonicamid metabolite TFNA	25 mg
<b>Fluazifop</b>		
36783	Fluazifop-butyl	250 mg
34027	Fluazifop-methyl	50 mg
<b>Flufenacet</b>		
34154	Flufenacet ESA sodium salt	10 mg
34512	Flufenacet Metabolite FOE5043	10 mg
<b>Fluroxypyr</b>		
36780	Fluroxypyr-1-methylheptyl ester	100 mg
<b>Glufosinate</b>		
31264	3-(Methylphosphinico)propionic acid	100 mg
<b>Glyphosate</b>		
05164	(Aminomethyl)phosphonic acid	50 mg
44159-U	Methylglyphosate	500 mg
<b>Haloperidol</b>		
36681	1,1,1-Trichloro-2-methyl-2-propanol hemihydrate	1 g
32497	Dimethachlor Metabolite SYN 528702 sodium salt	100 mg
<b>Haloxypop</b>		
45820	Haloxypop-methyl	50 mg
34043	Haloxypop P-methyl solution, 100 µg/mL	2 mL
<b>Imidacloprid</b>		
68678	6-Chloropyridine-3-carboxylic acid	100 mg
19386	6-Hydroxypyridine-3-carboxylic acid	100 mg
34534	Imidacloprid-olefin	10 mg
<b>Iodosulfuron</b>		
30317	Iodosulfuron-methyl-sodium	100 mg
<b>Ioxynil</b>		
36198	Ioxynil-methyl	100 mg
33381	Ioxynil-octanoate	100 mg
<b>Isofenphos</b>		
33436	Isofenphos-methyl	50 mg

Cat. No.	Description	Package Size
<b>Isoxadifen</b>		
33799	Isoxadifen-ethyl	100 mg
<b>Leptophos</b>		
MET677A	Leptophos oxon	50 mg
<b>Malathion</b>		
MET86C	Malathion O-analog	100 mg
34545	Malathion diacid	10 mg
<b>MCPA</b>		
35833	4-Chloro-2-methylphenol	1 g
33394	MCPA-2-ethylhexyl ester	100 mg
36144	MCPA methyl ester	100 mg
<b>Mecoprop</b>		
36148	Mecoprop methyl ester	100 mg
37871	Mecoprop-2-octyl ester	100 mg
<b>Metalaxyl</b>		
32399	Metalaxyl Metabolite CGA 108906	25 mg
32398	Metalaxyl Metabolite CGA 62826	25 mg
32808	Metalaxyl-M	100 mg
<b>Methiocarb</b>		
MET543A	Methiocarb sulfone	50 mg
34177	Methiocarb sulfoxide	100 mg
MET543B	Methiocarb sulfoxide solution, 100 µg/mL in toluene	5 mL
42221	4-(Methylsulfonyl)phenol	50 mg
09286	Thiophenol	5 mL 25 mL
<b>Methoxychlor</b>		
MET83B	P,p'-Methoxychlor olefin	50 mg
<b>Metolachlor</b>		
34148	Metolachlor OA	10 mg
<b>p,p'-DDT</b>		
MET699B	p,p'-DDMU	10 mg
MET698A	p,p'-DDA	100 mg
45421	4,4'-Dichlorobenzophenone (4,4'-DD)	50 mg
35484	2,2-Bis(4-chlorophenyl)acetic acid (4,4'-DDA)	250 mg
35486	1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane (4,4'-DDD)	250 mg
40092	4,4'-DDD solution, CRM, 5000 µg/mL in methanol	1 mL
35489	2-Chloro-1,1-bis(4-chlorophenyl)-ethene, (4,4'-DDMU)	250 mg
<b>Parathion</b>		
46192	Paraoxon-methyl	100 mg
36186	Paraoxon-ethyl	100 mg
35836	4-Ntrophenol	1 g
<b>Pirimiphos</b>		
45628	Pirimiphos-ethyl	250 mg
<b>Pirimicarb</b>		
33887	Desmethyl-formamido-pirimicarb	10 mg
33886	Desmethyl-pirimicarb	10 mg
<b>Prochloraz</b>		
34508	Prochloraz Metabolite BTS 40348	10 mg
34507	Prochloraz Metabolite BTS 44595	10 mg
<b>Propachlor</b>		
34152	Propachlor ESA sodium salt	10 mg
34151	Propachlor OA	10 mg
<b>Propoxycarbazon</b>		
32297	2-Hydroxy-propoxycarbazon	10 mg

Cat. No.	Description	Package Size
<b>Pyrazosulfuron</b>		
46323	Pyrazosulfuron-ethyl	100 mg
<b>Pyrethrum insecticides</b>		
46319	3-Phenoxybenzoic acid	250 mg
<b>Quizalofop</b>		
34074	Quizalofop-p-ethyl	200 mg
33942	Quizalofop-p-tefuryl solution, 100 ng/µl in acetonitrile	2 mL
<b>Ruelen</b>		
MET607A	4-tert-Butyl-2-chlorophenol	10 mg
<b>Simazine</b>		
MET58B	Simazine hydroxy	25 mg
<b>S-Metolachlor</b>		
32637	S-Metolachlor metabolite CGA 357704	100 mg
32641	S-Metolachlor metabolite CGA 368208	100 mg
32645	S-Metolachlor metabolite CGA 37735	100 mg
32648	S-Metolachlor metabolite CGA 50267	100 mg
32650	S-Metolachlor metabolite CGA 50720	100 mg
32646	S-Metolachlor metabolite NOA 413173	100 mg
<b>Spiromesifen</b>		
30482	Spiromesifen Metabolite M01	10 mg
<b>Spirotetramat</b>		
32484	Spirotetramat Metabolite BY108330-cis-enol	10 mg
32485	Spirotetramat Metabolite BY108330-cis-keto-hydroxy	10 mg
32486	Spirotetramat Metabolite BY108330-mono-hydroxy	10 mg
32487	Spirotetramat Metabolite BY108330-enol-glucoside	10 mg
<b>Sulfometuron</b>		
34224	Sulfometuron methyl	100 mg
<b>Terbufos</b>		
46044	Terbufos-sulfoxide	50 mg 100 mg
<b>Terbumeton</b>		
36514	Terbumeton-desethyl	250 mg
<b>Terbutylazine</b>		
MET58C	2-Chloro-4,6-diamino-1,3,5-triazine	100 mg
<b>Thiabendazole</b>		
33818	5-Hydroxythiabendazole	10 mg
<b>Thiacloprid</b>		
33897	Thiacloprid-amide	100 mg
<b>Thiofanox</b>		
31551	Thiofanox-sulfoxide	100 mg
<b>Thiometon</b>		
34234	Demeton-S-methyl solution, 100 µg/mL in acetonitrile	2 mL
45424	Demeton-S-methyl-sulfon	250 mg
<b>Thiophanate</b>		
45668	Thiophanate-methyl	250 mg
<b>Trifloxystrobin</b>		
34518	Trifloxystrobin Metabolite CGA 321113	10 mg
<b>Triclopyr</b>		
36538	Triclopyr 2-butoxyethylester	100 mg
<b>Thiamethoxam</b>		
73348	N-Desmethylthiamethoxam	50 mg
<b>Tembotrione</b>		
32584	Tembotrione metabolite AE 1417268	25 mg

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