POPRC-7/2: Chlorinated naphthalenes

The Persistent Organic Pollutants Review Committee,

Having examined the proposal by the European Union and its member States parties to the Stockholm Convention on Persistent Organic Pollutants to list chlorinated naphthalenes in Annexes A, B and/or C to the Convention and having applied the screening criteria specified in Annex D to the Convention,

Noting that the term "chlorinated naphthalenes" encompasses as many as 75 chlorinated naphthalenes containing from one to eight chlorine atoms that are commercially produced as mixtures of several congeners,[1]

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 dichlorinated naphthalenes, trichlorinated naphthalenes, tetrachlorinated naphthalenes, pentachlorinated naphthalenes, hexachlorinated naphthalenes, heptachlorinated naphthalenes and octachlorinated naphthalenes, as set out in the evaluation contained in the annex to the present decision;

2. *Also decides,* in accordance with paragraph 6 of Article 8 of the Convention and paragraph 29 of decision SC-1/7, 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 2012.

Annex to decision POPRC-7/2

Evaluation of chlorinated naphthalenes against the criteria of Annex D

A. Background

1. The primary source of information for the preparation of the present evaluation was the proposal submitted by the European Union and its member States parties to the Convention, contained in document UNEP/POPS/POPRC.7/2. Supporting information was provided in document UNEP/POPS/POPRC.7/INF/3.

2. Additional sources of scientific information included critical reviews prepared by recognized authorities, in particular an ecological screening assessment report on chlorinated naphthalenes (Ref. 3).

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. The proposal relates to chlorinated naphthalenes containing from one to eight chlorine atoms;

(ii) The chemical structures for the compounds were provided. Commercial chlorinated naphthalenes are a mixture of several congeners (mono-, di-, tri-, tetra-, penta-, hexa-, hepta- and octachlorinated naphthalenes);

The chemical identity of the commercial mixture and the individual congeners of chlorinated naphthalenes is adequately established;

(b) Persistence:

(i) The half-life values of monochlorinated and dichlorinated naphthalenes are below the Annex D criteria;

(ii) Consideration has been given to the weight of evidence, including the high predicted Arctic contamination potential of di-, tri-, tetra- and pentachlorinated naphthalenes, the predicted persistence of di-, tri-, tetra-, penta-, hexa-, hepta-

1 Such as Halowax, Nibren Waxes, Seekay Waxes and Cerifal Materials.

and octachlorinated naphthalenes in water, the empirical evidence for persistence of tri-, tetra-, penta-, hexa-, and heptachlorinated naphthalenes in sediments and soils, the detection of tri-, tetra-, penta-, hexa-, hepta- and octachlorinated naphthalenes in air and biota in the Arctic, Antarctic and in other regions that lack significant local sources of chlorinated naphthalenes (Ref. 3);

There is sufficient evidence that di-, tri-, tetra-, penta-, hexa-, hepta- and octachlorinated naphthalenes meet the criterion on persistence;

(c) Bioaccumulation:

(i) The log Kow value for chlorinated naphthalenes ranged from 3.9 to 8.3. The log Kow values for mono- and dichlorinated naphthalenes are below 5. Experimental bioconcentration factors for di- tri-, tetra- and pentachlorinated naphthalenes are above 5,000 and below 5,000 for monochlorinated naphthalenes;

(ii) and (iii) There is empirical evidence of the biomagnification of chlorinated naphthalenes throughout the Arctic marine food chain, i.e., increasing total chlorinated naphthalene concentration as trophic level increases, the high dietary uptake efficiencies of hexa-, hepta- and octachlorinated naphthalenes in northern pike, the very slow elimination of hexachlorinated naphthalenes from the bodies of rats and humans (Ref. 3). In addition, tri-, tetra-, penta-, hexa-, hepta-, and octachlorinated naphthalenes have been detected in biota in the Arctic, Antarctic and other regions that lack significant local sources of chlorinated naphthalenes (Ref. 1; Ref. 3);

There is sufficient evidence that di-, tri-, tetra-, penta-, hexa-, hepta- and octachlorinated naphthalenes meet the criterion on bioaccumulation;

(d) Potential for long-range environmental transport:

(i) and (ii) Tri-, tetra-, penta-, hexa-, hepta- and octachlorinated naphthalenes have been detected in air and biota in the Arctic, Antarctic and in other regions that lack significant local sources of chlorinated naphthalenes (Ref. 1; Ref. 3; Ref. 4; Ref. 5; Ref. 6, Ref. 7, Ref. 11);

(iii) The vapour pressure of chlorinated naphthalenes at 25° C ranges from 1.3×10^{-4} Pa (octachlorinated naphthalenes) to 2.1 Pa (monochlorinated naphthalenes). The estimated half-life in air for monochlorinated naphthalenes is 1 day and for di-, tri-, tetra-, penta-, hexa-, hepta- and octachlorinated naphthalenes, it ranged from 3.62 to 437 days (Ref. 3).

There is sufficient evidence that di-, tri-, tetra-, penta-, hexa-, hepta- and octachlorinated naphthalenes meet the criterion on potential for long-range environmental transport;

(e) Adverse effects:

(i) While the exposure of humans to chlorinated naphthalenes is associated with chloracne and lethality, it cannot be ruled out that these are caused by other contaminants such as dioxins and polychlorinated biphenyls;

(ii) Tests with mono- and dichlorinated naphthalenes resulted in $L(E)C_{50}$ values of 0.69-2.4 mg/L for fish and 0.37-2.82 mg/L for crustaceans. The available empirical and modeled aquatic toxicity data for chlorinated naphthalenes indicate that di-, tri-, tetra- and pentachlorinated naphthalenes may be toxic to aquatic organisms at relatively low concentrations: less than 1 mg/L for acute exposures, and less than 0.1 mg/L for chronic exposures (Ref. 3). Hexa-, hepta- and octachlorinated naphthalenes were found to cause harmful effects to mammals (particularly cattle) at relatively low doses of 2.4 mg/kg body weight per day and less (Ref. 3). Chlorinated naphthalenes have dioxin-like activity (Ref. 2; Ref. 13; Ref. 14). The toxic equivalents (TEQs) estimated for polychlorinated naphthalenes in sediments are greater than those estimated for polychlorinated biphenyls and polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzofurans (Ref. 9 and Ref. 10). The toxicity equivalency factors (TEFs) are congener specific and range from 2×10^{-8} (dichlorinated naphthalenes) to 4×10^{-3} (hexachlorinated naphthalenes) and 3×10^{-3} (heptachlorinated naphthalenes).

There is sufficient evidence that mono-, di-, tri-, tetra-, penta-, hexa-, hepta- and octachlorinated naphthalenes meet the criterion on adverse effects.

C. Conclusion

4. The Committee concluded that polychlorinated naphthalenes (di-, tri-, tetra-, penta-, hexa-, hepta- and octachlorinated naphthalenes) met the screening criteria specified in Annex D.

References

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