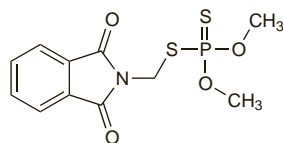


Phosmet (BAN)

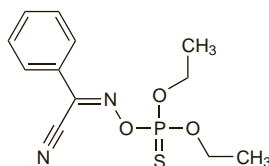
Fosmet. *O,O*-Dimethyl phthalimidomethyl phosphorodithioate.
 $C_{11}H_{12}NO_4PS_2 = 317.3$.
 CAS — 732-11-6.
 ATC Vet — QP53AF06; QP53BB03.

**Profile**

Phosmet is an organophosphorus insecticide (p.2047) used as a systemic ectoparasiticide in veterinary practice; it is applied topically to the host animal. It has also been used in agriculture and horticulture.

Phoxim (BAN, pINN)

Bayer-9053; Foksiimi; Foxim; Foxima; Phoxime; Phoximum. 2-(Diethoxyphosphinothioxyimino)-2-phenylacetonitrile.
 Фоксим
 $C_{12}H_{15}N_2O_3PS_2 = 298.3$.
 CAS — 14816-18-3.
 ATC Vet — QP53AF01.

**Profile**

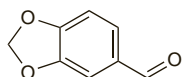
Phoxim is an organophosphorus insecticide (p.2047) used as a topical ectoparasiticide in veterinary practice. It is also used for the larvicidal treatment of rivers in the control of onchocerciasis (p.137).

Preparations

Proprietary Preparations (details are given in Part 3)
Ital.: Baythion EC†.

Piperonal

Heliotropin; Piperonylaldehyde. 1,3-Benzodioxole-5-carboxaldehyde.
 $C_9H_6O_3 = 150.1$.
 CAS — 120-57-0.

**Profile**

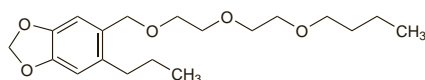
Piperonal is used as an insect repellent against head lice (see Pediculosis, p.2034).

Preparations

Proprietary Preparations (details are given in Part 3)
Fr.: Para Repulsif; **UK:** Rappell.

Piperonyl Butoxide (BAN)

Piperonil Butoksit; Piperonilo, butóxido de. 5-[2-(2-Butoxyethoxy)ethoxymethyl]-6-propyl-1,3-benzodioxole.
 $C_{19}H_{30}O_5 = 338.4$.
 CAS — 51-03-6.

**Pharmacopoeias.** In *BP* (Vet).

BP(Vet) 2008 (Piperonyl Butoxide). A yellow or pale brown oily liquid. Very slightly soluble in water; miscible with alcohol, with chloroform, with ether, and with petroleum oils.

Profile

Piperonyl butoxide is used as a synergist for pyrethrin and pyrethroid insecticides. Mixtures of piperonyl butoxide and pyrethrins or pyrethroids are used in the treatment of pediculosis (p.2034).

The symbol † denotes a preparation no longer actively marketed

Piperonyl butoxide is considered to cause a variety of gastrointestinal effects as well as mild CNS depression.

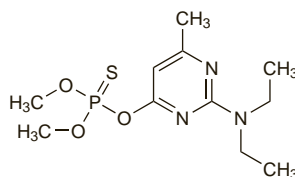
Preparations

Proprietary Preparations (details are given in Part 3)

Multi-ingredient: **Arg.:** Acardust†; Aero Helpp Forte†; Capitist†; Deca-Scab†; Hexa-Defital NF; Limpacid; Nopucid Compuesto; Para Plojicida; Para Plus; Quitoso†; Scabiociderm; **Austral.:** Banlice†; **Belg.:** Para; Para Plus; Shampoo; **Braz.:** Deltacid Plus; Pliohol†; Sarnapen†; **Canad.:** Licetrol†; Para†; Pronto; R & C; Scabene†; **Chile:** Launol; **Cz.:** Charlieu Anti-Poux†; **Fr.:** A-Par; Acardust; Anti-Act†; Aspipur; Charlieu Anti-Poux; Para Plus; Para Special Poux; Pyreflor; Spray-Pax; Spregal; **Ger.:** Goldgeist; Jacutin N; Spregal; **Gr.:** Para-plus; Runde; Spregal; **Israel:** A-200†; Acardust; Kin Soff; Para Plus; **Ital.:** Baygon; Cruzzy; Milice; Mom Piretro Emulsion†; Sinezan; **Neth.:** Para-Special; Spregal; Zinkan; **NZ:** Para Plus; **Port.:** Para-Pio†; **Rus.:** Para Plus (Пара Плюс); Pedilin Ko (Педимин Ко); Spray-Pax (Спрей-накс); Spregal (Спрегаль); **S.Afr.:** Nitagon; Spregal; **Turk.:** Kwell-P; **UK:** Fortefog; Prevent; **USA:** Blue; Lice; Pronto; Pyrinyl II; Pyrinyl Plus; RID; Tisit.

Pirimiphos-Methyl

Metilpirimifós. *O*-2-Diethylamino-6-methylpyrimidin-4-yl *O,O*-dimethyl phosphorothioate.
 $C_{11}H_{20}N_3O_3PS = 305.3$.
 CAS — 29232-93-7.

**Profile**

Pirimiphos-methyl is an organophosphorus insecticide (p.2047). It is used in agriculture and domestically.

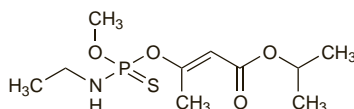
Preparations

Proprietary Preparations (details are given in Part 3)

Multi-ingredient: **Fr.:** Anti-Act†.

Propetamphos (BAN)

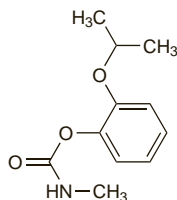
Propetamfós; Propetamfos. Isopropyl (E)-3-[(ethylamino)(methoxy)phosphinothio-oxy]but-2-enoate.
 $C_{10}H_{20}NO_4PS = 281.3$.
 CAS — 31218-83-4.
 ATC Vet — QP53AF09.

**Profile**

Propetamphos is an organophosphorus insecticide (p.2047) used as a topical ectoparasiticide in veterinary practice.

Propoxur (BAN)

2-Isopropoxyphenyl methylcarbamate.
 $C_{11}H_{15}NO_3 = 209.2$.
 CAS — 114-26-1.
 ATC Vet — QP53AE02.

**Profile**

Propoxur is a carbamate insecticide (p.2037) used as a topical ectoparasiticide in veterinary practice. It is also used as a fumigant in agriculture.

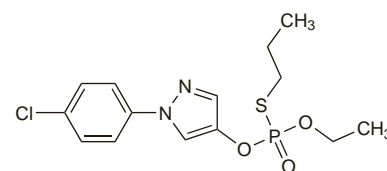
Preparations

Proprietary Preparations (details are given in Part 3)

Multi-ingredient: **Ital.:** Baygon.

Pyraclafos

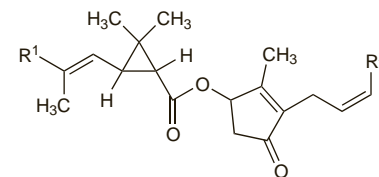
Piraclofós. (RS)-[O-1-(4-Chlorophenyl)pyrazol-4-yl O-ethyl S-propyl phosphorothioate].
 $C_{14}H_{18}ClN_2O_3PS = 360.8$.
 CAS — 77458-01-6.

**Profile**

Pyraclafos is an organophosphorus insecticide (p.2047) used for the larvicidal treatment of rivers in the control of onchocerciasis (p.137).

Pyrethrum Flower

Chrysanthème Insecticide; Dalmatian Insect Flowers; Flor del pelitre; Insect Flowers; Insektenblüten; Piretro; Pyrethri Flos.
 CAS — 8003-34-7 (pyrethrum); 121-21-1 (pyrethrin I); 121-29-9 (pyrethrin II); 25402-06-6 (cinerin I); 121-20-0 (cinerin II).
 ATC — P03AC01.
 ATC Vet — QP53AC01.



	R ¹	R ²
Pyrethrin-I	CH ₃	CH=CH ₂
Pyrethrin-II	COOCH ₃	CH=CH ₂
Cinerin-I	CH ₃	CH ₃
Cinerin-II	COOCH ₃	CH ₃

Pharmacopoeias. In *BP* (Vet), which also includes the extract. *US* includes only the extract.

BP(Vet) 2008 (Pyrethrum Flower). The dried flowerheads of *Chrysanthemum cinerariaefolium* containing not less than 1% of pyrethrins of which not less than one-half consists of pyrethrin I. It has a faint but characteristic odour.

BP(Vet) 2008 (Pyrethrum Extract). An extract prepared from Pyrethrum Flower. It contains 24.5 to 25.5% of pyrethrins, of which not less than half consists of pyrethrin I. A dark olive green or brown viscous liquid or, if decolourised, a pale amber liquid. Store in a well-filled container. Protect from light. It should be thoroughly stirred before use.

USP 31 (Pyrethrum Extract). A mixture of three naturally occurring, closely related insecticidal esters of chrysanthemic acid (pyrethrins I: jasmolin I, cinerin I, and pyrethrin I) and three closely related esters of pyrethric acid (pyrethrins II: jasmolin II, cinerin II, and pyrethrin II). The ratio of pyrethrins I to pyrethrins II is not less than 0.8 and not more than 2.8. It may contain pigments characteristic of chrysanthemum species, triglyceride oils, terpenoids, and carotenoid. It may also contain suitable solvents and antioxidants. It contains no other added substances. It is a pale yellow liquid having a bland, flowery odour. Insoluble in water; soluble in liquid paraffin and in most organic solvents. Store in airtight containers. Protect from light.

Adverse Effects and Precautions

Pyrethrum is irritant to the eyes and mucosa. Hypersensitivity reactions have been reported.

◇ References to the potential for toxicity of pyrethrin and pyrethroid insecticides.

1. Ray DE, Forshaw PJ. Pyrethroid insecticides: poisoning syndromes, synergies, and therapy. *J Toxicol Clin Toxicol* 2000; **38**: 95–101.
2. Bateman DN. Management of pyrethroid exposure. *J Toxicol Clin Toxicol* 2000; **38**: 107–9.
3. Bradberry SM, et al. Poisoning due to pyrethroids. *Toxicol Rev* 2005; **24**: 93–106.
4. Proudfoot AT. Poisoning due to pyrethrins. *Toxicol Rev* 2005; **24**: 107–13.
5. Ray DE, Fry JR. A reassessment of the neurotoxicity of pyrethroid insecticides. *Pharmacol Ther* 2006; **111**: 174–93.

Uses

Pyrethrum flower is mainly used for the preparation of pyrethrum extracts containing a mixture of chrysanthemic acid and pyrethric acid esters (pyrethrins I and II).

Pyrethrins in the form of pyrethrum extract have a long history of use as insecticides. Pyrethrum is rapidly toxic to many insects. It has a much quicker knock-down effect than clofenotane or lindane, but it is less persistent and less stable. Its action can be enhanced by certain substances such as piperonyl butoxide (p.2049), and pyrethrins with piperonyl butoxide are used clinically in the treatment of pediculosis (p.2034).

Pyrethroid insecticides (synthetic analogues of pyrethrins), such as permethrin and phenothrin, are also used clinically; deltamethrin and permethrin are among those used for the vector control of malaria.

Pyrethrum, pyrethrins, and pyrethroids are also used as topical ectoparasitides in veterinary practice and as agricultural, horticultural, and household insecticides.

Preparations

Proprietary Preparations (details are given in Part 3)

Ital.: Pearsol; SH3.

Multi-ingredient: **Arg.:** Quitosol; **Austral.:** Banlice; **Canad.:** Licetrol; Pronto; R & C; **Fr.:** Spray-Pax; **Ger.:** Goldgeist; **Israel:** A-200; Kin Soff; **Ital.:** Milice; Sinezan; **Port.:** Para-Pio; **Rus.:** Bubil (Бубил); Spray-Pax (Спрей-пакс); **Turk.:** Kwell-P; **UK:** Fortefog; Prevent; **USA:** Blue; Licide; Pronto; Pyrinyl II; Pyrinyl Plus; RID; Tisit.

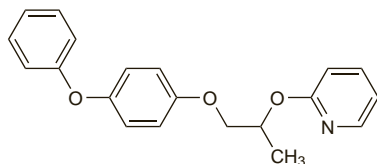
Pyriproxyfen

Piriproxifeno; Pyriproksifeeni; Pyriproxifen; Pyriproxifène; Pyriproxifenum; Pyriproxyfenum; S-9318; S-31183. 2-[1-Methyl-2-(4-phenoxyphenoxy)ethoxy]pyridine.

$C_{20}H_{19}NO_3 = 321.4$.

CAS — 95737-68-1.

ATC Vet — QP53AX23.



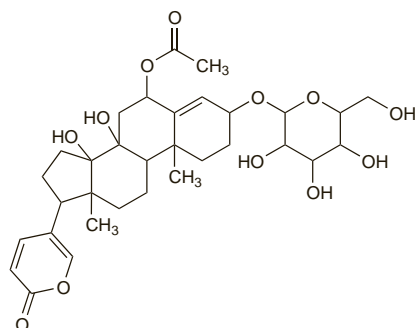
Profile

Pyriproxyfen is used as a topical ectoparasiticide in veterinary practice.

Red Squill

Esquila.

CAS — 507-60-8 (scilliroside).



(scilliroside)

Profile

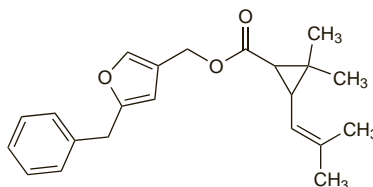
Red squill is a red variety of *Urginea maritima*, which contains, in addition to cardiac glycosides, an active principle, scilliroside. It is very toxic to rats and has been incorporated in rat poisons; it has neurotoxic and cardiotoxic properties.

Resmethrin

Resmetrina. 5-Benzyl-3-furylmethyl (1*RS*,3*RS*)-(1*RS*,3*SR*)-2,2-dimethyl-3-(2-methylprop-1-enyl)cyclopropanecarboxylate.

$C_{22}H_{26}O_3 = 338.4$.

CAS — 10453-86-8.



Profile

Resmethrin is a pyrethroid insecticide (see Pyrethrum Flower, p.2049) used in veterinary practice for the control of ectoparasites in the environment. Resmethrin is also used as an agricultural, horticultural, and household insecticide, but is not synergised by pyrethrum synergists such as piperonyl butoxide (p.2049).

References

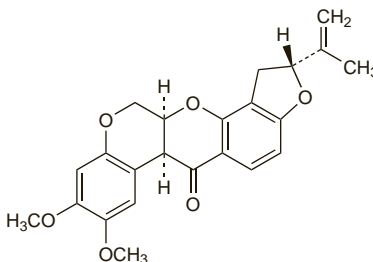
- WHO. Resmethrins. *Environmental Health Criteria* 92. Geneva: WHO, 1989. Available at: <http://www.inchem.org/documents/ehc/ehc/ehc092.htm> (accessed 26/04/04)
- WHO. Resmethrins health and safety guide. *IPCS Health and Safety Guide* 25. Geneva: WHO, 1989. Available at: <http://www.inchem.org/documents/hsg/hsg/hsg025.htm> (accessed 26/04/04)

Rotenone

Rotenona; Rotenonum. (2*R*,6*aS*,12*aS*)-1,2,6,6*a*,12,12*a*-Hexahydro-2-isopropenyl-8,9-dimethoxychromeno[3,4-*b*]furo[2,3-*h*]chromen-6-one.

$C_{23}H_{22}O_6 = 394.4$.

CAS — 83-79-4.



Profile

Rotenone is a non-systemic insecticide used in agriculture and in horticulture.

Rotenone is the active ingredient of derris (the dried rhizome and roots of *Derris elliptica*; also known as tuba root or aker-tuba) and of lonchocarpus (the dried root of *Lonchocarpus utilis*; also known as cube root, timbo, or barbusco). Powdered forms of derris and of lonchocarpus have been used as insecticides and fish poisons.

References

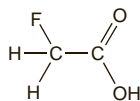
- WHO. Rotenone health and safety guide. *IPCS Health and Safety Guide* 73. Geneva: WHO, 1992. Available at: <http://www.inchem.org/documents/hsg/hsg/hsg073.htm> (accessed 26/04/04)

Sodium Fluoroacetate

Compound 1080; Fluoroacetato sódico; Sodium Monofluoroacetate.

$FC_2H_2CO_2Na = 100.0$.

CAS — 62-74-8.



(fluoroacetic acid)

Adverse Effects, Treatment, and Precautions

Sodium fluoroacetate is highly toxic, the lethal dose if ingested being about 1 to 5 mg/kg. Toxic effects may be delayed for several hours after absorption by mouth or inhalation, and include nausea and vomiting, apprehension, muscle twitching, cardiac irregularities, convulsions, respiratory failure, coma, and death usually due to ventricular fibrillation.

Treatment is generally supportive and symptomatic.

References to sodium fluoroacetate toxicity.

- Chi CH, *et al.* Clinical presentation and prognostic factors in sodium monofluoroacetate intoxication. *J Toxicol Clin Toxicol* 1996; **34**: 707-12.
- Chi CH, *et al.* Hemodynamic abnormalities in sodium monofluoroacetate intoxication. *Hum Exp Toxicol* 1999; **18**: 351-3.
- Goncharov NV, *et al.* Toxicology of fluoroacetate: a review, with possible directions for therapy research. *J Appl Toxicol* 2006; **26**: 148-61.
- Proudfoot AT, *et al.* Sodium fluoroacetate poisoning. *Toxicol Rev* 2006; **25**: 213-19.

Uses

Sodium fluoroacetate is a highly effective rodenticide but must be used with great caution because of its toxicity to other animals and to man.

Sulfiram (BAN, rINN)

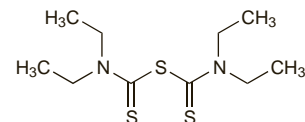
Monosulfiram; Sulfiramum. Tetraethylthiuram monosulphide.

Сульфирам

$C_{10}H_{20}N_2S_3 = 264.5$.

CAS — 95-05-6.

ATC Vet — QS02QA02.



Adverse Effects and Precautions

An erythematous rash has occasionally been reported. Sulfiram produces effects similar to those of disulfiram (p.2296) if ingested with alcohol. As there may be a risk of absorption after application of sulfiram to the whole body, patients are advised to abstain from alcohol for at least 48 hours.

♦ The reactions to alcohol occasionally reported in patients who have applied sulfiram solution^{1,2} resemble those seen with disulfiram. Analysis has shown that sulfiram solutions exposed to room light undergo photochemical conversion to disulfiram, and that the concentration of disulfiram, and the ability of the solution to inhibit aldehyde dehydrogenase and hence the metabolism of alcohol, increases with the duration of such storage.^{3,4} Whether patients who have applied sulfiram solution should avoid direct light immediately afterwards has not been elucidated.⁴

- Blanc D, Deprez P. Unusual adverse reaction to an acaricide. *Lancet* 1990; **335**: 1291-2.
- Burgess I. Adverse reactions to monosulfiram. *Lancet* 1990; **336**: 873.
- Mays DC, *et al.* Photolysis of monosulfiram: a mechanism for its disulfiram-like reaction. *Clin Pharmacol Ther* 1994; **55**: 191.
- Lipsky JJ, *et al.* Monosulfiram, disulfiram, and light. *Lancet* 1994; **343**: 304.

Uses and Administration

Sulfiram is a pesticide that has been used as an acaricide, either alone or with benzyl benzoate, in the treatment of scabies (p.2035), although other treatments are now preferred.

Sulfiram has also been used as a pesticide in veterinary practice.

Preparations

Proprietary Preparations (details are given in Part 3)

Braz.: Sarifam; Sulfiratr; Tetmosol; Valifram; **India:** Tetmosol; **Mex.:** Tetmosol; **Port.:** Thiosan; **S.Afr.:** Tetmosol; **Singapore:** Tetmosol; **Multi-ingredient:** **Fr.:** Ascabiol.

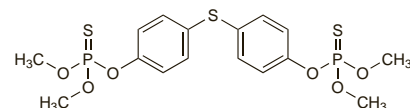
Temefos (USAN, rINN)

27165; Téméfós; Temefós; Temefosum; Temephos. *O,O'*-(Thiodi-*p*-phenylene) *O,O',O'*-tetramethyl bis(phosphorothioate).

Темефос

$C_{16}H_{20}O_6P_2S_3 = 466.5$.

CAS — 3383-96-8.



Profile

Temefos is an organophosphorus insecticide (p.2047). It is effective against the larvae of mosquitoes, blackflies, and other insects, and is used for the larvicidal treatment of rivers in the control of onchocerciasis (p.137). It is also effective against the crustacean host to the larvae of the guinea worm and is used in the control of dracunculiasis (p.136); treatment of drinking water is both effective and acceptable.