

유기용제의 피부독성 연구

The Study of Dermal Toxicity of Organic Solvents

* 연구자 : 임 철 홍 외2명

◎ Abstract

Quantitation of organic solvent penetration rate through skin is necessary for assessment of health hazard. Determining dermal exposure rate is important as permissible occupational inhalation exposures are lowed. We investigated dermal penetration of single and/or mixed organic solvents by the mixing ratio of one to one in SD rats. The skin penetration rates of organic solvents were altered by mixing with various organic solvents. The permeability coefficient (K_p) of toluene was increased 3.1 times by MIBK and 3.0 times by butyl acetate. Isopropyl alcohol enhanced K_p of butyl acetate 3.1 times. The K_p of MIBK were increased 5.3 times by isopropyl alcohol, 23.1 times by butyl acetate, and 2.6 times by toluene. The dermal penetration rate of isopropyl alcohol was much increased by other solvents. The K_p of isopropyl alcohol increased 22.7, 88.0, 124.9 times by MIBK, butyl acetate, and toluene. We also calculated the volume of organic solvents penetrated in human body as a result of 1 minute immersion of both hand and equivalent vapor concentration of the same organic solvents for 8 hours exposure amount would be absorbed through the lung. As a result when workers were exposed both hands for 1 minute to toluene, they were absorbed 15.08 mg of toluene and this volume equals to 1 ppm for 8 hours exposure by lung.

If toluene was mixed to isopropyl alcohol, MIBK, and butyl acetate to the ratio of 1:1 it was penetrated 10.80, 18.81, 18.56 mg and these were equal to 0.72 ppm, 1.26 ppm, and 1.24 ppm. Isopropyl alcohol was the most increased solvent by mixing with other organic solvents. The amount of isopropyl alcohol penetrated through skin was 23.65 mg for 1 minute and when isopropyl alcohol was mixed with MIBK, butyl acetate and toluene, the amount of isopropyl alcohol penetrated were increased to 81.63 mg, 163.08 mg and 194.75 mg. And these are equal to 8.30 ppm, 16.59 ppm and 19.81 ppm. In conclusion, our study indicates that the dermal penetration rate of isopropyl alcohol was well increased by other organic solvents. Therefore, it is necessary to take special precautions against the skin absorption of organic solvents.