A New Anvil Geometry for SAM-85 for High P, T X-ray Studies *	X17B1

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We have modified the conventional DIA anvils in order to improve their performance in terms of pressure capability and reliability. Figure 1 shows geometry of our new tapered WC anvils and Figure 2 the attainable pressure with the tapered anvils as compared to that of the conventional straight-flank anvils. Several points about this new geometry are worth noticing.

1. As is evident from Figure 2, we have gained 30% in maximum attainable pressure compared to the conventional anvil geometry. Thus the tapered WC anvils give the pressure range comparable to that of straight sintered diamond anvils.
2. The wedged anvil gaps act as pressure seals, thereby significantly reduced the number of blowouts, which used to cause failures in the experiments.
3. The tapered anvil geometry greatly reduced hysteresis in the pressure -load relation, enabling us to obtain multiple heating cycles at various pressures, and allowed complete P-V-T measurements within the entire P- T space with a single experiment.
4. The tapered anvil geometry significantly increased survival rate of the thermocouples to close to 100%. Counting all the factors together, we have increased our efficiency in the P-V-T experiments by a factor of 4 with the tapered anvils.

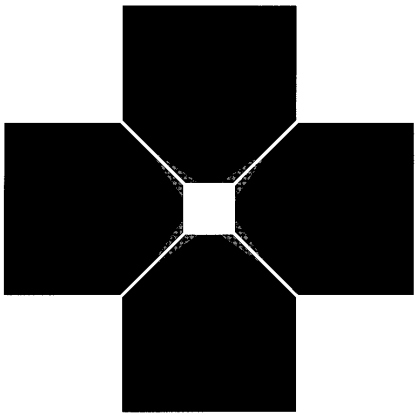

Figure 1. Geometry of tapered anvils (four shown). The light gray portions are removed, leaving the dark gray anvil

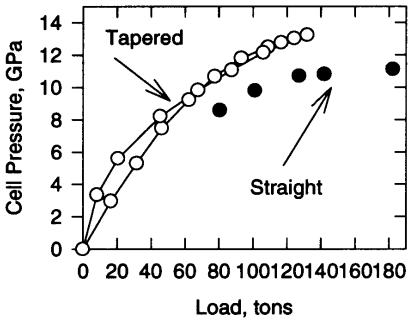

Figure 2. Pressure *vs.* load for the 4/3.5 mm tapered anvils (open circles) and the 4 mm straight anvils. Note that the curve for the straight anvils levels off at about 120 tons, where the tapered anvils generate a pressure that is about 30% higher.

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