

NOTE OF EXPLANATION FOR "AQUATIC" FACT SHEET FOR CHLOROBENZENE

The attached Fact Sheet for chlorobenzene (dated Oct. 11, 1984), with its described "Aquatic" basis, actually supports two Types of values. The value of 5 ug/L is a true Aquatic (Chronic) Type value; the value of 50 ug/L is an Aesthetic Type value, formerly referred to as an Aquatic Type value. Aesthetic Type values were made their own Type effective March 12, 1998. Because of its dual nature, this Fact Sheet is filed under both "Aquatic" and "Aesthetic."

-- NYSDEC 3-98

VALUE(S) ADDED 7-24-85

FACT SHEET REVISED -----

VALUE(S) REMOVED -----

Date: October 11, 1984

Surface Water Quality
Standard Documentation

Chemical: Chlorobenzene

C.A.S. No.(s): 108-90-7

Basis (Human/Aquatic): Aquatic

Standard by Water Classification:

	<u>ug/l</u>	<u>Notes</u>
Classes AA,AA-s;A;A-s;B;C	5	I
Class D	50	L
Classes SA;SB;SC;I	5	I
Class SD	50	L

Remarks:

Summary of Information

Because of the chemical similarity of mono-, di-, and trichlorobenzene an evaluation of the environmental effects data and standard derivation will be presented for all three in this fact sheet.

1. NAS-NAE. 1973. Water quality criteria 1972. EPA-R3-73-033 National Academy of Sciences and National Academy of Engineering, Wash, D.C. 594 pp.
-report tainting of fish flesh by o-dichlorobenzene at 0.25 mg/l in water.
2. a. EPA, 1980 Ambient water quality criteria for chlorinated benzenes. USEPA, Wash. D.C.
b. EPA, 1980 ambient water quality criteria for dichlorobenzenes. USEPA, Wash, D.C.
-LC₅₀ for mono,di and trichlorobenzenes in fresh and saltwater range from 0.45-15.9 mg/l.
-report chronic values in fresh and saltwater ranging from 222-763 ug/l.
-the data base was insufficient to derive criteria following the national guidelines to protect aquatic life.
-BCF for di and trichlorobenzene ranged from 60-182 in bluegill.

3. Birge, et al. 1979. Embryo-larval toxicity tests with organic compounds. In: Aquatic Toxicology, L.L. Marking and R.A. Kimerle eds., Special Technical Publication 657, American Society for Testing Materials, Phil. PA, pp. 131-147.
 - conducted embryo-larval tests with chlorobenzene
 - LC₁ for bass eggs was 1 ug/l (95% confidence interval, 0.3-3 ug/l)
 - 2% teratic largemouth bass larvae at 40 ug/l
 - concluded that selection of a maximum tolerable toxicant concentration for chlorobenzene from the test results could range from 0.5 to 10 ug/l.
 - authors concluded that LC₁ corresponded well with the results of other standard chronic studies.

4. Birge, W.J., J.A. Black, and D.M. Bruser. 1979. Toxicity of organic chemicals to embryo larval stages of fish. EPA-560/11-79-007. USEPA Wash, D.C. 60 pp.
 - re-calculated chlorobenzene LC₁ reported in Birge et al. (1979) taking into account teratic larvae in probit determinations.
 - goldfish LC₁ in 50 ppm hardness was 10 ug/l; goldfish and largemouth bass LC₁ in 200 ppm. hardness was 33 and 8 ug/l, respectively.

5. Black et al. 1982. The aquatic toxicity of organic compounds to embryo-larval stages of fish and amphibians. Univ. of Kentucky Water Resources Research Institute Research Report Number 133, Lexington, Kentucky. 61 pp.
 - tested chlorobenzene and 1,2-dichlorobenzene.
 - chlorobenzene LC₁ for rainbow trout and northwestern salamander were 14.3 and 9.7 ug/l, respectively,
 - dichlorobenzene LC₅₀ for rainbow trout and leopard frog were 3.01 and 5.56 ug/l; could not determine LC₁ for dichlorobenzene.
 - suggested that monosubstituted benzenes may be more toxic than corresponding disubstituted benzenes.

6. Simakov, Y.G. 1982. Effect of Benzene compounds on mitotic activity of lens epithelium in the rainbow trout Salmo gairdneri. Vopr Ikhtiol (Voika) 22(1): 139-144. (Abstract only).
 - found rainbow trout eye lens cell stimulation at 50ug/l trichlorobenzene.

7. Calmari, D., S. Galassi, and F. Setti. 1982. Evaluating the hazard of organic substances on aquatic life: the paradichlorobenzene example. Ecotox. Envir. Saf. 6:369-378.
 - fertility impairment in Daphnia was observed at 0.4 mg/l; 14 day LC₅₀ for rainbow trout was 0.8 mg/l.
 - tentatively recommended a water quality criteria of 50 ug/l.
 - cite Lloyd who determined that the minimum concentration of dichlorobenzene likely to be harmful to fish would be 2 ug/l.
 - Lloyd, R. 1979. The use of concentration response relationship in assessing acute toxicity data in analyzing the hazard evaluation process. K.L., Dixon, A.W. Maki and J. Cairns, Jr., eds. Amer. Fish. Soc., Wash. D.C. (original not seen).

8. Calamari, et al. 1983. Toxicity of selected chlorobenzenes to aquatic organisms. *Chemosphere* 12(2): 253-262.
-results of fertility tests on Daphnia magna resulted in 14 day EC16 for chlorobenzenes: MCB, 2.1 mg/l; 1,2 DCB, 0.37 mg/l; 1,4 DCB; 0.64 mg/l; 1,2,3 DCB 0.08 mg/l; and 1,2,4 TCB 0.32 mg/l.
9. Veith, G.D., D.J. Call and L.T. Brooke. 1983. Structure-toxicity relationships for the fathead minnow Pimephales promelas: narcotic industrial chemicals. *Can. J. Fish. Aquat. Sci.* 40:743-748.
-reported fathead minnow 96hr LC₅₀: 1,3 DCB, 7.8 mg/l; 1,4 DCB, 4.0 mg/l, and 1,2,4 TCB 2.9 mg/l.

Standard Derivation

Both acute and chronic data indicates that toxicity of mono, di and trichlorobenzene is variable. It cannot be conclusively stated that one compound is more toxic than the others. It is reasonable to conclude that the range of toxicity under varying conditions and varying test species is similar for all three of the chlorobenzenes and a single standard should be used for all three. The data also suggests that the ranges of toxicity of chlorobenzenes in fresh and saltwater are similar.

The lowest chronic values for chlorobenzenes range from 1 to 10 ug/l. The value of 5 ug/l should protect aquatic life from the toxic affects of mono, di and trichlorobenzenes and should be adopted as the standard for all surface water classes except classes D and SD. Applying a factor of 0.01 to the lowest acute value of 450 ug/l will also result in a value of 5 ug/l. Applying a factor of 0.2 to the tainting affect level of 250 ug/l results in a value of 50 ug/l which should be adopted as the standard for Classes D.

The proposed drinking water standards for mono, di and trichlorobenzenes range from 10 to 20 ug/l. Applying the methodology proposed in part 701.8 (d)(4) and using a drinking water standard of 10 ug/l and a bioaccumulation factor of 100 results in a value of 6.1 ug/l. The more stringent value of 5 ug/l derived to protect aquatic life from the toxic effects of chlorobenzenes should be adopted as the standard.