Decision POPRC-2/9: Alpha hexachlorocyclohexane

The Persistent Organic Pollutants Review Committee,

Having examined the proposal by Mexico, which is a Party to the Stockholm Convention on Persistent Organic Pollutants, to list alpha hexachlorocyclohexane (alpha-HCH, Chemical Abstracts Service number 319-84-6) 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 alpha-HCH, as set out in the evaluation contained in the annex to the present decision;

2. *Decides furthermore,* 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 of 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 2 February 2007.

Annex to decision POPRC-2/9

Evaluation of alpha-HCH 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 Mexico, contained in document UNEP/POPS/POPRC.2/INF/7.

2. Additional sources of scientific information included critical reviews prepared by recognized authorities and peer-reviewed scientific papers.

B. Evaluation

3. 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 structures were provided. Alpha-HCH consists of two enantiomers referred to as (+)-alpha-HCH and (-)-alpha-HCH. Information on specific physico-chemical properties was also provided;

The chemical identity of alpha-HCH is clearly established;

(b) Persistence:

(i) Alpha-HCH is persistent in sea water with estimated half-lives exceeding the screening criteria value of two months. Calculated values can range from 0.6 to 23 years, depending on environmental conditions and the respective enantiomer (Refs. 1, 2 and 3). Half-lives reported for (+)- and (-)-alpha-HCH in Arctic freshwater were estimated to be 0.6 and 1.4 years(Ref. 1);

Alpha-HCH exhibits half-lives in soil laboratory and field studies of 48 to 125 days (anoxic conditions). Data from a field study with gamma-HCH would suggest that alpha-HCH disappears more rapidly (Ref. 4). Evidence also exists, however, that gamma-HCH can have a higher degradation rate than alpha-HCH (Ref. 5);

(ii) Monitoring data from remote regions can serve as an indication of the persistence of alpha-HCH. Though emissions of alpha-HCH rapidly declined in the 1970s and 1980s, concentrations in the northern surface waters of the Pacific and in the Arctic Ocean can still be measured. This implies that alpha-HCH has accumulated in the past in the water and constitutes a substantial reservoir (Refs. 6 and 7);

There is sufficient evidence that alpha-HCH meets the criterion on persistence;

(c) **Bioaccumulation:**

(i) The log Kow reported in the proposal is 3.8 (Ref. 1). Bioconcentration factors for invertebrates can reach values of 60 to 2,750 (whole body, dry weight basis (Ref. 4). Bioconcentration factors for fish were in the range of 313–2,400 (wet weight basis) (Refs. 8 and 9);

(ii) and (iii) The biomagnification factors for alpha-HCH for different trophic levels (zooplankton, invertebrates, fish, and mammals) are in the range of 1–16. (Refs. 10 and 11). According to field studies in Arctic marine food webs, it has been demonstrated that alpha-HCH stereoselectively bioaccumulates in marine species and has the ability to biomagnify to a greater extent than gamma-HCH, for which values of up to 4,220 have been reported (Ref. 12);

Alpha-HCH has been detected in blood and adipose tissue in humans (Ref. 13). It has also been detected in breast milk and placenta tissue, thus exposing offspring in critical periods of development (Refs. 14, 15 and 16);

Available information suggests that the food chain bioaccumulation of alpha-HCH is higher than for lindane (Ref. 12);

There is sufficient evidence that alpha-HCH meets the criterion on bioaccumulation;

(d) **Potential for long-range environmental transport:**

(i) and (iii) Alpha-HCH has a low vapour pressure ($6x10^{-3}$ Pa) and a low Henry´s Law constant ($6.86x10^{-6}$ atm m^3 mol^{-1}) (Ref. 1) which decreases with water temperature (Ref. 17). The estimated half-lives in air are in the range of 0.3–4 years, depending on the atmospheric hydroxyl radical (OH) concentration (Ref. 1). The dominant pathway for distribution of alpha-HCH to colder regions was the atmosphere, from which it is partitioned into cold water, (Refs. 18 and 7);

(ii) Monitoring data show that the substance is abundant in remote areas including the Arctic and Antarctica (Ref. 18). The levels of Alpha-HCH increase with latitude (Ref.17). Alpha-HCH is one of the major organochlorine substances found in Arctic air with a concentration of approximately 10–70 pg/m^3 (Ref. 17) and in the Arctic Ocean up to 6 ng/l (Ref. 6). Alpha-HCH has also been frequently detected in marine as well as in terrestrial species in Arctic and sub-Arctic regions (Ref. 6);

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

Adverse effects:

(i) Compared to gamma-HCH, toxicological data for alpha-HCH are limited. Acute toxicity values are cited in the proposal from the World Health Organization (Ref. 4). Alpha-HCH is associated with kidney and liver effects in laboratory animals. Alpha-HCH is a probable human carcinogen (Ref. 1). Several indications that alpha-HCH is related to cancer in humans exist, although studies concerning genotoxicity are inconclusive, suggesting weak genotoxicity of alpha-HCH (Ref. 12);

(ii) The assessment of lindane and other hexachlorocyclohexane isomers by the United States Environmental Protection Agency (Ref. 12) and the Arctic Monitoring and Assessment Programme report on health effects associated with persistent toxic substances (Ref. 17) indicate potential risks from dietary exposure of alpha-HCH to communities in Alaska, and others in the circumpolar Arctic region, who depend on subsistence foods, such as caribou, seal and whale;

There is sufficient evidence that alpha-HCH meets the criterion on adverse effects;

C. Conclusion

4. The Committee concluded that alpha-HCH meets the screening criteria specified in Annex D.

References

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