

Abstract

Chemical-resistant gloves, designed to protect workers from chemical hazards, are made from a variety of polymer materials such as plastic, rubber, and synthetic rubber. One material does not provide protection against all chemicals, thus proper polymer selection is critical. Standardized testing, such as chemical degradation tests, are used to aid in the selection process. The current methods of degradation ratings based on changes in weight or tensile properties can be expensive and data often do not exist for complex chemical mixtures. There are hundreds of thousands of chemical products on the market that do not have chemical resistance data for polymer selection. The method described in this study provides an inexpensive alternative to gravimetric analysis. This method uses surface area change to evaluate degradation of a polymer material. Degradation tests for 5 polymer types against 50 complex mixtures were conducted using both gravimetric and surface area methods. The percent change data were compared between the two methods. The resulting regression line was $y = 0.48x + 0.019$, in units of percent, and the Pearson correlation coefficient was $r = 0.9537$ ($p \leq 0.05$), which indicated a strong correlation between percent weight change and percent surface area change. On average, the percent change for surface area was about half that of the weight change. Using this information, an equivalent rating system was developed for determining the chemical degradation of polymer gloves using surface area.