Use of Sintered Diamond Anvils in a 6-8 High-Pressure Apparatus *	X17B1

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The pressure capability of the Tcup apparatus (NSLS Activity Report 1995, B-140; 1996, B-145) has been extended to 22.8 GPa by the use of sintered diamond for the 1 cm cubes used as a second stage (Figure 1). The sintered diamonds were Advanced Diamond Compacts (ADCs). ADC is a natural diamond product hot-pressed with a SiC binder at modest pressure ($\sim$2 GPa). We achieved a pressure equivalent to our best tapered anvil run, with a maximum pressure of 22.8 GPa with a load of 110 tons. The untapered ADC pressure-load curve is tangent to the equivalent untapered WC curve at pressures below 5 GPa, but with much less curvature above there. At 110 tons, there is a 6GPa increase. We expect tapered ADC anvils to exhibit similar pressure increases. If we taper the anvils, and extroplate along the best -2° tapered trajectory, we would expect the pressure to reach 30 GPa at 120 tons (Figure 2).

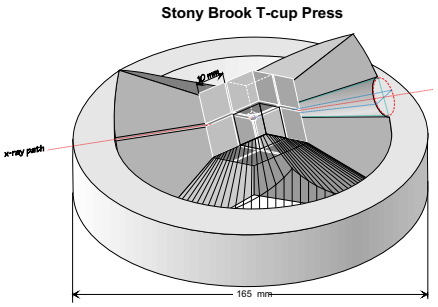

Figure 1. Tcup apparatus, showing eight 10 mm second stage cubic anvils inside three of six first stage anvils, two of which are cut away to allow x-ray passage

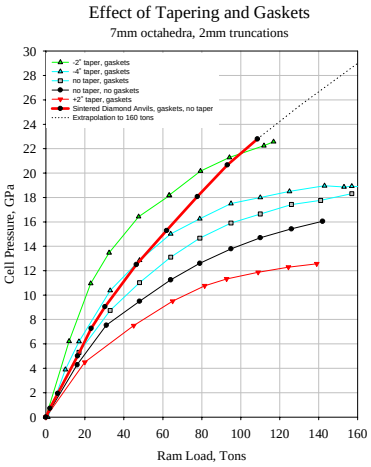

Figure 2. Plot of cell pressure vs. ram load for various anvil and gasket configurations. Heavy line is for the ADC anvils, the rest are WC.

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