THE DOW CHEMICAL COMPANY

MIDLAND, MICHIGAN 48674

September 3, 1987

TO: Bob Oubre
CEP Technology Center
OC 1120 Building
Texas Operations

FROM: Geary Olsen
Epidemiology Dept., H & ES
1803 Building, Midland

cc: Ralph Cook, M.D. Director of Epidemiology
Rita Shellenberger, Medical Dept. Texas Operations

SUBJECT: Your request concerning what is known about the potential association between vinyl chloride exposure and spontaneous abortions.

Enclosed is a copy of the literature review and several published articles that I obtained regarding your request. Much of the epidemiology literature identified in this computerized literature search, is actually review articles concerning reproductive outcomes and chemical exposures. All the reviews pertaining to vinyl chloride referred to one specific study, that done by Infante et al. and reported in Lancet in 1976.

Briefly, the Infante et al study surveyed men, who had worked at rubber manufacturing, P.V.C. fabrication and V.C.M. polymerizing facilities, for fetal loss (defined as any product of coneption not born alive). No data were obtained from the wives, or were maternal ages known which is a strong predictor of fetal loss. Infante et al reported a significant excess of fetal loss for the V.C.M. workers compared to the other two facilities. The age-adjusted fetal death rate per 100 pregnancies was 10.8 for the V.C.M. workers and 6.8 for the controls.

Although the Infante et al study has been widely reviewed and reported, it has received harsh criticism from Haas and Schottenfeld in their article that appeared in the Journal of Occupational Medicine in 1979. Schottenfeld is currently the director of epidemiology at the University of Michigan. Haas and Schottenfeld wrote, "While the authors (Infante et al) felt that these observations were likely to reflect a real difference in pregnancy outcome not attributable to either interviewer or patient recall bias, the conclusions were based on indirect sources of information and could not take into account the multiplicity of maternal factors known to affect pregnancy

outcome. The study design precluded documenting in even the crudest manner the validitiy of pregnancy histories. Without such adjustments and validation, the inferences made by Infante and colleagues cannot be sustained and little light is shed on the possible association of abnormal pregnancy outcome with paternal occupational exposure to V.C.M."

Two other articles that have been more recently published include a Russian and Finnish paper. The English abstract to the Russian paper stated, "Reproductive function was studied in men occupationally exposed to chloroprene, vinyl chloride or antimonite ore dust. This function was assessed on indirect evidence and from analyses of ejaculaties. The rate of spontaneous abortions was significantly increased among wives of men exposed to chloroprene as was the rate of stillbirths among wives of those exposed to vinyl chloride. Pathologic changes were detected in ejaculates."
The Finnish paper by Lindbohm et al reported no increased risk of spontaneous abortion among workers processing polymerized plastics or heated plastics made of vinyl chloride or of styrene. However, they are cautious in their intrepretation because of the small sample size in their study.

I believe a few words about spontaneous abortions with regards to their definition, identification and cause may also be helpful to you. Although the World Health Organization has defined spontaneous abortions as any non-deliberate interruption of an intrauterine pregnancy before the 28th week of gestation (since the last menstrual period, LMP) in which the fetus is dead when expelled, there are numerous variations of this definition in the literature. Other definitions may have such qualifiers as 1) including all bleeding episodes even though pathologic confirmations were not performed, 2) excluding younger gestational age fetal deaths (e.g., 24th week), 3) including terminations in which the fetus was alive upon expulsion but died very shortly thereafter, and 4) including terminations after the 28th week. Also, in a population where induced abortions are a frequent outcome of early gestation, consideration must be given to the potential number of spontaneous abortions that would have occurred had they not first been induced.

Because of the multiplicity of definitions, how spontaneous abortions are defined may greatly affect incidence enumeration and subsequent epidemiologic study results. Recognition by a woman as to whether she had a spontaneous abortion is not always certain. Very early spontaneous abortions may be mistaken for menstruation. Epidemiology studies will have to rely on the woman's perception in many instances because medical care was not sought for a bleeding episode. If a woman was certain of her positive pregnancy status prior to a bleeding loss, then the likelihood it was a spontaneous abortion greatly increases. However, recognition of a spontaneous abortion before pregnancy status is known becomes much more difficult. Medical records have their limitations too. Although women may not recall early spontaneous abortions, medical record data on early pregnancy would even more so be lacking. An "accepted" figure of confirmed pregnancies that result in spontaneous abortions is approximately 15 per cent. However, studies that have tested for human chorionic gonadotrophin (HCG is a very early indicator of a positive pregnancy) have reported estimates between 30 and 40 per cent loss to spontaneous abortions.

The most frequent cause of confirmed spontaneous abortions is chromosomal abnormalitites. However, the frequency of chormosomal abnormalities decreases with advancing gestational age. Approximately 90 per cent of all chromosomally abnormal conceptions will be aborted. Ten per cent of all chromosomally normal conception will be spontaneously aborted. About two-thirds of spontaneous abortions up to 28 weeks of gestational age are chromosomally normal. Several studies have examined

chromosomal aberrations in workers exposed to vinyl chloride but not all investigations have identified such changes. Methodological problems persist in these studies as reviewed in the paper by Haas and Shottenfeld.

As you can see, a spontaneous abortion is not readily defined and identified compared to a disease like cancer. Such nonclarity of definition means that studies including the spontaneous abortion cases reported in St. Gabriel, Louisiana will be very difficult to conduct, if they can be conducted at all due to our lack of knowledge of what was the actual incidence of spontaneous abortions in the study population as well as what is the true background rate of spontaneous abortions in the at large population.

There are several abstracts of reproductive toxicology studies reported in the literature review. I suggest you call K.S. Rao (H & ES reproductive toxicologist) at (517) 636-2776 concerning his opinion about the toxicology literature.

Listed below are the articles that I have enclosed for your review (in addition to the literature review). Please feel free to call me should you have any further questions or need additional assistance.

1. Infante PF, Wagoner JK, McMichael AJ, et al: Genetic risks of vinyl chloride. Lancet 1976; 1:734-735.

2. Paddle GM: Letter to the Editor concerning "Genetic Risks of Vinyl Chloride." Lancet 1976 1:1079.

3. Infante PF, Wagoner JK, McMichael AJ, et al: Response to Paddle letter concerning "Genetic Risks of Vinyl Chloride." Lancet 1976;1:1289-1290.

4. Haas JF, Schottenfeld D: Risks to the offspring from parental occupational exposures. JOM 1979;21:607-613.

5. Lindbohm ML, Hemminki K, Kyyronen P: Spontaneous abortions among women employed in the plastics industry. Am J Ind Med 1985:579-586.

6. Computerized literature search on vinyl chloride and reproductive outcomes.

LITERATURE SEARCH

REQUESTOR: Geary Olsen *DATE:* 9/2/87

SUBJECT:

Vinyl chloride / reproduction effects

DATABASES SEARCHED:

MEDLINE

MEDLINE, produced by the U. S. National Library of Medicine (NLM), is one of the major sources for biomedical literature materials. MEDLINE corresponds to the three printed indexes, *Index Medicus, Index to Dental Literature,* and *International Nursing Index.* Additional materials not published in *Index Medicus* are included in the MEDLINE database in the areas of communication disorders, and population and reproductive biology.

TOXLINE

TOXLINE is the National Library of Medicine's extensive collection of computerized toxicology information containing references to published human and animal toxicity studies, effects of environmental chemicals and pollutants, adverse drug reactions and analytical methodology. TOXLINE, including its back files, encompasses the years 1965-present.

TOXLINE is derived from the following sources:

1) Chemical Abstracts Service (CBAC)
2) BioSciences Information Service (HEEP)
3) American Society of Hospital Pharmacists. International Pharmaceutical Abstracts (IPA)
4) National Library of Medicine (TOXBIB)
5) Environmental Protection Agency: Pesticide Abstracts (PESTAB)
6) Environmental Mutagen Information Center (ETIC)
7) Environmental Teratogen Information Center (EMIC)
8) Smithsonian Science Information Exchange: Toxicology/ Epidemiology Research Projects (RPROJ)
9) National Technical Information Service (NTIS)
10) Hayes File on Pesticides (HAYES)
11) Toxic Materials Information Center (TMIC), Oak Ridge

(some duplicates/extraneous deleted)

Any questions, please call Louise Mendrala, 6-9454.

R&S 029503

MESZ 1966 - SEP 1967
1 VINYL-CHLORIDE
RESULT 779
2 EX G8.520#
RESULT 310142
3 1 AND 2
RESULT 41

1
AU Tabacova-S.
IN Institute of Hygiene and Occupational Health, Medical Academy, Sofia, Bulgaria.
TI Maternal exposure to environmental chemicals.
SO Neurotoxicology. 1986 Summer. 7(2). P 421-40. (Review).
LG EN.
AB 140 Refs.
MJ ENVIRONMENTAL-EXPOSURE. MATERNAL-FETAL-EXCHANGE. PRENATAL-EXPOSURE-DELAYED-EFFECTS.
MN ARSENIC: ae. FEMALE. HUMAN. HYDROCARBONS-CHLORINATED: ae. HYDROGEN-SULFIDE: ae. KINETICS. MANGANESE: ae. METHYLENE-CHLORIDE: ae. MILK-HUMAN: an. POLYCYCLIC-HYDROCARBONS: ae. PREGNANCY. REVIEW. STYRENES: ae. TETRACHLOROETHYLENE: ae. TOLUENE: ae. VINYL-CHLORIDE: ae. XYLENES: ae.

2
AU Panova-Z.
TI [Problems of women working in vinyl chloride manufacturing plants].
SO Akush-Ginekol (Sofiia). 1985. 24(6). P 75-80.
LG BU.
MJ CHEMICAL-INDUSTRY. VINYL-CHLORIDE: ae. VINYL-COMPOUNDS: ae. WOMEN. WOMEN-WORKING.
MN ADULT. BULGARIA. COMPARATIVE-STUDY. ENGLISH-ABSTRACT. ENVIRONMENTAL-EXPOSURE. FEMALE. HUMAN. MENSTRUATION: de. POLYVINYL-CHLORIDE: ae. REPRODUCTION: de.

3
AU Schrag-S-D. Dixon-R-L.
IN Office of Health Research, Us Environmental Protection Agency, Research Triangle Park, North Carolina 27711.
TI Occupational exposures associated with male reproductive dysfunction.
SO Annu-Rev-Pharmacol-Toxicol. 1985. 25. P 567-92. (Review).
LG EN.
AB 172 Refs.
MJ INFERTILITY-MALE: ci. OCCUPATIONAL-DISEASES: ci.
MN ANESTHETICS: ae. ARSENIC: ae. BENZENE: ae. BORON: ae. CADMIUM: ae. CARBON-DISULFIDE: ae. CONTRACEPTIVES-ORAL-HORMONAL: ae. DINITROBENZENES: ae. ETHYLENE-DIBROMIDES: ae. HUMAN. KEPONE: ae. LEAD: ae. MALE. MANGANESE: ae. METHYLMERCURY-COMPOUNDS: ae. PENTACHLOROPHENOL: ae. PESTICIDES: ae. PROPANE: aa, ae. REPRODUCTION: de. REVIEW. SEVIN: ae. SOLVENTS: ae. TETRACHLORODIBENZODIOXIN: ae. VINYL-CHLORIDE: ae.

4
AU Kalmaz-E-E. Kalmaz-G-D.
IN Department of Preventive Medicine and Community Health, University of Texas Medical Branch, Galveston.
TI Carcinogenicity and epidemiological profile analysis of vinyl chloride and polyvinyl chloride.
SO Regul-Toxicol-Pharmacol. 1984 Mar. 4(1). P 13-27. (Review).
LG EN.

AB The carcinogenicity of vinyl chloride and polyvinyl chloride (VC/PVC) is reviewed with specific attention to the gaps in knowledge for risk estimation and epidemiological presentation of the available data. Although experimental studies have demonstrated the carcinogenicity and mutagenicity of VC/PVC in general, the epidemiologic studies available for review do not include an assessment of carcinogenic risk among humans exposed to these chemicals. This conclusion is based on the observation that the majority of cohort studies reviewed lacked sufficient statistical power because of small sample sizes. Further, in epidemiological studies, individuals were not followed over an adequate period of time during which cancer could become clinically manifest. Author-abstract. 81 Refs.
MJ CARCINOGENS-ENVIRONMENTAL. POLYVINYL-CHLORIDE: to. POLYVINYLS: to. VINYL-CHLORIDE: to. VINYL-COMPOUNDS: to.
MN ANIMAL. BRAIN-NEOPLASMS: ci. BREAST-NEOPLASMS: mo. CHEMISTRY. EPIDEMIOLOGIC-METHODS. HUMAN. LEUKEMIA: ci. LIVER-NEOPLASMS: ci. LUNG-NEOPLASMS: ci. MUTAGENS. OCCUPATIONAL-DISEASES: ci, oc. POLYVINYL-CHLORIDE: po. REPRODUCTION: de. REVIEW. TERATOGENS. UNITED-STATES. VINYL-CHLORIDE: po.

5

AU Hemminki-K. Lindbohm-M-L. Hemminki-T. Vainio-H.
IN Institute of Occupational Health, Helsinki, Finland.
TI Reproductive hazards and plastics industry.
SO Prog-Clin-Biol-Res. 1984. 141. P 79-87.
LG EN.
MJ CHEMICAL-INDUSTRY. OCCUPATIONAL-DISEASES: ci. PLASTICS: po. REPRODUCTION: de.
MN ABNORMALITIES-DRUG-INDUCED: oc. ABORTION: ci. AGING. ETHYLENE-OXIDE: po. FEMALE. HUMAN. INFANT-NEWBORN. MALE. PREGNANCY. STYRENES: po. VINYL-CHLORIDE: po.

6

AU Theriault-G-P. Goulet-L.
IN Department de Medicine Sociale et Preventive, Univ. Laval, Quebec, Canada.
TI [Malformations in a residential community near a vinyl chloride factory].
SO Geogr-Med. 1983. 13. P 25-34.
LG FR.
MJ ABNORMALITIES-DRUG-INDUCED: et. AIR-POLLUTION: ae. CHEMICAL-INDUSTRY. VINYL-CHLORIDE: ae. VINYL-COMPOUNDS: ae.
MN FEMALE. HUMAN. INFANT-NEWBORN. PREGNANCY. QUEBEC. RISK.

7

AU Theriault-G. Iturra-H. Gingras-S.
IN Department of Social and Preventive Medicine, Faculty of Medicine, Laval University, Ste-Foy, Quebec, Canada.
TI Evaluation of the association between birth defects and exposure to ambient vinyl chloride.
SO Teratology. 1983 Jun. 27(3). P 359-70.
LG EN.
AB Birth defects incidence for infants born to residents of Shawinigan, Canada in 1966-1979 were significantly higher than in three comparison communities. Since there has been a vinyl chloride polymerization plant in this town since 1943 from which ten cases of angiosarcoma of the liver have been identified, this study explores the possible association between exposure to vinyl chloride monomer (VCM) in ambient air and the occurrence of birth defects in the

community. The excess of birth defects fluctuated seasonally in a way that corresponded to changes in VCM concentration in the environment. Mothers who gave birth to malformed children were younger on average in Shawinigan than in the comparison communities. However, there was no excess of still-births in Shawinigan. The excess in birth defects involved most organ systems, and variation in birth-defect rates among school districts could not be accounted for by estimates of VCM in the atmosphere. The occupational and residential histories of parents who gave birth to malformed infants were compared with those of parents of normal infants. The two groups did not differ in occupational exposure or closeness of residence to the vinyl chloride polymerization plant. Some descriptive data from this study raised the hypothesis of an association between VCM in the air and birth defects in the exposed community, but as a whole, within the sample size available, such an association could not be substantiated. Author-abstract.

MJ ABNORMALITIES-DRUG-INDUCED. AIR-POLLUTANTS: ae. AIR-POLLUTANTS-ENVIRONMENTAL: ae. VINYL-CHLORIDE: ae. VINYL-COMPOUNDS: ae.

MN ABNORMALITIES-DRUG-INDUCED: oc. COMPARATIVE-STUDY. EPIDEMIOLOGIC-METHODS. FEMALE. HUMAN. INFANT-NEWBORN. MALE. MATERNAL-AGE. PREGNANCY. QUEBEC. SEASONS. SUPPORT-NON-U-S-GOVT. SUPPORT-U-S-GOVT-NON-P-H-S.

8

AU Himeno-S. Okuda-H. Suzuki-T.

IN Department of Human Ecology, School of Health Sciences, University of Tokyo, Japan.

TI Lack of dominant lethal effects in male CD-1 mice after short-term and long-term exposures to vinyl chloride monomer.

SO Toxicol-Lett. 1983 Apr. 16(1-2). P 47-53.

LG EN.

AB Dominant lethal studies were conducted with vinyl chloride monomer (VCM) in male CD-1 mice, using short-term (10 000 ppm, 4 h/day, for 5 days) and long-term (5000 ppm, 4 h/day, 5 day/week, for 10 weeks) exposures. There was no evidence of dominant lethal effects due to VCM in either case. Semen examination of male mice after long-term exposure failed to reveal any alteration in sperm motility and shape. Sporadic appearance of giant cells was observed in the testes of males exposed to VCM, but was not considered to affect spermatogenesis. Author-abstract.

MJ GENES-DOMINANT: de. GENES-LETHAL: de. PREGNANCY-ANIMAL: de. VINYL-CHLORIDE: to. VINYL-COMPOUNDS: to.

MN ANIMAL. CORPUS-LUTEUM: de. ETHYL-METHANESULFONATE: pd. FEMALE. MALE. MICE. OVUM-IMPLANTATION: de. PREGNANCY. SPERM-MOTILITY: de. SPERMATOGENESIS: de. SUPPORT-NON-U-S-GOVT.

9

AU Anderson-D.

IN British Industrial Biological Research Association, Carshalton, Surrey, Uk.

TI The predictability of bioassays.

SO Prog-Clin-Biol-Res. 1982. 109. P 149-68.

LG EN.

MJ BIOLOGICAL-ASSAY: mt. CARCINOGENS-ENVIRONMENTAL: an. DRUG-SCREENING: mt. MUTAGENS: an.

MN ABNORMALITIES-DRUG-INDUCED. ABORTION: ci. ANIMAL. DOSE-RESPONSE-RELATIONSHIP-DRUG. FEMALE. HUMAN. MICE. MUTAGENICITY-TESTS. OCCUPATIONAL-DISEASES: ci. ORGAN-SPECIFICITY. PREGNANCY. RATS. SALMONELLA: de. VINYL-CHLORIDE: to.

10
AU Hattis-D.
IN Center for Policy Alternatives, Massachusetts Institute of Technology, Cambridge, Massachusetts.
TI Needs for public health intervention and needs for new research on vinyl halides and their polymers: a public policy perspective.
SO Environ-Health-Perspect. 1981 Oct. 41. P 227-31.
LG EN.
AB Consideration of needs for public health interventions and new research requires comparative assessments of the health benefits that are likely to result from alternative uses of limited regulatory and technical resources. This paper briefly examines regulatory and research priorities in the light of recent information on the carcinogenic hazards of vinyl chloride and alkyl and vinyl halides related to vinyl chloride, the respiratory-system hazards of poly (vinyl chloride), and the reproductive hazards of vinyl chloride. Specific suggestions are made for relatively promising types of efforts in these areas. Author-abstract.
MJ HEALTH-POLICY. POLYVINYL-CHLORIDE: ae. POLYVINYLS: ae. VINYL-CHLORIDE: ae. VINYL-COMPOUNDS: ae.
MN FEMALE. HUMAN. LEGISLATION-DRUG. MALE. NEOPLASMS: ci. OCCUPATIONAL-DISEASES: ci. POLYMERS. REPRODUCTION: de. RESPIRATORY-SYSTEM: de. UNITED-STATES. UNITED-STATES-ENVIRONMENTAL-PROTECTION-AGENCY. UNITED-STATES-OCCUPATIONAL-SAFETY-AND-HEALTH-ADMINISTRATION.

11
AU Vianna-N-J. Brady-J. Harper-P.
IN Bureau of Environmental Epidemiology, New York State Department of Health, Albany, New York.
TI Angiosarcoma of the liver: a signal lesion of vinyl chloride exposure.
SO Environ-Health-Perspect. 1981 Oct. 41. P 207-10.
LG EN.
AB Vinyl chloride (VCM) induced angiosarcoma of the liver (ASL) is a rare vascular tumor which might be associated with a wide range of disease states. The possibility that this tumor might be a signal lesion is supported by mortality studies suggesting that cancers of the digestive, respiratory, neurological and lymphatic systems have occurred more often than expected in VCM workers. There is also evidence that certain non-neoplastic disorders, such as pneumoconiosis and excess fetal deaths, may be associated with this chemical. It has been suggested that a gradual increase in the incidence of ASL might have occurred in recent years. This could be a reflection of the long latency period and/or the increased recognition of this entity. Several cases of ASL have occurred in people living in the vicinity of VCM plants. This raises the possibility that low-level exposure to this chemical over a long period might induce ASL. Author-abstract.
MJ HEMANGIOSARCOMA: ci. LIVER-NEOPLASMS: ci. OCCUPATIONAL-DISEASES: ci. VINYL-CHLORIDE: ae. VINYL-COMPOUNDS: ae.
MN ADOLESCENCE. ADULT. AGED. FEMALE. FETAL-DEATH: ci. HUMAN. INFANT. MALE. MIDDLE-AGE. NEOPLASMS: ci. NEW-YORK. PREGNANCY.

12
AU Hatch-M. Kline-J. Stein-Z.
IN Division of Epidemiology, School of Public Health, Columbia University, New York, N. Y.
TI Power considerations in studies of reproductive effects of vinyl

chloride and some structural analogs.
SO Environ-Health-Perspect. 1981 Oct. 41. P 195-201.
LG EN.
AB We review the evidence examining the relation of reproductive function and exposure to vinyl chloride and selected structural analogs. Investigation of these compounds for possible reproductive effects has focused on paternal exposure, a much less well studied route than maternal exposure. Drawing on animal models, we discuss what is known about the possible reproductive consequences of exposure to the father as well as to the mother. In evaluating the studies of reproductive outcome in relation to vinyl chloride or analogs, we consider what biologic model may have been tested and whether there was statistical power to detect moderate increases in risk. Parameters influencing statistical power are reviewed, and recommended sample sizes are set out which would insure sufficient power, in future studies, to detect adverse effects. Author-abstract.
MJ REPRODUCTION: de. VINYL-CHLORIDE: ae. VINYL-COMPOUNDS: ae.
MN ABNORMALITIES-DRUG-INDUCED: oc. ABORTION: ci. FEMALE. HUMAN. INFERTILITY-MALE: ci. MALE. PREGNANCY. PRENATAL-EXPOSURE-DELAYED-EFFECTS. PROBABILITY. SPERM-COUNT. SUPPORT-U-S-GOVT-P-H-S. VINYL-CHLORIDE: aa.

13
AU Rice-J-M.
IN Perinatal Carcinogenesis Section, Laboratory of Comparative Carcinogenesis, National Cancer Institute, Fort Detrick, Frederick, Maryland.
TI Prenatal susceptibility to carcinogenesis by xenobiotic substances including vinyl chloride.
SO Environ-Health-Perspect. 1981 Oct. 41. P 179-88.
LG EN.
AB The carcinogenicity of vinyl chloride for experimental animals when administered transplacentally is reviewed in comparison with known transplacental carcinogens, including those that, like vinyl chloride, are dependent on enzyme-mediated metabolic conversion to a reactive intermediate in maternal or fetal tissues. Vinyl chloride is converted by mixed-function oxidases to the reactive metabolite chlorooxirane, the carcinogenicity of which is also reviewed. Vinyl chloride is unequivocally a transplacental carcinogen for the rat. No evidence exists, however, to support the hypothesis that exposure of male rats to vinyl chloride or any other carcinogen confers an increased risk of tumor development on their progeny. Many structural analogs of vinyl chloride, i.e., substituted ethylenes, are also carcinogenic for adult animals, and can with confidence likewise be predicted to be effective transplacental carcinogens. Author-abstract.
MJ ETHYLENE-OXIDE: to. MATERNAL-FETAL-EXCHANGE. NEOPLASMS-EXPERIMENTAL: ci. VINYL-CHLORIDE: me. VINYL-COMPOUNDS: me.
MN ANIMAL. BIOTRANSFORMATION. CERCOPITHECIDAE. ETHYLENE-OXIDE: aa. ETHYLNITROSOUREA: to. FEMALE. MICE. PREGNANCY. RATS. RATS-INBRED-STRAINS. VINYL-CHLORIDE: aa, to.

14
AU John-J-A. Smith-F-A. Schwetz-B-A.
IN Toxicology Research Laboratory, Health and Environmental Sciences Usa, Dow Chemical U.S.A., Midland, Michigan.
TI Vinyl chloride: inhalation teratology study in mice, rats and rabbits.

SO Environ-Health-Perspect. 1981 Oct. 41. P 171-7.
LG EN.
AB These studies evaluated the effects of inhaled vinyl chloride monomer (VCM) on mouse, rat and rabbit embryonal and fetal development. Groups of pregnant CF-1 mice, Sprague-Dawley rats and New Zealand white rabbits were exposed to 500 ppm VCM for 7 hr daily during the period of major organogenesis. Subsequently, other groups of mice were similarly exposed to 50 ppm VCM, and rats and rabbits were exposed to 2500 ppm. While maternal toxicity was observed, exposure to VCM did not cause significant embryonal or fetal toxicity and was not teratogenic in any of the three species at the concentrations tested. Simultaneous exposure of some of the pregnant animals to VCM by inhalation plus 15% ethanol in the drinking water resulted in toxic effects greater than those associated with exposure to VCM alone in the three species. The fetal effects observed were similar to those reported for these three species following administration of ethanol without VCM exposure. Author-abstract.
MJ ABNORMALITIES-DRUG-INDUCED: et. ALCOHOL-ETHYL: to. SPECIES-SPECIFICITY. VINYL-CHLORIDE: to. VINYL-COMPOUNDS: to.
MN AEROSOLS. ALCOHOL-ETHYL: ad. ANIMAL. DRUG-SYNERGISM. FEMALE. FETAL-DEATH. MICE. MICE-INBRED-STRAINS. PREGNANCY. RABBITS. RATS. RATS-INBRED-STRAINS. VINYL-CHLORIDE: ad.

15

AU Salnikova-L-S. Vorontsov-R-S.
TI [Late sequelae of vinyl chloride action on embryogenesis].
SO Gig-Tr-Prof-Zabol. 1981 Dec. (12). P 56.
LG RS.
MJ EMBRYO: de. PRENATAL-EXPOSURE-DELAYED-EFFECTS. VINYL-CHLORIDE: to. VINYL-COMPOUNDS: to.
MN ANIMAL. FEMALE. MICE. MICE-INBRED-STRAINS. PREGNANCY.

16

AU Purchase-I-F.
IN Imperial Chemical Industries Limited, Alderley Park, Cheshire, Uk.
TI Appraisal of the merits and short comings of tests of mutagenic potential.
SO Dev-Toxicol-Environ-Sci. 1980. 8. P 105-19.
LG EN.
MJ GENES: de. MUTAGENICITY-TESTS: mt. MUTAGENS: pd. MUTATION.
MN ANIMAL. COMPARATIVE-STUDY. DNA-REPAIR: de. FEMALE. HUMAN. MICE. OCCUPATIONS. PHENOTYPE. PREGNANCY. RATS. SMOKING. VINYL-CHLORIDE: pd.

17

AU Hopkins-J.
TI Vinyl chloride--part 5: mutagenicity in man.
SO Food-Cosmet-Toxicol. 1980 Apr. 18(2). P 200-1.
LG EN.
MJ CHROMOSOME-ABERRATIONS. LYMPHOCYTES: de.
MN ADULT. CELLS-CULTURED. FEMALE. FETAL-DEATH: ci. HUMAN. MALE. OCCUPATIONAL-DISEASES: fg. PREGNANCY. VINYL-CHLORIDE: to.

18

AU Sanotskii-I-V. Davtian-R-M. Glushchenko-V-I.
TI [Male reproductive function studied under the action of chemical substances].
SO Gig-Tr-Prof-Zabol. 1980 May. (5). P 28-32.
LG RS.

MJ REPRODUCTION: de.
MN ADULT. AIR-POLLUTANTS-OCCUPATIONAL. ANTIMONY: ae. CHLOROPRENE: ae. DUST. EJACULATION: de. ENGLISH-ABSTRACT. ENVIRONMENTAL-EXPOSURE. FEMALE. FERTILITY: de. HUMAN. MALE. PREGNANCY. VINYL-CHLORIDE: ae.

19
AU Salnikova-L-S. Kitsovskaia-I-A.
TI [Effect of vinyl chloride on rat embryogenesis].
SO Gig-Tr-Prof-Zabol. 1980 Mar. (3). P 46-7.
LG RS.
MJ EMBRYO: de. VINYL-CHLORIDE: to. VINYL-COMPOUNDS: to.
MN ANIMAL. COMPARATIVE-STUDY. DOSE-RESPONSE-RELATIONSHIP-DRUG. EMBRYONIC-INDUCTION: de. ENVIRONMENTAL-EXPOSURE. FEMALE. MAXIMUM-PERMISSIBLE-EXPOSURE-LEVEL. PREGNANCY. RATS.

20
AU Bingham-E. Lane-J-M.
TI Vinyl halides -- carcinogenicity.
SO Vet-Hum-Toxicol. 1980 Feb. 22(1). P 31-3.
LG EN.
MJ CARCINOGENS. VINYL-COMPOUNDS: to.
MN ANIMAL. DICHLOROETHYLENES: to. ENVIRONMENTAL-EXPOSURE. GOVERNMENT-AGENCIES. HUMAN. MAXIMUM-PERMISSIBLE-EXPOSURE-LEVEL. MUTAGENS. OCCUPATIONAL-MEDICINE. REPRODUCTION: de. UNITED-STATES. VINYL-CHLORIDE: to.

21
AU Binns-C-H.
TI Vinyl chloride: a review.
SO J-Soc-Occup-Med. 1979 Oct. 29(4). P 134-41. (Review).
LG EN.
AB 50 Refs.
MJ OCCUPATIONAL-DISEASES: ci. POLYVINYL-CHLORIDE: po. POLYVINYLS: po. VINYL-CHLORIDE: po. VINYL-COMPOUNDS: po.
MN ABNORMALITIES-DRUG-INDUCED. ANIMAL. BRAIN-NEOPLASMS: ci. CHROMOSOME-ABERRATIONS. FEMALE. HEMANGIOSARCOMA: ci. HUMAN. LIVER-CIRRHOSIS: ci. LIVER-NEOPLASMS: ci. LUNG-NEOPLASMS: ci. MALE. MICE. MUTATION: de. OSTEOLYSIS: ci. PNEUMOCONIOSIS: et. PREGNANCY. REVIEW.

22
AU Haas-J-F. Schottenfeld-D.
IN Cornell University Medical College, New York, Ny.
TI Risks to the offspring from parental occupational exposures.
SO J-Occup-Med. 1979 Sep. 21(9). P 607-13.
LG EN.
AB Risks to the offspring of workers with occupational chemical exosures may derive from mutagenic, teratogenic or carcinogenic effects of industrial agents to which the parents are exposed. Evidence for impaired pregnancies and hazards to the offspring of working populations with chemical exposures is, however, very limited. Perhaps the best documented example is increased spontaneous abortion rates in female operating room personnel who have first trimester exposure to waste anesthetic gases. Evidence is reviewed for hazards to the offspring resulting from parental occupational exposure to vinyl chloride, benzene, chloroprene, radiation and petroleum-derived hydrocarbons. It is essential in investigating the role of occupational factors that other environmental and behavioral factors with major effects on pregnancy

outcome be accounted for. These include smoking, alcohol, and drug exposures. An approach to surveillance for chromosomal abnormalities in offspring of occupationally exposed parents is outlined. Author-abstract.
MJ CHROMOSOME-ABNORMALITIES: ci. OCCUPATIONAL-MEDICINE. REPRODUCTION: de.
MN ALCOHOL-DRINKING. ANESTHETICS: po. BENZENE: po. CARCINOGENS. CHLOROPRENE: po. CHROMOSOME-ABERRATIONS. ENVIRONMENTAL-EXPOSURE. FEMALE. HUMAN. HYDROCARBONS: po. MALE. MUTAGENS. PREGNANCY. SMOKING: co. TERATOGENS. VINYL-CHLORIDE: po.

23
AU Diubankova-E-N. Bykhovskii-A-V.
TI [Problem of the vinyl chloride hazard in relation to the hygienic aspects of using polyvinyl chloride materials].
SO Gig-Sanit. 1979 Jan. (1). P 69-74.
LG RS.
MJ POLYVINYL-CHLORIDE: ae. POLYVINYLS: ae. VINYL-CHLORIDE: ae. VINYL-COMPOUNDS: ae.
MN ADULT. ANIMAL. CHEMICAL-INDUSTRY. CHILD. DOSE-RESPONSE-RELATIONSHIP-DRUG. ENVIRONMENTAL-EXPOSURE. FEMALE. FETAL-DEATH: ci. FOOD-HANDLING. HEMANGIOSARCOMA: ci. HUMAN. LIVER-NEOPLASMS: ci. MALE. MUTAGENS. MUTATION: de. OCCUPATIONAL-DISEASES: ci. PLASTICS: ae. POLYVINYL-CHLORIDE: to. PREGNANCY. VINYL-CHLORIDE: to.

24
AU Ungvary-G. Hudak-A. Tatrai-E. Lorincz-M. Folly-G.
IN Department of Experimental Pathology, State Institute of Occupational Health, Budapest.
TI Effects of vinyl chloride exposure alone and in combination with trypan blue--applied systematically during all thirds of pregnancy on the fetuses of CFY rats.
SO Toxicology. 1978 Sep. 11(1). P 45-54.
LG EN.
AB Vinyl chloride (VC) has been shown to be present in the fetal and maternal blood as well as in the amniotic fluid after the exposition of pregnant CFY rats to VC at an atmospheric concentration of 5500, 18 000 or 33 000 mg/m3 (approximately 2000, 7000 or 12 000 ppm) for 2.5 h on the 18th day of pregnancy, indicating the permeability of the placenta to the agent. Teratological investigation of the offspring of pregnant rats exposed continuously to VC at an atmospheric concentration of 4000 mg/m3 air (1500 ppm) during the first, second or last third of pregnancy has shown that VC has no teratological effect in the rat and has no embryotoxic effects either, when applied during the second or last third of pregnancy in the above concentration. Exposition to VC during the first third of pregnancy resulted in an increased fetal mortality and in the manifestation of embryotoxic effects. Fetal losses and induction of central nervous system malformation due to trypan blue administration were not potentiated by a combined exposure of pregnant rats to VC and the dye. Author-abstract.
MJ FETUS: de. TERATOGENS. TRYPAN-BLUE: pd. VINYL-CHLORIDE: pd. VINYL-COMPOUNDS: pd.
MN AMNIOTIC-FLUID: me. ANIMAL. EMBRYO: de. FEMALE. GESTATIONAL-AGE. PREGNANCY. RATS. RATS-INBRED-STRAINS. VINYL-CHLORIDE: bl, me.

25
AU Haglund-B. Kjellman-B.
TI [Need for environmental anamnesis in leukemia and malformations in

children].
SO Lakartidningen. 1978 Sep 27. 75(39). P 3436-7.
LG SS.
MJ ABNORMALITIES-DRUG-INDUCED. LEUKEMIA-LYMPHOBLASTIC: ci. SOLVENTS: ae.
MN ADOLESCENCE. ADULT. CASE-REPORT. ENGLISH-ABSTRACT. ENVIRONMENTAL-EXPOSURE. FEMALE. HUMAN. INFANT-NEWBORN. MALE. PREGNANCY. TRICHLOROETHYLENE: ae. VINYL-CHLORIDE: ae.

26
AU Hens-L. Verschaeve-L. Susanne-C.
TI Mutagenicity of vinyl chloride monomer.
SO Arch-Belg-Med-Soc. 1977 Nov-Dec. 35(9-10). P 585-600. (Review).
LG EN.
AB 56 Refs.
MJ MUTAGENS. VINYL-CHLORIDE: to. VINYL-COMPOUNDS: to.
MN ABNORMALITIES-DRUG-INDUCED. ANIMAL. BIOTRANSFORMATION. CARCINOGENS. CHROMOSOME-ABERRATIONS. ENVIRONMENTAL-EXPOSURE. FEMALE. FETAL-DEATH: ci. GENES: de. GENES-DOMINANT. GENES-LETHAL. GENES-RECESSIVE. HAMSTERS. HUMAN. MALE. MICE. MITOCHONDRIA-LIVER: me. MUTATION: de. NEOPLASMS: ci. NEOPLASMS-EXPERIMENTAL: ci. NEUROSPORA-CRASSA: de. OCCUPATIONAL-DISEASES: ci. PREGNANCY. RATS. REVIEW. SALMONELLA-TYPHIMURIUM: de. SCHIZOSACCHAROMYCES: de. TERATOGENS. VINYL-CHLORIDE: me.

27
AU Anderson-D. Hodge-M-C. Purchase-I-F.
IN Imperial Chemical Industries, Ltd. Central Toxicology Laboratory, Alderley Park Nr. Macclesfield, Cheshire England.
TI Dominant lethal studies with the halogenated olefins vinyl chloride and vinylidene dichloride in male CD-1 mice.
SO Environ-Health-Perspect. 1977 Dec. 21. P 71-8.
LG EN.
MJ DICHLOROETHYLENES: to. GENES-DOMINANT: de. GENES-LETHAL: de. HYDROCARBONS-CHLORINATED: to. MUTATION: de. VINYL-CHLORIDE: to. VINYL-COMPOUNDS: to.
MN ANIMAL. CYCLOPHOSPHAMIDE: to. ENVIRONMENTAL-EXPOSURE. ETHYL-METHANESULFONATE: to. FEMALE. FERTILITY: de. FETAL-DEATH: ci. MALE. MICE. MICE-INBRED-STRAINS. OVUM-IMPLANTATION: de. PREGNANCY.

28
AU Infante-P-F.
IN Division of Surveillance, Hazard Evaluations and Field Studies, National Institue for Occupational Safety and Health, Cincinnati, Ohio.
TI Mutagenic and carcinogenic risks associated with halogenated olefins.
SO Environ-Health-Perspect. 1977 Dec. 21. P 251-4.
LG EN.
AB Recent experimental evidence indicates that structural analogs of vinyl chloride namely, vinylidene chloride and trichloroethylene, are mutagenic. Carcinogenic response also has been observed in experimental animals following exposure to vinylidene chloride, trichloroethylene, and perchloroethylene. More recent observations demonstrate low-level vinyl chloride-induced mammary carcinoma. An additional chlorinated olefin, chloroprene, has demonstrated a mutagenic response in several test systems. Likewise, several studies have indicated significant excesses of chromosomal aberrations as well as adverse effects on reproductive function

following male exposure to chloroprene. Although reports have indicated an increased incidence of lung and skin cancer among workers occupationally exposed to chloroprene, adequately designed studies have not been carried out which would allow the development of valid inferences regarding its carcinogenicity. The question facing the scientific community and society is whether observations in subhuman species are adequate to institute prudent public health practice by controlling these agents as carcinogens or mutagens or whether, once again, epidemiologic enumeration of the toll will be required. Author-abstract.

MJ HYDROCARBONS-CHLORINATED: po. MUTATION: de. NEOPLASMS: ci. OCCUPATIONAL-DISEASES: ci.

MN ANIMAL. CHROMOSOME-ABERRATIONS. ENVIRONMENTAL-EXPOSURE. FEMALE. HEMANGIOSARCOMA: ci. HUMAN. HYDROCARBONS-CHLORINATED: to. LIVER-NEOPLASMS: ci. LUNG-NEOPLASMS: ci. MALE. MAMMARY-NEOPLASMS-EXPERIMENTAL: ci. MICE. RATS. REPRODUCTION: de. RISK. SKIN-NEOPLASMS: ci. VINYL-CHLORIDE: to.

29

AU Infante-P-F. Wagoner-J-K. McMichael-A-J. Waxweiler-R-J. Falk-H.

TI Genetic risks of vinyl chloride [letter].

SO Lancet. 1976 Jun 12. 1(7972). P 1289-90.

LG EN.

MJ FETAL-DEATH: ci. VINYL-CHLORIDE: to. VINYL-COMPOUNDS: to.

MN ADULT. COMPARATIVE-STUDY. ENVIRONMENTAL-EXPOSURE. FEMALE. FETAL-DEATH: et, fg. HUMAN. MALE. MUTAGENS. NORTH-CAROLINA. OHIO. PATERNAL-AGE. PREGNANCY. RISK.

30

AU Kline-J. Stein-Z. Strobino-B. Susser-M. Warburton-D.

IN Columbia University College of Physicians and Surgeons, New York, Ny.

TI Surveillance of spontaneous abortions. Power in environmental monitoring.

SO Am-J-Epidemiol. 1977 Nov. 106(5). P 345-50.

LG EN.

MJ ABNORMALITIES-DRUG-INDUCED. ABORTION. POPULATION-SURVEILLANCE.

MN ABNORMALITIES-DRUG-INDUCED: co, fg. ABORTION: et, fg. CHROMOSOME-ABNORMALITIES: ci, co, fg. FEMALE. HUMAN. PREGNANCY. SUPPORT-U-S-GOVT-P-H-S. TERATOGENS. VINYL-CHLORIDE: ae.

31

AU Li-F-P.

IN Sidney Farber Cancer Institute, Boston, Massachusetts.

TI Clinical studies of cancer etiology.

SO Cancer. 1977 Jul. 40(1 Suppl). P 445-7.

LG EN.

AB Clues to causes of cancer in man can be identified through clinical observation of patients. Alert practitioners have, for example, recently discovered carcinogenic effects of occupational exposure to vinyl chloride and of diethylstilbestrol therapy during gestation. Clinical case studies have also clarified the role of host susceptibility in development of cancer. In most instances, validity of initial clinical observations was established by more detailed epidemiologic and laboratory studies. Clinicians can contribute to carcinogenesis studies by being alert to causes of cancer in their patients, and by referring exceptional observations to clinical epidemiologists and basic scientists for further study. Knowledge of risk factors can be applied to cancer prevention and early detection. Author-abstract.

MJ NEOPLASMS: et.

MN ADENOCARCINOMA: ci. ATAXIA-TELANGIECTASIA: co, fg, rt. CHROMOSOME-ABERRATIONS. DIETHYLSTILBESTROL: ae. DNA-REPAIR: re. FEMALE. HEMANGIOSARCOMA: ci. HUMAN. LIVER-NEOPLASMS: ci. LYMPHOMA: et, fg. MALE. MATERNAL-FETAL-EXCHANGE. PREGNANCY. RADIATION-TOLERANCE. VAGINAL-NEOPLASMS: ci. VINYL-CHLORIDE: po.

33

AU Infante-P-F. Wagoner-J-K. Waxweiler-R-J.
IN Division of Surveilance, National Institute for Occupational Safety and Health, Cincinnati, Ohio.
TI Carcinogenic, mutagenic and teratogenic risks associated with vinyl chloride.
SO Mutat-Res. 1976 Nov 1. 41(1 spel. no). P 131-41.
LG EN.
AB The data presented demonstrate clearly that vinyl chloride (VC) is related to a significant excess of mortality from cancer of the liver, lung and brain among workers occupationally exposed to VC. The risk of dying from cancer of the lymphatic and hematopoietic system also appears to increase with an increase in latency. These cancer sites could have been predicted by the animal bioassay conducted by Maltoni. With regard to the liver, even the histophthologic type of cancer (angiosarcoma) was observed first in experimental animals. A study of cancer mortality among populations residing proximate to VC polymerization facilities also demonstrated an increased risk of dying from CNS and lymphatic cancer. These latter findings raise cause for concern about out-plant emmissions of VC, but without further study these cancers obviously cannot be interpreted as being related to out-plant exposure to VC. Various test systems now have elicited a positive mutagenic response to VC. Thus, our observations of a significant excess of fetal mortality among the wives of males, who were occupationally exposed to VC, raise public health concern that VC may be mutagenic in humans. With regard to the teratogenicity of VC, observations of a significant excess of children born with birth defects were reported among populations residing proximate to VC polymerization facilities. Additional epidemiologic study is needed to determine whether a repeated pattern of excessive numbers of children born with birth defects can be observed in other communities with VC polymerization facilities. Author-abstract.
MJ CARCINOGENS. MUTAGENS. OCCUPATIONAL-DISEASES: ci. TERATOGENS. VINYL-CHLORIDE: to. VINYL-COMPOUNDS: to.
MN ABNORMALITIES-MULTIPLE: oc. ENVIRONMENTAL-EXPOSURE. FEMALE. FETAL-DEATH. HUMAN. MALE. OHIO. PATERNAL-AGE. PREGNANCY. RISK.

34

AU Anderson-D. Hodge-M-C. Purchase-I-F.
IN Imperial Chemical Industries Ltd. Cheshire, (England).
TI Vinyl chloride: dominant lethal studies in male CD-1 mice.
SO Mutat-Res. 1976 Nov. 40(4). P 359-70.
LG EN.
AB The mutagenic activity of vinyl chloride (VC) at three exposure levels was assessed in fertile male CD-1 mice with the dominant lethal test. Male mice were exposured by inhalation to VC at 3000, 10,000 and 30,000 ppm for 6 h a day for 5 days. By comparison with control males exposed to air, no mutagenic effects on any maturation stage of spermatogeneisis in treated males were detected. There was no significant increase in the number of post-implantational early foetal deaths as shown by the number of females with one or more early deaths or number of early deaths/pregnancy or the number of early deaths/total implants/pregnancy. There was no evidence of

pre-implantational egg losses as indicated by the total implants/pregnant female. There was also no reduction in fertility. The lack of effect was not due to the insensitivity of the system used since a dominant lethal effect was clearly demonstated in male mice dosed i.p. with cyclophosphamide (CTX) at 200 mg/kg body weight and ethyl methanesulphonate (EMS) orally at 200 mg/kg body weight once a day for 5 days. During dosing these animals were housed under dimilar exposure conditions to those animals exposed to the test substances but with a flow of air through the exposure chambers. Thus vinyl chloride is not mutagenic in the mouse at the stated exposure levels as measured by the dominant lethal test. Author-abstract.
MJ MUTAGENS. VINYL-CHLORIDE: pd. VINYL-COMPOUNDS: pd.
MN ADMINISTRATION-ORAL. AEROSOLS. ANIMAL. COMPARATIVE-STUDY. CYCLOPHOSPHAMIDE: pd. DOSE-RESPONSE-RELATIONSHIP-DRUG. ETHYL-METHANESULFONATE: pd. FEMALE. FERTILITY: de. GENES-DOMINANT. GENES-LETHAL. INJECTIONS-INTRAPERITONEAL. MALE. MICE. MICE-INBRED-STRAINS.

35
AU Purchase-I-F. Richardson-C. Anderson-D.
TI Chromosomal effects in peripheral lymphocytes.
SO Proc-R-Soc-Med. 1976 Apr. 69(4). P 290-2.
LG EN.
MJ CHROMOSOME-ABERRATIONS. LYMPHOCYTES: cy. OCCUPATIONAL-DISEASES: ci. VINYL-CHLORIDE: ae. VINYL-COMPOUNDS: ae.
MN ANIMAL. ENVIRONMENTAL-EXPOSURE. FEMALE. HUMAN. MALE. MICE. PREGNANCY.

36
AU Zaeva-G-N.
TI [Carcinogenic properties of vinyl chloride (a review of the literature)].
SO Gig-Tr-Prof-Zabol. 1976 Apr. (4). P 46-8. (Review).
LG RS.
AB 27 Refs.
MJ CARCINOGENS: to. VINYL-CHLORIDE: to. VINYL-COMPOUNDS: to.
MN ANIMAL. CARDIOVASCULAR-SYSTEM: de. DOSE-RESPONSE-RELATIONSHIP-DRUG. ENGLISH-ABSTRACT. ENVIRONMENTAL-EXPOSURE. FEMALE. HEMANGIOSARCOMA: ci. HUMAN. LIVER-NEOPLASMS: ci. MATERNAL-FETAL-EXCHANGE: de. MAXIMUM-PERMISSIBLE-EXPOSURE-LEVEL. NEOPLASMS-EXPERIMENTAL: ci. OCCUPATIONAL-DISEASES: ci. PREGNANCY. REVIEW. UNITED-STATES. USSR.

37
AU Infante-P-F. Wagoner-J-K. McMichael-A-J. Waxweiler-R-J. Falk-H.
TI Genetic risks of vinyl chloride.
SO Lancet. 1976 Apr 3. 1(7962). P 734-5.
LG EN.
AB A study of pregnancy outcome among wives of workers exposed to vinyl-chloride monomer (V.C.M.) indicated that, in comparison with controls, there was a significant excess fetal loss in the group whose husbands had a primary exposure to V.C.M., whereas no differences between the groups were observed before the husband's exposures. The difference in fetal death-rates for the post-exposure comparisons was a reflection of a greater fetal loss associated with the wives younger-aged husbands. The significant excess did not seem to be the result of bias from interviewers, respondents, nor from women who had experienced chronic abortions weighting the results. These findings, in conjunction with the

demonstration of a mutagenic response via microbial test systems and with observations of significant excesses of chromosomal aberrations among workers exposed to V.C.M., raise scientific and public-health concern for the possible genetic risks of V.C.M. to man. Author-abstract.
MJ CHROMOSOME-ABERRATIONS. FETAL-DEATH: ci. MUTAGENS. SPERMATOZOA: de. VINYL-CHLORIDE: ae. VINYL-COMPOUNDS: ae.
MN AGE-FACTORS. CHEMICAL-INDUSTRY. FEMALE. FETAL-DEATH: fg, oc. HUMAN. MALE. PARITY. PREGNANCY. SEX-FACTORS.

38
AU Brown-M-L.
TI The quality of the work environment.
SO Am-J-Nurs. 1975 Oct. 75(10). P 1755-60, 1793-4.
LG EN.
MJ OCCUPATIONAL-MEDICINE: st.
MN ASBESTOS. EDUCATION-NURSING. ENVIRONMENTAL-EXPOSURE. FEMALE. GOVERNMENT-AGENCIES. HOSPITALS: st. HUMAN. LEGISLATION-MEDICAL. MAXIMUM-PERMISSIBLE-EXPOSURE-LEVEL. NURSING-STAFF-HOSPITAL. OCCUPATIONAL-HEALTH-NURSING. OCCUPATIONAL-HEALTH-SERVICES. PREGNANCY. PUBLIC-HEALTH-NURSING. TIME-FACTORS. UNITED-STATES. VINYL-CHLORIDE.

39
AU Corbett-T-H.
TI Editorial: Inhalation anesthetics--more vinyl chloride?.
SO Environ-Res. 1975 Jun. 9(3). P 211-4.
LG EN.
MJ ANESTHESIA-INHALATION: ae. ANESTHETICS: ae. CARCINOGENS. OCCUPATIONAL-DISEASES: ci. VINYL-CHLORIDE. VINYL-COMPOUNDS.
MN ABNORMALITIES-DRUG-INDUCED: et. ABORTION: ci. ADULT. ANESTHESIOLOGY. CHILD. CHILD-PRESCHOOL. FEMALE. HEPATITIS-TOXIC: et. HUMAN. INFANT-NEWBORN. MALE. NEOPLASMS: ci. NURSE-ANESTHETISTS. OPERATING-ROOMS. PREGNANCY.

40
TI Is flagyl dangerous?.
SO Med-Lett-Drugs-Ther. 1975 Jun 20. 17(13). P 53-4.
LG EN.
MJ METRONIDAZOLE: to.
MN ADMINISTRATION-ORAL. AMEBIASIS: dt. ANIMAL. BACTERIA: de. CARCINOGENS. DIETHYLSTILBESTROL: to. FEMALE. HUMAN. MALE. METRONIDAZOLE: pd, tu. MUTAGENS. PREGNANCY. RATS. TERATOGENS. TRICHOMONAS-VAGINITIS: dt. VINYL-CHLORIDE: to.

41
AU Maltoni-C. Lefemine-G.
TI Carcinogenicity bioassays of vinyl chloride: current results.
SO Ann-NY-Acad-Sci. 1975 Jan 31. 246. P 195-218.
LG EN.
MJ CARCINOGENS: pd. NEOPLASMS-EXPERIMENTAL: ci. VINYL-CHLORIDE: pd. VINYL-COMPOUNDS: pd.
MN ANIMAL. ANIMALS-NEWBORN. FEMALE. HAMSTERS. HEMANGIOSARCOMA: ci. LIVER-NEOPLASMS: ci. MALE. MICE. PREGNANCY. RATS. SPECIES-SPECIFICITY. TIME-FACTORS.

YOU ARE NOW CONNECTED TO THE TOXLINE (1965 FORWARD, NON-ROYALTY) FILE.

SS 1 /C?
USER:

75-01-4 or Chlorethylene or Chloroethylene or Monochloroethylene
SS (1) PSTG (1195)

SS 2 /C?
USER:
vinyl and chloride
PROG:
SS (2) PSTG (1926)

SS 3 /C?
USER:
2 and not 1
PROG:
SS (3) PSTG (785)

SS 4 /C?
USER:
ts : vinyl chloride:
SS (4) PSTG (346)

SS 5 /C?
USER:
1 or 4
PROG:
SS (5) PSTG (1541)

SS 6 /C?
USER:
5 and reproduc:
SS (6) PSTG (69)

1
AU - Higginson J
TI - Existing Risks for Cancer
SO - Reducing the Carcinogenic Risks in Industry, F. F. Deisler, Jr., Editor; New York, Marcel Dekker, Inc., pages 1-19, 9 references, 1984
AB - Risk factors for cancer are reviewed. Cancer consists of a variety of diseases to which nearly all organs of the body are susceptible. The disease essentially consists of a change in one of the cells within an organ whereby the cell reproduces itself uncontrollably. Although the fundamental molecular, biochemical changes at the cellular level are not yet understood, there is much similarity between different types of tumors to justify their inclusion under the overall term cancer. Chemical, physical, biological, and cultural factors as carcinogenic stimuli are described. Carcinogenic stimuli consist of defined carcinogens such as vinyl-chloride (75014) and substances that affect the later stages of carcinogenesis (promoters), such as hormones. Carcinogenic risk factors are discussed. These are identified along with definable risk factors that are associated with an increased cancer risk but which cannot be readily called carcinogens. These include dietary fiber deficiency, excessive dietary fat intake, obesity, and such behavioral patterns as age at first pregnancy. Cancer patterns and existing carcinogenic risk factors such as tobacco, alcohol, occupational exposures, lifestyle factors, environmental pollution, medical therapy related carcinogens, and ionizing radiation are discussed. The most important risks are posed by tobacco and alcohol use. Diet and behavioral habits are considered significant, but individual factors have not been identified. Risk factors can

be identified for approximately half of the cancers in males and 15 to 20 percent in females in Europe and North America and, thus, offer a reasonable approach for controlling avoidable causes.

2
AU - Bi W ; Wang Y ; Huang M ; Meng D
TI - Effect Of Vinyl Chloride On Testis In Rats
SO - Ecotoxicology and Environmental Safety, Vol. 10, No. 3, pages 281-289, 9 references, 1985
AB - The effects of exposure to vinyl-chloride (75014) (VC) on testicular lesions were studied in 300 male adult Wistar-rats. Animals were exposed via inhalation to 0, 10, 100, or 300 parts per million (ppm) VC for 6 hours per day, 6 days per week, up to 12 months. Animals were serially sacrificed at 3, 6, or 12 months of treatment, while the remainder were sacrificed after 18 months. Autopsies were performed, and testes, lungs, liver, heart, kidneys, spleen, and brain were examined visually and microscopically for focal and generalized lesions and hemorrhage. Pathological changes to the testes were graded according to the number of damaged testicular seminiferous tubules counted under the microscope. After VC exposure, the organ and body weight ratio for the kidney, liver, spleen, and heart were increased, but those of the testis were decreased in month 6. The weights of testes were decreased and damage to the testicular seminiferous tubules was observed at incidence rates of 18.9, 29.7, 36.5, and 56.0 percent in the control, 10, 100, and 3,000ppm groups, respectively. The authors conclude that there is an obvious dose/response relation between the concentration of VC and the incidence of testis damage in exposed rats.

3
AU - Hemminki K ; Lindbohm M-L ; Hemminki T ; Vainio H
TI - Reproductive Hazards And Plastics Industry
SO - Progress in Clinical and Biological Research, Industrial Hazards of Plastics and Synthetic Elastomers, Vol. 141, Jarvisalo, J., P. Pfaffli, and H. Vainio, Editors; pages 79-87, 10 references, 1984
AB - The effects of occupational exposures within the plastics industry on the reproductive system are reviewed. Paternal exposure to vinyl-chloride (75014) has resulted in increased rates of spontaneous abortions. Higher than average prevalence rates of malformations in offspring of plastics workers have been observed. Female workers exposed to styrene (100425) have had more spontaneous abortions than the average, and offspring with central nervous system malformations. Significantly more spontaneous abortions have occurred in a group of females exposed to ethylene-oxide (75218). Unpublished studies of plastics industry workers support the published findings. Because the plastics industry is likely to expand in the future, a special research effort is needed to evaluate the health effects of commonly used substances in the industry. Reproductive epidemiology has the potential of detecting occupational hazards with reasonable accuracy, relatively shortly after exposure. However, because reproductive epidemiology is a new discipline, it may be compounded by unknown selection mechanisms relating to pregnancy and employment that need to be resolved before causal relationships can be established.

4
AU - Pries CN
TI - Reproductive Effects Of Occupational Exposures
SO - American Family Physician, Vol. 24, No. 2, pages 161-165, 7

R&S 029518

references, 1981
AB - Effects of occupational exposure to toxic materials on human reproductive capacity are reviewed. Employment trends and legal requirements in the treatment of pregnant workers are described. The need for a periodic reappraisal of hazards both inside and outside the workplace is emphasized. The six stages in which the human reproductive system is susceptible to environmental factors are identified. In stage 1, the production of release of sufficient viable sperm or ova may be affected. Stage 2 is characterized by mutations or chromosomal damage to the ova or sperm before fertilization. Exposure to vinyl-chloride (75014) may cause this type of effect. Environmental factors such as toxic secretions in the male reproductive tract may interfere with fertilization in stage 3. In stage 4, implementation of the ovum may be prevented by the local chemical environment. This effect may explain reduced fertility due to trichloroethylene (79016) exposure. Stage 5 is characterized by impaired growth and development of the embryo due to maternal/fetoplacental toxic effects such as those due to organic mercury (7439976) compounds. In stage 6, offspring can be affected after birth by the presence of toxins in breast milk. Toxins known to affect human reproduction and their effects are listed. The author concludes that increased efforts to evaluate workplace hazards to human reproduction are resulting in a better environment.

5
AU - Zielhuis RL ; Stijkel A ; Verberk MM ; van de Poel-Bot M
TI - Plastic Monomers
SO - Health Risks to Female Workers in Occupational Exposure to Chemical Agents, Springer-Verlag, Berlin, pages 42-47, 18 references, 1984
AB - Occupational health risks to women from exposure to plastic monomers are reviewed. Five compounds are discussed for which evidence suggestive of adverse effects on women and offspring has been reported. Available data does not provide any evidence of increased risk of congenital abnormalities in the offspring of parents living in the vicinity of polyvinyl-chloride (9002862) facilities and possible low concentration exposure to vinyl-chloride (75014). No data is available on the health risks of women occupationally exposed to vinyl-chloride. There is no conclusive evidence that occupational exposure to styrene (100425) has an adverse effect on menstruation although some studies have indicated increased risk of abortion or congenital abnormalities. An increased health risk on exposure to caprolactam (105602) has been indicated by several studies. Too few details are available to indicate female health risks associated with acrylates, but occupational exposure to nitrilacrylic-acid and the methyl ethyl ether of acrylic-acid (79107) have been reported to affect menstruation. Data is not sufficient to evaluate health risks to women beyond those experienced by men exposed to formaldehyde (50000). Reproductive effects have been reported in men exposed to formaldehyde. The authors conclude that no conclusions can be drawn about health effects specific to women from occupational exposure to other plastic monomers.

review no data

6
AU - Kahn H
TI - Research Results Of Soviet Scientists In Some Problems Of Occupational Medicine: Review Of The Years 1981-1984
SO - Scandinavian Journal of Work, Environment and Health, Vol. 11, No. 4, pages 241-248, 61 references, 1985
AB - Occupational medicine in Russia is reviewed. Maximum allowable

R&S 029519

concentrations in work zone air for new industrial toxic substances need to be established. These limits often consider mutagenic, teratogenic, and other biological effects. Special attention is being paid to substances that can be absorbed through the skin and to combined effects such as simultaneous exposure to carbon-monoxide (630080) and vibration. Occupational physiology and psychology studies are becoming more common. These have application in the early diagnosis of some types of industrial poisoning such as that due to chromium compounds. Studies of occupational pathology are becoming of greater interest. These have helped define vibration disease hypertension, which is thought to occur in as many as 20 percent of exposed workers. Diseases of the nervous system have been studied in miners of the far north. These diseases account for over 40 percent of the deaths in this group. Studies that deal with the mutagenicity of hazardous industrial substances or with the effect of these factors on reproduction are examined. Studies on the effect of methyl-methacrylate (80626) and vinyl-chloride (75014) on the sexuality of male workers indicate that sexual disturbances may be of use in early diagnosis. The author concludes that the rapid development of science and technology has broadened the problems of occupational health, making information exchanges between countries extremely important.

7
AU - Bardin CW ; Taketo T ; Gunsalus GL ; Koide SS ; Mather JF
TI - The Detection Of Agents That Have Toxic Effects On The Testis And Male Reproductive Tract
SO - Environmental Factors in Human Growth and Development, Banbury Report No. 11, Hunt, V. R., M. K. Smith, and D. Worth, Editors; Cold Spring Harbor Laboratory, pages 337-354, 23 references, 1982
AB - The detection of agents that are toxic to the male reproductive system is discussed. Chemical agents known or suspected to affect male reproduction include lead (7439921), 1,2-dibromo-3-chloropropane (96128) (DBCP), gossypol (303457), pesticides, anesthetic gases, and vinyl-chloride (75014). Of these, only lead, DBCP, and gossypol have been demonstrated to cause marked effects on the testis or sperm. The effects of toxic agents on reproductive behavior, pituitary function, testicular function, sperm fertilization capacity, and sperm viability after fertilization are summarized. Detection of agents that exert toxic effects on the reproductive organs of the fetus, neonate, and pubertal individual is discussed. Agents that prevent differentiation of the male external genitalia could be detected by assaying for 5-alpha-reductase, an enzyme that metabolizes testosterone to dihydrotestosterone. The detection of agents that interfere with post natal and pubertal development of the male reproductive tract is considered. This can be accomplished with various testicular cell lines, assaying for testicular androgen binding protein in laboratory animals, and making urinary gonadotropin measurements in pre pubertal and pubertal boys.

8
AU - Zenz C
TI - Reproductive Risks In The Workplace
SO - National Safety News, Vol. 130, No. 3, pages 38-46, 1984
AB - Reproductive effects of occupational hazards due to certain widely used chemicals and ionizing radiation are reviewed. The chemicals include lead (7439921), benzene (71432), carbon-monoxide (630080), dibromochloropropane (96128) (DBCP), chlordecone (143500), chloroprene-2-chlorobutadiene (126998), epichlorohydrin (106898),

2 review again

ethylene-dibromide (106934), ethylene-oxide (75218) (EO), mercury (7439976), vinyl-chloride (75014), anesthetic gases, and polychlorinated biphenyls (PCB). Reproductive effects of lead are well known, as it has long been known as an abortifacient. Excess exposure to lead has been associated with premature deliveries and with alteration in sperm, including decreased sperm count. Studies evaluating the reproductive toxicity of male and female workers exposed to benzene have not been reported, but chromosomal aberrations in peripheral blood lymphocytes and in bone marrow cells have been found in benzene workers. Several studies of carbon-monoxide have revealed decreased birth weights and increased mortality in the progeny of animals exposed to high concentrations. However, there is no information implicating effects on the fetus from occupational exposure to carbon-monoxide. Male DBCP workers have been reported as having abnormally low sperm counts. Findings from studies indicate that recovery occurs when the exposure has been for only a short period, such as 3 months. Chlordecone has been reported as producing infertility, loss of libido, and depressed sperm counts. Disturbances in spermatogenesis have been reported after exposure to chloroprene (126998). Epichlorohydrin has been reported to cause sterility in animals. Reported adverse effects of ethylene-dibromide include the induction of sterility, or heritable changes in offspring. Studies on EO suggest that continual occupational exposure increases the frequency of mutations. Vinyl-chloride is considered a possible reproductive toxin in human males. Studies of anesthetic gases and PCB have shown increased congenital malformations in the children of exposed workers. Ionizing radiation at recommended doses appears safe. The author concludes that protective measures can prevent adverse effects on reproducibility.

9

AU - Hemminki K ; Lindbohm M-L ; Hemminki T ; Vainio H

TI - Reproductive Hazards And Plastics Industry

SO - Industrial Hazards of Plastics and Synthetic Elastomers, Jarvisalo, J., P. Pfaffli, and H. Vainio, Editors; Alan R. Liss, Inc., New York, pages 79-87, 10 references, 1984

AB - Studies relating to reproductive effects experienced by employees in the plastics industry are reviewed. Some environmetal studies are also discussed as well as those concerning ethylene-oxide (75218), a metabolite of ethene (74851), which is used in chemical sterilization rather than in the plastics industry. The reproductive outcomes investigated include spontaneous abortions ad malformations in the offspring. The output of plastics has increased markedly over the last 3 decades and the production of plastic goods has become one of the main branches of employment in industrialized countries. The health effects of the ingredients in plastics, and of process and pyrolysis emissions are poorly known, and pose a challenge to occupational health studies. Studies of the effects of vinyl-chloride (75014) and styrene (100425), on workers and their spouses of workers, are described. Reproductive effects on workers and their spouses from the following industries are considered: plastics industry; styrene production and use; viscose rayon industry; laundries; and the pharmaceutical industry. The authors conclude that the plastics industry is likely to expand in the future and a special research effort is needed to evaluate the health effects of working within this industry.

10

AU - Kilian DJ

TI - Use Of Human Biological Monitoring For Risk Assessment Of Mutagenesis And Carcinogenic Effect

SO - Safe Handling of Chemical Carcinogens, Mutagens, Teratogens and Highly Toxic Substances, Vol. 1, Walters, D. B., Editor; Ann Arbor Science Publishers, Inc., Ann Arbor, Michigan, pages 247-258, 27 references, 1980

AB - Practical methods that can be utilized to help define the genetic risk of environmental factors are reviewed. Useful genetic monitoring tests that have been validated and incorporated into the medical literature include cytogenetic testing, body fluid analysis, fluorescent Y-chromosome detection in sperm cells, and epidemiological examinations. Cytogenetic or chromosome analysis of the number of structural rearrangements of the genetic material in peripheral lymphocytes is described. Results of a collaborative study by six expert laboratories show correlations far better than those of conventional toxicological techniques. Results of cytogenetic testing of vinyl-chloride (75014) exposed workers are presented. Cytogenetic analysis is the best tool available for the detection of genetic injury at the present time. Use of the Salmonella bacterial test system to detect the presence of mutagenic substances in blood and urine is described. The test system is inexpensive and fairly rapid to run, as well as a valuable tool for quantitating a mutagenic threshold for a variety of environmental situations. Examination of sperm to determine the presence of an extra Y-chromosome is described and the use of this test to examine conditions which produce an increase in the double Y-chromosome complement is discussed. Reproductive epidemiology is examined. Methodology development is needed to handle problems of multiple environmental exposures and the background of recessive genetic diseases that complicate such studies. The relationship of human genetic monitoring to human carcinogenesis is discussed. A number of diseases involve both excess chromosomal breaks and a high risk of cancer. Correlations are also seen in a number of studies between increased cancer risk to various environmental conditions and human chromosome studies. The author concludes that cytogenetics with new and expanded techniques will help to identify human carcinogens through the utilization of this practical clinical test system.

11

AU - Anonymous

TI - Criteria For A Recommended Standard. Occupational Exposure To Vinyl Halides

SO - Division of Criteria Documentation and Standards Development, NIOSH, U.S. Department of Health, Education and Welfare, 296 pages, 356 references, 1979

AB - An exposure standard is proposed for the vinyl halides and evidence gathered to support the standard is reviewed. It is proposed that employee exposure to vinyl halides in the workplace be controlled by adherence to the provisions for vinyl-chloride (75014), which are appended. The recommended standard applies to workplace exposure to the monomers vinyl-chloride, vinylidene-chloride (75354), vinyl-bromide (593602), vinyl-fluoride (75025), and vinylidene-fluoride (75387), including any unreacted monomer that may remain in polymers of these halides. The biologic effects of exposure to humans, including epidemiologic studies and historical reports of exposure are reviewed. Studies of animal toxicity and metabolism of these compounds, structure activity considerations, and correlation of exposure and effect are examined. Studies of carcinogenicity, mutagenicity, teratogenicity, and reproductive

effects are described. Results show the biologic effects of vinyl halide exposure to include changes in behavior, cardiovascular abnormalities, degenerative changes in the liver and bones, and the induction of malignant neoplasms, especially angiosarcomas of the liver. Sampling and analytical procedures for airborne vinyls in occupational environments are described. Results of vinyl-chloride production workplace hygiene studies are reported. Engineering controls to eliminate the potential for exposure to vinyl halides are discussed. Closed system operations are recommended as providing the best means of elimination of employee exposure, but ventilation systems are also examined. Safe work practices and personal protection are discussed. The basis for previous vinyl halide standards and the recommended standard are examined. It is noted that only vinyl-chloride is a known human carcinogen at this time, but animal studies suggest the possible efficacy of the other vinyl halides in this regard. Research needs on biological effects of exposure to vinyl halides include epidemiological studies, examination of human toxic effects, and development of sampling and analysis practices, particularly for vinyl halides other than vinyl-chloride. A substantial bibliography is appended.

12
AU - Anonymous
TI - Women In The Workplace A Symposium
SO - American Industrial Hygiene Association, Akron, Ohio, 164 pages, 49 references, 1977
AB - Particular industrial health problems of females are reviewed in a symposium. It is argued that demographic realities point to the biological inferiority of the human male; however, females have particular vulnerabilities, particularly reproductive vulnerabilities to industrial hazards which must be examined. Reproductive protection, income maintenance during pregnancy, the principles of teratology, and industrial environment hazards to females and the unborn child are discussed. The reproductive hazards of lead (7439921), anesthetic gases, non ionizing and ionizing radiation, vinyl-chloride (75014), organic solvents, pesticides, and carbon-disulfide (75150) are described. Health hazards to females in the mining industry, in the health care industry, and in electronics manufacture are examined. Research on respiratory disease prevalence in beauticians and its relationship to aerosol sprays is reported which showed an increased risk for development of nonspecific chronic respiratory disease and atypical sputum cytology related to hairspray and non specific aerosol exposure. Health hazards to females working in the plastics and rubber industries are considered, as well as health problems of females and future generations from such occupational exposures for their husbands. Hazards to the health of females working as flight attendants are described. Problems of alleged job discrimination based on the reproductive hazards to the female worker and offspring are considered. It is argued that since toxic chemicals do not discriminate between the sexes, employers cannot use reproductive hazards as an excuse for refusing to hire females or for firing them. Medical and legal solutions to problems facing females' rights to employment despite occupational hazards are examined. Medical guidelines for evaluating work disability associated with pregnancy are offered. The impact of OSHA standards on females is outlined. Job modifications for improved safety and efficiency are suggested. The trade union perspective on females in the workplace is provided.

13
AU - Pearn JH
TI - Teratogens And The Male. An Analysis With Special Reference To Herbicide Exposures
SO - Medical Journal of Australia, Vol. 2, pages 16-20, 44 references, 1983
AB - Teratogenic effects of male exposure to toxic agents are reviewed. It is well known that temporary infertility may occur in males exposed to toxic substances. It is reported that paternally mediated effects on the fetus have been detected in at least six species, and clinical studies of the fertility and offspring of factory workers exposed to lead (7439921), vinyl-chloride (75014), and the pesticides chlordecone (143500) and dibromochloropropane (96128) have been reported. Three mechanisms by which exposures of the male to toxic substances may cause poor reproductive performance or congenital malformations in the offspring are enumerated: a direct effect on pituitary/hypothalamic function, a direct effect on the sperm itself causing anatomical abnormalities, or abnormalities in seminal fluid with secondary abnormalities due to dissolved toxins. Studies concerning the fetotoxic effects of a number of drugs and chemicals administered to the male parent are summarized. Agents examined include: lead, thalidomide (50351), narcotics, dioxin (828002), ethanol (64175), halothane (151677), and enflurane (13838169). Results show unequivocal evidence that poisoning sufficient to cause either clinical toxicity or teratospermia may result in reduced fertility and a mean reduction in the average birth weight of offspring. Epidemiological studies of reproductive performance of males occupationally exposed to environmental hazards are examined. Effects of occupational exposures to vinyl-chloride, anesthetic gases, pesticides, and radiation including chromosome aberrations and increased miscarriages in wives of exposed males are reported; however, no increase in the rate of congenital abnormalities is revealed. The author concludes that spermatogenesis is particularly resilient after toxic exposure to various agents. Although the teratogenic action of hundreds of different toxic agents is quite unequivocal when administered to the pregnant mother, there is no positive experimental evidence to demonstrate that such agents can produce a similar effect through the father.

14
AU - Squirrell DCM ; Thain W
TI - Method 7 Determination Of Vinyl Chloride In Poly (Vinyl Chloride) By Head-Space Sampling Gas Chromatography
SO - Environmental Carcinogens Selected Methods of Analysis, Vol. 2, Methods for the Measurement of Vinyl Chloride in Poly (Vinyl Chloride), Air, Water, and Foodstuffs, IARC Scientific Publication No. 22, pages 105-111, 1 reference, 1978
AB - A method to determine vinyl-chloride (75014) in polyvinyl-chloride (9002862) is described. The source and principle of the method, precautions, required materials, apparatus, sampling procedure, analysis, and method of calculating results are delineated. The method is applicable to polyvinyl-chloride in the form of polymer power, premix powder, compound granules, and fabricated articles. Concentrations up to 2 milligrams vinyl-chloride per gram (g) of polyvinyl-chloride can be determined. The lower limit of detection is 0.1 microgram (microg) vinyl-chloride/g polyvinyl-chloride. The procedure involves dissolving the polymer in tetrahydrofuran in a sealed vial and determining the monomer by head space gas chromatography after equilibration under standard conditions.

Calibration is effected by the method of standard addition. Known amounts of vinyl-chloride are added to solutions of polyvinyl-chloride free of the monomer, and the samples are equilibrated under the same conditions. Once a sample has been chromatographically analyzed, the weight of vinyl-chloride in the sample is determined by use of a calibration graph, and the vinyl-chloride content is determined by dividing the weight of the vinyl-chloride in the sample by the weight of the polyvinyl-chloride sample. Analysis time is typically 30 minutes. The authors note that the reproducibility of the procedure is within 10 percent with respect to the mean for concentrations up to 10microg/g and within 5 percent at concentrations above 10microg/g.

15

AU - Squirrell DCM ; Thain W

TI - Method 5 Determination Of Traces Of Vinyl Chloride In Air By Trapping Followed By Gas Chromatography

SO - Environmental Carcinogens Selected Methods of Analysis, Vol. 2, Methods for the Measurement of Vinyl Chloride in Poly (Vinyl Chloride), Air, Water and Food Stuffs, IARC Scientific Publication No. 22, pages 89-95, 1 reference, 1976

AB - A method to determine vinyl-chloride (75014) in air at concentrations as low as 0.001 part per million is described. The source and principle of the method, precautions, required materials, apparatus, sampling procedure, analysis, and method of calculating results are delineated. The procedure involves trapping 1 to 10 liters of air in a tube filled with silica gel cooled by frozen carbon-dioxide. A typical air flow rate through the tube is about 200 milliliters per minute. During the sampling period, which is limited to about 20 minutes in length because of the accumulation of ice, vinyl-chloride is absorbed by the gel. The trap is connected to a gas chromatograph, fitted with a flame ionization detector. At the conclusion of the sampling period, the tube is quickly heated to 100 degrees-C by immersion in boiling water and purged with nitrogen to transfer the desorbed vinyl-chloride into the chromatograph. The chromatogram is developed for 8 minutes. Chromatographic calibration should be checked daily by measurement against a standard concentration and gas volume. The vinyl-chloride peak areas are measured for both standard and sample, and correction is made to the same attenuation. The vinyl-chloride concentration is calculated from the ratio of the corrected peak of the sample, volume of the standard, and concentration of the standard of the corrected peak of the standard and the volume of the sample. The authors note that the reproducibility of the method has not been determined.

16

AU - Squirrell DCM ; Thain W

TI - Method 6 Determination Of The 24-Hour Time-Weighted Average Concentration Of Vinyl Chloride In Air By Trapping Followed By Gas Chromatography

SO - Environmental Carcinogens Selected Methods of Analysis, Vol. 2, Methods for the Measurement of Vinyl Chloride in Poly (Vinyl Chloride), Air, Water, and Food Stuffs, IARC Scientific Publication No. 22, pages 97-103, 1 reference, 1978

AB - A method to determine the 24 hour time weighted average concentration of vinyl-chloride (75014) in air is described. The method is suited to applications at the factory boundary or beyond and will measure concentrations of vinyl-chloride as low as 0.005 part per million. The source and principle of the method,

precautions in its use, required materials, apparatus, sampling procedure, analysis, and method of calculating results are delineated. The procedure involves collecting a sample over a 24 hour period by pumping air through two activated charcoal adsorption tubes linked in series. The apparatus includes a peristaltic pump which is monitored to give a flow rate of 20 milliliters per minute through 30 centimeters of packed copper tube. At the end of the sampling interval, the absorbed vinyl-chloride is extracted from each tube with carbon-disulfide, and the two solutions are examined separately by gas chromatography. In the chromatographic analysis, 2 milliliters of carbon-disulfide are introduced into a vial with the charcoal; the vial is agitated, and 1 microliter of supernatant is injected into the chromatographic column. The peak height due to vinyl-chloride is measured, and the vinyl-chloride concentration in air is determined from the sample concentration and total volume of air sampled. If an appreciable quantity of vinyl-chloride is detected in the second tube, the result is suspect. Lower air flow rates can be used to reduce the risk of breakthrough, but the limit of detection is also raised. The authors note that the reproducibility of the method is within 10 percent of the mean over the range 0.1 to 1 part per million under laboratory conditions; repeated analyses under field conditions give a coefficient of variation of 8.5 percent over the range 0.05 to 0.5 part per million.

17
AU - Heinrichs WL
TI - Reproductive Hazards Of The Workplace And The Home
SO - Clinical Obstetrics and Gynecology, Vol. 26, No. 2, pages 429-436, 16 references, 1983
AB - Chemicals that adversely interfere with human reproductive processes and that may be present in the home or workplace are discussed. Confirmation through animal studies of reproductive effects is also given. Discussed are alcohol (64175), aminopterin (54626), anesthetic gases, carbon-disulfide (75150), DDT (50293), dibromo-chloropropane (96128), diethylstilbestrol (56531) (DES), diphenylhydantoin (57410) (DPH), ethylene-dibromide (106934), hexachlorobenzene (118741), kepone (143500), lead (7439921) and other smelter emissions, methylmercury (22967926), polychlorinated biphenyls (PCBs), thalidomide (50351), cigarette smoke, vinyl-chloride (75014), and warfarin (81812). Chemicals of heavy metals and halogenated hydrocarbons frequently affect various reproductive processes. The substances discussed most commonly increased the number of abortions. They included aminopterin, anesthetic gases, carbon-disulfide, DES, vinyl-chloride, cigarette smoke, pesticides, lead, various laboratory chemicals, and DPH. Reduced birth weight can be caused by alcohol, anesthetic gases, lead, pesticides, and PCBs. Carbon-disulfide, DDT, DES, lead, warfarin, and cigarette smoking contribute to premature births. Other chemicals can cause such problems as stillbirth, congenital malformations, libido or erection failure, azoospermia, testicular atrophy, decreased fertility, skeletal and central nervous system anomalies, menstrual disorders, and increased infant death rates.

18
AU - Braun R ; Legator MS ; McGregor DB ; Mohn GR ; Schoneich J
TI - Mutagenicity Of Selected Chemicals In The Host-Mediated Assay
SO - Comparative Chemical Mutagenesis, Environmental Science Research, Vol. 24, pages 353-392, 62 references, 1981
AB - The mutagenicity of a large number of chemicals in the host mediated

assay is reviewed. A brief history is given of the development of the host mediated assay. It is noted that, compared with in-vitro tests, the host mediated assay takes into consideration the pharmacokinetics of the compound, drug interactions, and the formation of mutagenic compounds from non mutagenic precursors, while allowing examination of organospecific mutagenesis. The standard procedure for the host mediated assay is described and variations are summarized. Methodological questions which arose during the literature review from which the data was taken are examined. A scheme is presented for standardization of results obtained in host mediated assays which calls for complete reporting of the compound name, formula, and constitution; the genetic indicator system; host animal; application site; incubation compartment and time; treatment conditions; effects observed; reproducibility; statistical test used; spontaneous mutant frequency; positive control employed and results; and a clear interpretation of the results obtained. Indicator organisms currently or occasionally used in host mediated assays and the major genetic effect examined are listed. Results from a variety of host mediated assays reported in the literature are presented for the following compounds: vinyl-chloride (75014), epichlorhydrin (106898), mitomycin-C (50077), thioTEPA (52244), diethylnitrosamine (55185), dimethylnitrosamine (62759), cyclophosphamide (50180), trenimon (68768), N-methyl-N'-nitro-N-nitrosoguanidine (70257), ethyl-methanesulfonate (62500), methyl-methanesulfonate (66273), myleran (55981), TEPA (57396), and ICR-170 (146598).

19

AU - Styles JA ; Richardson CR ; Callander RD ; Cross MF ; Bennett IP ; Longstaff E

TI - Activity Of Bromochlorodifluoromethane (BCF) In Three Mutation Test

SO - Mutation Research, Vol. 142, No. 4, pages 187-192, 15 references, 1985

AB - The genotoxicity of the halocarbon bromochlorodifluoromethane (353593) (BCF) was tested in three mutation assays. For bacterial assays, Salmonella-typhimurium strains TA-1535, TA-1537, TA-1538, TA-98, and TA-100 were used; strains were exposed to 5 to 75 percent BCF per volume. The mammalian in-vitro gene mutation assay was performed on the L5178Y-mouse line in concentrations ranging from 17 to 98 percent BCF exposure. BCF, vinyl-chloride-monomer (75014) (VCM), and ethyl-methanesulphonate (62500) were tested in the presence and absence of auxiliary metabolism for their ability to induce forward mutation in the L5178Y-mouse lymphoma gene mutation assay. BCF and VCM were administered at 5,000 or 50,000 parts per million (ppm). Animals were exposed to VCM or BCF or air for 6 hours and killed 24, 48, and 72 hours after exposure to BCF or air and 24 hours after exposure to VCM. BCF showed no evidence of mutagenic activity in S-typhimurium strains TA-1537, TA-1538, and TA-98. BCF was nontoxic to L5178Y-mouse cells unless auxiliary metabolic activation was added when a minimum of 20 percent survival was attained. There was no reproducible or dose related increase in mutation frequency above background values for BCF, either in the presence or absence of auxiliary metabolism. Clinical observations revealed no effects of BCF at either concentration whereas VCM at 50,000ppm caused the animals to be subdued with reduced reaction to noise during the last 2 hours of exposure. Elevated amounts of micronuclei were observed in both sexes at 24 hours after exposure to VCM. No significant effects were observed with BCF at either concentration at any of the sampling times. BCF induced a significant increase in revertant colonies in S-typhimurium strain

TA-1535. The authors conclude that while VCM gives positive results in all assays tested, BCF is mutagenic in-vitro in only one strain of S-typhimurium.

20
AU - Krivankova L ; Samcova E ; Bocek P
TI - Determination Of Thiodiacetic Acid In Urine Of People Exposed To Vinyl Chloride By Analytical Capillary Isotachophoresis
SO - Electrophoresis, Vol. 5, No. 4, pages 226-230, 14 references, 1984
AB - A method for determining thiodiacetic-acid (123933) (TDA) in urine by analytical capillary isotachophoresis (ITP) with column coupling was developed. The ITP analyzer was equipped with a column coupling system consisting of two polytetrafluoroethylene capillaries that were equipped with a conductivity detector. Solutions of 10 millimoles per liter (mmol/l) adjusted with beta-alanine to the desired values of pH were used as the main electrolytes in pre separation and analytical capillaries. The terminating electrolyte was 10mmol/l acetic-acid in all cases. TDA was determined in urine samples of 1 to 10 microliters during 45 minutes without any pretreatment of the sample. At a pH range of 3.5 to 3.7, the zone of TDA migrated together with the phosphate zone and was joined by the citrate zone at a pH range of 3.9 to 4.1. The zone of TDA migrated before citrate and phosphate together with other more mobile acids like fumaric-acid. With higher volumes of injected urine, mixed zones of TDA and citrate were formed in the pre separation capillary. For samples larger than 3 microliters, the dependence of the step length of TDA on the volume of injected urine enriched with TDA was not linear. The lowest detectable concentration of TDA was about 0.000006 mole per liter (mol/l) and the reproducibility of the analyses was in the range of 0.00002 to 0.00015mol/l. The authors conclude that the isotachophoresis method is rapid and samples of 10 microliters of urine without any pretreatment can be directly analyzed.

22
AU - Johnston RV ; Schwetz BA ; Middleton JJ ; Balmer MF ; Lisowe RW
TI - Cytogenetic Effects Of 1,1-Dichloroethylene On Rat Bone Marrow Cells
SO - Dow Chemical U.S.A., Midland, Michigan, 6 pages, 1 reference
AB - The cytogenetic effects of 1,1-dichloroethylene (75354) (DCE) were studied in rats. The study was a supplement to a long term toxicity study of DCE. Sprague-Dawley-rats were exposed in an inhalation chamber to 0, 25, or 75 parts per million (ppm) DCE for 6 hours per day, 5 days per week for 26 weeks. At the end of the study, animals were killed and bone marrow was aspirated. Bone marrow was incubated for 20 minutes and cells were isolated from the medium by centrifugation. Slides of the cells were prepared and 23 to 50 diploid cells per slide were examined and scored for multiple aberrations, miscellaneous aberrations, chromatid aberrations, and chromosome aberrations. No chromosomal aberrations were found among any of the bone marrow cells of exposed animals. The authors noted the DCE as received from the supplier contains 225ppm of a monomethyl ether of hydroquinone, and 1200ppm vinyl-chloride (75014). They conclude that exposure to 75ppm DCE vapor under the present experimental conditions does not cause chromosome abnormalities.

23
AU - John JA ; Schwetz BA ; Leong BKJ ; Smith FA ; Nitschke KD ; Haberstroh HD ; Murray FJ ; Balmer MF ; Gehring PJ
TI - The Effects Of Maternally Inhaled Vinyl Chloride On Embryonal And

Fetal Development In Mice, Rats And Rabbits

SO - Toxicology Research Laboratory, Health and Environmental Research, Dow Chemical U.S.A., Midland, Michigan, 30 pages, 12 references, 1976

AB - The effects of vinyl-chloride (75014) (VC) inhalation on embryonal and fetal development were investigated in CF1-mice, Sprague-Dawley-rats, and New-Zealand-white-rabbits. Pregnant animals were exposed to 500 parts per million (ppm) VC for 7 hours per day on days 6 to 15 of gestation for mice and rats and on days 6 to 18 for rabbits. Additional mice were exposed to 50ppm VC. Some animals were given 15 percent ethanol (64175) in drinking water. Additional rats and rabbits were exposed to 2500ppm VC. Animals were observed throughout pregnancy. Mice and rats were sacrificed on days 18 and 21 of gestation, respectively, and rabbits on day 29. Fetuses were weighed, measured, and examined for external anomalies. Mice given 50 or 5000ppm VC, and ethanol had decreased weight gain during gestation and decreased absolute liver weight at sacrifice. In mice given 50ppm VC, there were no apparent effects. Maternal weight gain and food consumption were significantly decreased in rats and rabbits given ethanol, 2500ppm and 500ppm VC exposures. Maternal deaths occurred in mice exposed to 500ppm VC. Fetal body weights were lower in 500ppm VC treated mice and 500ppm VC treated rats, but not 2500ppm VC treated rats. No significant effects were seen on litter size, number of implantation sites, or incidence of resorptions in exposed rats. Natural abortions were significantly lower in rats exposed to 2500ppm VC than in controls. No anomalies were seen in any species. The authors conclude that inhalation of VC is not teratogenic at concentrations high enough to cause maternal toxicity.

24

AU - Bonelli EJ ; Taylor PA ; Morris WJ

TI - Mass Fragmentography GC/MS In The Analysis Of Hazardous Environmental Chemicals

SO - International Laboratory, pages 19-28, 5 references, 1975

AB - Analyzing pesticides by a combined gas chromatography and mass spectrometry (GC/MS) method was investigated. Mass spectrum of the compounds were continuously generated in the ion source. Positive ions were extracted before passing through a filter. Ions from the detector were integrated by the ion current monitor and sent to a strip chart recorder. The scanning operation took 3 seconds. Specific ions were collected by applying a specific voltage across the filter. A mass fragmentographic device was used to monitor several ion fragments simultaneously. Samples of DDT (50293) whole fish extract, vinyl-chloride (75014) (VC), carbon-tetrachloride (56235), chloroform (67663), benzene (71432) in river and tap water, bis(chloroethyl)ether (6986487) (BCE), bis(chloromethyl)ether (542881) (BCME), fluorocarbon-11 (75694) (FC-11) and fluorocarbon-12 (75718) (FC-12) were analyzed. VC was collected on charcoal filters and desorbed in carbon-disulfide. Chlorinated water samples were obtained from four different locations. Benzene and chloroform were extracted with hexadecane. Five pesticides were identified and quantitated from a single injection of a whole fish extract. VC gave a peak height of 122 millimeters with a 1.6 percent deviation for six samples at a detection limit of 10 to 20 picograms per microliter of injection fluid. Chloroform concentrations ranged from 3.5 to 50 parts per billion (ppb) in water samples from various locations. Hexadecane extracted between 85 to 95 percent of benzene and chloroform from a 1 to 1ppb mixture of the compounds. The calculated voltage ratios of chloroform and VC showed that they were

free from impurities. BCME and BCE were detectable at 10 picograms and FC-11 and FC-12 were detectable at 1 to 5 picograms. The authors conclude that the sensitivity and reproducibility of the GC/MS procedure make it an excellent candidate for use in analyzing organic environmental contaminants.

25

AU - Ketterer PA

TI - Determination Of Vinyl Chloride In PVC Processing Plants

SO - Technical Paper, Regional Technical Conference, Society of Plastics Engineers, Palisades Section, pages 163-171, 7 references, 1974

AB - Sampling and analytical methods available to polyvinyl-chloride (9002862) processors for monitoring very low concentrations of vinyl-chloride-monomer (75014) (VCM) in air and products are reviewed. Gas chromatography with hydrogen flame ionization detector is the most widely used technique for VCM analysis because of its specificity, sensitivity, and moderate cost. Sampling methods, calibration procedures, and the choice of column and instrument parameters are also critical to the validity of the monitoring program. Determination of VCM in air may require short term instantaneous sampling and long term sampling of average concentrations. Of sampling methods, the bag method gives more accurate and reproducible results than the charcoal tube. Residual VCM in products can be determined quantitatively using tetrahydrofuran (THF) as the solvent. THF also can be used as the solvent for preparing calibration standards that are stable for reasonable periods of time. Standard accuracy can be improved by adding enough VCM so that errors in weighing are insignificant. For fast and efficient separation of VCM, the column should provide some retention of VCM for separation from low boiling nonpolar compounds, but allow elution of the VCM before large solvent peaks and other higher boiling material. Columns packed with a polyalkylene glycol give excellent resolution of VCM in air, water, carbon-disulfide (75150), and THF solutions. The author concludes that use of sampling, chromatographic, and standardization techniques described allows for detection of VCM at less than 0.05 parts per million (ppm) in solutions of less than 0.1ppm in air.

26

AU - Anonymous

TI - Review, Summarization, And Evaluation Of Literature To Support The Update And Revision Of Criteria Documents. VIII. Vinyl Chloride

SO - NIOSH, Rockville, Maryland, Contract No. 210-76-0167, 95 pages, 140 references, 1977

AB - Recent literature on occupational health standards for vinyl-chloride (75014) (VC) is reviewed. Analytical methods are discussed. The NIOSH recommended method of sampling and analysis is described. This method can be improved either by modifying the carbon-disulfide desorption procedure or by using a thermal desorption method. Alternative analytical methods are summarized. The human effects of VC exposure are discussed. The clinical symptoms of VC poisoning are described. Epidemiological surveys and case reports are presented. Epidemiological surveys have confirmed the existence of excess liver cancer mortality among workers exposed to VC. More than 38 cases of hepatic angiosarcoma attributed to VC have occurred since 1974. Animal studies of the pharmacodynamics and metabolism, biochemical effects, toxicity, mutagenicity, and carcinogenicity of VC are considered. Prolonged inhalation at concentrations of 50 parts per million has caused cancers in various animal species. Positive mutagenic results have occurred in

Salmonella-typhimurium incubated with VC in the presence of liver microsomes. Work practices and engineering controls are discussed. Current techniques of medical surveillance are described. Long term bioassays in several species need to be conducted to determine if there is a safe dose of VC. Research is also needed to determine possible effects of VC on reproductive functions.

28

AU - John JA ; Smith FA ; Leong BKJ ; Schwetz BA

TI - The Effects of Maternally Inhaled Vinyl Chloride on Embryonal and Fetal Development in Mice, Rats, and Rabbits

SO - Toxicology and Applied Pharmacology, Vol. 39, pages 497-513, 11 references, 1977

AB - The teratogenic and fetotoxic effects of inhaled vinyl-chloride (75014) (VC) were studied in mice, rats, and rabbits. Female CF-1-mice were exposed to 50 or 500 parts per million (ppm) VC, with or without 15 percent ethanol (64175) in the drinking water, from days 6 through 15 of pregnancy. One 2500ppm group also received 15 percent ethanol in water. Female New-Zealand-White-rabbits were exposed to VC in the same doses as rats at days 6 through 18 of pregnancy. Both doses of VC with ethanol produced significantly lower weight gain and liver weight than VC alone. High dose rats had significantly lower liver weights than controls. With ethanol, significantly lower weight gain and relative liver weight were seen compared to rats receiving 2500ppm VC alone. Neither dose of VC given to rabbits produced maternal toxicity, although food consumption was significantly lower in the 50ppm group and the 2500ppm VC plus ethanol group. Fetuses of mice exposed to 50ppm VC had significantly longer crown to rump lengths. Fetal body weight and crown to rump length were significantly reduced with ethanol. Significant decreases in live fetuses per litter and fetal body weight and significant increases in maternal deaths and resorptions were seen among 500ppm VC treated mice. Ethanol decreased implantation sites per dam, live fetuses per litter, fetal body weight, and length. Among low dose rats, fetal body weight was significantly reduced, but length was increased. Fetal length and weight were significantly lowered in 2500ppm rats with ethanol. Rabbits receiving 500ppm VC had significantly lower implantation sites per dam and live fetuses per litter. The only significant alteration in the 250ppm group was increased resorptions with ethanol. At high doses, fetal mice had increased delayed sternebrae and skull ossification and unfused sternebrae. Several skeletal abnormalities occurred with ethanol. Among high dose rats, an increased incidence of rib spurs was found with the addition of ethanol. Low dose fetal rats also had more rib spurs. The authors conclude that VC is not teratogenic in this study, but that mice are more perceptible to VC toxicity, which is enhanced by simultaneous exposure to ethanol.

29

AU - Bartsch H

TI - Mutagenicity Tests in Chemical Carcinogenesis

SO - Inserm Symposia Series, Vol. 52, IARC Scientific Publications, No. 13, pages 229-240, 33 references, 1976

AB - The use of mutagenicity tests in determining carcinogenicity is reviewed. The increasing evidence that carcinogenicity involves mutagenicity is discussed in light of the discovery that many carcinogenic chemicals require metabolic activation (in many cases associated with electrophilic binding to nucleophilic sites in nucleic acids and proteins) in order to show biological activity.

Methods for determining mutagenicity are discussed, and the need for extensive examination of these tests using know carcinogens is noted. Use of mutagenicity tests are suggested for tracing carcinogens in the human environment, prescreening compounds for mutagenic action, and investigating the capability of human tissues to generate electrophilic intermediates from the test compound. Research using such microbial mutagenicity tests with vinyl-chloride (75014) is cited which demonstrates that liver enzymes convert vinyl-chloride into mutagenic compounds. The development of enzyme profiles to identify individuals at risk for certain kinds of cancer development is suggested. The usefulness of mutagenicity tests in predicting possible carcinogenic effects of chemicals in humans is discussed. A number of cases are noted in which mutagens have not been shown to be carcinogens, and vice versa. Limitations of the mutagenicity test systems are considered. The number of potential carcinogens to be tested and the capacity to test for carcinogenicity (about 400 compounds per year) are considered. The author concludes that mutagenicity tests should be employed to pinpoint adverse biological effects of chemicals and target chemicals to be studied further. Researchers should avoid correlating positive mutagenicity results with carcinogenicity.

30

AU - Roscoe RJ ; Dooley DC ; Waxweiler RJ

TI - Health Hazard Evaluation Report, No. HETA-81-080-1146, Precision Plastics Company, Philadelphia, Pennsylvania

SO - Hazard Evaluations and Technical Assistance Branch, NIOSH, Cincinnati, Ohio, 13 pages, 9 references, 1982

AB - Several cases of breast and uterine cancer among female mold operators using polyvinyl-chloride (9002862) (PVC) at the Precision Plastics Company (SIC-3079), Philadelphia, Pennsylvania were investigated. The study was requested by Local 637 of the Industrial Workers Union and was performed on June 3 and July 28 and 29, 1981. The company employs 36 workers including 31 production personnel. There were no detectable concentrations of vinyl-chloride (75014) monomer in the personal breathing zone of two mold operators. Concentrations of PVC dust were below the OSHA standard for nuisance dust. Examination of medical records and insurance claims located three cases of breast cancer and two cases of cervical cancer out of a sample of 125 hourly employees who worked 5 years or longer. These cases represented an incidence rate more than 3 fold in excess of expected numbers for breast cancer and 4 fold for cervical cancer for women who worked more than 5 years. These excess risks were not considered statistically significant. The authors conclude that present exposure concentrations are not in excess of standards. The cancer cases could not be demonstrably due to occupational exposure to PVC or vinyl-chloride. The authors recommend that future cases of cancer be monitored.

31

AU - Sassu GM ; Zilio-Grandi F ; Conte A

TI - Gas Chromatographic Determination of Impurities in Vinyl Chloride

SO - Journal of Chromatography, Vol. 34, pages 394-398, 2 references, 1968

AB - A method was developed for separating impurities in vinyl-chloride (75014) by gas chromatography. A single 10 meters column was packed with tricresyl-phosphate on Chromosorb-P. Working temperatures were 50 and 35 degrees. A constant sample quantity of 1.5 milliliters was injected with a gastight syringe, and calibration curves (expressed in parts per million versus the area) were plotted using

calibrated mixtures of the various impurities in vinyl-chloride. Use of the 35 degrees-C temperature permitted resolution of the methyl-chloride-butadiene-1,3 and diacetylene-3-chloropropene-1 pairs into two elution peaks, which was not possible at 50 degrees-C. The impurity determination error was about 10 percent, mostly dependent on the accuracy of the sample injected. The authors suggest that analysis at 35 degrees-C be used to control the end product, and 50 degrees-C to control the various purification stages. An analysis time of 36 minutes at 50 degrees-C and 52 minutes at 35 degrees-C should be adequate for a commercial monomer of medium purity. The method offers excellent reproduction of retention times, simplicity and facility of analysis, high speed, and good separation of impurities.

32
AU - DEAN BJ ; ANDERSON D ; SRAM RJ
TI - MUTAGENICITY OF SELECTED CHEMICALS IN THE MAMMALIAN DOMINANT LETHAL ASSAY, IN: COMPARATIVE CHEMICAL MUTAGENESIS
SO - ENVIRON SCI RES; 24:487-538,1981
AB - EMIC/ORNL SEE: CA 96-175391

33
AU - SANOTSKII IV ; DAVTYAN RM ; GLUSKCHENKO VI
TI - STUDY OF THE REPRODUCTIVE FUNCTION IN MEN EXPOSED TO CHEMICALS
SO - GIG TR PROF ZABOL; (5):28-32,1980
AB - EMIC/ORNL SEE: HEEP 81-12865

34
AU - PETER S ; UNGVARY G
TI - LACK OF MUTAGENIC EFFECT OF VINYL CHLORIDE MONOMER IN THE MAMMALIAN SPOT TEST
SO - MUTAT RES; 77:193-196,1980
AB - EMIC/ORNL SEE: CA 92-123086

36
AU - SHORT RD ; MINOR JL ; WINSTON JM ; LEE C
TI - DOMINANT LETHAL STUDY IN MALE RATS AFTER REPEATED EXPOSURES TO VINYL CHLORIDE OR VINYLIDENE CHLORIDE
SO - J TOXICOL ENVIRON HEALTH; 3:965-968,1977
AB - EMIC/ORNL SEE: CA 88-131564

38
AU - KURZEL RB ; CETRULO CL
TI - CHEMICAL TERATOGENESIS AND REPRODUCTIVE FAILURE
SO - OBSTET GYNECOL SURV; 40:397-424,1985
AB - ETIC/ORNL

40
AU - SHORT RD ; MINOR JL ; WINSTON JM ; LEE C
TI - A DOMINANT LETHAL STUDY IN MALE RATS AFTER REPEATED EXPOSURES TO VINYL CHLORIDE OR VINYLIDENE CHLORIDE
SO - J TOXICOL ENVIRON HEALTH; 3:965-968,1977
AB - ETIC/ORNL

41
AU - HEMMINKI K ; LINDBOHM ML ; HEMMINKI T ; VAINIO H
TI - REPRODUCTIVE HAZARDS AND PLASTICS INDUSTRY, IN: INDUSTRIAL HAZARDS OF PLASTICS AND SYNTHETIC ELASTOMERS
SO - PROG CLIN BIOL RES; 141:79-87,1984
AB - ETIC/ORNL

42
AU - BARLOW SM ; SULLIVAN FM
TI - REPRODUCTIVE HAZARDS OF INDUSTRIAL CHEMICALS. AN EVALUATION OF ANIMAL AND HUMAN DATA
SO - REPROD HAZ INDUST CHEM; 610 PP,1982
AB - ETIC/ORNL

43
AU - PONCELET F ; DUVERGER-VAN BOGAERT M ; LAMBOTTE-VANDEPAER M ; DE MEESTER C
TI - MUTAGENICITY, CARCINOGENICITY, AND TERATOGENICITY OF INDUSTRIALLY IMPORTANT MONOMERS
SO - MUTAGEN CARCINOG TERATOG IND POLLUT; 205-279,1984
AB - ETIC/ORNL SEE: CA 100-97706

46
AU - SANOTSKY IV ; DAVTYAN RM ; GLUSHCHENKO VI
TI - STUDY OF THE REPRODUCTIVE FUNCTION IN MEN EXPOSED TO CHEMICALS
SO - GIG TR PROF ZABOL; (5):28-32,1980
AB - ETIC/ORNL

48
AU - Panova Z
TI - [Problems of women working in vinyl chloride manufacturing plants]
SO - Akush Ginekol (Sofiia); VOL 24, ISS 6, 1985, P75-80

51
AU - Hemminki K ; Lindbohm ML ; Hemminki T ; Vainio H
TI - Reproductive hazards and plastics industry.
SO - Prog Clin Biol Res; VOL 141, 1984, P79-87

52
AU - Zenz C
TI - Reproductive risks in the workplace
SO - National Safety News Sep. 1984, Vol.130. No.3, p.38-46.
AB - The possible effects of workplace exposure to some chemicals on the reproductive organs and cycles of men and women are described (benzene, carbon monoxide, dibromochloropropane, chlordecone, chloroprene, epichlorohydrin, ethylene dibromide, ethylene oxide, vinyl chloride, anaesthetic gases, polychlorinated biphenyls, mercury).

53
AU - Ziskind R ; Maldonado G ; Smith DF
AD - Science Applications, Inc., Hermosa Beach, CA.
TI - Development of a Protocol to Trace and Study School Children Exposed to Vinyl Chloride.
SO - Govt Reports Announcements & Index (GRA&I), Issue 04, 1985
AB - TD3: Although a considerable body of occupational and laboratory toxicology data have demonstrated the carcinogenic action of vinyl chloride monomer, there appears to be little epidemiological literature which examines significant exposure to children. This study expanded a pilot study which identified a cohort of 1,363 children who attended an elementary school adjacent to a vinyl chloride monomer processing plant in Saugus, California in the 1950's and 1960's. The current study identified a non-exposed control group (N=979), set up a computer data base management system to facilitate subject tracing, performed an analysis of the mortality experience of the two groups up to 1980, and developed a

protocol to validate pregnancy outcome data. The validation protocol results suggest that the questionnaire is a good instrument capable of recording valid reproductive information. Final rept. Jan 82-Apr 83, Portions of this document are not fully legible.

54
AU - Pearn JH
TI - Teratogens and the male - An analysis with special reference to herbicide exposure
SO - Medical Journal of Australia 9 July 1983, Vol.2, No.1, p.16-20. 44 ref.
AB - There are 3 mechanisms by which exposure of the male to toxic substances may cause poor reproductive performance or congenital malformations in his offspring: a direct effect on pituitary-hypothalamic function or male sex hormones; a direct effect on the sperm itself; abnormalities in seminal fluid with secondary abnormalities due to dissolved toxins. Experimental studies with 7 drugs and 5 groups of toxic chemicals are reviewed. Clinical studies reviewed relate to lead, vinyl chloride, the insecticide carbaryl, the pesticides chlordecone and dibromochloropropane, radiation, fathers with epilepsy, and male and female anaesthetists.

55
AU - Nisbet ICT ; Karch NJ
TI - Chemical hazards to human reproduction
SO - Noyes Data Corporation, Mill Road at Grand Ave., Park Ridge, NJ 07656, USA, 1983. 245p. Illus. Bibl.
AB - This book explores the importance of chemicals as factors contributing to reproductive impairment in humans. It summarises the results of studies in exposed humans, surveys methods for testing chemicals in laboratory animals, and discusses the predictive value of animal tests. Public health and occupational health aspects are both considered.

56
AU - Elskamp DMW
AD - Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
TI - Toxicology of Tetrachloroethylene.
SO - Govt Reports Announcements & Index (GRA&I), Issue 15, 1984
AB - TDG: Literature on the toxic characteristics of tetrachloroethylene was reviewed. Technical data, environmental and biological monitoring, toxicokinetics, and data of acute and chronic toxicity for laboratory animals and humans are given. The effects on reproduction, and mutagenic and carcinogenic effects are discussed. In Dutch; English Summary.

57
AU - Barlow SM ; Sullivan FM
TI - Reproductive hazards of industrial chemicals
SO - Academic Press (London) Ltd., 24-28 Oval Road, London NW1 7DX, United Kingdom, 1982. 610p. Bibl.
AB - The world-wide medical and scientific literature on reproductive pharmacology, endocrinology, and toxicology in animals and humans of about 50 of the most commonly used industrial chemicals is reviewed. Chapters cover: reproductive hazards; reproductive toxicity testing in animals; reproductive effects in humans; mutagenicity testing; reproductive hazards associated with different occupational groups (abortions, malformations and perinatal deaths, cancer and gene mutations in offspring); effects in male and female workers; review

of compounds (literature search, criteria for acceptable methodology in animal studies, mutagenicity, carcinogenicity).

58
AU - ANON
TI - Prevention of occupational cancer - International symposium
SO - International Labour Office, 1211 Geneva 22, Switzerland, 1982. 658p. Illus. Bibl.
AB - The 3 opening addresses and 84 technical papers presented at this symposium, 21-24 Apr. 1981, Helsinki, Finland, are reproduced under the section headings: current concepts in occupational carcinogenesis; epidemiology of occupational cancer; methodology for occupational cancer risk evaluation; prevention and control of occupational cancer risk; national policies and international cooperation in the prevention of occupational cancer.

61
AU - KURZEL RB ; CETRULO CL
TI - THE EFFECT OF ENVIRONMENTAL POLLUTANTS ON HUMAN REPRODUCTION, INCLUDING BIRTH DEFECTS
SO - ENVIRON. SCI. TECHNOL. 1981, 15(6) 625-640
AB - EIS: Epidemiology Information System

62
AU - Hladlo Z ; Kubiskova E ; Svobodova P ; Simova M
TI - Determination of a urinary metabolite of vinyl chloride - N-acetyl-S-(hydroxyethyl)cysteine
SO - Pracovni lekarstvi Oct. 1981, Vol.33, No.9, p.319-323. 30 ref.
AB - Detailed description of a spectrophotometric method of determining N-acetyl-S-(hydroxyethyl)cysteine in the urine of workers exposed to vinyl chloride. The method is based on the determination of SH compounds formed during the alkaline hydrolysis of N-acetyl-S-(hydroxyethyl)cysteine. The method is reproducible and has a yield of 74.7-81.3%. It can be used as an exposure test for indicating low levels of exposure to vinyl chloride and to other alkylation products metabolised to mercapturic acids.

63
TI - Effects of physical and chemical hazards on the reproductive health of male and female workers
SO - 1765 St. Laurent Blvd., Ottawa, Ontario, K1G 3V4, Canada, 1981. 33p. 21 ref.
AB - Contents: chemical and physical hazards; workplace exposure and its effects on reproduction; impediments to progress; chemical reproductive hazards, proven (anaesthetic gases, carbon disulfide, hormones, lead, mercury, pesticides, polychlorinated biphenyls, vinyl chloride); potential (aromatic hydrocarbons, carbon monoxide, carbon tetrachloride, chloroprene); suspected (arsenic, beryllium, cadmium, chloroform, dimethylformamide, lithium, nickel); physical reproductive hazards, proven (ionising radiation, non-ionising radiation); potential (heat, noise, vibration); employers' responsibilities and worker rights; bibliography; 2-page summary for poster display.

64
AU - ANON
TI - Control technology in the plastics and resins industry
SO - Superintendent of Documents, U.S. Government Printing Office, Washington D.C. 20402, USA, Jan. 1981. 324p. Illus. 25 ref.
AB - The 25 papers presented at this symposium, 27-28 Feb. 1979, Atlanta,

Georgia, USA, are reproduced. Topics covered include: OSHA and NIOSH roles in establishment and assessment of control technology; control of emissions; problems in polyvinyl chloride processing; vinyl chloride monomer; sampling methods; monitoring systems and workplace controls; loss prevention; design and implementation of systems and controls.

65
TI - Threshold limit values 1980
SO - H.M. Stationery Office, P.O. Box 569, London SE1 9NH, United Kingdom, 1981. 23p. 46 ref.
AB - This note reproduces the list of threshold limit values (TLVs, expressed in ppm or mg/m:3:), adopted by the American Conference of Governmental Industrial Hygienists in 1977 for over 500 hazardous substances which may be absorbed in the form of dust or fumes in workroom air. Substances for which additional or alternative standards apply in Great Britain are acrylonitrile, asbestos, benzene, cotton dust, coal mine dust, lead, 4,4'-methylenebis(2-chloroaniline), mica and talc, other non-siliceous dusts, tetrachloroethylene, trichloroethylene, vinyl chloride, chromium and its compounds, many pesticides and rubber solvent. List of carcinogens prohibited in Great Britain. TLVs for mineral dusts, substances of variable composition, welding fumes, mixtures, nuisance particulates, inert gases and vapours (simple asphyxiants), and tentative guidelines for grading experimental animal carcinogens into high, intermediate and low potency are appended.

66
AU - Sanotski:i IV ; Davtian RM ; Glushchenko VI
TI - [Male reproductive function studied under the action of chemical substances]
SO - Gig Tr Prof Zabol, ISS 5, 1980, P28-32

67
AU - Bingham E ; Lane JM
TI - Vinyl halides -- carcinogenicity.
SO - Vet Hum Toxicol; VOL 22, ISS 1, 1980, P31-3

68
AU - Scott R
AD - Author address not given
TI - Reproductive hazards.
SO - Job Saf. Health 6(5): 7-13 1978
AB - PESTAB. Toxic agents that can affect reproduction are examined. Those which act as mutagens, such as ionizing radiation, can cause chromosomal damage both to the sperm and the egg, which could result in miscarriage, stillbirth, or birth defects. Teratogens, such as thalidomide, can damage the fetus during pregnancy, causing deformaties. Transplacental carcinogens, such as diethylstilbesterol (DES), can cause cervical cancer in offspring. Industrial poisons such as beryllium oxide and bone marrow depressants such as benzene and ionizing radiation present hazards to pregnancy. Anaesthetic gases and vinyl chloride can affect the male reproductive system. Other common agents with possible reproductive effects are discussed. Pesticides which have been reported to affect reproduction include DBCP, carbaryl, organophosphates, organochlorines, 2,4-D, 2,4,5-T, and Kepone (chlordecone).

AU - EVANOFF BA ; ROSENSTOCK L
TI - REPRODUCTIVE HAZARDS IN THE WORKPLACE A CASE STUDY OF WOMEN FIREFIGHTERS
SO - AM J IND MED; 9 (6). 1986. 503-516.
AB - BIOSIS COPYRIGHT: BIOL ABS. RRM HAZARDOUS OCCUPATION HAZARDOUS MATERIALS AIR POLLUTION HYPERTHERMIA CARBON MONOXIDE PHYSICAL EXERTION TERATOGEN FETAL TOXICITY

2
AU - WHO
TI - WHO ENVIRONMENTAL HEALTH 2. EFFECTS OF OCCUPATIONAL FACTORS ON REPRODUCTION
SO - WORLD HEALTH ORGANIZATION. WHO ENVIRONMENTAL HEALTH, 2. EFFECTS OF OCCUPATIONAL FACTORS ON REPRODUCTION. VI+45P. WHO: COPENHAGEN, DENMARK. PAPER.; 0 (0). 1985. VI+45P.
AB - BIOSIS COPYRIGHT: BIOL ABS. RRM BOOK ANIMAL EPIDEMIOLOGY MUTAGENESIS INFERTILITY ABORTION TERATOGENESIS

4
AU - HEMMINKI K ; LINDBOHM M-L ; HEMMINKI T ; VAINIO H
TI - REPRODUCTIVE HAZARDS AND PLASTICS INDUSTRY
SO - JARVISALO, J., P. PFAFFLI AND H. VAINIO (ED.). PROGRESS IN CLINICAL AND BIOLOGICAL RESEARCH, VOL. 141. INDUSTRIAL HAZARDS OF PLASTICS AND SYNTHETIC ELASTOMERS; SYMPOSIUM ON OCCUPATIONAL HAZARDS RELATED TO PLASTICS AND SYNTHETIC ELASTOMERS, ESPOO, FINLAND, NOV. 22-27, 1982. XIV+441P. ALAN R. LISS, INC.: NEW YORK, N.Y., USA. ILLUS. ISBN 0-8451-0141-2.; 0 (0). 1984. P79-87.
AB - HEEP COPYRIGHT: BIOL ABS. RRM HUMAN STYRENE VINYL CHLORIDE ETHYLENE OXIDE OCCUPATIONAL EXPOSURE SPONTANEOUS ABORTION MALFORMATION

5
AU - Krivankova L ; Samcova E ; Bocek P
AD - Inst. Anal. Chem., Czech. Acad. Sci., Brno
TI - Determination of thiodiacetic acid in urine of people exposed to vinyl chloride by analytical capillary isotachophoresis
SO - Electrophoresis (Weinheim, Fed. Repub. Ger.); VOL 5, ISS 4, 1984,226-30
AB - CBAC COPYRIGHT: CHEM ABS A method is introduced for the detn. of thiodiacetic acid [123-93-3] in urine by anal. capillary isotachophoresis with column coupling. Thiodiacetic acid is 1 of the final metabolites of carcinogenic vinyl chloride [75-01-4] and appears at increased levels in the urine of people exposed to vinyl chloride vapors. The method enables the direct anal. of samples of 10 muL of urine without any pretreatment in .apprx.45 min. The lowest detectable concn. of thiodiacetic acid was .apprx.6 .times. 10-6 mol/L and the reproducibility of the analyses in the range of 2-15 .times. 10-5 mol/L was .apprx.3 relative %.

6
AU - Hemminki K ; Lindbohm ML ; Hemminki T ; Vainio H
AD - Inst. Occup. Health, Helsinki
TI - Reproductive hazards and plastics industry
SO - Prog. Clin. Biol. Res.; VOL 141, ISS Ind. Hazards Plast. Synth. Elastomers, 1984,79-87
AB - CBAC COPYRIGHT: CHEM ABS Plastic industry reproductive hazard review;Air pollution By plastic industry pollutants, occupational exposure to, reproductive hazards of;Health hazard Reproductive effects in relation to, in plastics industry Occupational;Plastics Industry of, reproductive health hazards in;Reproduction Plastic

industry occupational pollutant effect on

7
AU - BARDIN CW ; TAKETO T ; GUNSALUS GL ; KOIDE SS ; MATHER JP
TI - THE DETECTION OF AGENTS THAT HAVE TOXIC EFFECTS ON THE TESTIS AND MALE REPRODUCTIVE TRACT
SO - HUNT, V. R., M. K. SMITH AND D. WORTH (ED.). BANBURY REPORT, VOL. 11. ENVIRONMENTAL FACTORS IN HUMAN GROWTH AND DEVELOPMENT; SYMPOSIUM, NOV. 1-4, 1981. XX+570P. COLD SPRING HARBOR LABORATORY: COLD SPRING HARBOR, N.Y., USA. ILLUS. ISBN 0-87969-210-3.; 0 (0). 1982. P337-354.
AB - HEEP COPYRIGHT: BIOL ABS. HUMAN RAT LEAD PESTICIDE VINYL CHLORIDE 1 2 DI BROMO-3-CHLORO PROPANE

8
AU - Rossi L ; Van Lierop JB H
AD - Ist. Super. Sanita, Rome
TI - Repeatability and reproducibility of determinations of vinyl chloride in foods
SO - Food Chem. Toxicol.; VOL 20, ISS 5, 1982,603-10
AB - CBAC COPYRIGHT: CHEM ABS Vinyl chloride detn food;Food analysis Vinyl chloride detn. in, repeatability and reproducibility in relation to

9
AU - BARLOW SM ; SULLIVAN FM
TI - REPRODUCTIVE HAZARDS AND INDUSTRIAL CHEMICALS
SO - ANNUAL CONFERENCE OF THE BRITISH OCCUPATIONAL HYGIENE SOCIETY, NOTTINGHAM, ENGLAND, APRIL 7-10, 1981. ANN OCCUP HYG; 24 (4). 1981 (RECD. 1982). 359-362.
AB - HEEP COPYRIGHT: BIOL ABS. HUMAN FETAL TOXICITY METAL TOXICITY PESTICIDE

12
AU - Madlo Z ; Kubiskova B ; Svobodova P ; Simova M
AD - Krajska Hyg. Stanice, SKNV, Prague
TI - Determination of the vinyl chloride metabolite S-(2-hydroxyethyl)-N-acetylcysteine in urine
SO - Prac. Lek.; VOL 33, ISS 9, 1981,319-23
AB - CBAC COPYRIGHT: CHEM ABS S-(2-hydroxyethyl)-N-acetylcysteine (I) [15060-26-1] was detd. spectrophotometrically in urine. Amphoteric interfering compds. were removed prior to the anal. via chromatog. on Dowex 50 W. Nonamphoteric interfering compds. were removed by hydrolyzing I to S-(2-hydroxyethyl)cysteine and sepg. this hydrolysis product by chromatog. on Dowex 50 W. After elution, the S-(2-hydroxyethyl)cysteine was reacetylated, hydrolyzed, and the SH compds. analyzed. The technique afforded reproducible results and gave yields of 74.7-81.3%. The method is useful as a test for exposure to vinyl chloride [75-01-4] and other alkylation compds. metabolized to mercapturic acids.

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USER:
file toxlit65
PROG:
YOU ARE NOW CONNECTED TO THE TOXLIT65 (1965 - 80, ROYALTY) FILE.

SS 1 /C?
USER:
repro (sn)

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PROG:
TIME OVFLW: CONT? (Y/N)

USER:
Y
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TIME OVFLW: CONT? (Y/N)

USER:
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USER:

PROG:
SS (2) PSTG (2438)

SS 3 /C?
USER:
prt ss 1 au,ad,ti,so,ab compress
PROG:

1
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AU - SANOTSKII IV ; DAVTYAN RM ; GLUSHCHENKO VI
AD - Inst. Ind. Hyg. Occup. Dis., Acad. Med. Sci. USSR, Moscow, USSR.
TI - Reproductive function in men exposed to chemicals.
SO - GIG TR PROF ZABOL; 0 (5). 1980. 28-32.
AB - HEEP COPYRIGHT: BIOL ABS. Reproductive function was studied in men occupationally exposed to chloroprene, vinyl chloride or antimonite ore dust. This function was assessed on indirect evidence and from analyses of ejaculates. The rate of spontaneous abortions was significantly increased among wives of men exposed to chloroprene as was the rate of stillbirths among wives of those exposed to vinyl chloride. Pathologic changes were detected in ejaculates.

2
AU - ROSSI L ; WAIBEL J ; VOM BRUCK CG
TI - REPEATABILITY AND REPRODUCIBILITY OF MEASUREMENTS OF VINYL CHLORIDE CONCENTRATIONS IN MATERIALS AND ARTICLES MADE OF POLY VINYL CHLORIDE
SO - FOOD COSMET TOXICOL; 18 (5). 1980. 527-536.
AB - HEEP COPYRIGHT: BIOL ABS. REVIEW CHROMATOGRAPHY STATISTICS

3
AU - Rachev D ; Markov L
AD - Durzh. Inst. Kontrol Lek. Sredstva, Sofia
TI - Quantitative determination of lead and zinc in poly(vinyl chloride) blood transfusion systems
SO - Farmatsiya (Sofia); VOL 30, ISS 2, 1980,6-10
AB - CBAC COPYRIGHT: CHEM ABS Pb and Zn were detd. quant. in PVC systems by at.-absorption study of aq. autoclave products after 30 min at 120.degree. using cut samples. (9002-86-2 PVC) The amt. of Zn extd. during autoclaving decreased with increasing pH of the extractant at pH 3-4. The method had reproducibility .+-.2% for Zn.

4
AU - Krahn DF
AD - Haskell Lab. Toxicol. Ind. Med., E. I. du Pont de Nemours and Co., Wilmington
TI - Utilization of the CHO/HGPRT system: metabolic activation and method for testing gases
SO - Banbury Rep.; VOL 2, ISS Mamm. Cell Mutagen.: Maturation Test Syst., 1979,251-61
AB - CBAC COPYRIGHT: CHEM ABS After detg. the reproducibility and sensitivity of the CHO/HGPRT system using known mutagens and the storage stability of the S-9 fraction, the system was used to det. the mutagenic activity of gases and volatile liqs. Vinyl chloride was cytotoxic and mutagenic in the system when S-9 activation was included. (75-01-4 Vinyl chloride) The activation system had no effect on chlorofluoromethane mutagenic activity. (593-70-4 chlorofluoromethane) Freon 11 and Freon 12 were not mutagenic in the presence or absence of the activation system. (75-69-4 Freon 11)(75-71-8 Freon 12) The results obtained with gases and volatile liqs. using this system were comparable with results obtained using other systems.

5
AU - Kurlyandskii BA ; Stovbur NN ; Dukhovnaya AI
AD - Mosk. Gorod. Sanepidstants., Moscow, USSR
TI - Probability assessent of the comparative sensitivity of body systems to vinyl chloride poisoning
SO - Gig. Sanit.; ISS 8, 1978,51-5
AB - CBAC COPYRIGHT: CHEM ABS Rats were exposed for 4 h to inhalation of 0.4-4.4 g vinyl chloride/m3. (75-01-4 Vinyl chloride) The

neuromuscular system was the most sensitive to the toxic action of vinyl chloride, followed by arterial pressure, hepatic function, and gonads. The reproductive system was affected only by the highest concn. of vinyl chloride.

6
AU - Freed DJ ; Mujsce AM
AD - Bell Lab., Murray Hill, N. J.
TI - In situ generation of standards for gas chromatographic analysis
SO - Anal. Chem.; VOL 49, ISS 1, 1977,139-41
AB - CBAC COPYRIGHT: CHEM ABS Techniques for the direct generation of acrolein, acrylonitrile, and vinyl chloride by oxidn. of allyl alc., thermolysis of cyanoethyl trimethylammonium iodide, and dehydrochlorination of 1,2 dichloroethane, resp., for gas chromatog. anal. are described. (107-02-8 Acrolein)(107-13-1 Acrylonitrile)(75-01-4 Vinyl chloride)(107-18-6 Allyl alcohol)(42350-94-7 cyanoethyl trimethylammonium iodide)(107-06-2 1,2 Dichloroethane) Precolumns contg. conversion reagents generate the desired compd. from suitable precursors via direct injection. At the 5 ng level, a precision of <5% is achieved, with high and reproducible yields being obtained over a wide dynamic range. The method obviates the necessity for manipulation and storage of hazardous or toxic materials and facilitates the prepn. of precise stds.

7
AU - LAO RC ; THOMAS RS ; MONKMAN JL
TI - Improved methods for sampling and analysis of vinyl chloride.
SO - AM IND HYG ASSOC J; 37 (1). 1976 1-7
AB - HEEF COPYRIGHT: BIOL ABS. An analytical scheme was developed for vinyl chloride, which is applicable to ambient and in-plant atmospheres. Using computerized gas chromatographs equipped with automatic injection system and flow rate control, high reproducibilities are achieved in the ppb range. Samples from various sources were analyzed.

8
AU - Wedrychowicz A ; Dura K ; Garlinska J ; Fabian J ; Popiela T ; Stachura J ; Szybinski Z
AD - Krakow, Pol.
TI - Preliminary results of studies of the health status of workers exposed to vinyl chloride (VC)
SO - Przegl. Lek.; VOL 33, ISS 11, 1976,936-41
AB - CBAC COPYRIGHT: CHEM ABS Detn. of alk. phosphatase (I), alanine aminotransferase, and cholinesterase activities in workers exposed to vinyl chloride (II) is very important. (9001-78-9 Alk. phosphatase)(9000-86-6 Alanine aminotransferase)(9001-08-5 Cholinesterase)(75-01-4 Vinyl chloride) Dilation of the liver, abnormalities in liver function, higher I activity, and lower prothrombin activity are more frequent in workers exposed to higher I concns. (9001-26-7 Prothrombin) Slight but reproducible deviations were obsd. in liver enzyme activities and bilirubin levels. (635-65-4 Bilirubin) Morphol. changes in the liver were obsd. at all II concns. No cases of haemangiosarcoma were diagnosed.
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9

AU - Lao RC ; Thomas RS ; Monkman JL

AD - Air. Pollut. Control Dir., Canada Dep. Environ., Ottawa, Ont.

TI - Improved methods of sampling and analysis of vinyl chloride and other gaseous carcinogens

SO - Int. Conf. Environ. Sensing Assess., [Proc.]; VOL 1,, 1976,12, 4 pp.

AB - CBAC COPYRIGHT: CHEM ABS The gas-chromatog. system is applicable to both ambient and in-plant atms. A single phase column, packed with Chromosorb 102, gave high reproducibility of retention times. Recovery data for CS2 extn. of vinyl chloride (I) from activated carbon showed that recoveries are >90% for samples contg. >10ng. (75-01-4 Vinyl chloride) Entrapped I in both PVC resin and fabricated stocks was analyzed. (9002-86-2 Polyvinylchloride) The spread in the concn. distribution was more pronounced for the higher values of entrapped I than for the lower values. In addn., an equil. was established with entrapped I concns. of .apprx.15 .mu.g/g. Below this value, the head space concn. remained const. while the entrapped concn. was reduced. This result was obsd. only for the raw resins in granular form. The grab sample provided a useful means for plume chasing and sampling site selection, although weather played a major factor in the quality and amt. of data provided by this anal.

10

AU - Okamoto K ; Igarashi K

AD - Yamatake Honeywell Co., Tokyo, Japan

TI - Environmental pollution measurement using a high-speed gas chromatograph

SO - Keiso; VOL 19, ISS 4, 1976,43-7

AB - CBAC COPYRIGHT: CHEM ABS Gas sampling system and high-speed anal. up to 60 sec, were shown and discussed with practical samples, e.g. detn. of 20 ppm vinyl chloride in air and 50 ppm COS, CS2, SO2 in coke oven gas. (75-01-4 Vinyl chloride) Problems of accuracy and reproducibility of each component were considered from the viewpoint of maintenance of process gas chromatog.

11

AU - Rosenberg R ; Grahn O ; Johansson L

AD - Swed. Water Air Pollut. Res. Lab., Goteborg, Swed.

TI - Toxic effects of aliphatic chlorinated by-products from vinyl chloride production on marine animals

SO - Water Res.; VOL 9, ISS 7, 1975,607-12

AB - CBAC COPYRIGHT: CHEM ABS The acute toxic effects of chlorinated aliphatic hydrocarbons, formed as by-products from one Swedish and one Norwegian plastic prodn. factory, were examd. by expts. with cod (Gadus morhua), shrimp (Crangon crangon), and a polychaete (Ophryotrocha labronica). The toxicity of 1,2-dichloroethane-a dominating compd. of the by-products-and a distillate with heavier compds. were also estd. (107-06-2 1,2-Dichloroethane) The toxicity (48 hr, LC50) ratio between the concns. of a Swedish by-product, a Norwegian by-product, and dichloroethane was 1:9:34. The effects of 1,2-dichloroethane, 1,1,2-trichloroethane, and 1,1,2-trichloroethene on the reproductivity, and on the survival of adults of Ophryotrocha were studied. (79-00-5 1,1,2-Trichloroethane)(79-00-5 1,1,2-trichloroethene) The reproductivity was affected by these components in far lower concns. than those having acute toxic effects on adult specimens. In 1 expt. series Ophryotroucha was exposed suddenly to the test solns. and in a 2nd series the 1st presentation was made by a successive increase of the concn. during

1-hr. The estd. 96 hr LC50 values for the test with successive increase were 1.8-3.1 times higher than those found for the test with sudden exposure. It is suggested that a physiol. shock in the start of bioassay expts. might have reduced the LC50 values in many previous tests.

12
AU - Gellert RJ ; Bakke JL ; Lawrence NL
AD - Pacific Northwest Res. Found., Seattle, Wash.
TI - Persistent estrus and altered estrogen sensitivity in rats treated neonatally with clomiphene citrate
SO - Fert. Steril.; VOL 22, ISS 4, 1971,244-50
AB - CBAC COPYRIGHT: CHEM ABS Females rats treated at 3 days of age with clomiphene citrate [1-(p-(beta-diethylaminoethoxy)phenyl]-1,2-diphenyl-2-chloroethylene-] citrate (I) (100 mug, s.c.) showed accelerated vaginal opening, const. vaginal estrus, and an enlarged cleft clitoris. (50-41-9 Clomiphene citrate) I-treated rats overiectomized at 107 days of age and given daily s.c. injections of 10 mug estradiol-17beta showed a marked hypertrophy and metaplasia of the endometrial epithelium and a decreased growth response of the pituitary and uterus to estrogen stimulation. (50-28-2 Estradiol-17.beta.) Neonatally I-treated rats not given estradiol as adults also showed signs of metaplasia of the uterine lining. Thus, the presence of I during the early crit. stages of fetal development in an unspected pregnancy could lead to permit alteration of reproductive function in later life.

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