

OFFICE OF TOXIC SUBSTANCES  
CODING FORM FOR GLOBAL INDEXING

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Biochemical Research Laboratory

The Dow Chemical Company

RESULTS OF-RANGE FINDING TOXICOLOGICAL TESTS ON 1,2,4-TRICHLOROBENZENE

File  
K No.  
Chg.  
Rept. By K. J. Olson

Signed Ken Olson Checked DDM<sup>2</sup> Collier  
Date Feb. 24, 1958 Date Feb. 24, 1958

THIS REPORT IS THE PROPERTY OF THE DOW CHEMICAL COMPANY

PROBLEM

A sample of the subject material has been submitted to the Biochemical Research Laboratory for toxicological investigation and definition of industrial handling hazards.

CONCLUSIONS

The subject material has a moderate acute oral toxicity but should present no problem from ingestion incidental to industrial use or general handling. Care should be taken to avoid excessive intake of the material and containers should be clearly labelled so that swallowing due to improper identification cannot occur.

The undiluted material and the 10% solution in propylene glycol are both slightly irritating to the eye. Moderate pain might result from direct contamination. Slight conjunctivitis produced should subside within 24 hours. Minimal eye protection should provide adequate measure for the safe industrial handling of the material.

The undiluted material is slightly to moderately irritating to intact and abraded skin. Prolonged contact for a period of

(Continued)

CONCLUSIONS (CONTINUED)

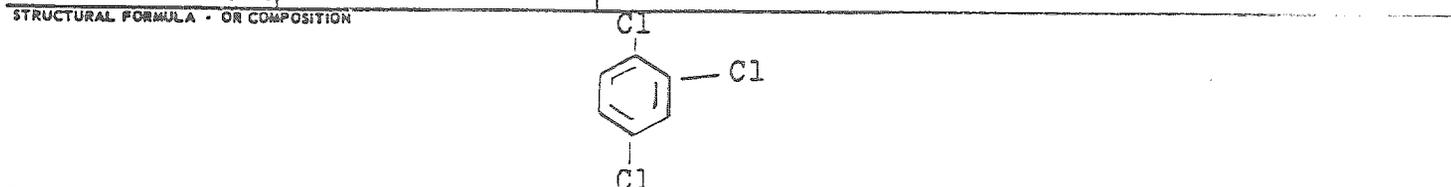
several hours should not produce a burn but would most likely result in some reddening and swelling. Skin absorption tests indicate that the material is absorbed through abraded skin and may be lethal in relatively small amounts. For this reason, it is of utmost importance to avoid contact with the material, particularly in cases where skin may be abraded or where it is otherwise likely that the material might enter the systemic circulation. In cases where skin is abraded or in any way damaged, all contact with the material should be avoided. For cleaning up spills, or in cases where gross contamination is likely, protective clothing should be worn.

Results of single vapor exposure tests indicate that there should be no problem from acute exposure to the material either at room temperature or when heated to 100°C.

These conclusions are based upon range finding toxicological tests and are limited to precautions for industrial handling of the material. Development of specific uses will require consideration of the health problems presented and of the need for further toxicological studies.

BIOCHEMICAL RESEARCH DEPARTMENT  
**THE DOW CHEMICAL COMPANY**  
 MIDLAND MICHIGAN  
**DATA SHEET OF PROPERTIES, HEALTH HAZARDS, AND PRECAUTIONS**  
**FOR SAFE HANDLING OF MATERIALS**

MOLECULAR FORMULA $C_6H_3Cl_3$	CHEMICAL NAME 1,2,4-Trichlorobenzene
MOLECULAR WEIGHT 181.46	INDUSTRIAL HYGIENE STANDARD
SYNONYMS	



PHYSICAL AND CHEMICAL PROPERTIES	BOILING POINT 213 * °C <small>* mmHg.</small>	EXPLOSIVE LIMITS (% BY VOL. IN AIR)	FLASH POINT °F.	IGNITION TEMP. °C	MELTING POINT 17 °C	VAPOR PRESSURE mm Hg 25°C	
	CORROSIVENESS (To Common Metals) Low				PHYSICAL STATE Liquid	COLOR Clear	
	CHEMICAL REACTIVITY Low					ODOR (Include Concentration in Air)	
	STABILITY (To pH Change, Heat, Light) Quite						

	TYPE OF CONTACT	CLASSIFICATION OF TOXIC PROPERTIES	
TOXIC PROPERTIES	EYE	<input checked="" type="checkbox"/> May cause no response or no more than very slight to slight transitory pain and/or irritation of the eyelids.  <input type="checkbox"/> May cause sufficient injury to the eye to result in loss of time from work. (This includes damage to the cornea which heals or scarily heals in a week and/or considerable conjunctival irritation with edema.)	<input type="checkbox"/> May cause some permanent loss of vision (this includes damage to cornea or internal injury which is incompletely healed in one week.)  <input type="checkbox"/> Vapor exposure may cause severe pain, lachrymation or serious injury to the eyes.
	SKIN (1)	<input type="checkbox"/> Single prolonged exposure (hours) causes no effect. Several repeated prolonged exposures may or may not cause the development of some slight irritation.  <input checked="" type="checkbox"/> Single prolonged exposure may cause some reddening of the skin. Repeated prolonged contacts may cause appreciable irritation, possibly a mild burn and/or may cause appreciable systemic injury due to absorption.	<input type="checkbox"/> Single short exposure (minutes) may cause considerable irritation and/or single prolonged or frequently repeated short exposures cause a burn and/or may cause systemic injury, even death.  <input type="checkbox"/> An exposure rapidly causes severe burns and/or serious systemic injury, even death.
	DUST OR MIST	<input type="checkbox"/> No systemic injury expected. No irritation to nose and throat in dusty or misty atmospheres.  <input type="checkbox"/> Throat and nose irritation in a dusty or misty atmosphere is painful but not intolerable and/or prolonged or repeated exposures may cause systemic injury.	<input type="checkbox"/> Dusty or misty atmosphere painful to nose and throat (intolerable to most people) and/or exposure may cause serious systemic injury.  <input type="checkbox"/> Short exposure (minutes) may cause death or serious systemic injury.
	VAPOR	<input checked="" type="checkbox"/> Exposures do not cause any effects other than some very slight irritation or pain to the eyes or respiratory passages at the most.  <input type="checkbox"/> Single exposures exceeding 1/2 hour, or frequently repeated exposures of shorter duration, may cause slight anesthesia and/or slight systemic injury, and/or cause appreciable, but not intolerable, irritation of respiratory passages.  <input type="checkbox"/> Even very short exposure will cause serious systemic injury or death.	<input type="checkbox"/> Exposures may cause extreme bronchitis, and/or serious systemic injury, and/or may cause intolerable irritation to the respiratory passages.  <input type="checkbox"/> Short exposures may cause unconsciousness, and/or serious systemic injury, including death.
	INGESTION	<input checked="" type="checkbox"/> Amounts which may be swallowed incidental to industrial handling will not cause injury. However, if substantial quantities should be swallowed, more or less serious effects may occur.	<input type="checkbox"/> Amounts which may be swallowed incidental to industrial handling and use may cause serious injury.

COMMENTS

\* Merck Index  
 (1) This material may be absorbed by abraded skin and produce death due to systemic injury.

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# 1,2,4-Trichlorobenzene

DEGREES OF EXPOSURE RELATED TO TYPES OF OPERATION		PRECAUTIONS (SEE CODE BELOW)							
		EYES	SKIN	INHALATION*		INGESTION			
				DUST OR MIST	VAPOR				
I	<b>NO CONTACT</b>	Characterized by remote operation with equipment isolated from the work area. The persons entering isolated areas will require the personal protection outlined for IV below.				A	A	A	A
II	<b>MINOR CONTACT</b>	Characterized by closed systems with equipment vented outside the work area; instrument control; mechanical handling of materials in bulk. Examples are: continuous reactors, stills and filters; enclosed conveyors; ventilated packaging.				A	A	A	A
III	<b>OCCASIONAL DAILY CONTACTS</b>	Characterized by manual handling of materials in packages such as bags, drums and fiberpaks. Ventilation may be provided for specific jobs. Many batch operations fall into this category.				B	B	A	A
IV	<b>GROSS CONTACT LIKELY</b>	Characterized by hand operation. Examples are: Emergency repairs, cleaning equipment, cleaning filters, taking care of spills, packaging volatile or dusty materials without ventilation, wheeling and tray drying.				B	C	A	A
<b>EYE CONTACT</b>		A No eye protection needed. B Use safety glasses without side shields. C Use safety glasses with side shields.		D Use chemical workers goggles. E Use gas tight goggles or a full face gas mask.					
<b>SKIN** CONTACT</b>		A A bath and clean clothes once per week along with the usual washing at mealtimes should be adequate precautions. B Grossly contaminated clothing and shoes must be removed not later than the end of the work period and must be thoroughly cleaned before re-use. C Require shower at the end of the work period and clean clothing from the skin out at the start of each work day.		D Clothing should be changed and skin washed promptly upon any detectable contact. Each use will require special consideration to determine suitable protective devices and standards of personal cleanliness. E Impervious clothing such as rubber boots, rubber aprons, and rubber gloves will be required. Specific items will be dictated as required by circumstance.					
<b>INHALATION</b>	<b>DUST OR MIST</b>	A No respiratory protection. B No protection required for exposure of thirty min. duration or less to obviously dusty atmospheres. Exposures of longer duration will require the use of a dust respirator bearing the approval of the U. S. Bureau of Mines for the use with toxic dusts.		D Any exposure to obviously dusty atmospheres will require a dust respirator bearing the approval of the U. S. Bureau of Mines for use with toxic dusts. E Any exposure to dusty atmospheres will require the use of an airline respirator, blower mask, or Chemox mask.					
	<b>VAPOR</b>	A No precautions necessary. B Longer single exposures, or frequently repeated exposures will require a gas mask or respirator equipped with appropriate canister. E Evacuate area at once and enter only with airline respirator, blower mask or Chemox mask.		C No precautions necessary for single exposures of no more than ten minutes. Longer exposures either single or repeated, will require gas mask or respirator equipped with appropriate canister. D Gas mask with appropriate canister required at all times.					
<b>INGESTION</b>		A No unusual procedures required.		E Food and tobacco should not be present in the work area. Hands and face should be washed before smoking and eating.					

**COMMENTS**

\*\*GOOD PRACTICE REQUIRES THAT GROSS AMOUNTS OF ANY CHEMICAL BE REMOVED FROM THE SKIN AS SOON AS IS PRACTICAL.

\*SUITABLE GAS MASK CANISTER

Organic vapor

SIGNED K. J. Olson    D. D. McCollister    CHECKED H. R. Hoyle  
 DATE 1-25-58    2-2-58    DATE 2-7-58

# FIRST AID MEASURES

<b>EYE CONTACT</b>	<p><input checked="" type="checkbox"/> If the eyes are contaminated, they should be flushed immediately with copious amounts of flowing water for at least 15 minutes.</p> <p><input checked="" type="checkbox"/> Medical attention should be obtained if irritation persists or develops after washing of the eyes.</p> <p><input type="checkbox"/> Medical attention should be obtained.</p> <p><input type="checkbox"/> <b>MEDICAL ATTENTION SHOULD THEN BE OBTAINED WITHOUT DELAY.</b></p>
<b>SKIN CONTACT</b>	<p><input checked="" type="checkbox"/> Any injuries or irritations which may develop should receive medical attention.</p> <p><input type="checkbox"/> Contaminated clothing and shoes should be removed and not re-used until thoroughly cleaned.</p> <p><input type="checkbox"/> Wash contaminated skin with soap and plenty of water.</p> <p><input checked="" type="checkbox"/> Contaminated clothing, including shoes, should be removed and the affected skin area should be washed thoroughly with soap and plenty of water.</p> <p><input type="checkbox"/> Medical attention should then be obtained.</p> <p><input checked="" type="checkbox"/> Contaminated clothing and shoes should not be re-used until thoroughly cleaned.</p> <p><input type="checkbox"/> All contaminated clothing, including shoes, <u>must</u> be removed immediately and the affected skin area flushed thoroughly with water from a safety shower, or other suitable device and cleansed with soap and plenty of water.</p> <p><input type="checkbox"/> <b>MEDICAL ATTENTION MUST THEN BE OBTAINED AS RAPIDLY AS POSSIBLE.</b></p> <p><input type="checkbox"/> Contaminated clothing including shoes, must not be re-used until thoroughly cleaned or must be discarded.</p>
<b>INHALATION</b>	<p><input type="checkbox"/> If a person should experience any noticeable ill effects from breathing the vapor or fumes of this material, medical attention should be obtained promptly.</p> <p><input type="checkbox"/> If a person should be overcome from breathing this material, he should be removed to fresh air at once, be made to rest, kept warm, and <b>MEDICAL ATTENTION SHOULD BE OBTAINED IMMEDIATELY.</b> If breathing stops, artificial respiration should be administered.</p>
<b>INGESTION</b>	<p><input type="checkbox"/> If appreciable amounts of material are swallowed, vomiting should be induced by tickling the back of the tongue with the finger or by giving an emetic such as 2 tablespoonfuls of table salt in a glass of warm water. Medical attention should then be obtained.</p> <p><input type="checkbox"/> If the material is swallowed, vomiting must be induced by tickling the back of the tongue with the finger or by giving an emetic such as 2 tablespoonfuls of table salt in a glass of warm water. <b>MEDICAL ATTENTION SHOULD THEN BE OBTAINED WITHOUT DELAY</b></p>

COMMENTS:

SAMPLE INFORMATION

C. R. I. Name: 1,2,4-Trichlorobenzene

Source:

Boiling Point: 213°C (Merck Index)

K Number:

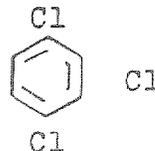
Date Request Received: 4-5-57

Date Sample Received: 4-5-57

Physical State: Liquid

Molecular Formula:  $C_6H_3Cl_3$ 

Structural Formula:

SUMMARY OF RANGE FINDING TOXICOLOGICAL DATAAcute Oral Toxicity

<u>Animal</u>	<u>Preparation Fed</u>	<u>Dose (g./kg.)</u>	<u>No.Died No.Fed</u>	<u>Response-Remarks</u>
Rat	10% solution in corn oil	0.50	0/2	Some liver and kidney damage observed at autopsy. Some bloody urine observed.
Rat	10% solution in corn oil	1.0	1/2	Some bloody diuresis, considerable kidney damage observed at autopsy.
Rat	10% solution in corn oil	2.0	2/2	Essentially the same as above.

Eye Contact - Rabbit

<u>Material</u>	<u>Treatment</u>	<u>Response-Remarks</u>
Undiluted	Washed and unwashed	Moderate immediate pain accompanied by slight conjunctivitis which subsided in 24 hours.
10% solution in propylene glycol	Washed and unwashed	Same as above.

Skin Contact - Rabbit

<u>Material</u>	<u>Condition of Skin</u>	<u>No. of Appl.</u>	<u>Site</u>	<u>Response-Remarks</u>
Undiluted	Intact	4	Ear	Moderate hyperemia followed 1st and 2nd application.
Undiluted	Intact	4	Belly	Same as above.
Undiluted	Abraded	3	Belly	Slight to moderate hyperemia after each application with slight edema and necrosis after 2nd application. Note: Animal developed tremors, was very weak, had wet nose, belly was hard to the touch and skin was cold and cyanotic. The animal eventually appeared to be paralyzed and experienced labored breathing. The animal autopsied by S. Sadek on 4-26-57. It showed subnormal temperature, evidence of reflexes, some paralysis, severe acute pneumonia, extensive fatty liver with kidney damage and the bladder appeared full of bloody urine.

The undiluted material was repeated on the skin contact test and the animal died after the 3rd application.

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Skin Contact - Rabbit (Continued)

<u>Material</u>	<u>Condition of Skin</u>	<u>No. of Appl.</u>	<u>Site</u>	<u>Response-Remarks</u>
10% sol. in Dowanol 50B	Intact	10	Ear	Essentially no irritation observed.
10% sol. in Dowanol 50B	Intact	10	Belly	Some hyperemia after 4th application only. Slight to moderate exfoliation developed after 4th application - skin normal in 16 days.
10% sol. in Dowanol 50B	Abraded	2	Belly	Moderate hyperemia and necrosis with slight edema after 1st application - area developed into a wet bleeding ulcer - skin essentially normal in 21 days.

Skin Absorption - Rabbit (Cuff Technique)

<u>Material</u>	<u>Dose (g./kg.)</u>	<u>Skin Condition</u>	<u>Exposure Time</u>	<u>No. Died No. Treated</u>	<u>Response-Remarks</u>
25% solution in Dowanol 50B	0.50	Intact	24. hours	0/2	Some hyperemia and necrosis observed upon removal of the cuff. Animals appeared normal otherwise.

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Inhalation (Saturated Atmosphere)

<u>Animal</u>	<u>Bath Temp.</u>	<u>Hours Exposed</u>	<u>No. Died No. Treated</u>	<u>Response-Remarks</u>
Rat	Room	7 1/2	0/3	No untoward reactions observed - pathology essentially negative at autopsy.
Rat	100°C	7	0/3	No untoward reactions observations. Some lung congestion, liver and kidney damage observed at autopsy.

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