
TABLE 5.7
Decontaminants Selection to Remove Environmental Hazardous Chemical (Alachlor) from Human Skin^a

	[¹⁴ C]-Alachlor (%)
PHSC	90.3 ± 1.2
Alachlor in Lasso supernatant	5.1 ± 1.2
Water-only wash of PHSC	4.6 ± 1.3
10% Soap-and-water wash	77.2 ± 5.7
50% Soap-and-water wash	90.0 ± 0.5

^a [¹⁴C]-Alachlor in Lasso EC formulation (1:20 dilution) mixed with powdered human stratum corneum, allowed to set for 30 minutes, then centrifuged. Stratum corneum wash with (1) water only, (2) 10% soap and water, and (3) 50% soap and water.

Abbreviations: PHSC, powdered human stratum corneum.

5.8 PHSC AND CHEMICAL DECONTAMINATION

Our laboratory uses the PHSC model to determine which chemicals might be able to remove (decontaminate) hazardous chemicals from human skin. A contaminant chemical is mixed with PHSC and the decontaminant effects of a series of possible decontaminants are measured. The liquid decontaminant is mixed with contaminated PHSC and, after a predetermined period, a solution is separated from the PHSC by centrifugation. The content of the solution is a measure of the decontaminant's potential. This is shown in Table 5.7, which demonstrates that alachlor readily contaminates PHSC. Water alone removes only a small portion of the alachlor. However, a 10% soap solution removes a larger portion of the alachlor, and a 50% soap solution removes most of it. Perhaps this is an elegant way to show that soapy water is effective in washing one's hands. However, it does illustrate the use of PHSC to determine the effectiveness of skin decontamination (25).

5.9 PHSC AND ENHANCED TOPICAL FORMULATION

Macromolecules have attracted interest as potential drug entities and as modulators to percutaneous delivery systems. Two macromolecular polymers (molecular weight [MW] 2081 and 2565) were developed to hold cosmetics and drugs to the skin surface by altering the initial chemical and skin partitioning. The effect of these polymers on the PC of estradiol with PHSC and water was determined in our laboratory. As shown in Table 5.8, the polymer L had no effect on the estradiol PC between PHSC and water. The polymer H, however, showed a significant increase ($p < 0.01$) in log PC for estradiol concentrations of 2.8 and 0.25 mg/mL. This increase was dependent upon the polymer concentration (26). The results suggest that the PHSC model can help in the development and selection of enhanced transdermal delivery systems.

5.10 PHSC AND QSAR PREDICTIVE MODELING

Many experiments have been conducted to predict chemical partitioning into the SC in vitro. However, most were based on quantitative structure–activity relationships (QSARs) or related chemicals to determine the partitioning process, and few studies focus on structurally unrelated chemicals (15). Since the range of molecular structure and physicochemical properties is very broad, any predictive model must address a broad scope of partitioning behavior.