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| journal or publication title | Science reports of the Research Institutes, Tohoku University. Ser. A, Physics, chemistry and metallurgy |
| volume | 22 |
| page range | 237-237 |
| year | 1970 |
| URL | http://hdl.handle.net/10097/27569 |

Spectral Analysis by Low Voltage Impulse Discharge Observation of Spectra by a Time-Resolved Technique and Erosion Rate of Electrodes*

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Abstract

A time-resolved technique was applied to investigate characteristics of spectra excited by a low voltage impulse discharge. Ion spectra of the gases in the atmosphere surrounding the spark and of some elements in the electrodes appeared in the first 10 msec of the discharge. Atom lines had lifetimes of about 30 msec, and resonance lines showed high absorption effects in air or in helium, especially in the later stages of the discharge. The absorption effect in a helium atmosphere was divided into two steps, the first caused by the initial breakdown energy and the next by the metastable state of helium. Further, a relation between the erosion rate of the electrodes and spectral line intensity was found in argon and in helium discharges.

* The 1503rd report of the Research Institute for Iron, Steel and Other Metals. Published in the *Spectrochimica Acta*, **25B** (1970), 419.