possibility that this anomalously strong but reversible increase of T_c at low pressures is related with the peculiarities which niobium[17] and niobium-rich alloys exhibit when lattice defects are introduced by application of pressure at liquid helium temperatures. In contrast to the decrease in T_c, commonly observed when lattice disorder is generated by other means (neutron diffraction[28], thin film sputtering[29]), such pressure induced lattice defects increase T_c as well. As mentioned above, however, this occurs for $4.96 \leqq n \leqq 5.04$, i.e. in a concentration range which is narrower than that for the anomaly in question ($4.9 < n < 5.25$).

The anomaly still occurs to its full extent in the ternary alloy $Nb_{96}Zr_2Mo_2$, which is isoelectronic with pure niobium, but, due to its enhanced lattice disorder, has markedly different mechanical and electronic properties, as indicated by the difference in hardness and residual resistivity ratio (Fig. 1). We therefore argue that the anomaly is not related to the singularities which these properties show near $n=5.0$. (We note that the transition temperature at zero pressure is lower by 0.16 °K than for pure niobium.) The other ternary alloy $Nb_{73}Zr_9Mo_{18}$ made by us has a resulting $n=5.09$ which agrees with the n-value for which, for the binary alloys, the splitting of $d\ln T_c/dp$ assumes its maximum value. It can be thought as being composed of equal parts of two binary alloys $Nb_{82}Zr_{18}$ ($n=4.82$) and $Nb_{64}Mo_{36}$ ($n=5.36$), each of which alone would show no splitting of $d\ln T_c/dp$. Mixed together, they exhibit considerable splitting. This strongly suggests that the anomaly is inherently connected with the number n of valence electrons per atom.

It is interesting to note that the transition temperature of this ternary alloy at $p=0$ is practically identical with that of a binary alloy of same n. This justifies nicely the use of n as a means of classifying the alloys investigated.

Conclusion

A reasonable interpretation can be made for the effect of pressure on T_c for transition metal alloys with approximately half filled d-bands. It appears that for pressures in excess of 25 kbar this band preserves its overall shape when the volume is changed, very much as it does when the band is filled with electrons by alloying. It would be desirable to check this statement in other cases. Preliminary measurements on the series Ti-V-Cr confirm it for $n<5$, but modifications seem to be necessary for the V-Cr alloys. This does not seem surprising, because

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pure chromium is antiferromagnetic. It may be expected that detailed studies of the pressure effect on T_c of alloys of both the early transition metals (those with less than half filled d-shells) and those from the filled end of the transition series, will contribute to the understanding of superconductivity in these metals.

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