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THE BASIC MECHANISMS OF STATIC ELECTRIFICATION

By Professor LEONARD B. LOEB

DEPARTMENT OF PHYSICS, UNIVERSITY OF CALIFORNIA

The term "static electrification," as here used, covers all processes for producing segregation of positive and negative electrical charges by mechanical actions which operate by contact or impact between solid surfaces, between solid and liquid surfaces, or in the rupture of solid or liquid surfaces by gases. These involve such phenomena as frictional electrification, spray electrification, electrification in dust storms, etc. A review of these phenomena in general shows a most unsatisfactory array of discordant, often non-reproducible and confusing results, whose theoretical interpretation in some cases is quite hopeless. 1,2,3,4,5


It is believed that in a considerable measure this situation results from the fact that many investigators are not alert to the possibility that in any one aspect of their studies not one but perhaps two or more of the various basic mechanisms may have been active. Such complications make theoretical interpretation in terms of any single proposed mechanism most difficult. In order to clarify the situation it is proposed to list the known mechanisms and briefly to discuss them. The basic mechanisms active are:

(1) Electrolytic effects, caused by distribution of electrolytic ions in solutions of liquids of high dielectric constants between the solutions and metals or solids, on contact, followed by mechanical separation. Since diffusion of ions across interfaces build up considerable potentials,