

RECOMMENDED METHODS OF ANALYSIS FOR PESTICIDE RESIDUES CODEX STAN 229¹

1. INTRODUCTION

1.1 Scope

Hereunder are given analytical methods which can, from practical experience of the Working Group on Methods of Analysis to the Codex Committee on Pesticide Residues, be applied to the determination of pesticide residues for regulatory purposes. The list, given in par.2, is not exhaustive and methods not mentioned in the list can also be applied, provided that they can be shown to be effective.

1.2 Criteria for the selection of analytical methods

Whenever possible, the Working Group used the following criteria when selecting analytical methods:

- (i) published in books, manuals or open literature; (For some newer compounds, few methods might be available from these sources; in those cases, GIFAP is prepared to supply analytical methods to regulatory authorities as a matter of routine policy and to other scientists on a case by case basis. Requests can be directed to: GIFAP, Avenue Albert Lancaster 79A, 1180 Brussels, Belgium);
- (ii) collaboratively studied or known to have been validated in a large number of laboratories;
- (iii) capable of determining more than one residue, i.e. multi-residue methods;
- (iv) suitable for as many commodities as possible at or below the specified MRLs;
- (v) applicable in a regulatory laboratory equipped with routine analytical instrumentation.

Preference was given to gas chromatography or high performance liquid chromatography as the determinative step for the methods. Under certain conditions however, methods using less sophisticated procedures, such as thin-layer chromatography or spectrophotometry, may be applicable. This may be the case, for example, when an exporting country wants to check whether or not a commodity produced in that country complies with an Codex MRL. In this case, the treatment history of the commodity may be known or assumed, so that the method used need not be as elaborate as in cases where samples of unknown treatment history are under investigation. Also, when the MRL is high compared to the limit of determination, simpler methodology may be applied in order to arrive at a "pass/no pass" decision or for quick screening purposes.

1.3 Application of methods

It will always be necessary for the analyst to validate a method before it is first applied in a practical situation. There is a further need for regular checks on the performance of the method in use at both the MRL and at the lower limit of determination. For all new pesticide/commodity combinations the

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method must be validated following Good Practice in Residue Analysis, (see reference 4). Confirmation of the identity of an indicated residue by an independent technique is also to be regarded as an essential part of Good Practice in Residue Analysis, especially when the initial result suggests that an MRL is exceeded. Mass spectrometry has become for many residues the method of choice for confirmatory purposes, but the ultimate choice of a confirmatory test depends upon the technique used in the initial determination and upon the available instrumentation and necessary expertise.

1.4 References to literature

Other relevant Codex recommendations in the field of enforcement of Codex maximum limits for pesticide residues are as follows:

1. Recommended Methods of Sampling for the Determination of Pesticide Residues (Ref: *Codex Alimentarius* Vol. 2, Section 3).
2. Portion of a Commodities to which Codex Maximum Residue Limits apply and which should be analysed (Ref: *Codex Alimentarius* Vol. 2, Section 4.1).
3. Explanatory Notes on Codex Maximum Limits for Pesticide Residues (Ref: *Codex Alimentarius* Vol. 2, Section 1).
4. Codex Guidelines on Good Practice in Pesticide Residue Analysis. (Ref: *Codex Alimentarius* Suppl 1 to vol, 2. Section 4).

In paragraph 3 references can be found to:

- general articles on pesticide residue methodology (paragraph 3.1);
- manuals (paragraph 3.2);
- individual papers (paragraph 3.3).

After each reference given in paragraph 3.3, the compounds to which the methods involved apply are indicated by their CCPR-number.

2. LIST OF METHODS OF ANALYSIS

The **numbers** refer to the manuals and books listed in paragraph 3.2, the **names** to the (first) author of the papers listed in paragraph 3.3.

CCPR number	Compound	References
001	aldrin/dieldrin	1a, 1n, 1o, 1p, 2a, 2d, 2f, 3, 4 (XII-5, 6; S1-5, S8-10, S12, S19), 5, 7a (5, 6), 7c (S8-10, S12, S19), 8a, 8b, 8c, 8d, 9a (M1, M12), 10 Ambrus, Abbott (2), Panel (4), Stijve (2, 3)
002	azinphos-methyl	2c, 2d, 2e, 2f, 3, 4 (XII-6; S5, S8, S19; 63, 63A), 7a (6), 7c (S8, S19), 7d(255), 9a (M2, M5, M12), 10 Abbott (1), Ambrus, Panel (3)
003	binapacryl	2a, 2d, 3, 4 (XII-4, 6; S19; 8, 43), 7a (6), 7c (S19), 9b, 10 Baker, PB (2)
004	bromophos	2a, 2c, 2d, 4 (XII-3, 6; S5, S8-10, S13, S17, S19; 210, 210A), 6d, 7a (3, 6), 7c (S8-10, S13, S17, S19), 9a (M2, M5, M12), 10 Abbott (1), Ambrus, Bottomley, Panel (7, 8), Stijve (7)
005	bromophos-ethyl	2a, 2c, 2d, 3, 4 (XII-3, 6; S8, S13, S17, S19; 263), 6d, 7a (3,6), 7c (S13, S17, S19), 9a (M2, M5, M12), 10 Abbott (1), Ambrus
006	captafol	2d, 2e, 4 (XII-6; S8, S19, S20; 266, 266A), 6d, 7a (6), 7b, 7c (S8, S19, S20), 9a (M1, M12), 10 Ambrus, Baker, PB (1), Buettler, Gilvydis, Pomerantz
007	captan	2a, 2d, 2e, 3, 4 (XII-6; S8, S12, S19, S20; 12, 12A), 7a (6), 7b, 7c (S8, S12, S19, S20), 9a (M1, M12), 10 Ambrus, Baker, PB (1), Buettler, Gilvydis, Pomerantz
008	carbaryl	1q, 2d, 2e, 2f, 2g, 3, 4 (XII-6; 100), 6c, 7a (6), 9a (M2, M13), 10 Brauckhoff, Chaput, Lawrence(1)
009	carbon disulphide	9a (M8) Mestres (2)
010	carbon tetrachloride	1d, 9a (M8) Daft, Mestres (2), Panel (5)

CCPR number	Compound	References
011	carbophenothion	2a, 2c, 2d, 2e, 2f, 3, 3d, 4 (XII-5, 6; S8, S10, S13, S16, S19), 7a (5, 6), 7c (S8, S10, S13, S16, S19), 8b, 8e, 9a (M2, M5, M12), 10 Abbott (1), Ambrus
012	chlordane	1a, 1o, 2a, 2d, 2f, 3, 4 (XII-5, 6; S9, S10, S12, S19), 5, 7a (5, 6), 7c (S9, S10, S12, S19), 6c, 6d, 8a, 8b, 8c, 8d, 9a (M1, M12), 10 Panel (4), Stijve (3), Veierov
013	chlordimeform	2e, 6a, 9a (M4), 10
014	chlorfenvinphos	2c, 2d, 2e, 2f, 3, 4 (XII-3, 5, 6; S8, S13, S17, S19; 239), 5, 7a (3, 5, 6), 7c (S8, S13, S17, S19), 9a (M2, M5, M12), 10 Abbott (1), Ambrus, Panel (7,8), Stijve (7)
015	chlormequat	6a, 9b Sachse, Stijve (5)
016	chlorobenzilate	2a, 2d, 2e, 3, 4 (XII-6; S19), 7a (6), 7c (S19), 10
017	chlorpyrifos	1p, 2a, 2c, 2d, 2e, 2f, 3, 4 (XII-6; S8, S9, S13, S19), 5, 7a (6), 7c (S8, S9, S13, S19), 8b, 8e, 9a (M2, M5, M12), 10 (Ambrus, Stijve (7))
018	coumaphos	2c, 2d, 2e, 3, 4 (XII-6; S19), 7a (6), 7c (S19), 8b, 8e, 9a (M2, M5, M12) Ambrus, Stijve (7)
019	crufomate	2d, 2e, 2f, 4 (XII-6; S19), 7a (6), 7c (S19), 8b, 8e Stijve (7)
020	2,4-D	2b, 2f, 3, 4 (27, 27A-380), 5,7d(27A-28A), 9a (M6) Ebing, Specht (1)
021	DDT	1a, 1n, 1o, 1p, 2a, 2d, 2f, 3, 4 (XII-4, 5, 6; S1-5, S8-10, S12, S19), 5, 6c, 7a (4,5,6), 7c (S8-10, S12, S19), 8a, 8b, 8c, 9a (M1, M12), 10 Abbott (2), Ambrus, Bottomley, Panel (4), Stijve (2, 3), Veierov
022	diazinon	1a, 2a, 2c, 2d, 2f, 3, 4 (XII-5, 6; S5, S8, S10, S13, S17, S19; 35A, 35B), 6c, 7a (5, 6), 7c (S8, S10, S13, S17, S19), 8e, 9a (M2, M5, M12), 10 Abbott (1), Ambrus, Bottomley, Panel (7), Stijve (7)

CCPR number	Compound	References
023	1,2-dibromoethane	1d, 8f, 9a (M8) Daft, Heikes, Mestres (2), Panel (5), Rains
024	1,2-dichloroethane	1d, 9a (M8) Daft, Mestres (2), Panel (5)
025	dichlorvos	2c, 2d, 2e, 2f, 3, 4 (XII-3, 6; S5, S8, S13, S17, S19; 200), 7a (3, 6), 7c (S13, S17, S19), 8b, 8e, 9a (M2, M5), 10 Abbott (1), Ambrus, Bottomley, Panel (1, 3, 7), Stijve (7)
026	dicofol	2a, 2d, 2f, 3, 4 (XII-6; S8, S9, S12, S19; 69, 69A), 7a (6), 7c (S8, S9, S12, S19), 9a (M1, M12), 10
027	dimethoate	2c, 2d, 2f, 3, 4 (XII-3, 6; S5, S8, S13, S17, S19; 42, 236), 5, 7a (3, 6), 7c (S8, S13, S17, S19), 9a (M5, M12), 10 Abbott (1), Ambrus, Panel (3, 7, 8), Stijve (7)
028	dioxathion	2c, 2d, 4 (XII-6; S8, S13, S19), 7a (6), 7c (S8, S9, S19), 8e, 9a (M2, M5, M12), 10 Abbott (1), Stijve (7)
029	diphenyl	2d, 4 (XII-6; 256A), 7a (6), 10 Farrow, Kitada, Lord, Mestres (1), Player, Pyysalo
030	diphenylamine	2d, 2e, 4 (XII-6), 7a (6), 10 Allen (1), Luke
031	diquat	2e, 4 (37), 6d Calderbank (2), King
032	endosulfan	1b, 2a, 2d, 2f, 3, 4 (XII-5,6; S5, S8, S12, S19; 50), 5, 7a (5, 6), 7c (S19), 5, 9a (M1, M12), 10 Abbott (2), Ambrus
033	endrin	1a, 1o, 2a, 2d, 2f, 3, 4 (XII-5, 6; S5, S9, S10, S12, S19), 5, 7a (5, 6), 7c (S9-10, S12, S19), 8a, 8b, 8c, 8d, 9a (M1, M12), 10 Abbott (2), Ambrus, Panel (4)
034	ethion	1a, 2a, 2c, 2d, 2f, 3, 4 (XII-3, 5, 6; S8, S9, S13, S17, S19), 7a (3, 5, 6), 7c (S8, S9, S13, S17, S19), 8e, 9a (M2, M5, M12), 10 Abbott (1), Ambrus, Stijve (7)

CCPR number	Compound	References
035	ethoxyquin	2d, 2e, 4 (XII-6; 500) Winell
036	fenchlorphos	1a, 2a, 2c, 2d, 2f, 3, 4 (XII-3, 5, 6; S8-10, S13, S17, S19), 7a (3, 5, 6), 7c (S8-10, S13, S17, S19), 8b, 8e, 9a (M2, M5), 10 Abbott (1), Ambrus, Panel (7, 8), Stijve (7)
037	fenitrothion	2a, 2c, 2d, 2f, 3, 4 (XII-3, 6; S5, S8, S13, S17, S19; 58), 6a, 8e, 9a (M2, M5), 10 Abbott (1), Ambrus, Bottomley, Desmarchelier, Panel (7,8), Stijve (7)
038	fensulfothion	2c, 2d, 2e, 3, 4 (XII-3, 6; S8, S13, S16, S17, S19), 6a, 7a (3, 6), 7c (S8, S13, S16, S17, S19), 9a (M2, M5), 10
039	fenthion	2c, 2d, 2e, 2f, 3, 4 (XII-3, 6; S5, S8, S13, S16, S17, S19), 7a (3, 6), 7c (S8, S13, S16, S17, S19), 8e, 9a (M2, M5), 10 Abbott (1), Ambrus, Hill
040	fentin	2e, 4 (S24; 55A, 55B), 6e Baker, PG (1)
041	folpet	2a, 2c, 2d, 3, 4 (XII-6; S8, S12, S19, S20; 91, 91A), 7a (6), 7b, 7c (S8, S12, S19, S20), 9a (M1, M12), 10 Ambrus, Baker, PB (1), Buettler, Gilvydis, Pomerantz
042	formothion	2d, 4 (XII-6; S5, S8, S19; 236), 6b, 7a (6), 7c (S8, S19), 9a (M2, M5, M12), 10 Abbott (1), Ambrus
043	heptachlor	1a, 1n, 1o, 2a, 2d, 2f, 3, 4 (XII-5, 6; S 1-4, S8-10, S12, S19), 5, 6c, 6d, 7a (5, 6), 7c (S8-10, S12, S19), 8a, 8b, 8c, 8d, 9a (M1, M12), 10 Abbott (2), Ambrus, Stijve (2, 3), Veierov
044	hexachlorobenzene	1k, 1o, 2a, 2d, 3, 4 (XII-1, 5, 6; S9, S10, S12, S19), 5, 6c, 7a (1, 5, 6), 7c (S9, S10, S12, S19), 8a, 8b, 8c, 8d, 9a (M1, M12), 10 Ambrus, Panel (4), Stijve (2, 3), Veierov, Zimmerli
045	hydrogen cyanide	2e, 4 (11), 9b Darr
046	hydrogen phosphide	2e, 4 (13), 9a (M8) Scudamore (2)

CCPR number	Compound	References
047	inorganic bromide	2e, 4 (S18; 149), 7c (S18), 9b Panel (2), Roughan, Stijve (1,4), VanWees
048	lindane	1a, 1o, 2a, 2d, 3, 4 (XII-5, 6; S1-5, S8-10, S12, S19), 5, 7a (5, 6), 7c (S8-10, S12, S19), 8a, 8b, 8c, 8d, 9a (M1, M12), 10 Abbott (2), Ambrus, Panel (4), Stijve (2,3), Veierov
049	malathion	1a, 2a, 2c, 2d, 2f, 3, 4 (XII-3, 5, 6; S5, S8, S10, S13, S17, S19; 72), 7a (3, 5, 6), 7c (S8, S10, S13, S17, S19), 8e, 9a (M2, M5, M12), 10 Abbott (1), Ambrus, Bottomley, Desmarchelier, Panel (1, 3, 7, 8), Stijve (7)
050	mancozeb	see 105: dithiocarbamates
051	methidathion	2a, 2c, 2d, 2e, 3, 4 (XII-6; S5, S8, S13, S19; 232), 6b, 7a (6), 7c (S8, S13, S19), 9a (M2, M5, M12), 10 Ambrus
052	methyl bromide	9a (M8) Mestres (2), Panel (5)
053	mevinphos	2c, 2d, 2f, 3, 4 (XII-3, 6; S5, S8, S13, S17, S19; 93), 7a (3, 6), 7c (S8, S13, S17, S19), 9a (M2, M5, M12), 10 Abbott (1), Ambrus
054	monocrotophos	1p, 2c, 2d, 2e, 2f, 4 (XII-6; S19), 7c (S19), 9a (M2, M5), 10 Ambrus
055	omethoate	1p, 2c, 2d, 4 (XII-6; S13, S17, S19; 236), 5, 7a (6), 7c (S13, S17, S19), 9a (M2, M5), 10 Abbott (1), Panel (3)
056	ortho-phenylphenol	2d, 2e, 10 Farrow, Kitada, Lord, Mestres (1), Player, Pyysalo
057	paraquat	2e, 4 (134), 6d, 7b Calderbank (1), Khan, King, Lott
058	parathion	1a, 2a, 2c, 2d, 2f, 3, 4 (XII-3, 4, 5, 6; S5, S8, S10, S13, S17, S19; 87A, 87B), 7a (3, 4, 5, 6), 7c (S8, S10, S13, S17, S19), 8e, 9a (M2, M5, M12), 10 Abbott (1), Ambrus, Panel (3)

CCPR number	Compound	References
059	parathion-methyl	1a, 2a, 2c, 2d, 2f, 3, 4 (XII-3, 5, 6; S5, S8, S13, S17, S19; 88A, 88B), 7a (3, 5, 6), 7c (S8, S13, S17, S19), 8e, 9a (M2, M5, M12), 10 Abbott (1), Ambrus, Panel (3)
060	phosalone	2a, 2c, 2d, 2e, 3, 4 (XII-5, 6; S8, S19), 5, 6a, 7a (5, 6), 7c (S8, S19), 9a (M2, M5, M12), 10 Abbott (1), Ambrus, Stijve (7)
061	phosphamidon	2c, 2d, 2e, 3, 4 (XII-6; S5, S13, S19), 7a (6), 7c (S13, S19), 9a (M5, M12), 10 Abbott (1), Ambrus, Bottomley
062	piperonyl butoxide	2e, 4 (XII-6; S19, S22; 163), 7a (6), 7c (S19), 9b Krause (2)
063	pyrethrins	2a, 2d, 2e, 4 (XII-6; S19, S22), 6b, 7a (6), 7c (S19), 9b
064	quintozene	2a, 2d, 2f, 3, 4 (XII-4, 5, 6; S8, S9, S12, S19; 99), 7a (4, 5, 6), 7c (S8, S9, S12, S19), 9a (M1, M12), 10
065	thiabendazole	2d, 2e, 2h, 4 (XII-6; 256A, 256B), 7d (256A, 256B), 8g, 9a (M3), 10 Farrow, Kitada, Mestres (1, 3), Rajzman, Yamada
066	trichlorfon	2c, 2d, 2e, 2f, 3, 4 (XII-6; S5, S13, S19; 112), 5, 7a (6), 7c (S13, S19), 8e, 9a (M2, M5, M12) Abbott (1), Ambrus, Bottomley
067	cyhexatin	2e, 4 (S24), 6a, 9b Moellhoff (2)
068	azinphos-ethyl	2c, 2d, 4 (XII-3, 5, 6; S5, S8, S13, S17, S19; 62, 62A), 7a (3, 5, 6), 7c (S8, S13, S17, S19), 9a (M2, M5, M12), 10 Abbott (1), Ambrus
069	benomyl	see 072: carbendazim
070	bromopropylate	2a, 2d, 4 (XII-6; S19), 7a (6), 7c (S19), 9a (M12), 10 Stijve (6)
071	camphechlor	2a, 2d, 2e, 4 (XII-5, 6; S9, S19), 7a (5, 6), 7c (S9, S19) Stijve (2)

CCPR number	Compound	References
072	carbendazim	2e, 2h, 4 (261, 378), 6a, 6d,7d (261, 370, 378) 9a (M3), 10 Ambrus, Farrow, Mestres (3), VanHaver
073	demeton-S-methyl	2d, 2f, 4 (XII-6; S5, S13, S16, S19), 7a (6), 7c (S13, S16, S19),9a (M2, M5), 10 Abbott (1), Ambrus, Hill, Wagner
074	disulfoton	2a, 2c, 2d, 2e, 2f, 3, 4 (XII-3, 6; S5, S8, S13, S16, S17, S19), 7a (3, 6), 7c (S8, S13, S16, S17, S19), 8e, 9a (M2, M5) Abbott (1), Ambrus, Panel (7)
075	propoxur	1e, 2d, 2g, 4 (XII-6; S19; S25; 216), 6a, 7a (6), 7c (S19), 9a (M2, M13), 10 Ambrus, Brauckhoff, Chaput, Lawrence (1)
076	thiometon	2d, 4 (XII-6; S13), 6b, 7a (6), 7c (S13), 9a (M2, M5, M10, M12) Abbott (1), Ambrus, Hill
077	thiophanate-methyl	2e, 2h, 4 (261), 5, 7d(261, 370, 378), 9a (M3), 10 Ambrus, Mestres (3), VanHaver
078	vamidotion	4 (XII-3,6; S17), 6a, 7a (3,6), 7c (S17), 9a (M2, M5, M10)
079	amitrole	2e(4A), 7d(4A) Galoux, Lokke (1), v.d.Poll
080	chinomethionate	2d, 2e, 4 (XII-6; S19; 189), 7a (6), 7c (S19), 9b, 10 Ambrus, Francoeur, Krause (1), Tjan
081	chlorothalonil	2a, 2d, 2e, 3, 4 (XII-6; S19), 6b, 7a (6), 7c (S19), 9a (M1, M12), 10 Ambrus, Lokke (2)
082	dichlofluanid	2a, 2d, 4 (XII-6; S8, S12, S19; 203; 203A, 203 -(371)), 7a (6), 7c (S8, S12, S19), 7d(203, 371, 203A, 371A), 9a (M1, M12), 10 Ambrus, Lokke (2), Brennecke (4)
083	dicloran	2d, 3, 4 (XII-6; S19), 7a (6), 7c (S19), 9a (M1), 10 Ambrus
084	dodine	2e Newsome (1)

CCPR number	Compound	References
085	fenamiphos	2c, 2d, 2e, 4 (XII-6; S8; S16; S19), 7a (6), 7c (S16, S19), 9a (M5, M12) Hill
086	pirimiphos-methyl	2a, 2c, 2d, 2e, 4 (XII-6; S8, S19; 476), 6b, 7a (6), 7c (S8, S19), 9a (M2, M5, M12), 10 Ambrus, Desmarchelier, Panel (7, 8), Stijve (7)
087	dinocap	2a, 2d, 2e, 4 (XII-6; S19; 68), 7a (6), 7c (S19), 9a (M9), 9b Ambrus
088	leptophos	withdrawn
089	sec-butylamine	2e, 6b Day, Hunter, Scudamore (1)
090	chlorpyrifos-methyl	2c, 2d, 4 (XII-6; S8, S19), 7a (6), 7c (S19), 9a (M2, M5), 10 Ambrus, Bottomley, Desmarchelier, Panel (4,8), Stijve (7)
091	cyanofenphos	2d, 4 (XII-6; S8, S19), 7a (6), 7c (S19), 9a (M2, M5), 10
092	demeton	2c, 2d, 2e, 4 (XII-6; S5, S16), 7a (6), 7c (S16), 9a (M5) Abbott (1)
093	bioresmethrin	6c, 6d, 9a (M11) Baker, PG (2), Bottomley
094	methomyl	1q, 2d, 2e, 2g, 4 (299), 6a, 7b, 9a (M13) Ambrus, Chaput
095	acephate	1p, 2c, 2d, 2e, 4 (XII-6; S19; 358), 6a, 7a (6), 7b, 7c (S19), 9a (M5, M12), 10
096	carbofuran	1e, 1q, 2e, 2g, 3, 4 (XII-6; S25), 6a, 7a (6), 7d(658, 344). 9a (M13), 10 Ambrus, Brauckhoff, Chaput, Lawrence(1), Moellhoff (1) Leppert (1, 2)
097	cartap	Official Gazette
098	dialifos	2a, 2d, 2e, 4 (XII-6; S19; 281), 7a (6), 7c (S19), 9a (M2, M5, M12), 10
099	edifenphos	2d, 4 (XII-6; S19), 7a (6), 7c (S19)

CCPR number	Compound	References
100	methamidophos	1p, 2c, 2d, 3, 4 (XII-6; S19; 358, 365), 5, 6a, 7a (6), 7c (S19), 9a(M5), 10
101	pirimicarb	2d, 4 (XII-6; S19; 309), 5, 6a, 7b, 10
102	maleic hydrazide	1m, 4 (297) Lane, Newsome (3)
103	phosmet	2c, 2d, 4 (XII-6), 7a (6), 9a (M2, M5, M12), 10 Ambrus
104	daminozide	2e, 6b Allen (2), Newsome (5), Saxton, Wright, Conditt
105	dithiocarbamates	2e, 3, 4 (S15, S21), 7c (S21), 9b Newsome (2), Panel (6), Ott
106	ethephon	2e, 9b Cochrane
107	ethiofencarb	2d, 2g, 4 (S25; 393), 9a (M13), 10
108	ethylene thiourea	1j, 4 (389), 7b, 9b Panel (9), Hirvi, Otto, Rosenberg
109	fenbutatin oxide	2e, 4 (S24), 6d Sano
110	imazalil	2d, 2e, 4 (XII-6; S19)
111	iprodione	2c, 2d, 2e, 4 (XII-6; S8, S19; 419), 6e, 7a (6), 7c (S8, S19), 9a (M1, M12), 10
112	phorate	2a, 2c, 2d, 2e, 4 (XII-3, 6; S8, S13, S16, S17, S19), 7a (3, 6), 7c (S8, S13, S16, S17, S19), 9a (M2, M5) Abbott (1), Ambrus, Hill
113	propargite	2a, 2d, 2e, 3, 4 (XII-6), 6a, 7a (6), 9a (M1) Ambrus
114	guazatine	Kobayashi

CCPR number	Compound	References
115	tecnazene	2a, 2d, 2e, 3, 4 (XII-6; S8, S12, S19; 108), 7a (6), 7c (S8, S12, S19), 9a (M1), 10
116	triforine	2e, 4 (338), 6d, 9b Bourke, Newsome (4)
117	aldicarb	1q, 2e, 2g, 4 (XII-6; 250), 6a, 7a (6), 9a (M10, M13), 10 Ambrus, Chaput
118	cypermethrin	2a, 2d, 4 (XII-6; S19, S23), 6g, 7a (6), 7c (S19), 9a (M11), 10 Ambrus, Baker, PG (2), Bottomley
119	fenvalerate	2a, 2d, 2e, 4 (XII-6; S19, S23), 6g, 7a (6), 7c (S19), 9a (M11), 10 Ambrus, Baker, PG (2), Bottomley
120	permethrin	2a, 2d, 2e, 4 (XII-6; S19, S23), 6g, 7a (6), 7c (S19), 9a (M11), 10 Ambrus, Baker, PG (2), Bottomley
121	2,4,5-T	2b, 4 (XII-6; 105), 6c, 7a (6), 9a (M6) Ebing, Lokke (3), Specht (1)
122	amitraz	2e, 4 (XII-6), 7a (6), 9b
123	etrimfos	2a, 2c, 2d, 4 (XII-6; S8, S19), 7a (6), 7c (S19), 6e, 9a (M2, M5) Ambrus, Bottomley, Panel (8)
124	mecarbam	2c, 2d, 4 (XII-6; S19), 6b, 7a (6), 7c (S19), 9a (M2), 10 Abbott (1)
125	methacrifos	4 (XII-6), 7a (6) Ambrus, Desmarchelier, Panel (7, 8)
126	oxamyl	1q, 2e, 2g, 4 (XII-6; 441), 5, 7a (6), 7d (441), 9a (M13), 10 Ambrus
127	phenothrin	4 (XII-6), 7a (6), 9 Baker, PG (2), Bottomley
128	phenthoate	2a, 2c, 2d, 4 (XII-6; S19), 6b, 7a (6), 7c (S19), 9a (M11), 10 Ambrus

CCPR number	Compound	References
129	azocyclotin	4 (S24) Moellhoff (2)
130	diflubenzuron	2e, 6d, 6f, 9a (M4) Austin
131	isofenphos	2a, 2c, 2d, 2e, 4 (XII-6; S8), 7a (6), 9a (M5, M12), 10
132	methiocarb	1q, 2d, 2g, 4 (79, 79A), 9a (M2, M13), 10 Chaput
133	triadimefon	2d, 2e, 4 (XII-6; S8, S19; 425-(605)), 7a (6), 7c (S8, S19), 7d (613, 425, 605) 10 Ambrus, Brennecke (2), Ragab
134	aminocarb	2d, 10 Brauckhoff
135	deltamethrin	2a, 2d, 4 (XII-6; S19, S23), 6g, 7a (6), 7c (S19), 9a (M11) Ambrus, Baker, PG (2), Bottomley
136	procymidone	2a, 2d, 4 (XII-6; S8, S19), 7a (6), 7c (S8, S19), 10
137	bendiocarb	2d, 2g, 6d, 4 (XII-6), 7a (6), 9a (M2, M13) Ambrus
138	metalaxyl	2c, 2d, 2e, 4 (XII-6; S8, S19; 517), 7a (6), 7b, 7c (S19), 9a (M4), 10 Ambrus
139	butocarboxim	2g, 9a (M13) Aharonson, Brauckhoff, Li, Muszkat
140	nitrofen	1a, 2a, 2d, 2e, 4 (XII-6; S19; 340), 6d, 7a (6), 7b, 7c (S19) Adler, Ambrus, Yu
141	phoxim	2d, 4 (XII-6; S19; 307), 7a (6), 7c (S19), 9a (M2, M12) Ambrus
142	prochloraz	2d Maclaine Pont, Somerville

CCPR number	Compound	References
143	triazophos	2c, 2d, 4 (XII-4,6; S8, S19; 401), 6d, 7a (6), 7c (S19), 9a(M2, M5, M12), 10 Ambrus
144	bitertanol	2d, 4 (XII-6; S19; 613; 613A), 7a (6), 7c (S19), 7d (613A, 426, 605), 9a (M12) Brennecke (1,3)
145	carbosulfan	2d, 4 (658 - (344)) Leppert (1,2)
146	cyhalothrin	2d, 6g
147	methoprene	2e, 6d
148	propamocarb	Gentile
149	ethoprofos	2c, 2d, 2e, 4 (XII-6; S8, S19), 7a (6), 7b, 7c (S19), 9a (M2, M5) Ambrus
150	propylene thiourea	Lembo, Nitz
151	dimethipin	2e
152	flucythrinate	2d, 2e
153	pyrazophos	2d, 4 (XII-4,6; S8, S19; 328), 6d, 7a (6), 7b, 7c (S19), 9a (M2, M5, M12), 10
154	thiodicarb	2g
155	benalaxyl	4 (S19) not published yet
156	clofentezine	Bichi, Snowdon
157	cyfluthrin	2d, 4 (S23), 9a (M11)
158	glyphosate	2e, 4 (405), 6h, 7d (405) 9b Cowell, Tuinstra, Wigfield
159	vinclozolin	2a, 2d, 4 (XII-6; S8, S19; 412), 9a (M1, M12)

CCPR number	Compound	References
160	propiconazole	2d, 4 (S19; 624), 7d (624)
161	paclobutrazol	2d Reed
162	tolyfluanid	2d, 4 (XII-6; S 8; S19: 371; 203- (371)), 7c (S8, S19), 7d (203A,371A) 9a (M1,M12) Brennecke (4) Specht (2), Anderson
163	anilazine	4 (XII-6; S19: 186), 7c (S19), 7d (186) 2d, 2e Lawrence(2), Brennecke(5)
164	demeton-S-methyl-sulphone	4(XII-6, S16, S19), 7c (S16), 9a (M5), 2d, 2e Andersson, Thornton, Wagner
165	flusilazole	2d, 4(S19)(only parent compound)
166	oxydemeton-methyl	4(XII-6, S16, S19), 7c (S16), 9a (M5), 2c, 2d, 2e Thornton, Wagner
167	terbufos	4 (S8; S19), 9a(M5) (Only parent compound), 2c, 2d, 2e Westcott
168	triadimenol	4 (XII-6, S19, 425 - (605)) 7a (6), 7c (S19), 9a (M12), 2d Allmendinger, Andersson, Brennecke (2), Ragab, Mendes
169	cyromazine	2e Cabras, Bardalaye
170	hexaconazole	2d, 11
171	profenofos	2c, 2d, 2e Andersson
172	bentazone	2e Cessna, Hogendoorn
173	buprofezin	Nishizawa JAOAC accepted for publication, Ishii (1)
174	cadusafos	2d

CCPR number	Compound	References
175	glufosinate-ammonium	4 (651), 7d (651)
176	hexathiazox	2e
177	abamectin	2e Prabhu, Vuik
178	bifentrin	2a,2e
179	cycloxydim	
180	dithianon	Baker, Kadenczki
181	myclobutanil	2e
182	penconazole	2d
183	propham	2d, 4 (s11), 6e (343-350) 7c (S11)
184	ethofenprox	
185	fenpropathrin	2, 7d (S23) Nakamura
186	metiram	see 105: dithiocarbamates
187	clethodim	
188	fenpropimorph	Kadenczki, v. Zoonen, Dieckmann, Lafuente (1,2), Tadeo
189	tebuconazole	7c(S19) Brennecke (6), Allmendinger, Maasfeld
190	teflubenzuron	
191	tolclofos-methyl	4 (s19), 7a (6), 7c (s19), 7d (S8) Becker, Ishii, Stan, Philips

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