On the Delta Rays Emitted by Zinc when Bombarded by Alpha Rays.

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I. INTRODUCTION.

In some experiments by V. E. Pound[1] and described by him in a paper, "On the secondary rays excited by alpha rays," he found that the delta radiation emitted by carbon when bombarded by the alpha rays from polonium increased very considerably when the temperature of the carbon was lowered from room temperature to the temperature of liquid air. He also showed that this increase in the delta radiation from carbon as its temperature was lowered was due to an increase in the amount of air occluded in the surface of the carbon.

Numerous observers have also found that the amount of a gas occluded in the surface of metals determines to a very considerable extent the intensity of the photo-electric effect exhibited by such metals when stimulated by ultra-violet light. Indeed, it was shown by Küstner[2] that no photo-electric effect was exhibited by zinc even with wave-lengths as short as $\lambda = 1850$ A°.U., when the metal was scraped in a vacuum after extraordinary precautions had been taken to exclude gases, particularly the active ones. Wiedmann and Hallwachs[3] have shown, too, that the removal of occluded gases from potassium by repeated distillation in a very high vacuum caused its photo-electric effect to disappear completely with light which included wave-lengths down to $\lambda = 3{,}400$ A°. U. The results of Küstner and Wiedmann and Hallwachs have also been confirmed by Fredenhagen.[4]

In addition, Hughes[5] has shown that the contact difference of potential between zinc or bismuth both distilled in *vacuo* and platinum is exceedingly small when the surfaces of the zinc or bismuth consist of a fresh deposit of the distilled metals. If traces of air, how-

[1] Pound. Phil. Mag. Nov. 23 and 24, 1912.
[2] Küstner. Phys. Zeit. p. 68, 1914.
[3] Wiedmann and Hallwachs. Verh. d. Deutsch. Phys. Ges. p. 107, 1914.
[4] Fredenhagen. Verh. d. Deutsch. Phys. Ges. p. 201, 1914.
[5] Hughes. Phil. Mag. Sept. 1914, p. 337.