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# Technical Memorandum

**To:** Brian A. Rakvica, P.E.
Nevada Division of Environmental Protection, Bureau of Corrective Actions

**From:** Joanne Otani Fehling, R.N., M.S.N., P.H.N. and Teri Copeland, M.S., DABT

**Date:** October 5, 2008

**Re:** Toxicology Review for 4,4-Dichlorbenzil

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This memorandum documents the results of our database search to determine whether a toxicity criterion or toxicological surrogate can be derived or identified for 4,4-dichlorbenzil.

Several databases were used to search for toxicity data for 4,4-dichlorbenzil, 2,2-dichlorobenzil, and "dichlorobenzil". These databases include: the USEPA's Integrated Risk Information System (IRIS), California EPA's (Cal-EPA) Toxicity Database, National Institutes of Health's PubMed, OVID, Micromedex, Agency for Toxicological Substances and Disease Registry (ATSDR), Registry of Toxic Effects of Chemical Substances (RTECS), and Material Safety Data Sheets (MSDS). In addition to the databases, the following websites were used to search for information on the dichlorbenzils: USEPA, Cal-EPA, and ATSDR.

The results of the database and website searches are summarized below:

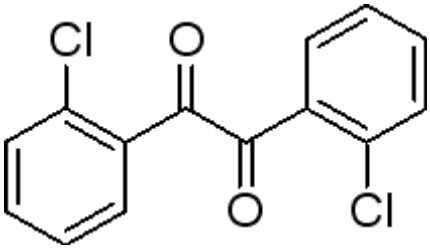
- An MSDS for scientific grade 2,2'-dichlorbenzil (CAS No. 21854-95-5) from Sigma-Aldrich Chemical Company was found (MSDS updated on 1/9/2008). In this document, only an LC50 for fathead minnows of 0.627 mg/L was reported. In addition, the compound is considered an irritant; however, the document states that the chemical, physical, and toxicological properties of the compound have not been thoroughly investigated. No additional toxicology data were noted (see attached).

- Dichlorbenzil could have many chlorinated combinations; however, no information was obtained in the published literature for the other combinations.

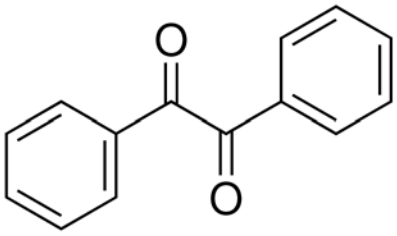
- None of the dichlorbenzils were listed in the USEPA's IRIS database (www.epa.gov/iris) or the Cal-EPA toxicity database (www.oehha.ca.gov), and also were not found on the ATSDR website(www.atsdr.cdc.gov) or ITER website (www.tera.org/iter/).

- The chemical structure of 2,2-dichlrobenzil is provided below. We were unable to find a predrawn structure for 4,4-dichlorobenzil. The only structural difference for the latter would be that the chlorines would move from the 2 position to the 4 position (from ortho to para) on

the benzene rings. (Para- isomers of benzene rings have attached chemical groups separated by two unsubstituted carbon atoms).




- Because of the lack of toxicology data available for the dichlorbenzils, another chemical that is structurally similar was evaluated. Benzil (CAS No. 134-81-6) has a similar chemical structure to the dichlorbenzils except it does not have the two chlorine atoms (see structure below).




- However, no additional toxicological information could be found for this structural surrogate using the same databases.

The only other information ascertained from the database searches above notes that both the dichlorbenzils and benzyl may be pre-cursor chemicals used in the synthesis of other chemicals such as dyes and resins. In addition, it was noted that benzil may also be a disinfectant.

Based on this rigorous literature search, there is not enough acute or chronic toxicity data available to adequately derive a toxicity criterion or identify a toxicological surrogate for the dichlorobenzils.

Because the MSDS notes that 2,2-dichlorobenzil is very toxic to aquatic organisms, perhaps some attention should be given for the potential for 4,4-dichlorobenzil to reach aquatic ecological receptors at the site.

# MATERIAL SAFETY DATA SHEET

Date Printed: 01/09/2008
Date Updated: 02/04/2006
Version 1.1

## Section 1 - Product and Company Information

| | |
|---|---|
| Product Name | 2,2'-DICHLORBENZIL, 97% |
| Product Number | 630012 |
| Brand | ALDRICH |
| Company | Sigma-Aldrich |
| Address | 3050 Spruce Street<br>SAINT LOUIS MO 63103 US |
| Technical Phone: | 800-325-5832 |
| Fax: | 800-325-5052 |
| Emergency Phone: | 314-776-6555 |

## Section 2 - Composition/Information on Ingredient

| Substance Name | CAS # | SARA 313 |
|---|---|---|
| 2,2'-DICHLOROBENZIL | 21854-95-5 | No |

Formula C14H8Cl2O2
Synonyms 2,2'-Dichlorobenzoyl

## Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Irritant. Dangerous for the environment.
Irritating to eyes. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

HMIS RATING

HEALTH: 2
FLAMMABILITY: 0
REACTIVITY: 0

NFPA RATING

HEALTH: 2
FLAMMABILITY: 0
REACTIVITY: 0

For additional information on toxicity, please refer to Section 11.

## Section 4 - First Aid Measures

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE

In case of contact, immediately wash skin with soap and copious amounts of water.

EYE EXPOSURE
In case of contact, immediately flush eyes with copious amounts of water for at least 15 minutes.

## Section 5 - Fire Fighting Measures

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

## Section 6 - Accidental Release Measures

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear respirator, chemical safety goggles, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Sweep up, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

## Section 7 - Handling and Storage

HANDLING
User Exposure: Do not breathe dust. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed.

## Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Mechanical exhaust required.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a dust mask type N95 (US) or type P1 (EN 143) respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash thoroughly after handling.

## Section 9 - Physical/Chemical Properties

Appearance: Physical State: Solid

| Property | Value | At Temperature or Pressure |
|---|---|---|
| Molecular Weight | 279.12 AMU | |
| pH | N/A | |
| BP/BP Range | N/A | |
| MP/MP Range | 133.0 - 134.0 °C | |
| Freezing Point | N/A | |
| Vapor Pressure | N/A | |
| Vapor Density | N/A | |
| Saturated Vapor Conc. | N/A | |
| SG/Density | N/A | |
| Bulk Density | N/A | |
| Odor Threshold | N/A | |
| Volatile% | N/A | |
| VOC Content | N/A | |
| Water Content | N/A | |
| Solvent Content | N/A | |
| Evaporation Rate | N/A | |
| Viscosity | N/A | |
| Surface Tension | N/A | |
| Partition Coefficient | Log Kow: 3.762 | |
| Decomposition Temp. | N/A | |
| Flash Point | N/A | |
| Explosion Limits | N/A | |
| Flammability | N/A | |
| Autoignition Temp | N/A | |
| Refractive Index | N/A | |
| Optical Rotation | N/A | |
| Miscellaneous Data | N/A | |
| Solubility | N/A | |

N/A = not available

## Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide, Hydrogen chloride gas.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

## Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: May cause skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: Causes eye irritation.
Inhalation: May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.
Ingestion: May be harmful if swallowed.

SIGNS AND SYMPTOMS OF EXPOSURE
To the best of our knowledge, the chemical, physical, and

toxicological properties have not been thoroughly investigated.

## Section 12 - Ecological Information

No data available.

ACUTE ECOTOXICITY TESTS
Test Type: LC50 Fish
Species: Pimephales promelas (Fathead minnow)
Value: 0.627 mg/l

## Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

## Section 14 - Transport Information

DOT
Proper Shipping Name: Environmentally hazardous substances, solid, n.o.s.
UN#: 3077
Class: 9
Packing Group: Packing Group III
Hazard Label: Class 9
PIH: Not PIH

IATA
Proper Shipping Name: Environmentally hazardous substance, solid, n.o.s
IATA UN Number: 3077
Hazard Class: 9
Packing Group: III

## Section 15 - Regulatory Information

EU ADDITIONAL CLASSIFICATION
Symbol of Danger: Xi-N
Indication of Danger: Irritant. Dangerous for the environment.
R: 36-50/53
Risk Statements: Irritating to eyes. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S: 26-36-60-61
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Irritant. Dangerous for the environment.
Risk Statements: Irritating to eyes. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing. This material and its container

must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

UNITED STATES REGULATORY INFORMATION

SARA LISTED: No

CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.

DSL: No

NDSL: Yes

## Section 16 - Other Information

DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.