National Institute for Occupational Safety and Health NIOSH

RTECS

The Registry of Toxic Effects of Chemical Substances

Asbestos, chrysotile

RTECS #: CI6478500

CAS #: 12001-29-5

PLAINTIFF'S EXHIBIT

SA-494

UPDATE: July 2000	MW: N/R	MF: $H_4O_4Si \cdot 1/_2H_2O \cdot 3/_2Mg$

NOTE:

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

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SYNONYMS:

1. 7 - 45 Asbestos
2. Asbestos (ACGIH)
3. Avibest C
4. Calidria RG 100
5. Calidria RG 144
6. Calidria RG 600
7. Cassiar AK
8. Chrysotile asbestos
9. Chrysotile asbestos (ACGIH)
10. Hooker No. 1 chrysotile asbestos
11. K6 - 30
12. Metaxite
13. NCI C61223A
14. Plastibest 20
15. 5R04
16. RG 600
17. Serpentine chrysotile
18. Sylodex
19. White asbestos

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
cytogenetic analysis	hamster lung	10 mg/L	CRNGDP 8,553,1987
cytogenetic analysis	hamster embryo	100 µg/L	ENVRAL 10,165,1975
cytogenetic analysis	hamster ovary	10 mg/L	CSHCAL 4,941,1977
cytogenetic analysis	human lymphocyte	10 mg/L	MUREAV 265,245,1992
cytogenetic analysis	intraperitoneal mouse	50 mg/kg	MUREAV 319,303,1993
cytogenetic analysis	intraperitoneal rat	100 mg/kg	CNREA8 48,6455,1988
cytogenetic analysis	rat other cell types	2 mg/L	NASGEJ 3,511,1985

cytogenetic analysis	intratracheal rat	2,900 gm/L	ENVRAL 57,175,1992
DNA inhibition	hamster lung	62 mg/L	TIVIEQ 1,71,1987
unscheduled DNA synthesis	human lung	10 mg/L	JEPOEC 6 (5/6),169,1986
unscheduled DNA synthesis	rat other cell types	4 µg/cm2	MUREAV 241,361,1990
micronucleus test	hamster embryo	500 ng/cm2/48 hour	CNREA8 44,5017,1984
micronucleus test	hamster lung	3,297 µg/L	MUREAV 320,253,1994
mutation in mammalian somatic cells	hamster lung	10 mg/L	MUREAV 68,265,1979
morphological transform	hamster embryo	250 ng/cm2	PAACA3 24,96,1983
morphological transform	mouse other cell types	10 mg/L	CSHCAL 4,941,1977
morphological transform	rat other cell types	400 ng/cm2	CRNGDP 6,523,1985
other mutation test systems	hamster embryo	1 mg/L	ENVRAL 10,165,1975
other mutation test systems	hamster ovary	10 mg/L	MUREAV 116,369,1983
other mutation test systems	human fibroblast	10 mg/L	MUREAV 116,369,1983
other mutation test systems	intratracheal rat	2,900 gm/L	ENVRAL 57,175,1992
sister chromatid exchange	hamster ovary	100 µg/L	ENVRAL 24,325,1981
sex chromosome loss and nondisjunction	oral Drosophila melanogaster	5 gm/L	MUREAV 261,9,1991
sex chromosome loss and nondisjunction	hamster embryo	500 ng/cm2/48 hour	CNREA8 44,5017,1984
sex chromosome loss and nondisjunction	hamster lung	40 mg/L	CRNGDP 8,553,1987
sex chromosome loss and nondisjunction	intraperitoneal rat	100 mg/kg	CNREA8 48,6455,1988

REPRODUCTIVE EFFECTS DATA AND REFERENCES:			
ROUTE/ ORGANISM	**DOSE**	**EFFECT**	**REFERENCE**
N/R	N/R	N/R	N/R

TUMORIGENIC DATA AND REFERENCES:			
ROUTE/ ORGANISM	**DOSE**	**EFFECT**	**REFERENCE**
inhalation hamster	lowest published toxic concentration: 23 mg/m^3/7 hour/47 week- intermittent	Tumorigenic: Equivocal tumorigenic agent by RTECS criteria Lung, Thorax, or Respiration: Tumors Endocrine: Adrenal cortex tumors	ENVRAL 10,368,1975
inhalation man	lowest published toxic concentration: 400 million particles per cubic foot/1 year-continuous	Tumorigenic: Carcinogenic by RTECS criteria Lung, Thorax, or Respiration: Fibrosis, focal (pneumoconiosis) Lung, Thorax, or Respiration: Tumors	AEHLAU 28,61,1974
inhalation rat	lowest published toxic concentration: 11 mg/m^3/26 week- intermittent	Tumorigenic: Carcinogenic by RTECS criteria Lung, Thorax, or Respiration: Tumors	BJCAAI 29,252,1974
inhalation rat	toxic concentration (other than lowest) : 12 mg/m^3/13 week-intermittent	Tumorigenic: Neoplastic by RTECS criteria Lung, Thorax, or Respiration: Tumors	RRCRBU 39,37,1972

inhalation rat	toxic concentration (other than lowest) : 10 mg/m^3/52 week-continuous	Tumorigenic: Equivocal tumorigenic agent by RTECS criteria Lung, Thorax, or Respiration: Tumors	IAPUDO 30,285,1980
inhalation rat	toxic concentration (other than lowest) : 11 mg/m^3/8 hour/26 week- intermittent	Tumorigenic: Carcinogenic by RTECS criteria Lung, Thorax, or Respiration: Tumors	IAPUDO 30,363,1980
implant rat	lowest published toxic dose: 200 mg/kg	Tumorigenic: Equivocal tumorigenic agent by RTECS criteria Tumorigenic: Tumors at site of application	IARCCD 8,289,1973
intrapleural rat	lowest published toxic dose: 100 mg/kg	Tumorigenic: Carcinogenic by RTECS criteria Lung, Thorax, or Respiration: Tumors	BJCAAI 23,567,1969
intrapleural rat	lowest published toxic dose: 300 mg/kg/12 week- intermittent	Tumorigenic: Equivocal tumorigenic agent by RTECS criteria Lung, Thorax, or Respiration: Tumors	VOONAW 20 (4),47,1974
intrapleural rat	toxic dose : 90 mg/kg	Tumorigenic: Neoplastic by RTECS criteria Tumorigenic: Tumors at site of application	JSOMBS 29,20,1979
intrapleural rat	toxic dose : 200 mg/kg	Tumorigenic: Neoplastic by RTECS criteria Lung, Thorax, or Respiration: Bronchogenic carcinoma	JNCIAM 48,797,1972
intrapleural rat	toxic dose : 120 mg/kg/2 week-intermittent	Tumorigenic: Neoplastic by RTECS criteria Tumorigenic: Tumors at site of application	CALEDQ 17,313,1983

intraperitoneal hamster	lowest published toxic dose: 200 mg/kg	Tumorigenic: Equivocal tumorigenic agent by RTECS criteria Gastrointestinal: Other changes	IAPUDO 30,337,1980
intraperitoneal mouse	lowest published toxic dose: 80 mg/kg	Tumorigenic: Carcinogenic by RTECS criteria Tumorigenic: Tumors at site of application	ENVRAL 35,277,1984
intraperitoneal mouse	toxic dose : 400 mg/kg	Tumorigenic: Equivocal tumorigenic agent by RTECS criteria Gastrointestinal: Tumors	ENVRAL 27,433,1982
intraperitoneal rat	lowest published toxic dose: 9 mg/kg	Tumorigenic: Carcinogenic by RTECS criteria Tumorigenic: Tumors at site of application	ZHPMAT 162,467,1976
intraperitoneal rat	toxic dose : 90 mg/kg	Tumorigenic: Equivocal tumorigenic agent by RTECS criteria Tumorigenic: Tumors at site of application	ENVRAL 4,496,1971
intraperitoneal rat	toxic dose : 28 mg/kg	Tumorigenic: Neoplastic by RTECS criteria Gastrointestinal: Tumors	NATWAY 59,318,1972
intraperitoneal rabbit	lowest published toxic dose: 25 mg/kg	Tumorigenic: Equivocal tumorigenic agent by RTECS criteria Gastrointestinal: Other changes	IAPUDO 30,337,1980
intratracheal hamster	toxic dose : 48 mg/kg/6 week-intermittent	Tumorigenic: Equivocal tumorigenic agent by RTECS criteria Lung, Thorax, or Respiration: Tumors	IAPUDO 30,305,1980

intratracheal mouse	lowest published toxic dose: 200 mg/kg	Tumorigenic: Carcinogenic by RTECS criteria Lung, Thorax, or Respiration: Tumors	PAACA3 15,6,1974
intratracheal rat	lowest published toxic dose: 13 mg/kg	Tumorigenic: Equivocal tumorigenic agent by RTECS criteria Lung, Thorax, or Respiration: Bronchogenic carcinoma	ENVRAL 21,63,1980
multiple hamster	lowest published toxic dose: 240 gm/kg/35 week- continuous	Tumorigenic: Equivocal tumorigenic agent by RTECS criteria Tumorigenic: Facilitates action of known carcinogens	ANYAA9 132,456,1965
oral rat	lowest published toxic dose: 7,100 mg/kg/39 week-continuous	Tumorigenic: Carcinogenic by RTECS criteria Liver: Tumors Kidney, Ureter, and Bladder: Kidney tumors	ARGEAR 46,437,1976
subcutaneous mouse	lowest published toxic dose: 2,400 mg/kg/13 week-intermittent	Tumorigenic: Neoplastic by RTECS criteria Lung, Thorax, or Respiration: Tumors Tumorigenic: Tumors at site of application	FCTXAV 6,566,1968

ACUTE TOXICITY DATA AND REFERENCES:

ROUTE/ ORGANISM	DOSE	EFFECT	REFERENCE

inhalation human	lowest published toxic concentration: 2.8 fiber/cubic centimeter/5 year	Lung, Thorax, or Respiration: Fibrosis, focal (pneumoconiosis) Lung, Thorax, or Respiration: Cough Lung, Thorax, or Respiration: Dyspnea	ENVRAL 23,292,1980
intraperitoneal rat	lowest published lethal dose: 300 mg/kg	Behavioral: Change in motor activity (specific assay) Gastrointestinal: Hypermotility, diarrhea Gastrointestinal: Peritonitis	AJPAA4 70,291,1973

OTHER MULTIPLE DOSE DATA AND REFERENCES:

ROUTE/ ORGANISM	DOSE	EFFECT	REFERENCE
inhalation hamster	lowest published toxic concentration: 30 mg/m^3/6 hour/78 week- intermittent	Lung, Thorax, or Respiration: Fibrosis (interstitial) Lung, Thorax, or Respiration: Changes in lung weight	INHTE5 7,503,1995
inhalation rat	lowest published toxic concentration: 8,210 $\mu g/m^3$/6 hour/20 day- intermittent	Lung, Thorax, or Respiration: Fibrosis (interstitial)	TXAPA9 137,67,1996
oral rat	lowest published toxic dose: 10,867 mg/kg/78 week-continuous	Gastrointestinal: Other changes Kidney, Ureter, and Bladder: Other changes in urine composition Biochemical: Metabolism (intermediary): Other carbohydrates	TOLED5 39,205,1987

REVIEWS:

ORGANIZATION	STANDARD	REFERENCE
American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value	Confirmed human carcinogen	DTLVS* TLV/BEI,1999
American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value	time-weighted average 0.2 mg/m^3 f/cubic centimeter (f)	DTLVS* TLV/BEI,1999
International Agency for Research on Cancer (IARC) Cancer Review	Human Sufficient Evidence	IMEMDT 2,17,1973
International Agency for Research on Cancer (IARC) Cancer Review	Animal Sufficient Evidence	IMEMDT 2,17,1973
International Agency for Research on Cancer (IARC) Cancer Review	Human Sufficient Evidence	IMEMDT 14,11,1977
International Agency for Research on Cancer (IARC) Cancer Review	Animal Sufficient Evidence	IMEMDT 14,11,1977
International Agency for Research on Cancer (IARC) Cancer Review	Group 1	IMSUDL 7,106,1987
TOXICOLOGY REVIEW		31BYAP -,93,1974

STANDARDS AND REGULATIONS:

ORGANIZATION	STANDARD	REFERENCE
Mine Safety and Health Administration (MSHA) STANDARD - air	time-weighted average 5 fiber/cubic centimeter (fiber > 5 um)	DTLWS* 3,33,1973
Occupational Safety and Health Administration (OSHA)	cancer hazard	CFRGBR 29,1910.1001,1987
Occupational Exposure Limit - AUSTRIA	Carcinogen, JAN1999	
Occupational Exposure Limit - FRANCE	VME 0.6 fiber/ml, continuous1 Carcinogen, JAN1999	
Occupational Exposure Limit - NORWAY	time-weighted average 0.1 $fiber/cm^3$, JAN1999	

Occupational Exposure Limit - SWEDEN	time-weighted average 0.2 fiber/ml, Carcinogen, JAN1999
Occupational Exposure Limit - SWITZERLAND	MAK- week 0.25 fiber/ml, Carcinogen, JAN1999
Occupational Exposure Limit - UNITED KINGDOM	LTEL 0.5 fiber/ml/4 hour, JAN1993
Occupational Exposure Limit - UNITED KINGDOM	LTEL 1.5 fiber/ml/10 hour, JAN1993
Occupational Exposure Limit IN ARGENTINA, BULGARIA, COLOMBIA, JORDAN, KOREA	American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value; time-weighted average 0.2 mg/m^3 f/cubic centimeter (f)
Occupational Exposure Limit IN NEW ZEALAND, SINGAPORE, VIETNAM	American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value time-weighted average 0.2 mg/m^3 f/cubic centimeter (f)

NIOSH DOCUMENTATION AND SURVEILLANCE:

ORGANIZATION	STANDARD or SURVEY	REFERENCE
National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Level TO ASBESTOS-air	100 minute time-weighted average 0.1 fiber/cubic centimeter in a 400L air sample	NIOSH* DHHS #92-100,1992
National Occupational Exposure Survey 1983	National Occupational Exposure Survey 1983: Hazard Code: T1575; Number of Industries 45; Total Number of Facilities 5,924; Number of Occupations 48; Total Number of Employees Exposed 92,033; Total Number of Female Employees Exposed 13,262	

STATUS IN FEDERAL AGENCIES:	
ORGANIZATION	**REFERENCE**
EPA GENETOX PROGRAM 1988, Positive: Carcinogenicity-mouse/rat	
EPA GENETOX PROGRAM 1988, Negative: TRP reversion	
EPA TSCA Section 8(d) unpublished health/safety studies	
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, OCTOBER 2000	
NIOSH Analytical Method, 1994: Asbestos (bulk) by PLM, 9002; by PCM, 7400; by TEM, 7402	
NIOSH Analytical Method, 1994: Asbestos, chrysotile by XRD, 9000	
NTP Carcinogenesis Studies (feed):some evidence:rat	NTPTR* NTP-TR-295,1985
NTP Carcinogenesis Studies (feed);no evidence:hamster	NTPTR* NTP-TR-246,1990
NTP 9th Report on Carcinogens, 2000:Known to be human carcinogen	

REFERENCES:	
CODEN	**REFERENCE**
31BYAP	"Experimental Lung Cancer: Carcinogenesis and Bioassays, International Symposium, 1974," Karbe, E., and J.F. Park, eds., Springer-Verlag New York, Inc., 1974
AEHLAU	Archives of Environmental Health. (Heldref Pub., 4000 Albemarle St., NW, Washington, DC 20016) V.1- 1960-
AJPAA4	American Journal of Pathology. (Lippincott/Harper, Journal Fulfillment Dept., 2350 Virginia Ave., Hagerstown, MD 21740) V.1- 1925-
ANYAA9	Annals of the New York Academy of Sciences. (New York Academy of Sciences, 2 E. 63rd St., NewYork, NY 10021) V.1- 1877-
ARGEAR	Archiv fuer Geschwulstforschung. (VEB Verlag Volk und Gesundheit Neue Gruenstr. 18, Berlin DDR-1020, Ger. Dem. Rep.) V.1- 1949-
BJCAAI	British Journal of Cancer. (Macmillan Press Ltd., Houndmills, Basingstoke, Hants. RG21 2XS, UK) V.1- 1947-
CALEDQ	Cancer Letters (Shannon, Ireland). (Elsevier Scientific Pub. Ireland Ltd., POB 85, Limerick, Ireland) V.1- 1975-

CFRGBR	Code of Federal Regulations. (U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402)
CNREA8	Cancer Research. (Public Ledger Building, Suit 816, 6th & Chestnut Sts., Philadelphia, PA 19106) V.1- 1941-
CRNGDP	Carcinogenesis (London). (Oxford Univ. Press, Pinkhill House, Southfield Road, Eynsham, Oxford OX8 1JJ, UK) V.1- 1980-
CSHCAL	Cold Spring Harbor Conferences on Cell Proliferation. (Cold Spring Harbor, NY) V.1-10, 1974-83.
DTLVS*	The Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) booklet issues by American Conference of Governmental Industrial Hygienists (ACGIH), Cincinnati, OH, 1996
DTLWS*	"Documentation of the Threshold Limit Values for Substances in Workroom Air," Supplements. For publisher information, see 85INA8.
ENVRAL	Environmental Research. (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1967-
FCTXAV	Food and Cosmetics Toxicology. (London, UK) V.1-19, 1963-81. For publisher information, see FCTOD7.
IAPUDO	IARC Publications. (WHO Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210) No.27- 1979-
IARCCD	IARC Scientific Publications. (Geneva, Switzerland) No.1-26, 1971-78. For publisher information, see IAPUDO.
IMEMDT	IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man. (WHO PublicationsCentre USA, 49 Sheridan Ave., Albany, NY 12210) V.1- 1972-
IMSUDL	IARC Monographs, Supplement. (WHO Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210) No.1- 1979-
INHTE5	Inhalation Toxicology. (Hemisphere Publishing Corp., c/o Taylor & Francis Inc., 1900 Frost Rd., Suite 101, Bristol, PA 19007) V.1- 1989-
JEPOEC	Journal of Environmental Pathology, Toxicology and Oncology. (Chem-Orbital, POB 134, Park Forest, IL 60466) V.5(4)- 1984-
JNCIAM	Journal of the National Cancer Institute. (Washington, DC) V.1-60, 1940-78. For publisher information, see JJIND8.
JSOMBS	Journal of the Society of Occupational Medicine. (John Wright & Sons, Ltd., Techno House, Redcliffe Way, Bristol BS1 6NX, UK) V.23- 1973-
MUREAV	Mutation Research. (Elsevier Science Pub. B.V., POB 211, 1000 AE Amsterdam, Netherlands) V.1- 1964-
NASGEJ	NATO ASI Series, Series G: Ecological Sciences. (Springer-Verlag New York, Inc., Service Center, 44 Hartz Way, Secaucus, NJ 07094) No.1- 1983-
NATWAY	Naturwissenschaften. (Springer-Verlag, Heidelberger Platz 3, D-1000 Berlin 33, Fed. Rep. Ger.) V.1- 1913-

NIOSH*	National Institute for Occupational Safety and Health, U.S. Dept. of Health, Education, and Welfare, Reports and Memoranda.
NTPTR*	National Toxicology Program Technical Report Series. (Research Triangle Park, NC 27709) No.206-
PAACA3	Proceedings of the American Association for Cancer Research. (Waverly Press, 428 E. Preston St., Baltimore, MD 21202) V.1- 1954-
RRCRBU	Recent Results in Cancer Research. (Springer-Verlag New York, Inc., Service Center, 44 Hartz Way, Secaucus, NJ 07094) V.1- 1965-
TIVIEQ	Toxicology In Vitro. (Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, NY 10523) V.1- 1987-
TOLED5	Toxicology Letters. (Elsevier Science Pub. B.V., POB 211, 1000 AE Amsterdam, Netherlands) V.1- 1977-
TXAPA9	Toxicology and Applied Pharmacology. (Academic Press, Inc., 1 E. First St., Duluth, MN 55802)V.1- 1959-
VOONAW	Voprosy Onkologii. Problems of Oncology. For English translation, see PONCAU. (V/O Mezhdunarodnaya Kniga, 113095 Moscow, USSR) V.1-10, 1928-37; V.1- 1955-
ZHPMAT	Zentralblatt fuer Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene, Abteilung 1: Originale, Reihe B: Hygiene, Krankenhaushygiene, Betriebshygiene, Praeventive Medizin. (Stuttgart, Fed. Rep. Ger.) V.155-169, 1971-1979. For publisher information, see ZAOMDC.

RTECS Compound Description:
Tumorigen
Mutagen
Human Data
Natural Product

ALT CAS #: 12426-98-1
ALT CAS #: 61076-97-9