which is roughly the order of their autoprotolysis constants under normal conditions (table 1).

The shock conductivities of ethyl alcohol, acetone and glycerol were less than we could measure (i.e. $<ca.\ 10^{-4}\ \Omega^{-1}\ cm^{-1}$). Examining the possible reasons for this, we observe first that the autoprotolysis constant of ethyl alcohol is considerably lower than those of the other liquids in table 1 and this probably explains its failure to conduct. Acetone can only undergo autoprotolysis in its enolic form, whose concentration is extremely small [10] and whose autoprotolysis constant is unknown: it is not surprising that its resistance remained high. The autoprotolysis constant of glycerol is also unknown, but its acidic ionization constant in water is very low.[11] Moreover, glycerol has a high viscosity which increases steeply with increasing pressure,[12] causing a corresponding decrease in the mobility of dissolved ions.[13] This factor may contribute to the high resistance of glycerol in shock compression.

Turning now to the behaviour of water in reflected and colliding shocks, we see from fig. 5 that the conductivities are certainly greater than they are in single shocks at the same distance from the explosive. However, the differences are unexpectedly small. An increase in intensity of single shock waves from 50,000 atm to 100,000 atm causes an 80-fold increase in κ, whereas the reflection of a 50,000 atm wave by the arrangement shown in fig. 1*b* (which should produce an instantaneous pressure of about 100,000 atm) causes only a twofold increase in κ, and the collision of two 50,000 atm waves by the method shown in fig. 1*c* (which should raise the pressure to about 160,000 atm) causes only a fivefold increase in κ. These results are surprising, but they can be explained in two kinds of ways.

The first possibility is that the conductivity of water in reflected and colliding shocks is, in fact, less than it is in a single shock of the same total pressure. This may well be so, because the temperature is lower in multiple shocks than in a single shock of the same intensity. The lower temperature probably reduces the mobilities of the ions and lowers the value of K_{auto}. In addition it favours the partial freezing of water which Altshuler, Bakanov and Trunin observed in single shock waves at pressures above 130,000 atm.[14]

The second possibility is that we failed to produce the pressures we imagined. There could be several reasons for this. First, the calculated pressures are for normal reflections and head-on collisions of *plane* shock waves, whereas some photographs taken by Dr. A. H. Ewald show that the shock fronts in our experiments are actually spherical, with radii of about 30 mm This means that at points away from the principal axis, the interactions must have been oblique and the pressures less than those for normal incidence. Secondly, the main charges shown in fig. 2 were detonated at points on their circumference instead of on their axes, and this must have increased the obliqueness of the collisions. Thirdly, it is possible that the conductivities measured by the arrangement shown in fig. 1*b* relate to conditions in front of the Teflon rather than in front of the aluminium, because the principal electrical path was through a thin layer of water near the surface of the Teflon. We have measured the shock impedance of Teflon and found it to be only about half that of aluminium, so that the reflected pressure at a water/Teflon interface will certainly not be twice the incident pressure, as it is at a water/aluminium boundary. Finally, Finkelstein [15] has calculated that the reflection or collision of strong shocks in water causes a "spiking" of the interaction wave, and that although the excess pressure is high its duration is short. It might even be less than the response time of our measuring circuits (*ca.* 0·15 μsec) although this seems unlikely.

At present we are unable to decide which of these factors was the main cause of the unexpectedly low conductivities.

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