Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade
Chemical Review Committee
Second meeting
Geneva, 13–17 February 2006
Item 5 (b) of the provisional agenda*
Inclusion of chemicals in Annex III of the Rotterdam Convention: review of notifications of final regulatory actions to ban or severely restrict a chemical: Endosulfan

Endosulfan: supporting documentation provided by Thailand

Note by the secretariat

The annex to the present note contain the supporting documentation provided by Thailand in support of its final regulatory action on endosulfan.

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* UNEP/FAO/RC/CRC.2/1.
Annex

List of supporting documentation on Endosulfan submitted by Thailand

924 endosulfan

Insecticide, acaricide

IRAC 2A; cyclodiene

NOMENCLATURE: Common name endosulfan (BSO, E-ISO, (m) F-ISO, ANSI, ESA); thiodan (Iran, USSR); benozeptin (JMAF); no name (Italy)

IUPAC name (1,4,5,6,7-hexachloro-8,9,10-trinorborn-5-en-2,3-ylenedimethylene) sulfide; 6,7,8,9,10-hexachloro-1,5,5a,6,7,9a-hexahydro-6,9-methano-2,4,3-benzodioxathiepine 3-oxide

Chemical Abstracts name 6,7,8,9,10,10-hexachloro-1,5,5a,6,7,9a-hexahydro-6,9-methano-2,4,3-benzodioxathiepine 3-oxide


EC number 204–079–4 Development codes Hoe 02 671 (Hoechst); FMC 5462 Official codes OMS 204 (α); OMS 205 (β); OMS 570; ENT 23979

PHYSICAL CHEMISTRY: Composition Endosulfan is a mixture of two stereoisomers: alpha-endosulfan, endosulfan (I), stereoisomer 3α,5αβ,6α,9α,9β; comprises 64–67% of the tech. grade; beta-endosulfan, endosulfan (II), stereoisomer 3α,5αα,6β,9β,9αα, comprises 29–32%. Earlier reports on the stereochirality of these isomers gave conflicting accounts (W. Riemschneider, World Rev. Pest Control, 1963, 2(4), 29). Mol. wt. 406.9 M.f. C₉₂H₇₆Cl₄O₇S

Form Colourless crystals: (tech. cream to brown, mostly beige). M.p. ≥ 80°C (tech.); α- 109.2°C; β- 213.3°C. V.p. 0.83 mPa (20°C) for 2:1 mixture of α- and β- isomers Kow log P for α- = 4.74; β- = 4.79 (both at pH 5) Henry α- 0.48; β- 0.07 (both Pa m³ mol⁻¹, 22°C, calc.)

S.g./density c. 1.8 (20°C) (tech.) Solubility In water alpha-endosulfan 0.32, beta-endosulfan 0.33 (both in mg/l, 22°C). In ethyl acetate, dichloromethane, toluene 200, ethanol c. 65, hexane c. 24 (all in g/l, 20°C). Stability Stable to sunlight. Slowly hydrolysed in aqueous acids and alkalis, with the formation of the diol and sulfur dioxide.

COMMERCIALISATION: History Insecticide reported by W. Finkenbrink (Nachrichtenbl. Dtsch. Pflanzenschutzdienstes (Braunschweig), 1956, 8, 183). Introduced by Hoechst AG (now Bayer CropScience) and, in the USA, by FMC Corp. Patents DE 1015797; US 2799686; GB 810802 (all to Hoechst) Manufacturers Aako; Bayer CropScience; Drexel; Excel; Hindustan; Makhteshim-Agan; Millennium; Parry; Seo Han; Sharda.

APPLICATIONS: Biochemistry Antagonist of the GABA receptor-chloride channel complex. Mode of action Non-systemic Insecticide and acaricide with contact and stomach action. Uses Control of sucking, chewing, and boring insects and mites on a very wide range of crops, including fruit (including citrus), vines (0.1–0.2%), olives, vegetables including potatoes (0.1–0.2%), ornamentals, cucurbits, cotton (1.5–2.5 l/ha), tea (1.0–2.0 l/ha), coffee (1.5–2.0 l/ha), rice (1.5–2.0 l/ha), cereals (1.0–2.0 l/ha), maize and sorghum (1.5–2.5 l/ha), oilseed crops (1.0–2.0 l/ha), hops, hazels and sugar cane (1.5–2.5 l/ha), tobacco (0.8–1.5 l/ha), alfalfa, mushrooms, forestry, glasshouse crops, etc. Also controls thrips. Phytotoxicity Glasshouse geraniums and chrysanthemums, alfalfa, and lime beans may be injured. Formulation types DP; EC; GR; SC; UL; WP; Powder concentrate. Compatibility Incompatible with strongly alkaline endosulfan 363
materials. Selected products 'Fan' (FMC); 'Afidanil' (Ethyriadin); 'Algodán 350' (Ingeniería Industrial); 'Cekulfan' (Cequsa); 'Davonil' (Vapco); 'Devisulfan' (Devicidas); 'Endocel' (Excel); 'Endothan' (Dhanuka); 'Endosol' (Armco); 'Endastar' (Shaw Wallace); 'Hifán' (Hindustan); 'Lucasulfan' (Lacava); 'Mentor' (Crop Health); 'Phaser' (Bayer CropScience); 'Speed' (Nagarjuna Agrichem); 'Thiordan' (Bayer CropScience); 'Thionex' (Malathion-Agan); mixtures 'Tomahawk' (+ ethion) (Calliope).


MAMMALIAN TOXICITY: Reviews FAO/WHO 83, 85 (see part 2 of the Bibliography). Oral Acute oral LD₅₀ for rats 70 mg (in aqueous suspension)/kg; 110 mg tech. (in oil)/kg, 76 mg alpha-isomer/kg, 240 g beta-isomer/kg; for dogs 77 mg tech./kg. Skin and eye Acute percutaneous LD₅₀ for rabbits 359 mg (in oil)/kg; for male rats >4000, female rats 500 mg/kg. Inhalation LC₅₀ (4 h) for male rats 0.0345, female rats 0.0126 mg/l. NOEL (2 y) for rats 15 ppm diet; (1 y) for dogs 10 ppm diet. ADI (JMPR) 0.006 mg/kg b.w. [1998]. Toxicity class WHO (a.i.) II; EPA (formulation) I (tech.). EC classification T1; R24/25 Xi; R36 N; R50, R53

ECOTOXICOLOGY: Birds Acute oral LD₅₀ for mallard ducks 205–245, ring-necked pheasants 620–1000 mg/kg. F fish Highly toxic (LC₅₀ 96 h) for golden orfe 0.002 mg/l water but, in practical use, should be harmless to wildlife. Daphnia LC₅₀ (48 h) 75–750 μg/l. Algae EC₅₀ (72 h) for green algae ≈ 0.56 mg/l. Bees Not toxic to bees under field conditions at an application rate of 1.6 l/ha (560 g endosulfan/ha). Worms NOEC 0.1 mg/kg dry weight.

ENVIRONMENTAL FATE: EHC 40 (WHO, 1984). Animals The principal route of elimination is faeces; most of the radioactivity is excreted within the first 48 hours. The amounts excreted are independent of dose level, number of dosages and isomerism. There are indications of species-specificity. Residues of endosulfan accumulate in the kidneys rather than in fat. Elimination from the kidneys takes place with DT₅₀ 7 d, but there is no sign of accumulation in the kidneys even after long-term feeding. Endosulfan is metabolised rapidly in mammalian organisms to less-toxic metabolites and to polar conjugates. Plants The plant metabolites (mainly endosulfan sulfate) were also found in animals and have thus been investigated from a toxicological point of view. 50% of residues are lost in 3–7 days (depending on plant species). Soil/Environment Endosulfan (alpha- and beta-) is degraded in soil with DT₅₀ 30–70 d. The main metabolite usually found was endosulfan sulfate, which is degraded more slowly and is, for this reason, the most important metabolite. DT₅₀ for total endosulfan (alpha- and beta- endosulfan and endosulfan sulfate) in the field is 5–8 mo. No leaching tendency was observed. Koc 3000–20 000; Kd < 3%.

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