

Abstract -
Institution

Short communication

A COMPARISON OF THE MUTAGENIC PROPERTIES OF VINYL CHLORIDE AND METHYL CHLORIDE*

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A.W. ANDREWS, E.S. ZAWISTOWSKI and C.R. VALENTINE

Frederick Cancer Research Center, Frederick, Maryland 21701 (U.S.A.)

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Work

In developing a screening program for environmental gases using the Ames assay [1], we have found that vinyl chloride (C_2H_3Cl) and methyl chloride (CH_3Cl) are highly mutagenic. Both gases are industrial chemicals; vinyl chloride in the manufacture of polyvinyl chloride (PVC) and methyl chloride as a refrigerant. Chopra and Sherman [3] have shown the presence of methyl chloride in tobacco smoke, thus suggesting that a large portion of our population may be exposed to this gas.

The *Salmonella typhimurium* tester strain TA 1535 which can detect mutagens causing base pair substitutions, was obtained from Dr. Bruce Ames. The strain was grown in nutrient broth, shaken for 14 h at 37°C. and 0.2 ml was then added to molten top agar, with and without 0.5 ml of a 1 : 2 dilution of Aroclor 1254-stimulated liver homogenate [9]. Quintuplicate petri plates containing Vogel Bonner E medium [8] were overlayed with this mixture and incubated inside an anaerobic jar in the presence of the test gas. After 72 h at 37°C the revertant colonies were counted using a hand-held tally.

To obtain a given percentage of test gas, the anaerobic jar was evacuated to a known pressure. Atmospheric pressure was assumed to be 760 mm of mercury so that a pressure change of 7.6 mm approximated 1% of the jar volume. Gas was added until the desired pressure change was observed, and the jar was then allowed to fill with room air. The head space of the jar was analyzed after 24-48 h by gas chromatography.

A gas-tight syringe was used to transfer 5.0 ml of the jar's atmosphere to a sealed 120 ml serum bottle. One ml was then removed from the serum bottle and injected into a Shimadzu GC-4BM gas chromatograph equipped with a flame ionization detector and a 3 foot x 3 mm I.D. glass column packed with 80-100 mesh Porapak Q. The column operating temperatures were 75°C for methyl chloride and 100°C for vinyl chloride. The helium carrier gas-flow rate

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