to a lower temperature, T_c being lowered by about 0·06° under 13 400 atm. The change is much smaller than that observed for tin, but is in the same direction. This result disagrees with the observation of Kan, Sudovstov and Lazarew; we may mention that the behaviour of thallium in the experiments of these workers was stated to be very sensitive to the method of mounting the specimen.

Bismuth

Bismuth, though not normally a superconductor, is obviously very close to being one. Hilsch (1951) has shown that very thin films of bismuth deposited from the vapour on to a surface at liquid helium temperatures exhibit superconductivity, with T_c at about 5°K (although annealing at room temperature destroys this property of the film) and a large number of alloys containing bismuth have been found to be superconductors. The positive value of dT_c/dp found by Alexeyevski for the bismuth-rich compounds $RhBi_4$, $NiBi_3$ and KBi_2, together with the vanishingly small electronic specific heat of the pure metal at low temperatures led him to suggest that bismuth might be a 'virtual' superconductor and that sufficient pressure might bring its transition temperature into the liquid helium region. Another interesting pointer arises from the curve of atomic volume of the elements plotted against atomic number; the superconducting metals are found to occupy a fairly well defined range of atomic volumes intermediate between the peaks and troughs of the curve (see for instance Mendelssohn 1952). Bismuth at ordinary pressures would appear to have just too great an atomic volume to take its place in this group.

A number of runs were made under pressure with samples of bismuth of purity stated to exceed 99·999%. No signs of superconductivity could be observed (down to 2°K) at mean pressures less than 20 000 atm., but at all pressures tried between 20 000 atm. and 41 000 atm., a superconducting transition was observed at about 7°K, the value of T_c not varying by more than 0·1°K throughout the range of pressures covered. This behaviour was reversible; that is, after relaxation of the pressure at room temperature the specimen was again non-superconducting.

It is of interest to consider this result in conjunction with the phase-equilibrium diagram for bismuth at high pressures determined by Bridgman (1935 b), in which polymorphic transitions are shown at room temperature at about 25 500 atm. and 27 000 atm. In view of the uncertainty about the distribution of pressure in our experiments, it seems reasonable to associate the onset of superconductivity with the changes to more close-packed crystalline forms of bismuth discovered by Bridgman.

Calcium and Strontium

Strontium satisfies the criteria for superconductivity arising in the theories of Fröhlich and Bardeen, and although calcium does not satisfy these criteria, both metals are exceptional in that their electrical resistance at room temperature increases with pressure (Bridgman 1949, 1952)—a property which would be expected to favour the appearance of superconductivity at high pressure.

We have subjected samples of calcium of purity 97% and strontium of purity 99·85% to mean pressures of 44 000 and 42 000 atm. respectively, and examined them down to 2·1°K. No signs of superconductivity could be observed in either metal.

The work is to be extended to other superconductors and non-superconductors, and to higher pressures.

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