## APPENDIX

To obtain a clearer picture of liquid aerosols as formed by generators such as were used in these experiments, investigations of temperature, dew point and light absorption were made on water and salt aerosols at various distances along a 17 mm. (inside diameter) glass delivery tube from a generator. The results of such investigations may be summarized briefly as follows:

Temperatures (measured by fine wire thermocouples) of the jet nozzles and of the air-liquid spray inside the generator could be controlled by means of an external water bath. When equilibrium conditions were attained, these temperatures differed by not more than a few tenths of a degree centigrade. Their average value was taken as the generator temperature, or temperature at which the aerosol was formed.

With the generator operating in air rather than a temperature bath, this generator temperature dropped about 12 C. below room temperature. Proceeding down the delivery tube, the rising aerosol temperature coincided with the dew point until a critical temperature (about 4 C. above generator temperature) was reached, above which the dew point remained constant. This suggested that the aerosol atmosphere is saturated as it leaves the generator, and that with the rising temperature along the tube the small liquid droplets evaporate with sufficient rapidity to maintain saturation until the droplets have either disappeared or been converted into solid or pseudosolid impurity residues of low vapor pressure.

This interpretation was checked by assuming that all the water leaving the delivery tube was in the saturated vapor phase (none in aerosol particles) at the critical temperature. The amount of water leaving the tube, calculated on this assumption, was found equal to the amount entering, as calculated from measurements of rate of loss of water from the generator reservoir and of temperature, dew point and flow of air into the generator.

According to this picture, the amount of water in the particles when formed at the generator can be calculated as the difference between the amount in saturated vapor phase at the critical temperature and that in saturated vapor phase at the generator temperature. This was about 0.25 Gm./min. and was relatively insensitive to generator temperature. With care in maintaining generator pressure and room temperature constant, the 10 watt cooling effect of evaporation could be detected by a slight decrease in the slope of the temperature rise curve.

In some cases the aerosol particles were completely evaporated in a length of tube corresponding to a particle lifetime of about 0.2 second. Presumably they would have evaporated faster had the rise of temperature been more rapid. Theoretically,[22] a water drop $10^{-3}$ cm. in radius would hardly last longer than 0.06 second in an unsaturated atmosphere at room temperature, and a drop $10^{-4}$ cm. in radius, only 0.0006 second.

Measurements of light absorption [23] plotted against temperature (or length) along the delivery tube gave a curve of two branches—a rapidly decreasing branch which merged rather suddenly into a constant asymptotic value maintained for the remainder of the temperature rise (or tube length). The extrapolated intersection of these two branches occurred at the critical temperature for water aerosols, and for salt aerosols of less than 1 per cent concentration.

The asymptotic absorption values presumably result from absorption by comparatively solid impurity (or salt) residues. When the generator was charged with distilled rather than with tap water, this value was reduced by a factor of 10 (near the limit of detection of the apparatus). The value for 1 per cent salt solution was about five times that for tap water.

For concentrations greater than 1 per cent the dew point measurements could not be made accurately because of the hygroscopic nature of salt. The critical temperature could still be determined by the light absorption method, however. For a 5 per cent salt solution the asymptotic absorption value was almost five times that for a 1 per cent solution. The transition to the asymptotic value was more gradual, as though evaporation were slowed by the high salt and impurity content of these larger particles in the later stages of evaporation.

22. Langmuir, I.: The Evaporation of Small Spheres, Phys. Rev. **12**:368, 1918.
23. We use the term to include scattering, diffraction and reflection effects as well.