Machiels and Pescatore (1983) also illustrated this phenomenon by taking a glass and polishing its surface to roughness of 7 microns. They used this surface roughness as a reference to which they compared the enhanced roughness of the same material polished to a 600 and 100 grit finish (Fig. 6.4).

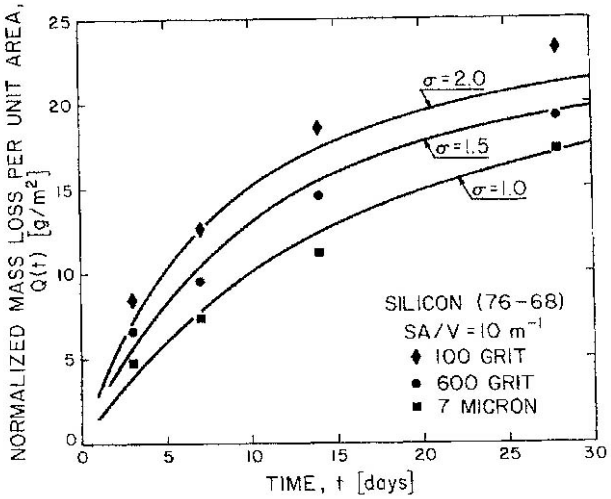

Figure 6.4. Comparison of the normalized release of silicon from a borosilicate glass as a function of surface roughness. [Machiels and Pescatore, 1983]

Results

Measurement Method for Surface Area of Column Materials

Surface areas were measured on the sieve fractions of starting material. At the completion of the testing; the contents of the columns were again sieved and remeasured. The bulk surface areas for each column could be determined for the post-leaching rock by taking the individual masses of the sieve fractions specified in the protocol above, multiplying each mass by the surface area (SA), and combining their fractional percent of the total as a weighted linear average:

$$A \times SA_{sieve1} + B \times SA_{sieve2} + C \times SA_{sieve3} + \quad = \quad SA_{bulk}$$

Where: A + B + C = 1

A = fraction of total sieve 1 size
B = fraction of total sieve 2 size
C = fraction of total sieve 3 size

Surface Area Data

Duplicate leaching columns were run for each of the shales in this study and only a single column for the sandstone. Tables 6.1 through 6.5 summarize the surface area data. Each contains the weight fraction of retained on the individual sieves, the BET surface area for each fraction and the modeled ‘effective’ surface area for the materials before the testing protocol.