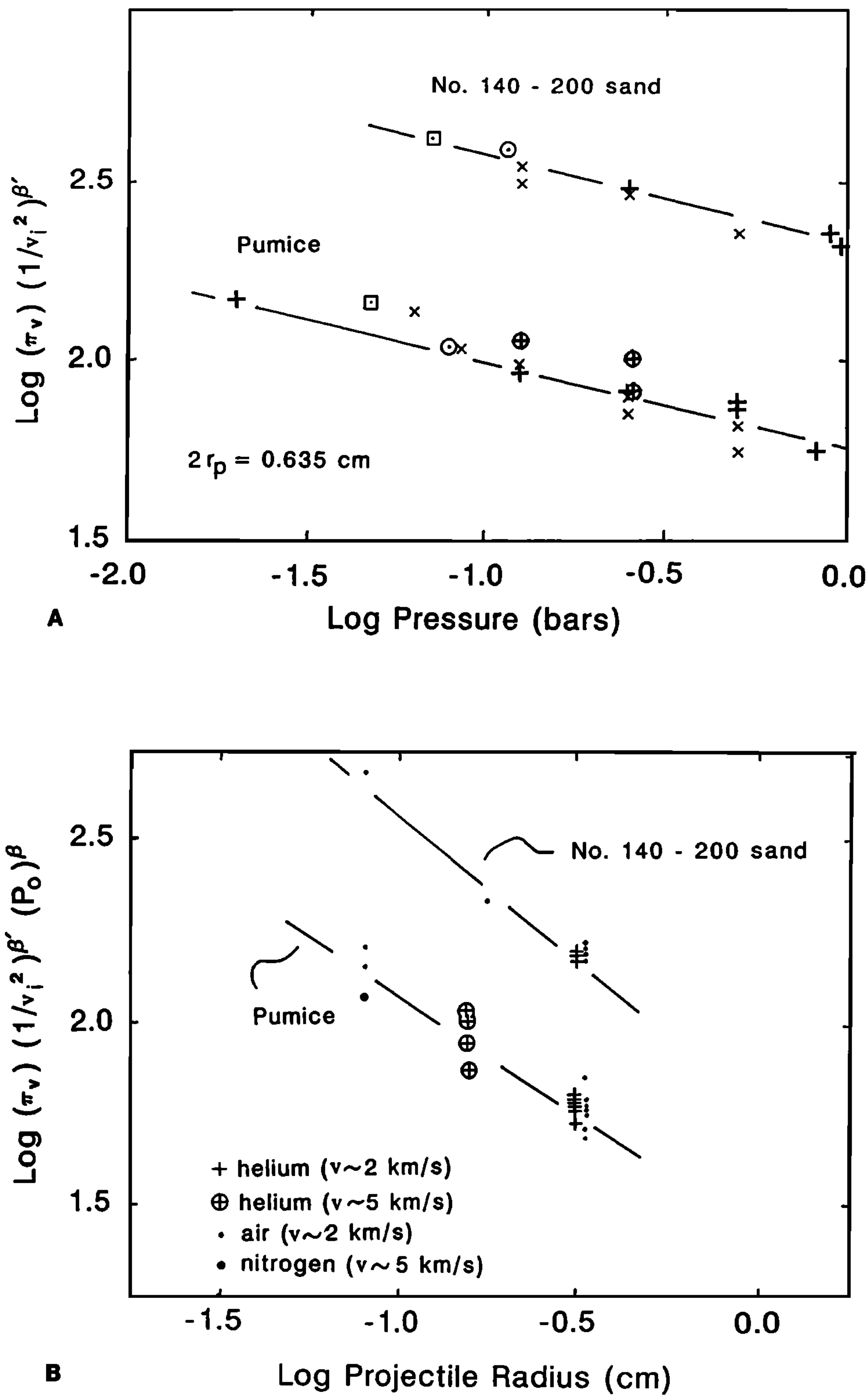


Fig. 4. The effect of atmospheric pressure on cratering efficiency $\pi_v$ with the assumption that cratering in sand and compacted pumice are controlled by target strength. Scaling relations from *Holsapple and Schmidt* [1987] predict that cratering efficiency should depend only on impact velocity $v_i$ for a given target strength (see text). Consequently, cratering efficiency corrected for the assumed strength scaling should depend only on atmospheric pressure (again for a given target strength). Figure 4*a* shows a subset of the data in Figure 2 in order to track the effects of static atmospheric pressure while minimizing possible effects from aerodynamic drag and possible projectile-atmospheric interactions: low atmospheric densities ($\rho/\rho_0 < 0.25$, where $\rho_0$ is the density of air at STP) at low impact velocities and $\rho/\rho_0 < 0.05$ at high impact velocities. For a given projectile size (Figure 4*a*) the assumption of strength scaling appears reasonable. Symbols in Figure 4*a* correspond to those in Figure 2 with circled helium data further distinguishing high impact velocities (greater than 4 $km/s^{-1}$). The observed pressure dependence for a given projectile size (Figure 4*a*) can be applied to cratering efficiency in order to test for any projectile size effect. Figure 4*b* reveals that a clear dependence on projectile size exists, contrary to predictions for strength scaling. Moreover, both compacted pumice and loose sand exhibit similar dependences. These results combined with analysis of data for vacuum conditions indicate that atmospheric pressure modifies gravity-scaled cratering relations. (Impact velocity in kilometers per second.)