

## INVESTIGATION OF THE WEHNELT CATHODE EXPLOSION

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### ABSTRACT

This work is preliminary in an attempt to determine the cause of the Wehnelt cathode explosion.

A discharge tube with a hot, coated platinum cathode was used. A "B" battery eliminator maintained a steady, low potential drop across the tube.

Experiments were performed in which different gases were introduced into the tube after the current had started. These experiments seem conclusive that the explosion is due to some action in the coating on the cathode and is not due to any sudden ionization formed by the introduced atmosphere. The active materials were barium oxide and No. 6 Express sealing wax. The gases used were air, hydrogen, and oxygen.

Further work was done to determine whether the explosion is due to a chemical action in the active coating. Here a platinum strip about 1½ mm. wide was cupped to hold a paste made of BaO, C and distilled water. When a potential difference of 60 volts per cm. was applied and the strip was heated to brilliance, the resulting chemical action produced instantly a discharge so great that it could not be measured with an Ayrton universal shunt and galvanometer. After 30 seconds the current decreased to a readable value.

The above experiment was repeated with a potential difference of 3 volts per cm. The discharge again began immediately but continued to increase for 5 minutes before starting to decrease.

It should be observed that the chemical action eliminates the necessity of priming and offers a possible explanation of the Wehnelt cathode explosion.