

Techniques for Estimating the Percutaneous Absorption of Chemicals Due to Occupational and Environmental Exposure

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This article reviews the scientific principles involved in determining the percutaneous absorption of chemicals. To assist industrial hygienists in assessing the risks of dermal uptake of chemicals in workplaces, lists of absorption rates and example calculations including the use of wipe sampling to estimate skin exposure are presented. Recent advances in the use of mathematical models to examine the various factors influencing the percutaneous absorption of chemicals from matrices are discussed. Results from various models suggest that the skin uptake of nonvolatile, highly lipophilic chemicals in soil will range from about 30 percent to 50 percent, while the uptake of volatile chemicals will usually be less than 5 percent. The available published information suggests the following rules of thumb: (1) the bioavailability of chemicals in media vary widely; consequently, it is important to account for matrix effects; (2) proper wipe sampling should be conducted to estimate the degree of skin contact with contaminated surfaces; (3) the hazards posed by dermal contact with certain chemicals in the workplace, particularly those with a high n-octanol: water partition coefficient, can produce an appreciable degree of the daily absorbed dose, and the dose from percutaneous absorption can often be as much as one-half that due to inhalation; (4) the contribution to overall uptake from percutaneous absorption of chemical vapors can be significant if the atmospheric concentration of the chemicals is tenfold to one thousandfold higher than the threshold limit value, even when the worker wears protective clothing and adequate respiratory protection. Leung, H.-W.; Paustenbach, D.J.: Techniques for Estimating the Percutaneous Absorption of Chemicals Due to Occupational and Environmental Exposure. *Appl. Occup. Environ. Hyg.* 9(3):187-197, 1994.