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CONCERNING THE QUESTION OF SELECTIVE HEATING OF SMALL PARTICLES IN THE ULTRASHORT WAVE_CONDENSER FIELD

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C. Conclusion.

The work presented offers a complete mathematical theory of the total problem, i.e., the stationary as well as the non-stationary condition. On the basis of the illustrated theoretical currents and the measurement results on the model system, temperature relations can now be calculated in advance for systems of any size and any chosen constants. These calculations confirm the theoretical and experimental results already reported by other authors and simultaneously extend them to the non-stationary starting process.

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Summary.

The problem of selective heating of smaller particles imbedded in a suspension medium with other electrical constants in the ultrashort wavefield is subjected to a detailed theoretical and experimental examination. The problem is divided in 2 parts: the condition of the involved equilibrium, in which at constant particle temperature the developing amount of heat in the particle developed by field effect in a unit of time, flows off completely into the surrounding medium; preceeded by the starting process, during which, with increasing particle temperature, initially great, then dropping to zero, developed ~~d~~ amount of heat in the tunit of time, attributes to its heating. Both cases are treated separately, theoretically and experimantally. For the stationary case the theoretical treatment of W. Krassny-Ergen with the introduction

of special margin conditions is generalized, and thus an explicit, analytical solution of the occurring differential equation is won. For an emulsion of globe-formed particles for any chosen material system, particle size, and electrical condition, this makes it possibłe to evaluate the resulting particle-high-temperatures. These high temperatures are worth mentioning only in relation to the suspension medium, at a very much greater effect-conductivity of the dispersing phase and in the millimeter area of the particle diameter and greater. The average particle high temperature, in the extremely favorable system of water-in-oil emulsion with optimum conductivity of the water of the droplets at field strengths of 5 ... 10 kV/cm, reaches 60^{o} for particles of 2 mm diameter and thus makes a selective boiling dispersal of the water droplets possible. This case is examined experimentally in the condenser field of a strong short wave sender at 11 m wave length. A confirmation of the theoretical evaluation results. The necessary field strengths for a selective boiling dispersal of water droplets lie only a little below the dispersal field strengths of droplets by the static field strengths.

The partial differential equation described for the non-stationary initial process, cannot be subjected to an explicit, analytical solution. However, by a constant transformation procedure described in detail the possibility exists, to recalculate from one experimentally evaluated system to systems of other physical constants and involved particle sizes. Therefore, a macroscopic model system, in which the initial process extends almost over an hour, is measured in detail thermoelectrically in its spatial and timely temperature distribution. There is a possibility of a considerable rise in relative high temperatures of particles across the stationary achievable high temperatures. However, for microscopic and colloid-dispersed dimensions here too the achievable high temperatures in size area remain far below $1/1000^{o}$, so that heere too, the usage area is limited to macroscopic systems. Such a medical-therapeutic usage possibility is mentioned briefly.