

Determination of 176 Pharmaceuticals and Personal Care Products (PPCPs) in Surface Water in China

Pharmaceutical and Personal Care Products (PPCPs) are a new series of pollutants with multiple sources, such as: antibiotics, synthetic musk, pain relievers, antihypertensive drugs, contraceptives, hypnotics, obesity drugs, hair gel, hair dye, fungicide, etc. Many PPCPs have high bioactivity, optical activity and polarity, and only exist in trace amounts in environment. Most PPCPs are discharged into the sewage in original or transformed structures, and then into the sewage treatment plants. Some PPCPs are discarded into trash and permeate into the ground and surface water such as rivers, lakes and wetlands.

Veterinary drugs, pesticides, medicines and cosmetics are known as pseudo-persistent chemicals and are the main source of PPCPs in the environment. Recently, PPCPs have been detected in sewage, surface water, ground water and soil with the improvement of analytical technologies, and have been approved to have adverse effects on human health and the environment.

In collaboration with many distinguished research institutions and analytical centers in China, SCIEX developed an LC-MS/MS method of 176 PPCPs, which provides an easy and reliable way for surface water monitoring.

SCIEX is a global leader in pioneering mass spectrometry technologies, providing effective solutions for scientists and lab analysts around the world. As strategic partners, Alta Scientific (Tianjin) and A ChemTek (USA) have closely collaborated with Sciex to provide many First Standard[®] reference materials and standard solutions, including the pesticides mix solution used in this LC-MS/MS method.

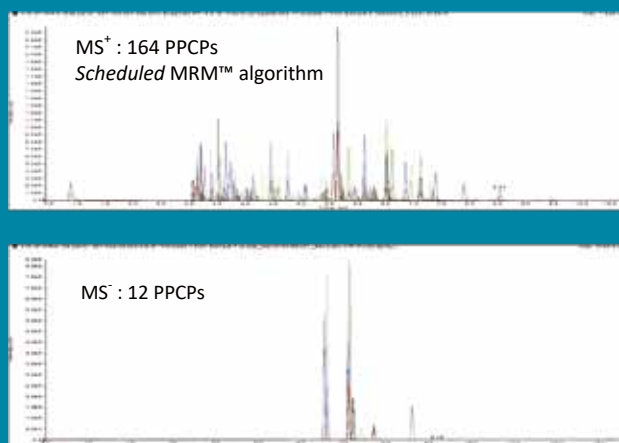


Figure 1, Standard Solutions of PPCPs in 5ng/mL Concentration



No.	CatNo	Product	CAS
1	1ST2210	Medroxyprogesterone 17-acetate	71-58-9
2	1ST2221	17-Methyltestosterone	58-18-4
3	1ST2286	Testosterone Propionate	57-85-2
4	1ST10044	Norgestimate	35189-28-7
5	1ST2203	Norethindrone	68-22-4
6	1ST2220	Testosterone	58-22-0
7	1ST2270	17a-Estradiol	57-91-0
8	1ST2274	Nortestosterone	434-22-0
9	1ST2275	Trenbolone; 17β-Trenbolone	10161-33-8
10	1ST8517	D-(-)-norgestrel	797-63-7
11	1ST8523	Megestrol	3562-63-8
12	1ST2226	Hydrocortisone	50-23-7
13	1ST2228	Cortisone	53-06-5
14	1ST2227	Prednisone	53-03-2
15	1ST10027	Diltiazem	42399-41-7
16	1ST10088	1,7-Dimethylxanthine	611-59-6
17	1ST10063	Irbesartan	138402-11-6
18	1ST10065	Valsartan	137862-53-4
19	1ST10070	Telmisartan	144701-48-4
20	1ST10046	Amlodipine	88150-42-9
21	1ST10069	Losartan	114798-26-4
22	1ST10041	Dehydronifedipine	67035-22-7
23	1ST10042	Digoxigenin	1672-46-4
24	1ST10026	Digoxin	20830-75-5
25	1ST10055	Lidocaine	137-58-6
26	1ST2278	Sildenafil	139755-83-2
27	1ST10062	Diphenhydramine	58-73-1
28	1ST10030	Fluoxetine	54910-89-3
29	1ST7102	Diazepam	439-14-5
30	1ST8016	Alprazolam	28981-97-7
31	1ST8021	Nitrazepam	146-22-5
32	1ST10048	Doxepin hydrochloride	1229-29-4
33	1ST10045	Imipramine hydrochloride	113-52-0
34	1ST8020	Lorazepam	846-49-1
35	1ST10053	Sulpiride	15676-16-1
36	1ST10071	Zolpidem	82626-48-0
37	1ST8015	Midazolam	59467-70-8
38	1ST8019	Clonazepam	1622-61-3
39	1ST8029	Triazolam	28911-01-5
40	1ST8031	Oxazepam	604-75-1
41	1ST10039	Carbamazepine	298-46-4
42	1ST21313	Triclocarban	101-20-2
43	1ST10020	Miconazole	22916-47-8
44	1ST2522	Thiabendazole (TBZ)	148-79-8
45	1ST10047	Fluconazole	86386-73-4
46	1ST21200	Climbazol	38083-17-9
47	1ST1302	Salbutamol; Albuterol	18559-94-9
48	1ST1301	Clenbuterol	37148-27-9
49	1ST1310	Formoterol	73573-87-2
50	1ST10049	Cimetidine	51481-61-9
51	1ST10019	Ranitidine	66357-35-5
52	1ST7127	Carbadox; CBX	6804-07-5
53	1ST23011	Warfarin	81-81-2
54	1ST5605	Ampicillin	69-53-4
55	1ST5621	Cloxacillin	61-72-3
56	1ST5638	Oxacillin	66-79-5
57	1ST5619	Penicillin V	87-08-1
58	1ST5637	Penicillin G	61-33-6
59	1ST5639	Dicloxacillin	3116-76-5
60	1ST5640	Nafcillin sodium salt	985-16-0
61	1ST5601	Amoxicillin	26787-78-0
62	1ST7816	Azithromycin	83905-01-5
63	1ST7814	Clarithromycin	81103-11-9
64	1ST7801	Erythromycin; Erythromycin A	114-07-8
65	1ST7802	Lincomycin	154-21-2
66	1ST7712	Roxithromycin	80214-83-1
67	1ST7812	Virginiamycin M1	21411-53-0
68	1ST7031	Virginiamycin S1	23152-29-6
69	1ST8014	Ormetoprim	6981-18-6
70	1ST7803	Clindamycin	18323-44-9
71	1ST7804A	Oleandomycin phosphate	7060-74-4
72	1ST7805	Tilimicosin	108050-54-0
73	1ST4017	Sulfadiazine	68-35-9
74	1ST4042	Sulfadimethoxine	122-11-2
75	1ST4002	Sulfamerazine	127-79-7
76	1ST4014	Sulfamethazine	57-68-1
77	1ST4008	Sulfamethizole	144-82-1
78	1ST4005	Sulfamethoxazole	723-46-6
79	1ST4015	Sulfanilamide	63-74-1
80	1ST4007	Sulfathiazole	72-14-0
81	1ST4034	Sulfachlorpyridazine	80-32-0
82	1ST4009	Trimethoprim	738-70-5
83	1ST4004	Sulfamethoxypridazine	80-35-3
84	1ST4003	Sulfapyridine	144-83-2
85	1ST4006	Sulfadoxine	2447-57-6
86	1ST4010	Sulfisoxazole	127-69-5
87	1ST4012	Sulfabenzamide	127-71-9
88	1ST4028	Sulfaquinoxaline	59-40-5

No.	CatNo	Product	CAS
89	1ST4001	Sulfacetamide	144-80-9
90	1ST4013	Sulfaphenazole	526-08-9
91	1ST7191	Glubendamide	10238-21-8
92	1ST7192	Glimepiride	93479-97-1
93	1ST7193	Glipizide	29094-61-9
94	1ST7195	Repaglinide	135062-02-1
95	1ST7197	Tolbutamide	64-77-7
96	1ST10066	Glucilazide	21187-98-4
97	1ST10056	Atenolol	29122-68-7
98	1ST10075	Betaxolol	63659-18-7
99	1ST10064	Nadolol	42200-33-9
100	1ST10119	Sotalol	3930-20-9
101	1ST10001	Coffeine	58-08-2
102	1ST10087	Codeine	76-57-3
103	1ST10040	Cotinine	486-56-6
104	1ST10086	Dextromethorphan	125-71-3
105	1ST10054	Diprophylline	479-18-5
106	1ST7125	Antipyrine	60-80-0
107	1ST10050	Aminophenazone	58-15-1
108	1ST10057	Phenacetin	62-44-2
109	1ST7116	4-Acetamidopheno; Paracetamol	103-90-2
110	1ST5703	Ciprofloxacin	85721-33-1
111	1ST4127	Cinafloxacin	105956-97-6
112	1ST4107	Enrofloxacin	93106-60-6
113	1ST5761	Flumequine	42835-25-6
114	1ST5759	Lomefloxacin	98079-51-7
115	1ST5738	Norfloxacin	70458-96-7
116	1ST5740	Ofloxacin	82419-36-1
117	1ST5757	Sarafloxacin	98105-99-8
118	1ST21140	Oxolinic acid	14698-29-4
119	1ST5756	Pefloxacin	70458-92-3
120	1ST5714	Enoxacin	74011-58-8
121	1ST5735	Nalidixic acid	389-08-2
122	1ST5702	Cinoxacin	28657-80-9
123	1ST5758	Difloxacin	98106-17-3
124	1ST5743	Orbifloxacin	113617-63-3
125	1ST5753	Sparfloxacin	110871-86-8
126	1ST10011	Cefotaxime	63527-52-6
127	1ST7013	Cephalexin	15686-71-2
128	1ST12001	Cefapirin	21593-23-7
129	1ST10007	Cefaclor	53994-73-3
130	1ST12003	Cephadrine	38821-53-3
131	1ST12004	Cefetamet Pivoxyl	65243-33-6
132	1ST7014	Cefazolin	25953-19-9
133	1ST12005	Desacetylcefotaxime	66340-28-1
134	1ST12006	Cefamandole Lithium	58648-57-0
135	1ST12011	Cefadroxil	50370-12-2
136	1ST4129A	Anhydrochlorotetracycline Hydrochloride	65490-24-6
137	1ST4112	Anhydrotetracycline Hydrochloride	13803-65-1
138	1ST4110	Chlortetracycline	57-62-5
139	1ST4105	Demeclocycline Hydrochloride Hydrate	64-73-3 (Anhydrous)
140	1ST4128	4-Epianhydrochlorotetracycline Hydrochloride	158018-53-2
141	1ST4103A	4-Epianhydrostetracycline Hydrochloride	4465-65-0
142	1ST4118A	4-Epichlortetracycline Hydrochloride	101342-45-4
143	1ST4115	4-Epi-oxytetracycline	14206-58-7
144	1ST4101A	4-Epitetracycline Hydrochloride	23313-80-6
145	1ST4122	Doxycycline	564-25-0
146	1ST10067	Isochlortetracycline	514-53-4
147	1ST4111	Oxytetracycline	79-57-2
148	1ST4102	Tetracycline	60-54-8
149	1ST20271	Carbofuran	1563-66-2
150	1ST20259	"Carbofuran-3-hydroxy"	16655-82-6
151	1ST20277	Carbaryl	63-25-2
152	1ST20272	"Propoxur"	114-26-1
153	1ST20469	2,3,5-Trimethacarb	2655-15-4
154	1ST20251	"Pirimicarb"	23103-98-2
155	1ST20252	"Promecarb"	2631-37-0
156	1ST20249	Methiocarb	2032-65-7
157	1ST20374	Metolcarb	1129-41-5
158	1ST20253	Isopropcarb	2631-40-5
159	1ST20257	Fenobucarb	3766-81-2
160	1ST20509	Banol	671-04-5
161	1ST20449	Methomyl	16752-77-5
162	1ST20282	Methomyl-oxime	13749-94-5
163	1ST20250	Bendiocarb	22781-23-3
164	1ST20375	Aldicarb	116-06-3
165	1ST21048	Triclosan	3380-34-5
166	1ST10081	Gemfibrozil	25812-30-0
167	1ST7157	Ibuprofen	15687-27-1
168	1ST7160	Naproxen	22204-53-1
169	1ST22063	MCPB; (2-Methyl-4-Chlorophenoxy) butyric Acid	94-81-5
170	1ST22602	2,4-DB	94-82-6
171	1ST22600	2-(2,4,5-Trichlorophenoxy) propionic Acid	93-72-1
172	1ST22601	2,4,5-T	93-76-5
173	1ST22031	Dichlorprop	120-36-5
174	1ST22690	2-(4-Chloro-2-methylphenoxy) propanoic Acid	93-65-2
175	1ST22596	MCPA; 2-Methyl-4-chlorophenoxyacetic Acid	94-74-6
176	1ST22017	2,4-D	94-75-7