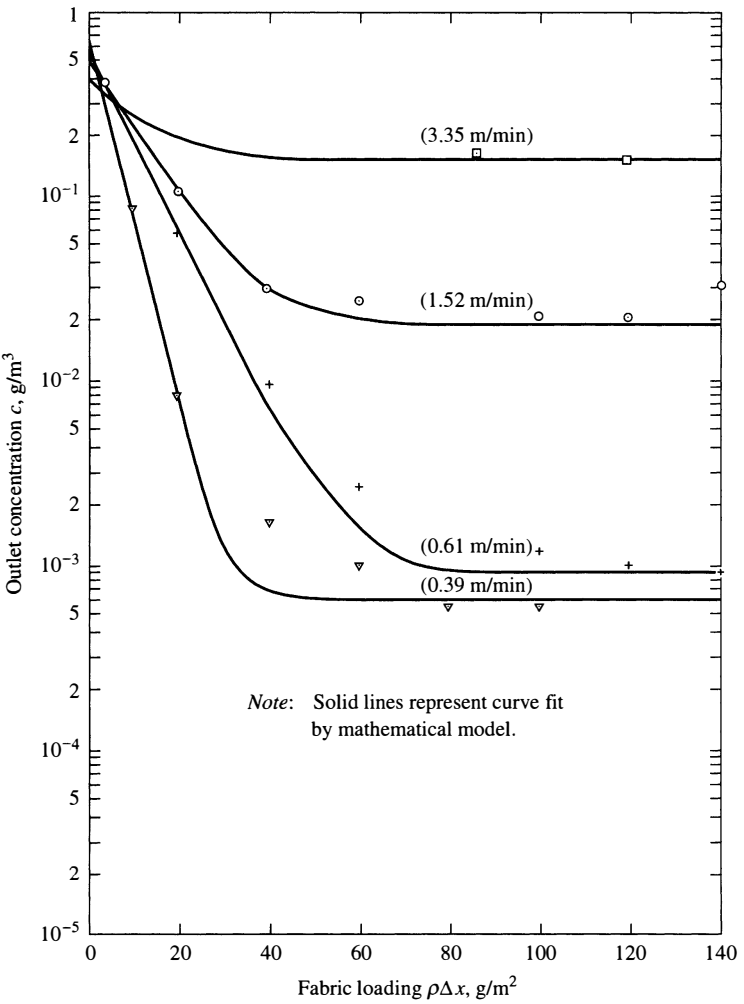
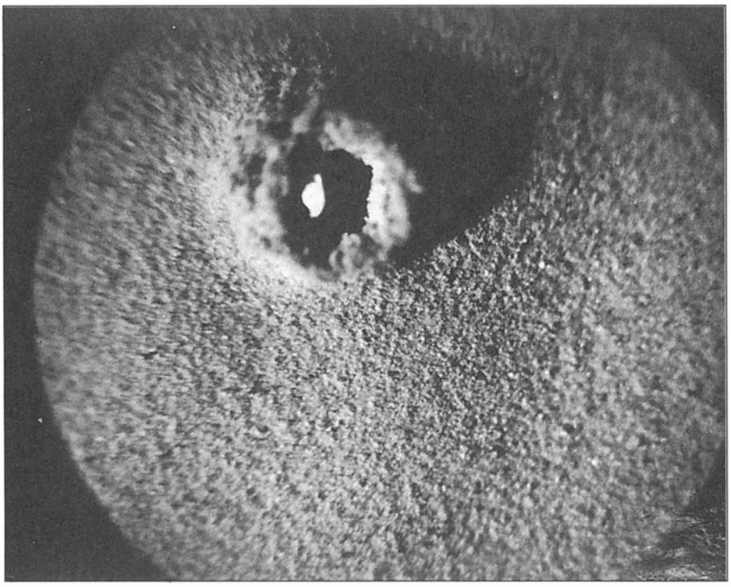
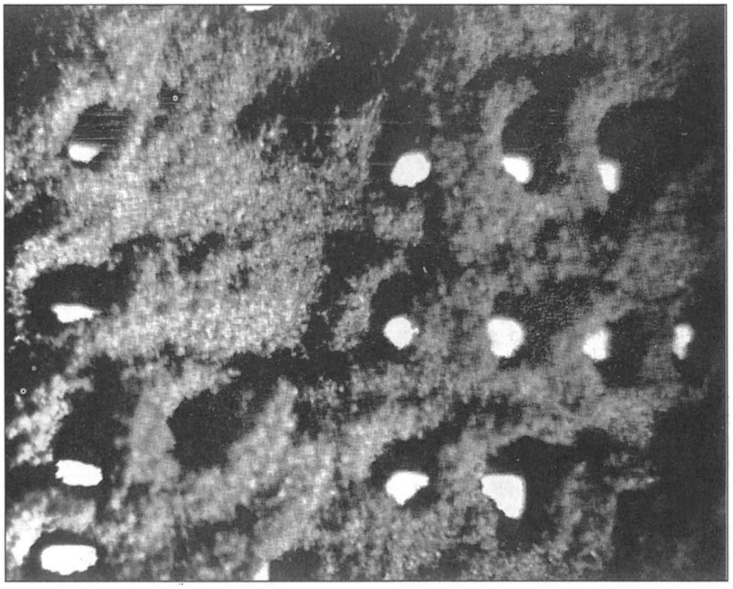


FIGURE 9.15
Effect of fabric loading (mass of collected particles per unit area) and face velocity on filter outlet concentration. For all the tests, the inlet concentration was about 0.8 g/m^3. (From Ref. 17.)

the inlet concentration (i.e., $\eta \approx 99.9$ percent). Once the cake has been properly established, the filtration efficiency remains constant. But why do any particles at all get through? The simple picture presented previously would suggest complete particle capture. Furthermore, by comparing the four curves in this figure, we see that if the superficial velocity increases, the efficiency falls; for a superficial velocity of 3.35 m/min the outlet concentration is about 20 percent of the inlet concentration. The particles that pass through such a filter do not pass through the cake but through *pinholes,* which are regions where the cake did not establish properly. Figure 9.16 on page 290 shows several such pinholes. They are apparently about 100 μ in diameter,



(*a*)



(*b*)

FIGURE 9.16
Photos of pinhole leaks in surface filters, with the filter surface lighted from below: (*a*) pinhole leak showing characteristic mound (20× magnification) and (*b*) massive pinhole leaks with monofilament screen, without loose fibers. (Most air pollution filter cloths are made from fibers with many loose ends, which establish the filter cake. These lead to fewer pinholes and much better collection efficiency than does the monofilament cloth, shown below, which has no such loose ends.) (From Ref. 17.)