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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN 26 1981

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

DATE: June 26, 1981

SUBJECT: EPA Reg.#707-133; 707-128. KATHON WT and KATHON WT 1.5% for use in Air Washer Systems to control microbial fouling. Addendum to Woodrow memo of May 21, 1981.
CASWELL#195C Accession#244707, 244708

FROM: William Woodrow, Ph.D
Toxicology Branch/HED (TS-769)

WWD for LDG

TO: John Lee (31)
Registration Division (TS-767)

Registrant: Rohm and Haas Co.
Independence Mall
Philadelphia, Pa. 19105

Action Requested:

The registrant questions the need to perform subchronic inhalation toxicity tests requested by Woodrow, May 21, 1981, for the following chemicals:

a. Nitrons oxide;
b. Carbonyl sulfide;
c. Propionaldehyde;
d. Hydrocarbon (C_6);
e. Chlorotoluene; and
f. Malonic acid

In addition, Woodrow requested that oncogenic studies be conducted with benzene, toluene and chlorotoluene.

The present applications (Reg.#707-128; KATHON WT, and #707-133; KATHON WT 1.5%) propose the addition of two different KATHON WT concentrations for use in Air Washer Systems to control microbial fouling under two product labels.

77

Recommendations:

Amendment of Rohm and Haas labels (EPA#707-133 and 707-128) to include the use of KATHON WT and KATHON WT 1.5% in Air Washer Systems for control of microbial fouling at active ingredient concentrations ranging from 2 to 14 ppm is toxicologically acceptable.

Additional information recently obtained from Dr. Darrell Hinnant of the Drew Chemical Corp. and data submitted by Rohm and Haas obviate the need for subchronic or oncogenic studies of volatile compounds identified in simulated air washer experiments which were requested by Woodrow (See Woodrow memo of May 21, 1981).

BACKGROUND INFORMATION

Rohm and Haas Co. KATHON products are microbicides registered for control of microbial fouling in cooling systems. In order to add a use for treating water in industrial Air Washer Systems Rohm and Haas performed laboratory scale tests to determine what volatile compounds would be stripped from microbicide-treated water that could be carried by air into work rooms serviced by Air Washer Systems in which people worked.

The tests were conducted according to a test protocol (see Woodrow memo of May 21, 1981). Gas chromatographic analysis of effluant air from the laboratory test device identified a number of compounds at very low concentrations. The parent active microbicide ingredients (5-chloro-2-methyl-4-isothiazolin -3-one, and 2-methyl-4-isothiazolin 3-one) did not appear in effluant test air.

Threshold Limit Values (TLV) established by the American Congress of Governmental Industrial Hygenists (ACGIH) values for "workplace air", which were set by consensus, when available, indicated that the very low levels of some of the compounds identified during the laboratory testing would not cause human health hazards.

Information on the toxic properties of the following compounds was not at hand during preparation of the May 21, 1981, Woodrow review, therefore toxicity testing was required:

a. Nitrous oxide;
b. Carbonyl sulfide;
c. Propionaldehyde;
d. Hydrocarbon (C_6);
e. Chlorotoluene; and
f. Malonic acid.

In addition oncogenicity tests were requested for benzene, toluene and chlorotoluene.

The registrant provided no information concerning dilution factors that may be associated with large amounts of air flowing from outside into air washers, or untreated water added to treated recirculating water within air washers, which could have an effect on final concentrations of volatile materials found in work spaces serviced by Air Washer treated air.

Review of recently acquired information from Rohm and Haas, Drew Chemical Corp. and other sources, which has direct bearing on concentrations of KATHON break-down or other compounds entering work spaces serviced by Air Washers employing KATHON treated water.

Recently acquired air and water flow characteristics of a typical, large Industrial Air Washer system:

incoming (filtered) air flow rate = 180,000 cfm (See Woodrow memo of May 21, 1981)

34,000 gallons of treated water recirculation rate (treated with microbicide).

When v/v air and water are compared for this system, 39 parts of air/1 part of water ratio may be calculated.

$$1\ ft^3 \left(\frac{28.316\ gallons}{3.785\ g/ft^3}\right) = 7.5\ gallons$$

$$1.8 \times 10^5\ cfm \times 7.5 = 1{,}350{,}000\ gallons\ of\ air$$

$$\frac{1{,}350{,}000}{34{,}000} = 39/parts\ air/1\ part\ water$$

The tests conducted by Rohm and Haas employed 5 parts air bubbled through 1 part KATHON treated water

$$Thus\ \frac{39}{5} = \frac{7.8 \times air\ dilution\ factor}{}$$

increase in air dilution in actual Air Washer operation compared to tests performed by Rohm and Haas.

Volatile compounds contained in simulated air washer tests conducted by Rohm and Haas, for which some additional information has recently been provided to Toxicology Branch by Rohm and Haas:

Simulated Air Washer Test Results:

Volatile Component detected	Approx. Conc. found in eff. air. water (treated at 100 ppm)	Expected Conc. at 2 ppm use conc.*	Max. expected Conc. of 14 ppm use Conc.**
	(ppm)	(ppm)	(ppm)
Nitrous oxide	1.0	0.02	0.096
Carbonyl sulfide	1.0	0.02	0.096
Propionaldehyde	0.2	0.004	0.0192
Hydrocarbon (C_6)	0.05	0.001	0.0048
Chlorotoluene	0.1	0.002	0.0096
Malonic acid	0.2	0.004	0.0192
Benzene	0.05	0.001	0.0048
Toluene	0.3	0.006	0.0288

*100 ppm values $\div$ 50
** 2 ppm values x 7

Dr. Darrell Hinnant of Drew Chemical Co. provided the following information to Woodrow:

> From 25 to 50% make up air is routinely recycled from Air Washer treated work spaces back into the treated air system, thus accounting for at least a 25% reduction in volatile compound concentration.
>
> This factor is permissable due to constant, large amounts of outside air entering work spaces.

Thus, a total dilution factor of 7.8 from differences in air flow characteristics of actual use and simulated test systems, plus a further reduction of 25% is possible for application to test system values, for estimation of potential volatile compound concentrations from KATHON used in Air Washers:

Rohm and Haas also provided the following information to Woodrow:

Nitrous oxide

NIOSH Criteria Doc.: Occupational exposure to waste anesthetic gasses and vapors recommended standard TWA (Time Weight Average) 25 ppm.

0.096 ppm (Max. expected conc. at 14 ppm use) $\frac{\circ}{\circ}$ 7.8 x .75 = 0.009 ppm

(Actual use air dilution; input air and make-up air factors used to adjust simulated air washer test results)

Thus, 9 ppb of nitrous oxide falls well below the NIOSA value of 25 ppm TWA, and would not be expected to cause any hazard to humans.

Hydrocarbon (C_6)

HEXANE

A TLV (threshold limit value) - air of 100 ppm. OSHA std. air TWA (time weight average) of 500 ppm.

NIOSH Criteria Document: Occupational exposure to alkanes recommended air TWA 350 mg/m^3

CYCLOHEXANE

TLV-air is 300 ppm
OSHA std. air TWA of 300 ppm

ALKANES

NIOSH Criteria Document: Occupational exposure to alkanes recommended standard air TWA of 350 mg/m^3

0.0048 ppm (max. expected conc. at 14 ppm use conc.)

$\frac{\circ}{\circ}$ 7.8 x .75 = 0.00046 ppm, or 0.46 ppb

0.46 ppb compared to the suggested work place acceptable limits for C_6 hydro-carbons is insignificant; human hazards due to C_6 hydrocarbons used under there conditions in Air Washers is highely unlikely.

Chlorotoluene

TLV-air of 1 ppm (skin)
OSHA std.-air TWA of 1 ppm
NIOSH Criteria Document: Occupational exposure to benzlchloride recommended std. 5 mg/m^3 for 15 minutes.

0.0096 ppm (max. expected conc. at 14 ppm use conc.) ÷ 7.8 x .75:

0.009 ppm, or 0.9 ppb

0.9 ppb compared to the values listed above by OSHA and NIOSH would indicate no human hazard involved from chlorotoluene from KATHON used in air washers.

BENZENE

CL (ceiling concentration) of 25 ppm
OSHA std.-air TWA 10 ppm
NIOSH Criteria Document: Occupational exposure to benzene recommended standard air CL of 1 ppm for 60 min.

0.0048 ppm (max. expected conc. at 14 ppm use conc.);
same value as shown for Hydrocarbon C_6 = 0.46 ppb.

0.46 ppb compared to the OSHA value of 10 ppm and NIOSH CL of 1 ppm for 1 hour (approximately 200x less concentrated) would indicate that benzene generated from use of KATHON in air washers would not cause any hazard to humans exposed in treated work spaces.

TOLUENE

TLV-air 100 ppm (skin)
OSHA std.-air TWA 200 ppm; CL of 300 ppm
NIOSH Criteria Document: Occupational exposure to toluene recommended std. air TWA of 100 ppm, CL of 200 ppm for 10 min.

0.0288 ppm (max. expected conc. at 14 ppm KATHON use conc.)

÷ 7.8 x .75 = 0.0027 ppm, or 2.7 ppb of toluene - compared to the NIOSH TWA of 100 ppm for max. exposure indicates that toluene in air washer treated work spaces resulting from the use of KATHON treated Air Washers would be highly unlikely to pose any human health problems.

Compounds identified in effluent air from simulated Air Washer test experiments whose toxic property potentials are not described by OSHA or NIOSH are:

Carbonyl sulfide;
Propionaldehyde; and
Malonic acid.

Simulated Air Washer test results for maximum KATHON use concentration values, 14 ppm, adjusted by use air dilution values are:

Carbonyl Sulfide;

0.096 ppm (max. expected conc. at 14 ppm KATHON use conc)

÷ 7.8 x .75 = 0.009 ppm or 9 ppb;

Propionaldehyde

0.0192 ppm (max. expected conc. at 14 ppm KATHON use conc.)

÷ 7.8 x .75 = 0.0018 ppm, or 1.8 ppb; and

Malonic acid

0.0192 ppm (max. expected conc. at 14 ppm KATHON use conc.)

÷ 7.8 x .75 = 0.0018 ppm or 1.8 ppb

Dr. Darrel Hinnant of Drew Chemical Corp. told Woodrow (6/25/81) that only the slug method of dosing Air Washer recirculating water systems is employed for biological fouling control. A continuous dosing system is definately not used for these systems, according to Dr. Hinnant. Thus, these systems are "slugged" with microbicide 3x weekly, only during the summer months; when signficant fouling problems occur. Dr. Hinnant also stated that within one hour after slug feeding (or dosing) Air Washer systems, the product concentration falls from a maximum of 14 ppm to a low of 2 ppm.

Therefore, it is quite probable that the preceeding estimations of volatile materials carried into work spaces by Air Washer air when KATHON is used to treat system water may realistically be reduced by an additional factor of 7.

An additional dilution factor Dr. Hinnant discussed concerns the large amounts of moisture removed from incoming summer air at high relative humidity. This moisture must be removed to adjust the RH of work place air within very narrow limits for successful textile spinning and other plant operations. Such outside moisture is added directly to microbicide-treated water, thereby further diluting microbicide concentration. Such an additional dilution factor was intentionally not factored into the above compound values.

The estimated volatile compound concentration values shown above resulting from the use of maximum "slug" KATHON microbicide in Air Washers are conservative and represent what are believed to be "high" values that are probably never attained in actual use of this product.

Most of the identified compounds which are highly unlikely to enter work spaces serviced by Air Washers employing KATHON microbicide have been assigned values prescribed by OSHA and NIOSH as acceptable for work place concentrations which are far higher than would be possible to achieve in Air Washer systems using KATHON, and therefore Toxicology Branch estimates that human hazards resulting from the use of KATHON WT, or KATHON WT 1.5% are very remote or non-existent.

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