observed that CuCl transforms to a birefringent phase that is opaque in transmitted white light.

The present experiments were motivated by the above results and their suggestion of the possibility of a highly-conducting high-pressure phase. Indeed, we have observed a sharp resistance drop in CuCl by a factor of ~ 10^7 at 40 kbar indicating the entering of a metallic phase before it transforms into a much less conducting phase at $P \gtrsim 55$ kbar.

2. Experimental details

Crystals were grown using the gel-growth process, (Armington and O'Connor 1967, 1968) because this process is capable of yielding large high-purity (Armington *et al* 1967) single crystals. The crystals were grown at 15 °C to slow down the rate of growth and thus improve the purity and crystalline perfection (Henisch 1970). Powder pattern x ray analysis indicated that the crystals were single phase in the zinc blende structure. Clear tetrahedral crystals 1·0–2·5 mm on an edge were hand-picked for property measurement. Since the crystals tend to decompose to $CuCl_2$ and Cu on exposure to air (especially moist air), they were stored in a 1% HCl solution, a few Cu pellets being added to the solution to retard the $Cu^+ \rightarrow Cu^{++}$ reaction. A dry N_2 atmosphere was used whenever the crystals were removed from the solution for handling. The crystals were always handled and grown under dim red light to avoid light-induced deterioration. Isomica packing rings and AgCl or Teflon pressure medium were used with the Bridgeman anvil sets to provide the high-pressure environment at room temperature. Both Mo- and W-strips with Cu-coated contacts to the samples were used for leads. Crystals were ground down to 0·1–0·2 mm thick triangular platelets and loaded on to the anvil sets. The two-point resistance was measured by an HP 410B VTVM, and the pressure was calculated from the load determined by a calibrated Dutt–Norton gauge. Runs on one polycrystalline sample

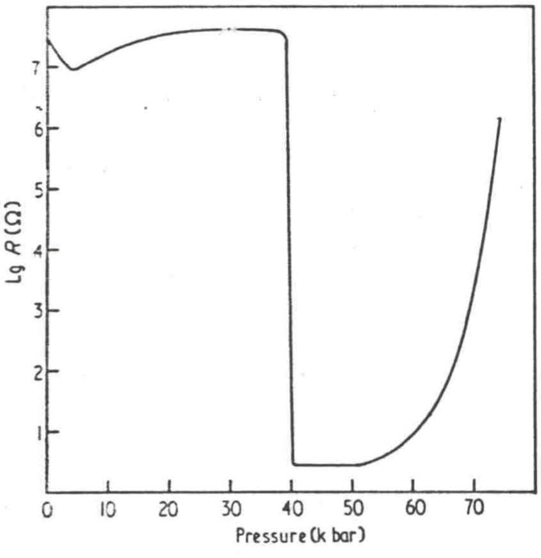

Figure 1. Schematic pressure dependence of resistance for a CuCl crystal at room temperature (300 K).

(prepared by melting and c
temperature for $P \leqq 20$ kb
Schematic results for o
tance R decreased initial
increased only slightly (pe
pressure up to 40 kbar. Be
~ $30 \times 10^6\ \Omega$ and ~$6 \times$
through 40 kbar by ≦2 kb
tance. Further increase o
However, for higher P, R
~75 kbar.

It should be noted th
caused by pinching or sh
in only seven of them. W
defects in, the samples. Six
one semiclear crystal, wit
occurred in crystals prep
stals. We also noticed th
and decreasing pressure c
change (or latent heat) acc
the case of Sm-monocha
over a 9 K range was also
sample. As the pressure d
rapidly without significan
jump. The anomaly is ab

3. Conclusions

The results shown in figu
tion in CuCl at 40 kbar ar
transition at somewhat h
critical pressure require
These observations are c
CuCl powder at high pres
vity near 40 kbar can eas
CuCl particles and their
Only tentative specu
possible at this time alth
covalent- to metallic- to
collapsed metallic phase

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stages of this work and t
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