been noted with 120 sparks per second up to 800 kilovolts, which voltage has happened to be the maximum available with 60-cycle excitation of the condenser at the time of these tests, due to temporary power-limitations.

We are now using tubes of 12 sections placed inside of a Tesla coil 6 inches in diameter and 38 inches long, each electrode being connected to a tap on the winding of the coil. The coil itself shields the tube from ground, and distributes the voltage. A tube of this type, *with one end grounded,* has been operated to 1900 kilovolts at one spark per second, and to 1600 kilovolts at 120 sparks per second, at which voltage the tube operated perfectly; primary power was again the limitation. Insulation difficulties are also serious at these voltages above ground. Experiments are in progress on direct measurements of the output from these tubes of the expected radiations and "rays" of radioactive energy-equivalents, the results of which we hope to report shortly.

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Photoelectric Effect and the *J* Phenomenon

In the issue of the Physical Review for May 1, 1930, appears a paper by E. Marx describing "A new photoelectric effect in alkali cells" wherein that author investigates changes produced in the limiting potential acquired by an insulated alkali electrode, by varying the composition of the incident radiation. Although these experiments constitute the first systematic study of the phenomenon in the optical region, an analogous investigation was carried out with x-rays some years ago by C. G. Barkla. I quote from one of the latter's notices (Nature, March 27, 1926, p. 448)—"The ionization produced by a heterogeneous beam of x-rays in a gas, or the electronic emission from a metal plate, (measured by ionization outside the plate) may be abruptly and enormously increased either by (*a*) superposing on that beam a very feeble radiation of slightly shorter wave-lengths, or (*b*) by taking away from the complex radiation a very small amount of the radiation of longer wave-lengths, as by filtering; that is, either by adding higher frequency radiations to or eliminating lower frequency radiations from the beam, the same effect is produced; namely, a sudden large increase in the ionization. The magnitude of a sudden increase may be from 100 to 150 percent of the original magnitude. This is the *J* ionization produced by the *J* photoelectric emission accompanying the *J* absorption."

Since the independent variable (composition of the incident radiation) is the same for both cases, they deal presumably with the same effect, and it should be legitimate to compare the results, although an extrapolation from the optical to the x-ray region must be made with caution. This comparison is difficult, since it is unlikely that the experimental arrangements were the same for both. In Marx's work, the alkali electrode was insulated, and the removal of some of the red from an incident beam of white light caused an increase in the limiting potential acquired. On the other hand, in Barkla's experiment, the photoelectric plate was probably kept at a constant potential, and he observed that the removal of some of the long wave-length radiations from the beam of x-rays caused an increase in the ionization due to photoelectrons. Barkla interprets his result as a manifestation of some unexplained interaction between the component radiations in the incident beam, which causes a fundamental change in the amount or in the nature of the photoelectric emission. This is not necessarily inconsistent with the experiments of Marx, but it is not one of the assumptions of the tentative theory which he offers. Other possible suppositions as to Barkla's experimental arrangement lead also to conclusions which are at variance with the theory of Marx. At present all that can be deduced is that the four items (*a*) the experiments, (*b*) the theory of Marx, (*c*) the experiments, (*d*) the theory of Barkla, are not consistent.

I am not aware that Barkla's observation has ever been verified. It is possible that a series of varied experiments of this nature might throw some light on the elusive *J* phenomenon.

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