

RESPIRATOR ARTICLE ABSTRACTS

We review the articles published in the American Industrial Hygiene Association Journal (AIHJ) and the Applied Occupational and Environmental Hygiene Journal for information that is applicable to the field of respiratory protection; we then publish abstracts of these articles. We appreciate the cooperation of the American Industrial Hygiene Association and the American Conference of Governmental Hygienists in allowing us to do this.—Ed.

"Workplace Field Testing of a Disposable Negative-Pressure Half-Mask Dust Respirator (3M 8710)," George Wallis, Robert Menke, and Charles Chelton, *American Industrial Hygiene Association Journal*, 54(10): 576–583, October 1993.

The performance of the 3M 8710 dust/mist half-mask respirator was characterized in a workplace atmosphere that contained concentrations of manganese dioxide dust in the range 0.14 to 20 mg/m³ as manganese. Workplace protection factors (WPFs) were calculated from the simultaneously measured concentrations outside the respirator, C_o , and inside the respirator, C_i . The WPFs, C_o/C_i , were in the range of 2.8 to 848. A plot of WPF vs C_o indicated that for $1 < C_o < 20 \text{ mg/m}^3$, the WPF did not have a constant value, but tended to increase as C_o increased. The relation could be approximated by the linear-regression equation $\text{WPF} = 12.9 + 28.4C_o$ ($r = 0.77$). In addition to measurements of C_i and C_o , the size distribution of manganese dioxide particles was determined at different values of C_o . The relation of C_p , the concentration of particles in stated particle-size groups, and C_o was found to have the form $C_p = A + kC_o$ where A and k are constants. A plausible explanation for the dependence of WPF on C_o could be obtained by assuming that the performance of the respirator is related to particle size such that particles of small aerodynamic diameter (e.g., $< 2\mu\text{m}$) have a higher probability of penetrating into the respirator than do larger particles. With this assumption, WPF depends on C_o if $kC_o \ll A$, and is independent of C_o if $kC_o \gg A$. The explanation applies to particle penetration through either the filter medium or the face seal.