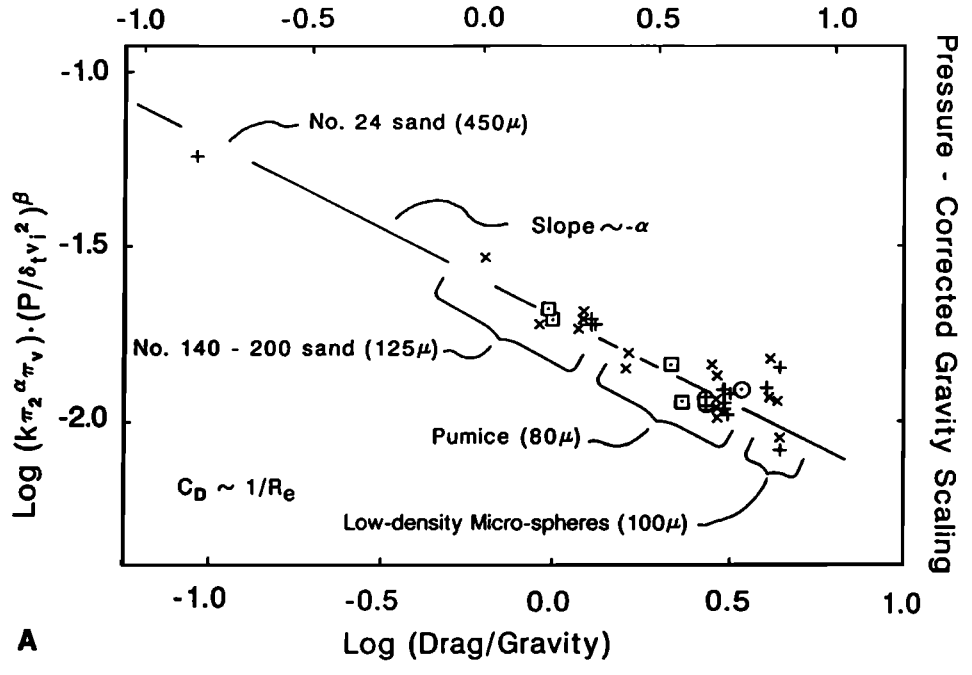

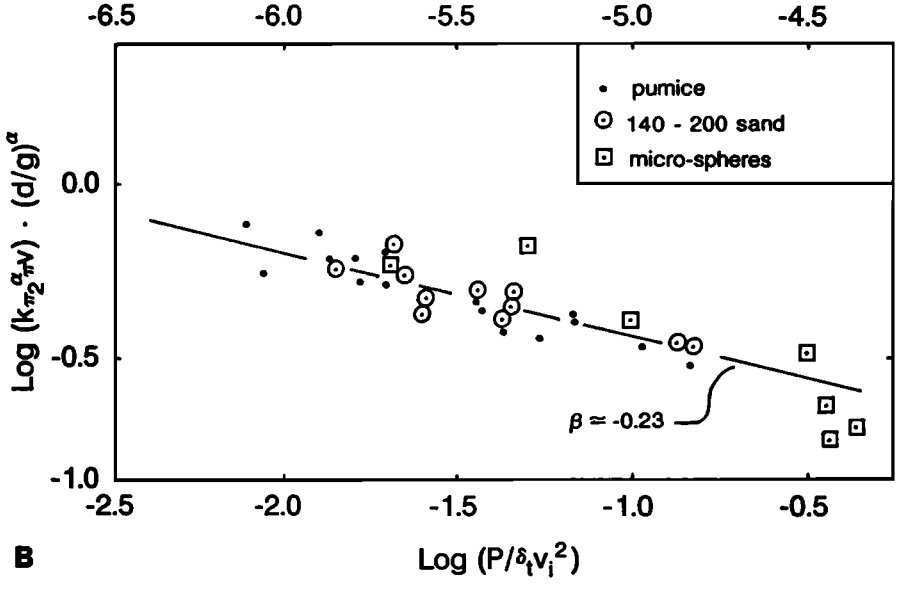

Fig. 8. (*a*) Gravity-controlled cratering efficiency corrected for the effects of ambient pressure and expressed in terms of a dimensionless aerodynamic drag parameter (equation (16*c*)). Data shown are for interactions at the scale of individual grains resulting in small Reynolds ($Re < 2$) where the drag coefficient is inversely proportional to Re. Additionally, impact velocities have been restricted to less than 2.5 km/s (Mach number less than 10) in order to minimize possible projectile-atmosphere effects. The dimensionless drag/gravity parameter (equation (16*c*)) is expressed here along the lower axis as $(\mu/\mu_o)\,(a_o/a)^2 R_v^{1/2}/\delta_t$ with atmospheric viscosity μ referenced to air μ_o; target particle a referenced to pumice; and R_v in centimeters. The upper axis shows values in cgs corresponding to equation (14) with the drag coefficient calculated as $24/Re$ for values discussed in the text. Different projectile sizes and atmospheric compositions (viscosity) result in trends for a given target that can be extrapolated to other targets with different grain size. The resulting exponent closely matches the gravity scaling exponent α for porous targets. For complete consistency with the coupling-parameter theory [see *Holsapple and Schmidt*, 1987], the ordinate also should include a factor $\pi_2^{\alpha\beta/3}$ (equation (10*d*)). The small value of $\alpha\beta/3$ and the limited range in π_2 for the subset of data minimize any possible offsets resulting from exclusion of this factor. (Pressure-corrected gravity-scaling shown in cgs.) (*b*) Cratering efficiency corrected for the dimensionless pressure term as a function of the ratio of drag d to gravitational deceleration g with the drag coefficient inversely related to the Reynolds number (equation (16*c*)). If the effect of aerodynamic deceleration becomes more important than gravity, then d should replace g in the π_2 parameter. Consequently, the dependence on the atmospheric pressure parameter for different targets (offset in Figure 7*b*) should collapse onto a single line as shown. This model-based result is consistent with the empirical result shown in Figure 8*a*. (Values of (d/g) are in cgs, as in upper axis of Figure 8*a*; the pressure parameter in lower axis is shown with pressure in bars, velocity in kilometers per second, and density in grams per cubic centimeter. Upper axis is in dimensionless form.)