POPRC-4/5: Endosulfan

The Persistent Organic Pollutants Review Committee,

Having examined the proposal by the European Community and its member States that are Parties to the Stockholm Convention on Persistent Organic Pollutants to list endosulfan, including: alpha (α) endosulfan (Chemical Abstracts Service number 959-98-8) beta (β) endosulfan (Chemical Abstracts Service number 33213-65-9), technical endosulfan (Chemical Abstracts Service number 115-29-7), in Annexes A, B and/or C to the Convention and having applied the screening criteria specified in Annex D to the Convention,

1. *Decides*, in accordance with paragraph 4 (a) of Article 8 of the Convention, that it is satisfied that the screening criteria have been fulfilled for endosulfan, as set out in the evaluation contained in the annex to the present decision;

2. *Decides also,* in accordance with paragraph 6 of Article 8 of the Convention and paragraph 29 of decision SC-1/7 of the Conference of the Parties to the Stockholm Convention, to establish an ad hoc working group to review the proposal further and to prepare a draft risk profile in accordance with Annex E to the Convention;

3. *Invites,* in accordance with paragraph 4 (a) of Article 8 of the Convention, Parties and observers to submit to the Secretariat the information specified in Annex E before 9 January 2009.

Annex to decision POPRC-4/5

Evaluation of endosulfan against the criteria of Annex D

A. Background

1. The primary source of information for the preparation of this evaluation was the proposal submitted by the European Community and its member States that are Parties to the Convention, contained in document UNEP/POPS/POPRC.4/14.

2. Given a comparable toxicity of the sulfate metabolite, a number of authors make use of the term “endosulfan (sum)” which includes the combined residues of both isomers of the parent and endosulfan sulfate. The information provided included data from alpha and beta endosulfan and the transformation product endosulfan sulfate.

B. Evaluation

4. The proposal was evaluated in the light of the requirements of Annex D, regarding the identification of the chemical (paragraph 1 (a)) and the screening criteria (paragraphs 1 (b)–(e)):

(a) Chemical identity:

(i) Adequate information was provided in the proposal and supporting documents;

(ii) The chemical structure was provided;

The chemical identity of endosulfan, alpha (α) endosulfan, beta (β) endosulfan, and technical endosulfan are clearly established;

(b) Persistence:

(i) Based on combined DT_{50} measured in laboratory studies for alpha and beta endosulfan and endosulfan sulfate, the estimated combined half-life in soil for endosulfan (alpha, beta isomers and endosulfan sulfate) ranges between 28 and 391 days; the literature, however, reports both higher and lower values. These values are varied and some exceed the criterion of persistence. Taking into account the half-life of alpha and beta endosulfan, which is followed by the half-life of endosulfan sulfate, together these values exceed the criterion of six months’ persistence in soil. In water-sediment laboratory studies, the combined half-lives in the total system were between 18 and 21days, but mineralization was very low, <0.1%, indicating additional concern on endosulfan-related metabolisms. Under certain environmental conditions the screening criteria would not be met. Taking into account the combined degradation rate of the three major components, however, there is information to support the consideration of endosulfan as being persistent;

There is sufficient evidence that endosulfan meets the criterion on persistence;

(c) Bioaccumulation:

(i) Reported bioconcentration factors in aquatic species vary between 1,000 and 3,000 on whole-body-weight basis, which is below the criterion for the bioconcentration factor of 5,000. The largest values have been observed for fish. In addition, the log Kow is measured at 4.7 which is below the criterion of 5;

(ii) Bioaccumulation modelling studies published in the literature indicate that biomagnification of endosulfan by terrestrial (air-breathing) organisms is a concern, with predicted biomagnification factor (BMF) values ranging from 2.5 to 28 for herbivorous and carnivorous wildlife respectively. This modelling technique is new, however, and not yet widely recognized and requires further verification. Data indicate that the relative distribution of the different metabolites among taxonomic groups may differ considerably; combined estimations indicate a potential for bioaccumulation, which is particularly relevant because of the high toxicity and ecotoxicity of endosulfan isomers and several metabolites. The bioaccumulation of endosulfan has been observed for some animal taxa but in other cases there is no evidence. The environmental concern rests on the combination of this bioaccumulation potential with high toxicity and ecotoxicity;

(iii) Endosulfan was detected in adipose tissue and blood of animals in the Arctic and the Antarctic. Endosulfan has also been detected in the blubber of minke whales and in the liver of northern fulmars;

There is sufficient evidence that endosulfan meets the criterion on bioaccumulation.

(d) Potential for long-range environmental transport:

(i) Levels of 0.9 and 3.02 ng/g of endosulfan in the blubber of elephant seals in the Antarctic provide evidence of potential concern for endosulfan found in areas distant from its sources of release but the toxicological significance is not known. Other data, however, also show lower levels in other areas of the globe;

(ii) Evidence of long-range environmental transport of endosulfan and endosulfan sulfate is confirmed by Arctic monitoring data;

(iii) Volatilization is well documented. An atmospheric half-life of 27 d (± 11 days) was estimated. Half-lives of > 2.7 days for alpha endosulfan and of > 15 days for beta endosulfan were reported. Half-life values of less than two days have also been calculated. Arctic monitoring publications indicate the potential for long-range environmental transport of endosulfan residues. Overall persistence (Pov) for the endosulfan family is in the region of 10 days for tropical air and soil. The Arctic contamination potential after 10 years of continuous releases was between 0.1 and 1.0%;

There is sufficient evidence that endosulfan meets the criterion on potential for long-range environmental transport;

(e) Adverse effects:

(i) There are a number of papers reporting adverse effects of endosulfan in humans and other species;

(ii) There are toxicity and ecotoxicity data available for both endosulfan isomers and several metabolites. Endosulfan is a very toxic chemical for many kinds of animals. Metabolism occurs rapidly, but the oxidized metabolite endosulfan sulfate shows an acute toxicity similar to that of the parent compound. Endosulfan has the potential to cause endocrine disruption in both terrestrial and aquatic species. Endosulfan causes neurotoxicity, haematological effects and nephrotoxicity but shows no carcinogenic or mutagenic properties. Studies vary on the conclusion for teratogenic effects;

(ii) Degradation studies indicate that endosulfan is degraded into a large number of other metabolites, all of them retaining the endosulfan structure, and some of them showing significant toxicity while others do not;

There is sufficient evidence that endosulfan meets the criterion on adverse effects.

C. Conclusion

4. The Committee concluded that endosulfan met the screening criteria specified in Annex D.

References

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