

Skin Absorption of Toluene, Styrene, and Xylene by Man

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*From the Department of Toxicological Chemistry and Industrial Toxicology, Medical Academy, Łódź, Poland***Toluene¹**

We have investigated the skin absorption of liquid toluene and of solutions of toluene in water by the methods we used for ethylbenzene (Dutkiewicz and Tyras, 1967). The absorption rate of liquid toluene was 14-23 mg./cm.²/hr in 10 estimations on nine subjects. Absorption of toluene from an aqueous solution was proportional to the concentration (Figure). For equal concentrations the rate was only a little less than that of ethylbenzene. Very short exposure of the hands to liquid toluene (a few minutes) or more prolonged exposure (about one hour) to water saturated with toluene causes the absorption of as much toluene as an eight-hour exposure to the maximum allowable concentration of 0.1 mg./litre of air.²

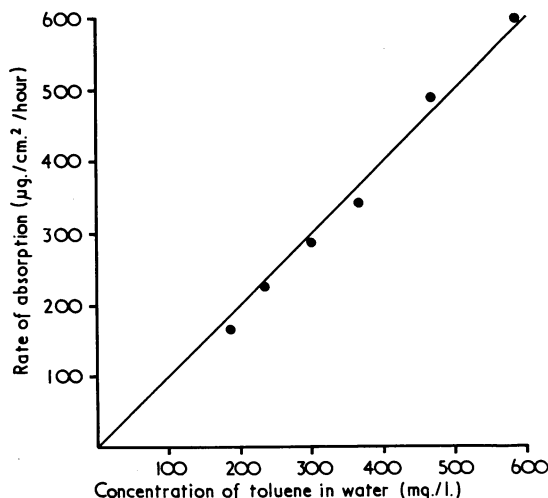


FIGURE. Rate of absorption of toluene as a function of the concentration in water.

Styrene³

The absorption of styrene through the skin of the hand and the forearm in man was investigated experimentally. Both the absorption of liquid styrene and the absorption from aqueous solutions were studied by the method of Dutkiewicz and Tyras (1967). The rate of absorption of liquid styrene was 9 to 15 mg./cm.²/hr, and the rates from aqueous solutions were 40-180 µg./cm.²/hr for mean concentrations of 66.5-269 mg./litre. Absorption of styrene from solution was linear with concentration. The mandelic acid excreted in urine was equivalent to about 13% of the absorbed dose—much less than after lung absorption. Very short exposure of the hands to liquid styrene (a few minutes) or more prolonged exposure (about one hour) to water saturated with styrene may result in the absorption of as much styrene as an 8-hour exposure to the maximum allowable concentration of 0.05 mg./litre of air.⁴

Urinary mandelic acid does not provide a reliable index of absorption where there is simultaneous skin and lung exposure.

Xylene⁵

The absorption of liquid xylene through the skin in man was investigated under experimental conditions (Dutkiewicz and Tyras, 1967). Using the direct method, experiments of absorption were carried out on the skin of the forearms of 10 different volunteers.

It has been established that the rate of absorption of liquid xylene was from 4.5 to 9.6 mg./cm.²/hour.

REFERENCE

Dutkiewicz, T., and Tyras, H. (1967). A study of the skin absorption of ethylbenzene in man. *Brit. J. industr. Med.*, **24**, 330-332.

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²The M.A.C. for toluene accepted in Poland (Orders of Ministry Council, August 21, 1959, r. Dz. Ust. 53, poz. 316) is 0.1 mg./litre. This is equivalent to 26.6 parts per million.

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⁴The M.A.C. for styrene accepted in Poland (Orders of Ministry Council, August 21, 1959, r. Dz. Ust. 53, poz. 316) is 0.05 mg./litre.

⁵Received for publication March 20, 1968