The Registry of Toxic Effects of Chemical Substances

Carbon dioxide

RTECS #: FF6400000

CAS #: 124-38-9

UPDATE: August 2003	MW: 44.01	MF: CO_2

NOTE:

- **TOXICITY DATA HAVE NOT BEEN EVALUATED. OMISSION OF A SUBSTANCE OR NOTATION DOES NOT IMPLY ANY RELIEF FROM REGULATORY RESPONSIBILITY.**

TABLE OF CONTENTS:

SYNONYMS:

1. Anhydride carbonique (French)
2. Carbonic acid anhydride
3. Carbon dioxide (ACGIH:OSHA)
4. Carbonic acid gas
5. Carbonic anhydride
6. Carbon oxide
7. Dry ice
8. Khladon 744
9. Kohlendioxyd (German)
10. Kohlensaure (German)
11. R 744

SKIN AND EYE IRRITATION DATA AND REFERENCES:

ROUTE/ ORGANISM	DOSE	EFFECT	REFERENCE
N/R	N/R	N/R	N/R

MUTATION DATA AND REFERENCES:

SYSTEM TEST	ROUTE/ ORGANISM/ TISSUE	DOSE	REFERENCE
N/R	N/R	N/R	N/R

REPRODUCTIVE EFFECTS DATA AND REFERENCES:

ROUTE/ ORGANISM	DOSE	EFFECT	REFERENCE
inhalation mouse	lowest published toxic concentration: 55 pph/2 hour (3 day male)	Reproductive: Paternal effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count)	JRPFA4 13,165,1967
inhalation mouse	lowest published toxic concentration: 55 pph/4 hour (6	Reproductive: Effects on fertility: Male fertility index (e.g., # males impregnating	JRPFA4 13,165,1967

	day male)	females per # males exposed to fertile nonpregnant females)	
inhalation mouse	lowest published toxic concentration: 2 pph/8 hour (10 day pregnant)	Reproductive: Effects on fertility: Post- implantation mortality (e.g., dead and/or resorbed implants per total number of implants) Reproductive: Specific developmental abnormalities: Musculoskeletal system	TJADAB 30,187,1984
inhalation rat	lowest published toxic concentration: 6 pph/24 hour (10 day pregnant)	Reproductive: Specific developmental abnormalities: Musculoskeletal system Reproductive: Specific developmental abnormalities: Cardiovascular (circulatory) system Reproductive: Specific developmental abnormalities: Respiratory system	CIRUAL 8,1218,1960
inhalation rat	lowest published toxic concentration: 6 pph/24 hour (10 day pregnant)	Reproductive: Effects on newborn: Growth statistics (e.g., reduced weight gain)	CIRUAL 8,1218,1960
inhalation rabbit	lowest published toxic concentration: 13 pph/4 hour (9-12 day pregnant)	Reproductive: Specific developmental abnormalities: Musculoskeletal system	ZMOAAN 56,165,1965

TUMORIGENIC DATA AND REFERENCES:

ROUTE/ ORGANISM	DOSE	EFFECT	REFERENCE
N/R	N/R	N/R	N/R

ACUTE TOXICITY DATA AND REFERENCES:

ROUTE/ ORGANISM	DOSE	EFFECT	REFERENCE
inhalation dog	lowest published toxic concentration: 5 pph	Cardiac: Changes in coronary arteries Cardiac: Pulse rate decreased with fall in BP Vascular: BP elevation not characterized in autonomic section	VCVN1* - ,327,1988
inhalation dog	lowest published toxic concentration: 10 pph	Lung, Thorax, or Respiration: Dyspnea Autonomic Nervous System: Other (direct) parasympathomimetic	VCVN1* - ,327,1988
inhalation human	lowest published lethal concentration: 9 pph/5 minute	N/R	TABIA2 3,231,1933
inhalation human	lowest published lethal concentration: 11 pph	N/R	VCVN1* - ,328,1988
inhalation human	lowest published toxic concentration: 0.25 pph	Lung, Thorax, or Respiration: Dyspnea Vascular: Other changes	VCVN1* - ,328,1988
inhalation human	lowest published toxic concentration: 2.5 pph	Cardiac: Pulse rate decreased with fall in BP Behavioral: Headache Vascular: BP elevation not characterized in autonomic section	VCVN1* - ,328,1988
inhalation human	lowest published toxic concentration: 7 pph	Behavioral: Irritability Brain and Coverings: Other degenerative changes	VCVN1* - ,328,1988

		Nutritional and Gross Metabolic: Body temperature decrease	
inhalation mammal (species unspecified)	lowest published lethal concentration: 90,000 ppm/5 minute	N/R	AEPPAE 138,65,1928
inhalation mammal (species unspecified)	lowest published toxic concentration: 11 pph/2 hour	Blood: Normocytic anemia	VCVN1* -,327,1988
inhalation mammal (species unspecified)	lowest published toxic concentration: 70 pph	Cardiac: Arrythmias (indlucing changes in conduction) Blood: Changes in serum composition (e.g. TP, bilirubin, cholesterol) Nutritional and Gross Metabolic: Changes in: K	VCVN1* -,327,1988
inhalation mouse	lowest published toxic concentration: 20 pph	Lung, Thorax, or Respiration: Acute pulmonary edema	VCVN1* -,327,1988
inhalation rat	lowest published toxic concentration: 21 pph/1 hour	Cardiac: Other changes Cardiac: Pulse rate decreased with fall in BP Cardiac: Arrythmias (indlucing changes in conduction)	VCVN1* -,327,1988
inhalation rabbit	lowest published toxic concentration: 5 pph/5 hour	Blood: Changes in serum composition (e.g. TP, bilirubin, cholesterol) Blood: Changes in cell count (unspecified) Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: Multiple enzyme effects	VCVN1* -,327,1988

inhalation rabbit	lowest published toxic concentration: 3 pph/7 day	Blood: Normocytic anemia	VCVN1* - ,327,1988
inhalation rabbit	lowest published toxic concentration: 0.1 pph/20 minute	Blood: Other changes Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: Cabonic anhydrase	CEXPB9 27,95,2000

OTHER MULTIPLE DOSE DATA AND REFERENCES:

ROUTE/ ORGANISM	DOSE	EFFECT	REFERENCE
inhalation rat	lowest published toxic concentration: 10,000 ppm/24 hour/30 day-continuous	Blood: Other changes	JPETAB 78,11,1943
inhalation rabbit	lowest published toxic concentration: 27,000 ppm/24 hour/30 day-continuous	Behavioral: Somnolence (general depressed activity)	JPETAB 78,11,1943

REVIEWS:

ORGANIZATION	STANDARD	REFERENCE
American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value	time-weighted average 5000 ppm	DTLVS* TLV/BEI,2002
American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value	short term exposure limit 30,000 ppm	DTLVS* TLV/BEI,2002
American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value	time-weighted average 5000 ppm	DTLVS* TLV/BEI,1999
TOXICOLOGY REVIEW		EVHPAZ

		11,163,1975

STANDARDS AND REGULATIONS:		
ORGANIZATION	**STANDARD**	**REFERENCE**
Environmental Protection Agency (EPA) Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) 1988	PESTICIDE SUBJECT TO REGISTRATION OR RE-REGISTRATION	FEREAC 54,7740,1989
Environmental Protection Agency (EPA) Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) 1998 STATUS OF	PESTICIDES: RED Completed	RBREV* -,299,1998
Mine Safety and Health Administration (MSHA) STANDARD - air	time-weighted average 5000 ppm (9000 mg/m^3)	DTLVS* 3,39,1971
Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (General Industry)	8 hour time-weighted average 5000 ppm (9000 mg/m^3)	CFRGBR 29,1910.1000,1994
Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (Construction)	8 hour time-weighted average 5000 ppm (9000 mg/m^3)	CFRGBR 29,1926.55,1994
Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (Shipyards)	8 hour time-weighted average 5000 ppm (9000 mg/m^3)	CFRGBR 29,1915.1000,1993
Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (Federal Contractors)	8 hour time-weighted average 5000 ppm (9000 mg/m^3)	CFRGBR 41,50-204.50,1994
Occupational Exposure Limit - AUSTRALIA	time-weighted average 5000 ppm (9000 mg/m^3), short term exposure limit 30000 ppm, JAN1993	
Occupational Exposure Limit - AUSTRIA	MAK 5000 ppm (9000 mg.m^3), JAN1999	
Occupational Exposure Limit - BELGIUM	time-weighted average 5000 ppm (9000 mg/m^3), short term exposure limit 30000 ppm, JAN1993	

Occupational Exposure Limit - DENMARK	time-weighted average 5000 ppm (9000 mg/m^3), JAN1999
Occupational Exposure Limit - FINLAND	time-weighted average 5000 ppm (9000 mg/m^3), JAN1999
Occupational Exposure Limit - GERMANY	MAK 5000 ppm (9000 mg/m^3), JAN1999
Occupational Exposure Limit - HUNGARY	short term exposure limit 9000 mg/m^3, JAN1993
Occupational Exposure Limit - JAPAN	Occupational Exposure Limit 5000 ppm (9000 mg/m^3), JAN1999
Occupational Exposure Limit - THE NETHERLANDS	MAC-TGG 5000 ppm (9000 mg/m^3), JAN1999
Occupational Exposure Limit - NORWAY	time-weighted average 5000 ppm (9000 mg/m^3), JAN1999
Occupational Exposure Limit - THE PHILIPPINES	time-weighted average 5000 ppm (9000 mg/m^3), JAN1993
Occupational Exposure Limit - POLAND	MAC(time-weighted average) 9000 mg/m^3, MAC(short term exposure limit) 27000 mg/m^3, JAN1999
Occupational Exposure Limit - RUSSIA	time-weighted average 5000 ppm, JAN1993
Occupational Exposure Limit - SWEDEN	NGV 5000 ppm (9000 mg/m^3), KTV 10000 ppm (18000 mg/m^3), JAN1999
Occupational Exposure Limit - SWITZERLAND	MAK- week 5000 ppm (9000 mg/m^3), JAN1999
Occupational Exposure Limit - THAILAND	time-weighted average 5000 ppm (9000 mg/m^3), JAN1993
Occupational Exposure Limit - TURKEY	time-weighted average 5000 ppm (9000 mg/m^3), JAN1993
Occupational Exposure Limit - UNITED KINGDOM	time-weighted average 5000 ppm (9150 mg/m^3), short term exposure limit 15000 ppm, SEP2000
Occupational Exposure Limit IN ARGENTINA, BULGARIA, COLOMBIA, JORDAN, KOREA	American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value; time-weighted average 5000 ppm
Occupational Exposure Limit IN NEW ZEALAND, SINGAPORE, VIETNAM	American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value time-weighted average 5000 ppm

NIOSH DOCUMENTATION AND SURVEILLANCE:

ORGANIZATION	STANDARD or SURVEY	REFERENCE
National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Level TO CARBON DIOXIDE-air	10 hour time-weighted average 5000 ppm; short term exposure limit 30000 ppm	NIOSH* DHHS #92-100,1992
National Occupational Hazard Survey 1974	National Occupational Hazard Survey 1974: Hazard Code: 17367; Number of Industries 239; Total Number of Facilities 35,989; Number of Occupations 150; Total Number of Employees Exposed 447,416	
National Occupational Exposure Survey 1983	National Occupational Exposure Survey 1983: Hazard Code: X8532; Number of Industries 110; Total Number of Facilities 12,913; Number of Occupations 95; Total Number of Employees Exposed 192,401; Total Number of Female Employees Exposed 17,538	
National Occupational Exposure Survey 1983	National Occupational Exposure Survey 1983: Hazard Code: 17367; Number of Industries 310; Total Number of Facilities 70,119; Number of Occupations 186; Total Number of Employees Exposed 1,121,046; Total Number of Female Employees Exposed 222,613	

STATUS IN FEDERAL AGENCIES:

ORGANIZATION	REFERENCE
EPA TSCA Section 8(b) CHEMICAL INVENTORY	
EPA TSCA Section 8(d) unpublished health/safety studies	
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JANUARY 2001	

NIOSH Analytical Method, 1994: Carbon dioxide, 6603
OSHA ANALYTICAL METHOD #ID-172

REFERENCES:

CODEN	REFERENCE
AEPPAE	Naunyn-Schmiedeberg's Archiv fuer Experimentelle Pathologie und Pharmakologie. (Berlin, Ger.) V.110-253, 1925-66. For publisher information, see NSAPCC.
CEXPB9	Clinical and Experimental Pharmacology and Physiology. (Blackwell Scientific Publications, (Australia) Pty Ltd., 107 Barry St., Carlton, Vic. 3053, Australia) V.1- 1974-
CFRGBR	Code of Federal Regulations. (U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402)
CIRUAL	Circulation Research. (American Heart Assoc., 7320 Greenville Ave., Dallas, TX 75231) V.1- 1953-
DTLVS*	The Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) booklet issues by American Conference of Governmental Industrial Hygienists (ACGIH), Cincinnati, OH, 1996
EVHPAZ	EHP, Environmental Health Perspectives. (U.S. Government Printing Office, Supt of Documents, Washington, DC 20402) No.1- 1972-
FEREAC	Federal Register. (U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402) V.1- 1936-
JPETAB	Journal of Pharmacology and Experimental Therapeutics. (Williams & Wilkins Co., 428 E. Preston St., Baltimore, MD 21202) V.1- 1909/10-
JRPFA4	Journal of Reproduction and Fertility. (Biochemical Soc. Book Depot, POB 32, Commerce Way, Colchester, Essex CO2 8HP, UK) V.1- 1960-
NIOSH*	National Institute for Occupational Safety and Health, U.S. Dept. of Health, Education, and National Institute of Occupational Safety and Health, U.S. Dept. of Health, Education, and Welfare, Reports and Memoranda.
RBREV*	Status of Pesticides in Registration, Reregistration, and Special Review (Rainbow Report), Special Review and Reregistration Division Office of Pesticide Programs U.S. Environmental Protection Agency, 401 M. Street, S.W., Washington, D.C. 20460, Spring 1998
TABIA2	Tabulae Biologicae. (The Hague, Netherlands) V.1-22, 1925-63. Discontinued.

TJADAB	Teratology, The International Journal of Abnormal Development. (Alan R. Liss, Inc., 41 E. 11th St., New York, NY 10003) V.1- 1968-
VCVN1*	"Vrednie chemichescie veshestva. Neorganicheskie soedinenia elementov I-IV groopp" (Hazardous substances. Inornanic substances containing I-IV group elements), Filov V.A., Chimia, 1988.
ZMOAAN	Zeitschrift fuer Morphologie und Anthropologie. (E. Schweizerbart'sche Verlagsbuchhandlung, Johannesstr. 3A, D-7000 Stuttgart 1, Fed. Rep. Ger.) V.1- 1899-

RTECS Compound Description:
Reproductive Effector
Human Data