modulation, the pulse will be modulated with 60 cycle.

This phenomenon (7.) will occur only in the magnetron of the high power and the direct heating cathode type.

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47. Trial Manufacture of Electron Accelerator.

Kiichi Kimura, Isao Kumabe, Tetsuro Nakatau, Hidero Ueyanagi and *Asao Kusumegi.*

(K. Kimura Laboratory)

We achieved a trial manufacture of an electron accelerator using a single cavity resonator. In the first place, we performed the preliminary experiments about the resonant wave length of the reentrant-type cavity, but decided suitable dimentions of the cavity experimentally because we found that the various theories about it provide disagreement with our experiments.

Our cavity is 4.4 cm long, 3.4 cm in diameter, 0.58 cm in nose diameter, 1 cm in the accelerator gap length, about 0.66 MΩ shunt resistance, and it has gold-plated inside for the requirement of the good conductivity.

Oscillator is a magntron M-312 (wave length: 10 cm) operated by D.C. 4 kV anode voltage, A.C. (60 cycle) 3.5 kV cathode voltage and external magnetic field of 820 gauss. The above-mentioned cavity resonator was excited by the loop coupling through the cylindrical wave guide and the coaxial cable, and electron acceleration was tested by the electric field (about 20 kV) in the axial direction of the cavity. And 18 kV electrons were obtained. Then input power into the cavity was about 300 W and the pressure was 3×10^{-5} mm Hg. Electron energy was measured on the fluorescent screen by the magnetic deflection. Electrons which were emitted from a Th-W filament and were focused by Wehnelt cylinder, were accelerated at 4 kV and were injected on the cavity. The nose length in the cavity is controled by bellows from the vacuum outside for the purpose of obtaining the resonance of the cavity.

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48. On Some Properties of 2π-type Counter. (II)

Yoshiaki Uemura, Yoshio Saji and *Sakae Shimizu.*

(K. Kimura Laboratory)

We found that natural counts of 2π-type counter were approximately proportional to the length of the center wire of a counter, not to the length of a cathode cylinder.

In the previous paper*, we reported the method by which one could obtain the absolute number of β-particles emitted from a sample by the use of 2π-type counter. In that case, we varied the distance between the top of a center wire and a mica window. Now, in the present experiments, we varied the diameter of the cathod cylinder. As the result, the same method led us to obtain a good agreeable value of the absolute number of β-particles emitted from the same sample. Then, this method was found to be applicable to more general use. However, it must be pointed out that when the diameter of the cathod of a counter is larger than that of the window, a value obtained by this method is a little smaller.

* The Reports of the Inst. for Chem. Res. Kyoto Univ., 21 (1950).

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49. Study on the Ion Source.

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(K. Kimura Laboratory)

We have constructed the new type ion source using the discharge in the magnetic field, which is durable and little consumable in electric power and yields comparatively much ion current. The discharge was produced in the cylindrical space of 1 cm. in diameter and about 3 cm. in length in the coaxial field of 200~400 gauss. At the center of which the doughnut anode and on both sides the cathodes which were also magnetic pole pieces were settled. The generated ions was protruded through the canal drilled in one cathode. When the ion source was operated at the discharging voltage of D.C. 1000~2000 volts and the vacuum pressure of 8×10^{-4}~3×10^{-3} mm Hg, the ion current of 20~300 μA could be obtained. In the case of hydrogen gas, about 60 % of the total ions were protons, and this ratio increased after long hours' operation.

Furthermore, we have tried the theoretical treatment of the ion beam passing through the canal and the conditions to obtain maximum ion current were derived. Good agreement was found between the calculations and the experimental results. Thus the most effective size of the canal of conductance 440 cc/sec. in the case of hydrogen was 0.1 cm. in radius and 0.52 cm. in length for protons having the energy of 1000 volts.