92 per cent of that of the 8 per cent particles. To a good approximation this is consistent with the picture that in this concentration range the size and the charge of the original liquid droplets are independent of concentration (see, however, the third paragraph from the end of the following section), and the final particle charge is determined to a large extent when the liquid droplets are formed. Such a picture is also consistent with the shape of the two curves. If we regard the difference in shape as being produced entirely by a variation in the radiuses of the particles, the square root of the ratio of the most probable values of $\frac{r^2}{e}$ from the curves should equal roughly the cube root of the concentration ratio, and this is almost exactly so.

AGGREGATION AND RELATED EFFECTS

If the aerosol charge density be determined from the area under a charge-weighted distribution curve, first for a sample taken directly from the exposure chamber, and then for a sample which has passed through a second chamber, a fraction may be obtained by dividing the difference in areas by the first (larger) area. This fraction will be a relative measure of the total effect of all the causes which reduce the charge associated with the particles in the second or settling chamber, being zero if the particles pass through unchanged, or unity if all charge is neutralized or lost by aggregation or settling out.

The accompanying table compiles data for silica, sodium chloride and mixed aerosols of varying concentrations, taken under comparable conditions (as described in the foregoing section) before and after the aerosols had passed through a 20 l. settling jar, in which they remained effectively 14 minutes. Curve 1 of figure 4 shows some of these data for silica plotted as fractional charge loss vs. concentration. Now fractional charge loss due to aggregation is concentration dependent, while fractional losses due to gravity and diffusion are not. Hence, extrapolation to zero concentration gives a relative measure of the fractional settling out due to gravity and diffusion in the absence of aggregation.[15]

Similarly, the fractional settling out due to gravity would be little affected by the addition of vertical surfaces in the settling chamber, whereas that due to diffusion should increase in proportion to the total surface presented. Hence, a plot of zero-concentration intercepts (obtained as in fig. 4) vs. total surface areas in the settling chamber, if extrapolated to zero area, should give the fractional settling out due to gravity alone, were aggregation not present.

Curve 1 of figure 4 will approach unity at sufficiently high concentrations, corresponding to all charge being removed. If, as in curve 2 of figure 4, we construct a mirror image of this curve through the ordinate value of the zero-concentration intercept but with a vertical scale such that it approaches zero ordinate at high concentrations, then the fraction included between these two curves may be regarded as a measure of the fractional aggregation of all particles.

This measure of fractional aggregation is subject to at least two restrictions. First, it is evident that for complete aggregation in the absence of diffusion or

15. In the presence of the appreciable aggregation taking place at higher concentrations, this intercept value would still represent the fractional settling out, due to gravity and diffusion, of the nonaggregated particles only if the size distribution of these particles (and possibly their charge distribution also) were unaffected by the aggregation.