

it appears that this will be the situation usually encountered with small particles, and that the reverse effect, where particles of large $\frac{r^2}{e}$ ($\frac{r}{e}$ for case 1) disappear more rapidly, will be encountered only if (a) particle charge increases more rapidly than the square of radius (first power for case 1) when loss by diffusion is predominant, or (b) particle charge increases less rapidly than the square of radius (first power for case 1) when gravity settling is predominant (as might conceivably be the case for large particles or shallow chambers).

It will be noted that with this method particles which are electrically neutral affect our measurements only indirectly, and we have given no proof that the behavior we have observed is representative of the uncharged particles, if there be such, as well as the charged. Such a proof would be irrelevant if it were determined that the relative number of neutral particles present was small,¹⁹ or perhaps would be accomplished if it were demonstrated that the effect of charge on aggregation and similar phenomena was small.²⁰ The method we have presented could serve as a criterion in developing a means of altering particle charges in a controllable fashion,²¹ and then could be used to investigate the effect of charge on aggregation, a basic question on which we have not touched.

Since all the information summarized above has resulted from experiments designed to test the feasibility of a method rather than to contribute to a general understanding of aerosol phenomena, and since all of the experiments have been done with the most involved case of independent charge, radius and charge-radius ratio distributions, it is obvious that much additional and more precise information of a more fundamental nature could be obtained, especially in connection with aggregation phenomena. Where possible, the use of particles of constant size would be a great advantage. In all cases the method we have developed possesses the advantage of dealing with the particles while they are still entrained in their natural environment, thus avoiding possible misinterpretation resulting from faulty methods of collection or from changes which may take place during and after collection. In addition, the method appears to be capable of dealing with particles even smaller than the limit of resolution of the electron microscope.

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19. This number has been reported negligible for materials like silica under the special conditions described by W. B. Kunkel (The Electrical Charges on Dust Particles, *Phys. Rev.* **78**:91, 1950).

20. There seems to be a general feeling that under many circumstances this also is true (Wilson, I. B., and La Mer, V. K.: Retention of Aerosol-Particles in the Human Respiratory Tract as a Function of Particle Radius, *J. Indust. Hyg. & Toxicol.* **30**:265, 1948. Kunkel, W.: Growth of Charged Particles in Clouds, *J. Applied Phys.* **19**:1053, 1948). There are, of course, other circumstances under which it is not true (Whytlaw-Gray R., and Patterson, H. S.: *Smoke: A Study of Aerial Disperse Systems*, London, Edward Arnold & Co., 1932, chap. XIV, pp. 146-167).

21. Fuchs, N.; Petrjanoff, I., and Rotzeig, B.: On the Rate of Charging of Droplets by an Ionic Current, *Tr. Farad. Soc.* **32**:1131, 1936. Lipscomb, W. N.; Rubin T. R., and Sturdivant, J. H.: An Investigation of a Method for the Analysis of Smokes According to Particle Size, *J. Applied Phys.* **18**:72, 1947.