

3.9×10^{-5} (in/sec)/(psi/in) in the present units, so the value 8.6×10^{-5} (in/sec)/(psi/in) would appear somewhat high. On the other hand, Jaeger and Cook cite a value 230×10^{-5} (in/sec)/(psi/in) for "Berea sandstone" on page 197 of [10]. The textbook values of k span too wide a range to help determine the permeability of Wilkeson sandstone, but the assumed value falls within the range and is not unreasonable.

Figure 7 is a comparison between the theory and Olsen and Thomas's data. The ordinate represents h and the abscissa v , both coordinates being logarithmic. The curve was obtained from equation (28) by numerical integration for the given experimental conditions and assumed material properties, and for

$$\mu_w = 0.42 \quad . \quad (32)$$

Agreement between experiment and theory is seen to be excellent. The measured values of h do appear to become constant at low v in accord with (29), and in the opposite extreme they decrease inversely with v in accord with (30). The theory accurately describes the shape of the transition between the two asymptotes. The choice $\mu_w = 0.42$ befitting the data, moreover, falls in the midst of the plausible range (15). The comparison in Fig. 7 is highly encouraging, though positive confirmation of the theory must await an independent measurement of k .

Olsen and Thomas also subjected Wilkeson sandstone to a few pressures P_o lower than 17,000 psi over a very limited range of feed rates. Figure 8 shows a sample of the results, for $d_o = 0.030$ inch and $\theta_o = 90^\circ$ as before. The depth h is plotted as a function of P_o for a feed rate $v = 40$ in/sec. The four experimental points were obtained by interpolating between data at nearby values of v , and the straight solid line follows from (28). The data describe an S-shaped curve, which tends toward the theory at high P_o . The fact that the first two points fall well below theory should come as no surprise, because equation (25) predicts a critical pressure $P_c = 7900$ psi when $v = 40$ in/sec. Notice that if h were assumed proportional to $(P_o - P_c)$ as shown by the dotted line, then the best choice for P_c would be only 4000 psi. The P_c of (25) should be interpreted as the pressure for which h falls short of theory by about half, rather than as an absolute cutoff.