

December 1, 1960

R. E. Eckardt, M.D.  
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P.O. Box 45  
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Dear Doctor Eckardt:

By this time you will have received a letter from Dr. Sanders in which he expressed his view of the likelihood that ethylene dibromide could be used in low concentration (up to 30 ml. per gallon) in motor oil. It may well be that your people have an interest in its usage for other purposes, so that I shall tell you briefly what we know about this compound. We have not published anything on it because of a certain sketchiness in our toxicologic observations, but we have watched over its handling for years, and have learned a few things that would not be evident otherwise. If a report is required, it could be provided, but I am taking the short course at the moment.

The neat compound is, in several respects, about the worst of the halogenated hydrocarbons in commercial use. Since it has been handled and used mostly (not exclusively) in connection with the handling and use of tetraethyl lead, it has had little opportunity to reveal its harmful properties, for the precautions thrown around T.E.L. for the avoidance of cutaneous contact and respiratory exposure, have been such as to provide protection from the dibromide. Hence, a number of people have been greatly surprised to find out how toxic it is.

When given by mouth in one dose to rabbits, the lethal dose lies between 30 and 50 mg. per kg. The effects relate to the CNS, liver and kidneys mainly, but all of the tissues of the body share in the injury, especially if the animal survives long enough for such damage to reach a severe level.

The material is absorbed readily through the skin shortly after contact is sustained, but after a time the local damage produced by contact with the undiluted compound is great; there is a bullous edema of the skin, with induration extending into the deep layers, and often (depending on the quantity absorbed) a deep necrosis of the skin in the central area of contact.

(Incidentally this happens to the human skin under certain conditions.

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A workman spilled a small quantity on a fairly heavy work shoe and did not note it instantly and remove it. Consequently it penetrated somewhat into the leather. Against orders (for this had happened on a lesser scale previously), in the belief that the essentially new shoe should be salvaged, he set it on a warm radiator to air out for a day, and subsequently wore it. He developed a hot, painful lesion of the foot, in the area of contact with the shoe, which went on to necrosis and he was disabled for some weeks. The treatment of such lesions is not very satisfactory but is not, of course, so difficult as that of "chrome ulcers". There is no practical means of cleaning leather or similar types of fabric into which the material has penetrated.)

The lethal dose for the rabbit when applied once in undiluted form on the skin is of the order of 0.3 to 0.5 ml. per kg. (equivalent to 0.75 to 1.1 gram per kg). Earlier observations have shown that dilution in kerosene retards percutaneous absorption and diminishes the cutaneous damage. In concentrations of the order of 2.5 ml. per gallon of kerosene repetitive applications on the skin cause little or no local damage beyond that incident to contact of the skin with kerosene. Such absorption of the bromine compound as may occur under these conditions is too small to induce demonstrable illness.

In view of the proposed use of ethylene dibromide in motor oil we have initiated some observations which will be concluded shortly, unless some unexpected result turns up. It does not appear that there is any reason for concern about the use of the material in sufficiently low concentrations. On the other hand, full precautions must be taken to avoid intoxication or injury in the handling of the undiluted compound. The facts concerning the escape of the vapor from its mixture in oil, under certain conditions, will also have to be established beyond any doubt. The permissible concentrations in the air for various periods of exposure have not been determined satisfactorily so far as I know. The present recommendation of the Association of Governmental Hygienists, as you probably know, for the tolerable concentration of the vapors of ethylene dibromide in air under normal occupational conditions, is 25 parts per million by volume. This is probably none too low.

Sincerely yours,

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Robert A. Kehoe, M. D.

RAK:ss

cc: Dr. F. Cleveland  
Dr. L.W. Sanders

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