

THE ILLUMINATION-CURRENT RELATIONSHIP IN POTASSIUM PHOTO-ELECTRIC CELLS.¹

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IT has been commonly believed that the photo-electric current is directly proportional to the intensity of illumination. The relationship has been experimentally studied by Elster and Geitel, Lenard, Griffith and Richtmyer. Lenard concluded the relationship to be linear, although his results plot as a shallow curve, convex toward the illumination axis. Griffith found the curve to increase more rapidly than the illumination. Elster and Geitel and Richtmyer found the linear relation. On the assumption of this linear relation the photo-electric cell has been suggested as a physical photometer.

The problem of the present investigation was to develop absorbing screens to use with alkali metal cells, probably rubidium or cæsium, to reduce the wave-length sensibility to that of the normal eye.

After carefully determining the conditions under which the quadrant electrometer could be used to measure current, a number of potassium cells were constructed and studied. It was found that no two showed the same illumination-current relationship. When plotted, the results showed all varieties of curves, from convex to the illumination axis to concave. Further work with special cells showed this relationship to be a function of voltage, electrode distance and gas pressure.

The wave-length sensibility curves were different for the various cells, probably due to varying relative strength of the normal and selective effects.

It is concluded that the photo-electric cell, at least as at present made, is only applicable to photometry if accurately calibrated for every illumination intensity used. The application of absorbing screens to produce a visual luminosity curve sensibility is not feasible.

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