US EPA ARCHIVE DOCUMENT

6-12-87

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

JUN 12 1987

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Inhalation Exposure for ~~Per~~Cypermethrin

THRU: Michael P. Firestone, PhD, Acting Chief
Special Review Section
Exposure Assessment Branch
Hazard Evaluation Division (TS-769C)

TO: George LaRocca, PM #15
Registration Division (TS-767C)

EAB has been asked to provide an exposure estimate for homeowners exposed to cypermethrin applied as a termiticide. In order to expedite the process of exposure assessment and perhaps eliminate the need for such a long and expensive study, EAB has calculated a theoretical maximum exposure based on the vapor pressure for cypermethrin provided by the registrant, ICI Americas. This value was provided by phone by Barbara Kaminski of ICI Americas, 12 June 1987. She got this value from her technical staff. EAB has no other specific validation for this number but it will be used for the purpose of this assessment as it is the best available data at this time.

EAB has calculated a worst-case exposure scenario for cypermethrin via the inhalation route. This theoretical calculation is based on the following assumptions: 100% saturation of the cypermethrin in the air; a total of 15 hours spent in the home, 5 hours at light work and 10 hours at rest; and a 60 kg individual which accounts for the presence of women and children in the home. The respiratory rates used are those given in Subdivision U of the Pesticide Assessment Guidelines. The calculations are listed below.

GIVEN:	Vapor Pressure	1.4×10^{-9} mm Hg @ 20°C
	Absolute Temperature	20°C + 273.15 = 293.15 K
	Universal Gas Constant	0.08206 L·atm/mol·K
	Formula Weight of Cypermethrin	400 g/mol

1/8

IDEAL GAS LAW: $pV = nRT$ where p = pressure
V = volume
n = number of moles
R = universal gas constant
T = absolute temperature

Assuming a volume of 1 L:

$$pV = nRT$$

$$n = \frac{pV}{RT}$$

$$n = \frac{(1.4 \times 10^{-9} \text{ mm Hg}) \times (1 \text{ atm}/760 \text{ mm Hg}) \times (1 \text{ L})}{(0.08206 \text{ L·atm/mol·K}) \times (293.15 \text{ K})}$$

$$n = 7.7 \times 10^{-14} \text{ mol cypermethrin/L}$$

Assuming a 15 hr day, 5 hr at light work (29 L/min) and 10 hr at rest (7.4 L/min):

$$29 \text{ L/min} \times 60 \text{ min/hr} \times 5 \text{ hr/day} = 8700 \text{ L}$$
$$7.4 \text{ L/min} \times 60 \text{ min/hr} \times 10 \text{ hr/day} = 4440 \text{ L}$$
$$13140 \text{ L inhaled/day}$$

moles inhaled/day:

$$7.7 \times 10^{-14} \text{ mol/L} \times 13140 \text{ L/day} = 1.0 \times 10^{-9} \text{ mol/day}$$

ug/day:

$$(400 \text{ g/mol}) \times (1 \times 10^{6} \text{ ug/g}) = 4.00 \times 10^{8} \text{ ug/mol}$$

$$(4.00 \times 10^{8} \text{ ug/mol}) \times (1.0 \times 10^{-9} \text{ mol/day}) = 4.0 \times 10^{-1} \text{ ug/day}$$

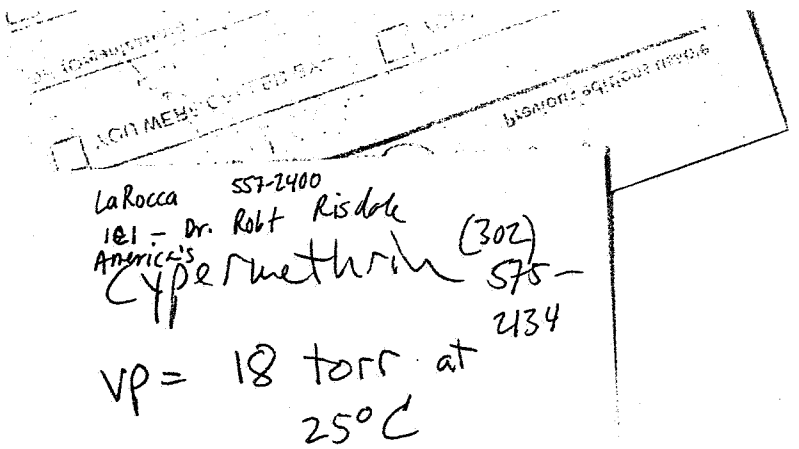
ug/kg/day:

$$\frac{4.0 \times 10^{-1} \text{ ug/day}}{60 \text{ kg individual}} = 6.7 \times 10^{-3} \text{ ug/kg/day}$$

It should be noted that the utility of this theoretical approach will vary from compound to compound. The more toxic chemicals, such as organophosphates, will likely yield unacceptable risks when saturation of the indoor air is assumed.

It must be emphasized that this is a worst-possible-case scenario and that indoor air is not likely to approach saturation with the material. This theoretical exposure assessment should allow Toxicology Branch to estimate risks from this compound. If the risks are acceptable, EAB sees no reason to request an exposure monitoring study for cypermethrin applied as a termiticide.

Karen E. Warkentien
Special Review Section
Exposure Assessment Branch
Hazard Evaluation Division (TS-769C)



LaRocca 557-2400
101 - Dr. Robt Risdale
America's Cypermethrin (302) 575-2434

VP = 18 torr at 25°C

Karen,
Please calc. IGL saturation exposure as a Termiticide! mtf

OF CALL

Previous editions usable

TO: Karen

☐ YOU WERE CALLED BY— ☐ YOU WERE VISITED BY— Barbara Kamykowski

OF (Organization)

☒ PLEASE PHONE ▶ ☐ FTS ☐ AUTOVON 302-575-3969

☐ WILL CALL AGAIN ☐ IS WAITING TO SEE YOU

☐ RETURNED YOUR CALL ☐ WISHES AN APPOINTMENT

MESSAGE

1.4×10^{-9} mm Hg @ 20°C

RECEIVED BY

DATE 12 JUNE 87 TIME 2:17

63-110 NSN 7540-00-634-4018
★U.S.GPO:1985-0-461-274/20028

STANDARD FORM 63 (Rev. 8-81)
Prescribed by GSA
FPMR (41 CFR) 101—11.6

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"See"

$$VP = 1.4 \times 10^{-9} \text{ mm Hg @ } 20^{\circ}C$$
$$MW = 293.15 \text{ K}$$
$$R = 0.08206 \text{ L atm/mol.K}$$
$$FW = 400 \text{ g/mol}$$

$PV = nRT$

$$n = \frac{PV}{RT}$$

$$n = \frac{(1.4 \times 10^{-9}\ \text{mm Hg}) \times (1\ \text{atm}/760\ \text{mm Hg}) \times 1\ \text{L}}{(0.08206\ \text{L·atm/mol·K}) \times (293.15\ \text{K})}$$

$$n = 7.7 \times 10^{-14}\ \text{mol/L}$$

L inhaled / day $= 13140$ L/day

moles inhaled / day

7.7×10^{-14} mol/L $\times$ 13140 L/day $= 1.0 \times 10^{-9}$ mol/day

ug/day

400 g/mol $\times (1 \times 10^6$ ug/g$) = 4.00 \times 10^8$ ug/mol

4.00×10^8 ug/mol $\times$ 1.0×10^{-9} mol/day $= 4.0 \times 10^{-1}$ ug/day

ug/kg/day $\frac{4.0 \times 10^{-1}}{60} = 6.7 \times 10^{-3}$ ug/kg/day

C	12.0	× 22 =	264
H	1.0	× 19	19
Cl	35.5	× 2 =	71
N	14.0	× 1 =	14
O	16.0	× 2 =	32
			400