# Appendix A – Environmental Fate Evaluation

Chlorothalonil is expected to possess some degree of mobility in the open environment. Chlorothalonil degrades through both photolytic ($t_{1/2}$ = 10 hr) and microbial processes ($t_{1/2}$ = 7 – 68 days). Chlorothalonil degrades rapidly in clear, shallow water through aqueous photolysis. Chlorothalonil is not susceptible to hydrolysis in waters below pH 9, but does hydrolyze in waters at or above pH 9 ($t_{1/2}$ = 40-60 days). Although photolytic transformation of chlorothalonil is more rapid than biotic metabolism, aqueous photolysis is limited to environmental compartments where clear, shallow waters are exposed to direct sunlight. Therefore, the main route of dissipation for chlorothalonil in the environment is expected to be through aqueous, biotic degradation ($t_{1/2}$ = 7-29 days). Chlorothalonil degrades under both aerobic aquatic conditions ($t_{1/2}$ = 7-16 days), and aerobic terrestrial conditions ($t_{1/2}$ = 22-68 days), and through anaerobic degradation ($t_{1/2}$ = 21-29 days).

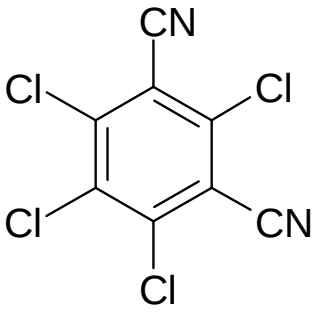


**Figure A-1 Chlorothalonil**

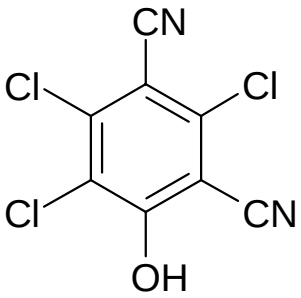


**Figure A-2 4-Hydroxy-2,5,6-trichloro-1,3-dicyanobenzene (SDS-3701)**

The major metabolite considered for terrestrial effects in this assessment, SDS-3701 (4-hydroxy-2,5,6-trichloro-1,3-dicyanobenzene), forms under differing test conditions, and appears to be more mobile and more persistent than chlorothalonil. In submitted aerobic soil metabolism studies (MRID 00137232+) conducted with chlorothalonil, up to 32% of the applied radiation was

present as 3701. In submitted anaerobic metabolism studies (MRID 00147975) conducted with chlorothalonil, up to 43% of the applied radiation was present as 3701. In the available aerobic soil metabolism study (MRID 00040547), also conducted with chlorothalonil, up to 32% of the applied radiation was present as SDS-3701. Only 4% of SDS-3701 formed in the submitted aqueous photolysis study while chlorothalonil dissipated rapidly. In clear shallow waters exposed to direct sunlight, the degradate SDS-1301 is not expected to form in significant amounts. In aquatic metabolism studies conducted with chlorothalonil, a comparison of the ratio of residues reported in water and sediment for chlorothalonil and SDS-3701 indicated that a greater percent of the degradate was present in the water compartment than for chlorothalonil. The degree of persistence exhibited by the chlorothalonil metabolites is sufficient to allow their possible appearance in ground water.

Both chlorothalonil and the degradate of concern for terrestrial organisms have simple chemical structures with simple substituents (including multiple chlorine atoms) attached to a single benzene ring. A comparison of the estimated values for the parent, chlorothalonil, and the degradate, SDS- 3701, through structural analysis modeling indicating roughly similar fate properties for both the parent and degradate is discussed in Section 3.3.1, Potential Exposure to SDS-3701.

In different soils, chlorothalonil mobility is expected to range from slightly mobile to moderately mobile, with laboratory $K_d$ values ranging from 3 to 30. Depending upon soil/sediment composition, concentrations of chlorothalonil in benthic sediments could exceed concentrations found in runoff waters. The vapor pressure and Henry's Law values for the chlorothalonil indicates a slight degree of volatility from both soil and water.

It has been demonstrated that chlorothalonil did bioconcentrate in oysters (BCF = 2660X) and bluegill sunfish (BCF = 3000X). Recalcitrant metabolites did concentrate somewhat in the biochemical (carbon) pool of the organisms, and were slow to be eliminated. Evolution of volatile compounds, including carbon dioxide, was not significant in laboratory testing. However, local ambient air monitoring data demonstrated that chlorothalonil was present in the air.

**Table A-1 Summary of Environmental Fate Properties of Chlorothalonil Used in Assessment.**

| Study Type | Value | Test System | Source / MRID Number |
|---|---|---|---|
| Hydrolysis | half-life = stable | pH 5 and 7;<br>(half-life 30-60 days @ pH9 -may be concentration dependant) | 0040539,<br>00147975 |
| Photodegradation in Water | half-life = 10 hours | pH 7 | 45710223 |
| Photodegradation on Soil | half-life = stable | | 00040541,<br>00040542,<br>00040543,<br>00143751 |
| Aerobic Soil Metabolism | half-life = 68 days;<br>half-life = 24 days;<br>half-life = 22 days;<br>half-life = 24 days | silt loam soil<br>loam soil<br>TX sandy loam soil<br>OH sandy loam soil | 00087351 |
| Aerobic Aquatic Metabolism | total system half-life = 21 days,<br>total system half-life = 13 days | Running ditch water-clay sediment, UK<br><br>Pond water-clay loam sediment, UK | 45908001 |

| | | | |
|---|---|---|---|
| Anaerobic Aquatic Metabolism | total system half-life = 21 days;<br>total system half-life = 29 days | silt loam soil;<br>sandy loam soil | 00147975 |
| Adsorption/Desorption | 26 ($K_d$)<br>29 ($K_d$)<br>20 ($K_d$)<br>3 ($K_d$) | silty clay loam soil;<br>silt soil;<br>sandy loam soil;<br>sand soil | 00115105<br>00153730 for aged column |
| Laboratory Volatility | $5.72 \times 10^{-7}$ torr | 25 °C | 00153732 |
| Bioaccumulation in Fish | 2700X | Whole fish | 45710224 |
| Bioaccumulation in Bivalves | 2660 X | | 42070601 |
| Terrestrial Field Dissipation | total system half-life = 1-2 months | sandy loam soil | 00087296;<br>42433813 |