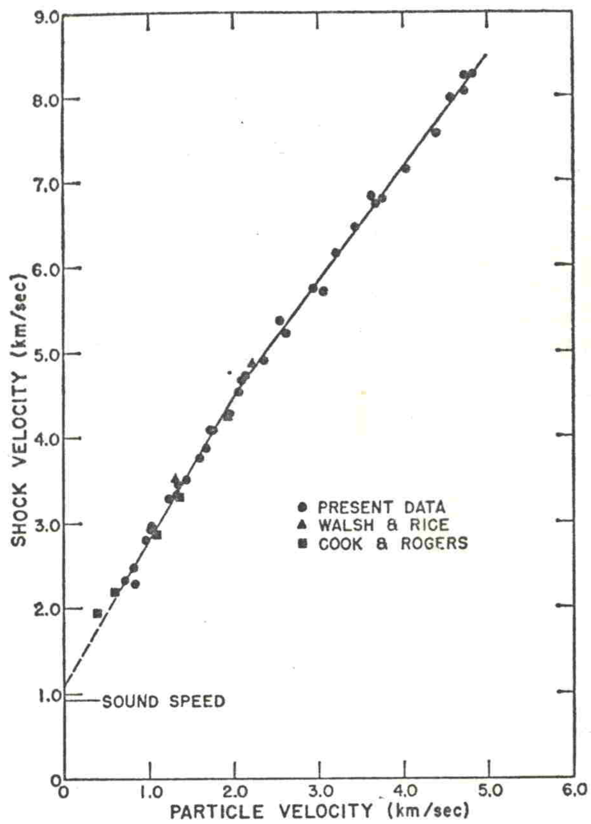


FIG. 8. Shock velocity-versus-particle velocity plot for carbon tetrachloride.

similarity in the observed behavior between carbon disulfide and benzene indicates that carbon disulfide undergoes an instantaneous transformation to a mixed phase material at 62 kbar with the new phase being completely formed at 80 kbar. In addition, the shock wave remains stable at and above the transition pressure.

The observed transition is thought to be a transformation from the liquid state to a "black substance" as observed by Bridgman.[4] Whalley[23] and Butcher *et al.*[24] investigated the phenomenon and the transformed material in more detail. They found that under static pressures the transition takes place at about 40 kbar over a temperature range of 120–200°C. The black substance was determined to be an amorphous form of carbon disulfide, stable at ambient pressure and temperature, and has some of the characteristics of a semiconductor. In some experiments[25] where carbon disulfide was shocked to about 200 kbar, a black fluffy solid was recovered which may be the solid observed in the static experiments.

Some experiments were performed to determine the electrical properties of carbon disulfide near the transition pressure. It was observed, with rather insensitive instrumentation, that there was negligible electrical conductivity below the transition pressure. However, near 80 kbar the conductivity increased significantly, indicating a connection between the transition and electrical conduction.

D. Carbon Tetrachloride

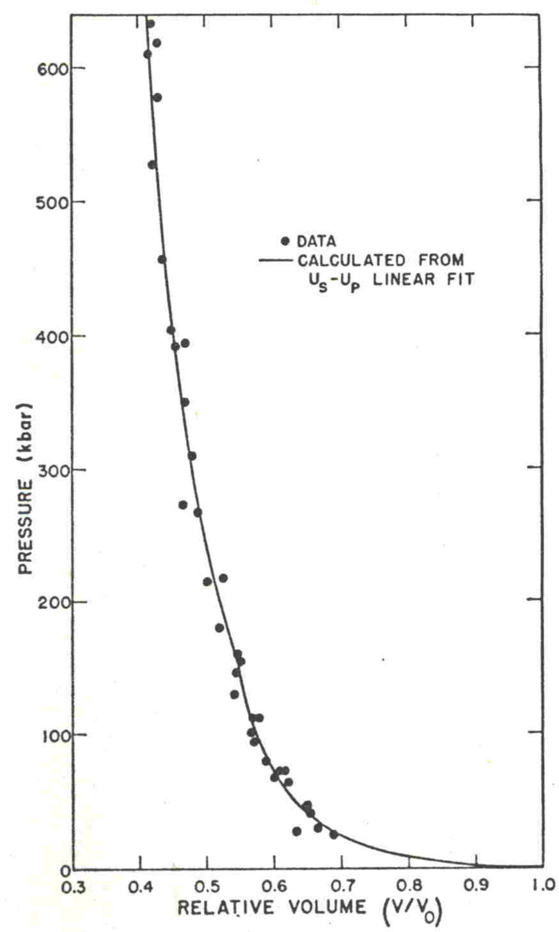
Carbon tetrachloride, in some respects, has a less complicated behavior under shock conditions than either benzene or carbon disulfide. In Table III are the Hugoniot data obtained from the experiments. The $U_s - U_p$ data are plotted in Fig. 8 and are fit by two straight lines. They differ in slope, but there is no displacement of the two segments. The lines are fitted by

$$U_s = 1.11 \pm 0.08 + (1.67 \pm 0.05) U_p \qquad (11)$$

in the range $2.30 \leq U_s \leq 4.70$ km/sec. Above $U_s = 4.70$ km/sec the linear relationship is

$$U_s = 1.87 \pm 0.14 + (1.32 \pm 0.03) U_p. \qquad (12)$$

These lines intersect at $U_s = 4.70$ and $U_p = 2.17$ km/sec. A least-squares fit of the data to a quadratic in the particle velocity resulted is a smooth curve through



. Pressure-versus-relative volume plot for carbon tetrachloride.