

Pesticide Reference Material for Food Testing

Multiannual Control Program for Pesticide Residues (MACP) 2026-2028

Food safety is essential, and multiple regulations govern the control of contaminants such as mycotoxins, heavy metals, 3-MCPD, dioxins, dioxin-like and non-dioxin-like PCBs, nitrates, and—most critically—pesticide residues in food.

To support compliance with maximum residue levels (MRLs) and to protect consumer health, the European Union has established a Multiannual Control Program for Pesticide Residues (MACP) for food of plant and animal origin produced within the EU and EFTA. Each MACP covers a three-year period, with the next cycle spanning 2026–2028.

This program applies to all food of plant and animal origin produced within the EU and EFTA, as well as products imported from non-EU countries.

We recognize the importance of ensuring both the nutritional value and safety of food. With an extensive portfolio for sample preparation (e.g., QuEChERS) and instrumental analysis (UHPLC, GC), we provide a comprehensive range of high-quality pesticide reference materials to support laboratories in meeting MACP requirements. Our offering includes two quality grades:

Pestanal® analytical standards

TraceCERT® certified reference materials

These high-purity, reliable materials help ensure accurate, traceable results across a wide range of pesticide residues included in the MACP scope.



Pesticides to be determined in products of plant origins

CAS No.	Compound	Pestanal® (analytical standard)	TraceCERT® (CRM)
94-75-7	Dichlorophenoxy-acetic acid (2,4-D)	31518-250 mg	76514-100 mg
90-43-7	2-Phenylphenol	45529-250 mg	93681-50 mg
71751-41-2	Abamectin	31732-100 mg	CRM42377-100 mg
30560-19-1	Acephate	45315-250 mg	CRM56997-100 mg
74070-46-5	Aclonifen	36792-50 mg-R	CRM36792-25 mg
101007-06-1	Acrinathrin	46415-100 mg-R	93682-50 mg
116-06-3	Aldicarb	33386-100 mg	68417-50 mg
309-00-2	Aldrin	36666-25 mg	
865318-97-4	Ametoctradin	32461-50 mg	93683-25 mg
11141-17-6	Azadirachtin	PHL89574-5 mg	
86-50-0	Azinphos-methyl	45333-250 mg	CRM63232-100 mg
131860-33-8	Azoxystrobin	31697-100 mg	43854-50 mg
8001-54-5	Benzalkonium Chloride		1050993-5 mL
1820573-27-0	β-Cyfluthrin	46003-250 mg	93223-50 mg
17804-35-2	Benomyl	45339-250 mg	
82657-04-3	Bifenthrin (Z-isomer)		CRM43931-100 mg

CAS No.	Compound	Pestanal® (analytical standard)	TraceCERT® (CRM)
99267-18-2	Bifenthrin (mix of isomers)	34314-100 mg	
92-52-4	Biphenyl	35800-1 g	PHR2358-1 g
55179-31-2	Bitertanol		CRM68817-100 mg
188425-85-6	Boscalid	33875-100 mg-R	74144-50 mg
	Bromide ion		43147-100 mL (1000 mg/L bromide in water)
18181-80-1	Bromopropylate	45357-250 mg	93744-50 mg
41483-43-6	Bupirimate	31510-250 mg	94164-50 mg
69327-76-0	Buprofezin	37886-100 mg	CRM69368-100 mg
133-06-2	Captan	32054-250 mg	74047-50 mg
63-25-2	Carbaryl	32055-250 mg	CRM55396-50 mg
10605-21-7	Carbendazim	45368-250 mg	79888-50 mg
1563-66-2	Carbofuran	32056-250 mg	CRM53859-100 mg
500008-45-7	Chlorantraniliprole	32510-25 mg	CRM52823-25 mg
	Chlorate ion		73166-100 mL (1000 mg/L chlorate in water)
122453-73-0	Chlorfenapyr	37913-100 mg-R	CRM52951-100 mg

CAS No.	Compound	Pestanal® (analytical standard)	TraceCERT® (CRM)
999-81-5	Chloromequat chloride	45387-250 mg	93757-50 mg
1897-45-6	Chlorothalonil	36791-250 mg	CRM42164-50 mg
101-21-3	Chlorpropham	45393-250 mg	CRM43551-100 mg
2921-88-2	Chlorpyrifos	45395-100 mg	94114-100 mg
5598-13-0	Chlorpyrifos-methyl	45396-100 mg	
74115-24-5	Clofentezine	36763-50 mg	CRM55869-50 mg
1702-17-6	Clopyralid	36758-250 mg	CRM36758-50 mg
210880-92-5	Clothianidin	33589-100 mg	68965-50 mg
736994-63-1	Cyantraniliprole	32372-25 mg	CRM01303-25 mg
120116-88-3	Cyazofamid	33874-100 mg-R	CRM69113-50 mg
180409-60-3	Cyflufenamid	32403-25 mg	94184-25 mg
400882-07-7	Cyflumetofen	32068-50 mg	CRM32068-50 mg
68359-37-5	Cyfluthrin (mixture of isomers)		43832-100 mg
57966-95-7	Cymoxanil	34326-100 mg	
52315-07-8	Cypermethrin	36128-100 mg	51991-50 mg
94361-06-5	Cyproconazole	46068-100 mg	
121552-61-2	Cyprodinil	34389-100 mg	CRM68162-100 mg
66215-27-8	Cyromazine	45414-50 mg	CRM07346-25 mg
52918-63-5	Deltamethrin	45423-250 mg	05995-50 mg
333-41-5	Diazinon	45428-250 mg	68486-50 mg
62-73-7	Dichlorvos	45441-250 mg	CRM18185-250 mg
115-32-2	Dicofol	36677-100 mg-R	74046-50 mg
60-57-1	Dieldrin	33491-100 mg-R	CRM44959-100 mg
7173-51-5	Didecylidimethylammonium chloride	34466-250 mg	
87130-20-9	Diethofencarb	34087-100 mg	CRM04342-25 mg
119446-68-3	Difenoconazole	36531-250 mg	74177-50 mg
35367-38-5	Diflubenzuron	45446-250 mg	77070-50 mg
60-51-5	Dimethoate	45449-100 mg	CRM52994-100 mg
110488-70-5	Dimethomorph	46027-100 mg	CRM56585-100 mg
83657-24-3-2	Diniconazole	43266-250 mg	93795-50 mg
122-39-4	Diphenylamine	45456-250 mg	CRM69121-100 mg
3347-22-6	Dithianon	45462-250 mg	43834-50 mg
2439-10-3	Dodine	45466-250 mg	93845-50 mg
138511-97-4	Emamectin Benzoate B1a		CRM80996-10 mg
115-29-7	Endosulfan (α+β ~2:1)	32015-250 mg	
133855-98-8	Epoxiconazole		93871-50 mg
16672-87-0	Ethephon	45473-250 mg	19347-50 mg
563-12-2	Ethion	45477-250 mg	CRM89323-50 mg
23947-60-6	Ethirimol	45478-250 mg	93638-50 mg
75-21-8	Ethylene oxide		48838-1 mL (50 mg/mL in MeOH)
75-21-8	Ethylene oxide		CRM44609-1 mL (500 µg/mL in DMSO)
75-21-8	Ethylene oxide		CRM47949-1 mL (2000 µg/mL in dichloromethane)
80844-07-1	Etofenprox	34094-100 mg	89929-50 mg
153233-91-1	Etoxazole	32506-50 mg	CRM55951-50 mg
131807-57-3	Famoxadone		49644-100 mg
161326-34-7	Fenamidone	33965-100 mg-R	CRM05386-50 mg
22224-92-6	Fenamiphos	45483-250 mg	CRM67114-100 mg
60168-88-9	Fenarimol	45484-250 mg	93891-50 mg
120928-09-8	Fenazaquin	31635-100 mg	CRM05394-50 mg
114369-43-6	Fenbuconazole	31654-100 mg	CRM05513-50 mg
13356-08-6	Fenbutatin oxide	34342-250 mg	
126833-17-8	Fenhexamid	31713-100 mg	CRM56366-100 mg
122-14-5	Fenitrothion	45487-250 mg	CRM64454-100 mg
72490-01-8	Fenoxycarb	34343-250 mg	CRM53122-100 mg
39515-41-8	Fenpropathrin	31223-250 mg	CRM80196-50 mg
67306-00-7	Fenpropidin	46017-50 mg	94273-50 mg
67564-91-4	Fenpropimorph	36772-100 mg-R	40713-100 mg
134098-61-6	Fenpyroximate	31684-100 mg	CRM51998-100 mg

CAS No.	Compound	Pestanal® (analytical standard)	TraceCERT® (CRM)
55-38-9	Fenthion	36552-250 mg	CRM01874-100 mg
51630-58-1	Fenvalerate	45495-250 mg	90664-50 mg
120068-37-3	Fipronil	46451-100 mg	16785-50 mg
158062-67-0	Flonicamid	32509-25 mg	CRM56522-25 mg
83066-88-0	Fluazifop-P	35372-25 mg	
272451-65-7	Flubendiamide	32801-100 mg	94356-50 mg
131341-86-1	Fludioxonil	46102-100 mg-R	74123-50 mg
101463-69-8	Flufenoxuron	31594-250 mg	CRM43024-50 mg
239110-15-7	Fluopicolide	41132-100 mg	94372-50 mg
658066-35-4	Fluopyram	32462-50 mg	CRM01345-25 mg
951659-40-8	Flupyradifurone	37050-100 mg	CRM37050-50 mg
136426-54-5	Fluquinconazole	46301-100 mg	CRM41441-50 mg
85509-19-9	Flusilazole	45753-100 mg	CRM75834-50 mg
76674-21-0	Flutriafol	34344-100 mg	94387-50 mg
102851-06-9	τ-Fluvalinate	46294-100 mg	CRM90043-100 mg
907204-31-3	Fluxapyroxad	37047-100 mg	94522-50 mg
133-07-3	Folpet	32057-250 mg	CRM66004-100 mg
23422-53-9	Formetanate hydrochloride		94554-50 mg
98886-44-3	Fosthiazate	34099-50 mg	36073-50 mg
77182-82-2	Glufosinate ammonium	45520-100 mg	49677-100 mg
1071-83-6	Glyphosate	45521-250 mg	89432-100 mg
69806-34-4	Haloxypop	45817-100 mg	36473-50 mg
95977-29-0	Haloxypop-P		36824-25 mg
79983-71-4	Hexaconazole	34348-100 mg	CRM90416-50 mg
78587-05-0	Hexythiazox	33365-100 mg	CRM50902-100 mg
35554-44-0	Imazalil	32007-100 mg	CRM53259-100 mg
138261-41-3	Imidacloprid	37894-100 mg	68694-50 mg
144171-61-9	Indoxacarb	33969-25 mg-R	CRM67344-25 mg
36734-19-7	Iprodione	36132-100 mg	89977-50 mg
140923-17-7	Iprovalicarb	33431-100 mg-R	91451-50 mg
24353-61-5	Isocarbophos	37901-100 mg-R	36831-50 mg
50512-35-1	Isoprothiolane	76547-50 mg	36107-50 mg
143390-89-0	Kresoxim-methyl	37899-100 mg	90053-50 mg
91465-08-6	λ-Cyhalothrin	31058-100 mg	72765-50 mg
330-55-2	Linuron	36141-100 mg	
103055-07-8	Lufenuron	31662-100 mg	76088-50 mg
121-75-5	Malathion	36143-100 mg	91481-50 mg
123-33-1	Maleic hydrazide		CRM67139-100 mg
8018-01-7	Mancozeb (Dithiocarbamate ligand)	45553-100 mg	
374726-62-2	Mandipropamid	32805-100 mg	77043-50 mg
12427-38-2	Maneb (Dithiocarbamate ligand)	45554-250 mg	
110235-47-7	Mepanipyrim	33970-50 mg	36108-50 mg
24307-26-4	Mepiquat chloride	36151-100 mg	38117-50 mg
139968-49-3	Metaflumizone	32966-100 mg	77344-50 mg
57837-19-1	Metalaxyl	32012-100 mg	89979-50 mg
70630-17-0	Metalaxyl-M	32808-100 mg	CRM67566-100 mg
41394-05-2	Metamitron	36154-100 mg	38889-50 mg
10265-92-6	Methamidophos	33395-100 mg	
950-37-8	Methidathion	36158-100 mg	
2032-65-7	Methiocarb	36152-100 mg	CRM43234-100 mg
16752-77-5	Methomyl	36159-100 mg	74088-50 mg
161050-58-4	Methoxyfenozide	32507-50 mg	79327-50 mg
220899-03-6	Metrafenone	32964-100 mg	18996-50 mg
6923-22-4	Monocrotophos	36173-100 mg	
88671-89-0	Myclobutanil	34360-100 mg	CRM50639-100 mg
160430-64-8	N-(6-Chloro-3-pyridylmethyl)-N-cyano-N-methylacetimidine (Acetamiprid)	33674-100 mg-R	51625-50 mg
54-11-5	(-) - Nicotine	36733-250 mg	
1113-02-6	Omethoate	36181-100 mg	CRM49589-100 mg

CAS No.	Compound	Pestanal® (analytical standard)	TraceCERT® (CRM)
77732-09-3	Oxadixyl	34365-100 mg	CRM67427-100 mg
23135-22-0	Oxamyl	36184-100 mg	CRM50404-100 mg
301-12-2	Oxydemeton-methyl		36003-100 mg
76738-62-0	Paclbutrazol	46046-250 mg	43900-50 mg
298-00-0	Parathion methyl	36187-100 mg	
66246-88-6	Penconazole	36189-100 mg	
66063-05-6	Pencycuron	31118-100 mg	CRM36225-50 mg
40487-42-1	Pendimethalin	36191-100 mg	89931-50 mg
52645-53-1	Permethrin	45614-250 mg	68216-100 mg
732-11-6	Phosmet	36195-100 mg	CRM61371-100 mg
23103-98-2	Pirimicarb	45627-250 mg	CRM44719-100 mg
29232-93-7	Pirimiphos-methyl	32058-250 mg	44716-100 mg
67747-09-5	Prochloraz	45631-250 mg	64947-50 mg
32809-16-8	Procymidone	36640-250 mg-R	
41198-08-7	Profenofos	45632-250 mg	44394-100 mg
24579-73-5	Propamocarb	45638-250 mg	42092-50 mg
2312-35-8	Propargite	32051-100 mg	CRM40596-100 mg
60207-90-1	Propiconazole	45642-250 mg	CRM56557-100 mg
12071-83-9	Propineb (Dithiocarbamate ligand)	45643-250 mg	
23950-58-5	Propyzamide	45645-250 mg	
189278-12-4	Proquinazid	32508-50 mg	38244-50 mg
52888-80-9	Prosulfocarb	31141-250 mg	CRM36431-100 mg
178928-70-6	Prothioconazole	34232-100 mg	38273-50 mg
123312-89-0	Pymetrozine	46119-250 mg-R	CRM44184-100 mg
175013-18-0	Pyraclostrobin	33696-100 mg-R	CRM01346-50 mg
8003-34-7	Pyrethrum extract	33739-100 mg	CRM42339-1.2 mL
96489-71-3	Pyridaben	46047-25 mg-R	CRM50836-25 mg
179101-81-6	Pyridalyl	32393-25 mg	54373-25 mg
53112-28-0	Pyrimethanil	31577-250 mg	
95737-68-1	Pyriproxyfen	34174-100 mg	
124495-18-7	Quinoxifen	46439-100 mg	36334-50 mg
935545-74-7	Spinetoram solution		43065-1 mL (100 µg/mL in acetonitrile)

CAS No.	Compound	Pestanal® (analytical standard)	TraceCERT® (CRM)
168316-95-8	Spinosad	33706-50 mg	CRM51599-50 mg
148477-71-8	Spirodiclofen	33654-100 mg-R	CRM03908-50 mg
283594-90-1	Spiromesifen	33599-100 mg	CRM55998-50 mg
203313-25-1	Spirotetramat	32713-100 mg	CRM51095-100 mg
118134-30-8	Spiroxamine	46443-100 mg	CRM52554-100 mg
107534-96-3	Tebuconazole	32013-250 mg	43897-50 mg
112410-23-8	Tebufenozide	31652-100 mg	CRM01373-50 mg
119168-77-3	Tebufenpyrad		36372-50 mg
83121-18-0	Teflubenzuron	45756-250 mg-R	CRM01399-100 mg
79538-32-2	Tefluthrin	35548-100 mg	CRM67635-100 mg
5915-41-3	Terbuthylazine	45678-250 mg-R	74124-50 mg
112281-77-3	Tetraconazole	37087-100 mg	74239-50 mg
116-29-0	Tetradifon	45680-250 mg	38452-50 mg
148-79-8	Thiabendazole	45684-250 mg	PHR1259-500 mg
111988-49-9	Thiacloprid	37905-100 mg-R	14783-50 mg
153719-23-4	Thiamethoxam	37924-100 mg-R	68901-50 mg
59669-26-0	Thiodicarb	34375-250 mg	CRM68124-100 mg
23564-05-8	Thiophanate-methyl	45688-250 mg	14223-50 mg
57018-04-9	Tolclofos-methyl	31209-250 mg	38461-50 mg
43121-43-3	Triadimefon	45693-250 mg	38803-50 mg
55219-65-3	Triadimenol	46138-250 mg	38878-50 mg
24017-47-8	Triazophos	45696-50 mg	CRM74120-50 mg
41814-78-2	Tricyclazole	45808-10 mg	39116-10 mg
141517-21-7	Trifloxystrobin	46447-100 mg	CRM52273-100 mg
64628-44-0	Triflumuron	35029-100 mg	74022-50 mg
68694-11-1	Triflumizole	32611-100 mg	CRM32611-50 mg
95266-40-3	Trinexapac-ethyl	37898-100 mg -R	79994-50 mg
50471-44-8	Vinclozolin	45705-250 mg	
12122-67-7	Zineb (Dithiocarbamate ligand)	45707-250 mg	
156052-68-5	Zoxamide	32501-50 mg	80001-50 mg

Pesticides to be determined in products of animal origin

CAS-No	Compound	Pestanal® (analytical standard)	TraceCERT® (CRM)
789-02-6	2,4'-DDT	49018-100 mg	
789-02-6	2,4'-DDT solution	45839-2 mL (100 µg/mL in acetonitrile)	
789-02-6	2,4'-DDT solution	45839-10 mL (100 µg/mL in acetonitrile)	
50-29-3	4,4'-DDT	31041-100 mg	
309-00-2	Aldrin	36666-25 mg	
8001-54-5	Benzalkonium Chloride		1050993-5 mL
99267-18-2	Bifenthrin (mix of isomers)	34314-100 mg	
82657-04-3	Bifenthrin (Z-isomer) Chlorate ion		CRM43931-100 mg 73166-100 mL (1000 mg/L chlorate in water)
5103-74-2	γ-Chlordane	442599-50 mg	90435-10 mg
57-74-9	Chlordane (mix of isomers)		53797-20 mg
999-81-5	Chlormequat chloride	45387-250 mg	93757-50 mg
2921-88-2	Chlorpyrifos	45395-100 mg	94114-100 mg
5598-13-0	Chlorpyrifos-methyl	45396-250 mg	
52315-07-8	Cypermethrin	36128-100 mg	51991-50 mg
52918-63-5	Deltamethrin	45423-250 mg	05995-50 mg
333-41-5	Diazinon	45428-250 mg	68486-50 mg
7173-51-5	Didecylidimethyl- ammonium chloride	34466-250 mg	

CAS-No	Compound	Pestanal® (analytical standard)	TraceCERT® (CRM)
60-57-1	Dieldrin	33491-100mg-R	CRM44959-100 mg
115-29-7	Endosulfan (mix of isomers)	32015-250 mg	
959-98-8	α-Endosulfan	45468-100 mg	74119-50 mg
33213-65-9	β-Endosulfan	33385-100 mg	40828-50 mg
131807-57-3	Famoxadone		49644-100 mg
51630-58-1	Fenvalerate	45495-250 mg	90664-50 mg
120068-37-3	Fipronil	46451-100 mg	16785-50 mg
77182-82-2	Glufosinate- ammonium	45520-100 mg	49677-100 mg
1071-83-6	Glyphosate	45521-250 mg	89432-100 mg
319-84-6	α-HCH	33856-50 mg	74142-50 mg
319-85-7	β-HCH	33376-100 mg	CRM33376-50 mg
319-86-8	δ-HCH	33377-50 mg	CRM33377-50 mg
608-73-1	HCH, mix of isomers	36756-250 mg	
76-44-8	Heptachlor	32349-100 mg	
118-74-1	Hexachlorobenzene	45522-250 mg	
144171-61-9	Indoxacarb	33969-25 mg-R	CRM67344-25 mg
58-89-9	Lindane	45548-250 mg	PHR1244-500 mg
24307-26-4	Mepiquat chloride	36151-100 mg	38117-50 mg
72-43-5	Methoxychlor	36161-100 mg	CRM64156-100 mg
56-38-2	Parathion	45607-100 mg	CRM49412-100 mg
40487-42-1	Pendimethalin	36191-100 mg	89931-50 mg
52645-53-1	Permethrin	45614-250 mg	68216-100 mg
29232-93-7	Pirimiphos-methyl	32058-250 mg	44716-100 mg

Pestanal® (analytical standard grade)

www.sigmaaldrich.com

Certificate of Analysis

Product Name:	Fluxapyroxad	
Product Number:	PESTANAL®, analytical standard	
Batch Number:	37047	
Batch Number:	BCCL9175	
CAS Number:	907204-31-3	
Formula:	C ₁₄ H ₈ F ₄ N ₂ O	
Formula Weight:	381.30	
Expiration Date:	JUN 2027	
Quality Release Date:	16 JUL 2024	

TEST	SPECIFICATION	RESULT
APPEARANCE (COLOR)	WHITE TO OFF WHITE	OFF WHITE
APPEARANCE (FORM)	POWDER OR CRYSTALS	POWDER
PURITY (HPLC AREA %)	≥ 98.0 %	99.9 %
MELTING POINT	154 - 160 C	158 C
WATER	± 1.0 %	0.2 %
PROTON NMR SPECTRUM	CONFORMS TO STRUCTURE	CONFORMS

Dr. Reinhold Schweninger
Quality Assurance
Buchs, Switzerland

Sigma-Aldrich warrants that at the time of the quality release or subsequent retest date this product conformed to the information contained in this publication. The current specification sheet may be available at Sigma-Aldrich.com. For further inquiries, please contact Technical Service. Purchaser must determine the suitability of the product for its particular use. See reverse side of invoice or packing slip for additional terms and conditions of sale.

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The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the US and Canada.

Page 1 of 2

TraceCERT® (certified reference material)

www.sigmaaldrich.com

Certified Reference Material

Reference material certificate

Fluxapyroxad

Product no.:	94522
Lot no.:	94522
Description of CRM:	Solid neat material
Expiry date:	MAR 2028
Storage:	2-8°C; storage under Argon
Chemical formula:	C ₁₄ H ₈ F ₄ N ₂ O
Molecular mass:	381.30 g/mol
CAS No.:	907204-31-3

Sample Certified value & Expanded uncertainty
 $U_{95\%} = k \cdot u_{\text{CRM}} \text{ (k=2.8)^{11221}}$
 as mass fraction

Fluxapyroxad	0.989 g/g ± 0.006 g/g (98.9 % ± 0.6 %)
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Metrological traceability: Traceable to the SI through an unbroken chain of comparisons via NIST P51 (Benzoic acid)¹¹²¹. Details see "Certification process details" on page 2.

Measurement method: The certified value is established by high-resolution quantitative NMR measurements (qNMR) in accordance with ISO/IEC 17025.¹⁴

Intended use: Use this certified reference material (CRM) as calibrant for chromatography or any other analytical technique.

Minimum sample size: The sample is solid at room-temperature. 10 mg is recommended as the minimum sample size. If less material is used, it is recommended to increase the certified uncertainty by a factor of two for half of sample and a factor of four for a quarter of sample.

Instructions for handling and correct use: This material does not require drying before use. The CRM should be stored in the original bottle. Warm to room temperature before opening. After use the bottle should be tightly closed and protected from excessive moisture and light.

Accreditation: Sigma-Aldrich Production GmbH is accredited by the Swiss Accreditation Service SAS as reference material producer under no. SRMS 0001 in accordance with international standard ISO 17034.¹⁵

Certificate issue date: 25 MAR 2024

ISO 17034
SRMS 0001

Dr. A. Rück - CRM Operations

Dr. P. Zell - Approving Officer

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- Chromatogram
- Expiry date
- Additional information if applicable, e.g. water content, mp, chiral ratio

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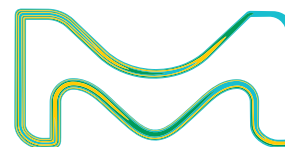
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