## Reference Table of Pesticide Degradates & Impurities for Monitoring Prioritization

**This table is a clarifying tool and supplement to EPA's Aquatic life and human health benchmarks for pesticides, which list many pesticide degradate**

| Parent | Degradates & Impurities of Toxicological or or Ecotoxicological Concern | Reference Values | Notes |
|---|---|---|---|
| 2,4-D | 2,4-dichlorophenol (2,4-DCP) | EPA drinking water Health Advisory | also a degradate of 2,4-DP and 2,4-DB |
| | impurity: dioxins/furans; average concentration 1.1 ng/g active ingredient (TEQ) (EPA 2006) | Both enforceable drinking water standards and EPA water quality criteria | |
| 2,4-DB | 2,4-dichlorophenol (2,4-DCP) | EPA drinking water Health Advisory | also a degradate of 2,4-DP and 2,4-D |
| 2,4-DP | 2,4-dichlorophenol (2,4-DCP) | EPA drinking water Health Advisory | also a degradate of 2,4-D and 2,4-DB |
| Bromoxynil Heptanoate | Bromoxynil | Both EPA pesticide human health benchmark and OPP aquatic life benchmark | |
| Bromoxynil Octanoate | Bromoxynil | Both EPA pesticide human health benchmark and OPP aquatic life benchmark | |
| Carbaryl | 1-naphthol | None | Degradate of interest, but no current benchmarks |
| Chlorothalonil | impurity: hexachlorobenzene; concentration <40 ug/g (EPA 2012); OPP has requested concentration data | Both enforceable drinking water standards and EPA water quality criteria | |
| | impurity: dioxins/furans; estimated concentration 39 ng/g (mass, not TEQ) (Holt et al. 2010); OPP has requested concentration data | Both enforceable drinking water standards and EPA water quality criteria | |
| | SDS-3701 (4-hydroxy-2,5,6-trichloro-1,3-dicyanobenzene) | EPA OPP aquatic life benchmark | |
| Chlorpyrifos | Chlorpyrifos oxon | None | Degradate of interest, but no current benchmarks |
| | 3,5,6-trichloro-2-pyridinol (TCP) | EPA OPP aquatic life benchmark | |
| Cyantraniliprole | INJ9Z38 | None | No current benchmarks; DPR has required development of analytical method; other degradates may also be of interest |

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| Cyhalothrin (all isomers, including lambda and Gamma) | 3-phenoxybenzoic acid (3-PBA) | EPA OPP aquatic life benchmark | also degradate of cypermethrin, esfenvalerate, fenpropathrin, permethrin |
| Cypermethrin (all isomers) | 3-phenoxybenzoic acid (3-PBA) | EPA OPP aquatic life benchmark | also degradate of cyhalothrin, esfenvalerate, fenpropathrin, permethrin |
| Dacthal (DCPA) | impurity: hexachlorobenzene; concentration <0.3 mg/g; OPP has requested data (EPA 2011) | Both enforceable drinking water standards and EPA water quality criteria (lowest values are for human fish consumption) | |
| | impurity: dioxins/furans; concentration <0.1 ng/g (mass, not TEQ); OPP has requested data (EPA 2011) | Both enforceable drinking water standards and EPA water quality criteria | |
| | tetrachloroterephthalic acid (TPA) | EPA drinking water Health Advisory | |
| | monomethyl tetrachloroterephthalic acid (MTP) | None | Degradate of interest, but no current benchmarks |
| Dazomet | methylisothiocyanate (MITC) | Both enforceable drinking water standard (CA DPH AAL**) and EPA OPP aquatic life benchmark | also degradate of metam sodium and metam potassium |
| DDVP (dichlorvos) | 2,2-dichloroacetic acid | EPA drinking water Health Advisory | |
| Diazinon | Diazoxon | None | Degradate of interest, but no current benchmarks |
| Dicamba | 3,6-dichlorosalicylic acid (DCSA) | EPA OPP aquatic life benchmark | |
| Dichlobenil | 2,6-dichlorobenzamide (BAM) | EPA pesticide human health benchmark | also degradate of fluopicolide |
| Diuron | 3,4-dichloroaniline (3,4-DCA) | None | Degradate of interest, but no current benchmarks; also degradate of linuron and propanil |
| Endosulfan I/II | endosulfan sulfate | EPA water quality criteria for aquatic life protection | |
| Esfenvalerate | 3-phenoxybenzoic acid (3-PBA) | EPA OPP aquatic life benchmark | also degradate of cyhalothrin, cypermethrin, fenpropathrin, permethrin |
| Fenpropathrin | 3-phenoxybenzoic acid (3-PBA) | EPA OPP aquatic life benchmark | also degradate of cyhalothrin, cypermethrin, esfenvalerate, permethrin |
| Fluopicolide | 2,6-dichlorobenzamide (BAM) | EPA pesticide human health benchmark | also degradate of dichlobenil |

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|---|---|---|---|
| Linuron | 3,4-dichloroaniline (3,4-DCA) | None | Degradate of interest, but no current benchmarks; also degradate of diuron and propanil |
| Malathion | malaoxon | None | Degradate of interest, but no current benchmarks |
| Mancozeb | ethylene thiourea | Both EPA pesticide human health benchmark and OPP aquatic life benchmark | also degradate of metiram |
| Metam sodium | methylisothiocyanate (MITC) | Both enforceable drinking water standard (CA DPH AAL**) and EPA OPP aquatic life benchmark | also degradate of dazomet and metam potassium |
| Metam potassium | methylisothiocyanate (MITC) | Both enforceable drinking water standard (CA DPH AA***) and EPA OPP aquatic life benchmark | also degradate of dazomet and metam sodium |
| Metiram | ethylene thiourea | Both EPA pesticide human health benchmark and OPP aquatic life benchmark | also degradate of mancozeb |
| Naled | DDVP (dichlorvos) | Degradate is also a registered pesticide (see its values) | also degradate of trichlorfon; must use both DDVP and dichlorvos to find benchmarks |
| | 2,2-dichloroacetic acid | EPA drinking water Health Advisory | |
| PCNB | pentachlorophenol | Both enforceable drinking water standards and EPA water quality criteria (lowest values are for human fish consumption) | |
| | impurities: dioxins, furans, dioxin-like PCBs (Huang et al 2014); No public US concentration data identified; data appear to exist, but are redacted in EPA risk assessment (EPA 2010) | Both enforceable drinking water standards and EPA water quality criteria | |
| | impurity: hexachlorobenzene; concentration <500 ug/g (EPA 2010) | Both enforceable drinking water standards and EPA water quality criteria (lowest values are for human fish consumption) | |
| Permethrin | 3-phenoxybenzoic acid (3-PBA) | EPA OPP aquatic life benchmark | also degradate of cypermethrin, cyhalothrin, esfenvalerate, fenpropathrin |
| Propanil | 3,4-dichloroaniline (3,4-DCA) | None | Degradate of interest, but no current benchmarks. Also degradate of diuron and linuron |

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| Telone | 3-chloroacrylic acid | EPA OPP aquatic life benchmark | |
| | 3-chloroallyl alcohol | EPA OPP aquatic life benchmark | |
| Thiamethoxam | clothianidin | Degradate is also a registered pesticide (see its values) | |
| Thiophanate-methyl | carbendazim | Degradate is also a registered pesticide (see its values) | |
| Tralomethrin | deltamethrin | Degradate is also a registered pesticide (see its values) | |
| Triazole derivatives* | 1,2,4-triazole | EPA pesticide human health benchmark | |
| | triazole alanine | EPA pesticide human health benchmark | |
| | triazole acetic acid | EPA pesticide human health benchmark | |
| Triclopyr (butoxyethyl ester and triethylamine salt) | 3,5,6-tricloro-2-pyridinol (TCP) | EPA OPP aquatic life benchmark | |
| Trichlorfon | DDVP (dichlorvos) | Degradate is also a registered pesticide (see its values) | also degradate of naled; must use both DDVP and dichlorvos to find benchmarks |
| | 2,2-dichloroacetic acid | EPA drinking water Health Advisory | |

*Triazole derivatives: bitertanol, bromuconazole, cyproconazole, difenoconazole, epoxiconazole, fenbuconazole, flusilazole, hexaconazole, ipconazole, metconazole, myclobutanil, paclobutrazole, propiconazole, prothioconazole, tebuconazole, tetraconazole, triadimefon, triadimenol, triticonazole

**CA DPH AAL = California Department of Public Health Archived Advisory Level (an enforceable drinking water standard - see drinking water reference value information)

**References**

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