Photo emissive cell: B.Sc. Part-2 Hons.

Dr. Supriya Rani

Guest Faculty, Depatrment of Physics,

Magadh Mahila College, PU

Email id- supriya.physics@gmail.com

Photo-emissive cell :

Photo-emissive cells are of two types (a) vacuum type and (b) gas filled type.

The features in a photo-emissive cells are.

(i) A sensitive surface for the cathode

(ii) The anode at high potential

(iii) A suitable gas for the gas filled photo-electric cells.

Vaccum type photo-emissive cell consists of a thin glass or quartz bulb which is highly evacuated and contains a semi-cylindrical plate C coated with potassium or caesium which serves as photocathode and a nickel or platinum wire A which serves as anode. The positive potential is applied to the anode by the battery B which is connected between anode and cathode through a rheostat R and a galvanometer (or microammeter) G. When light of frequency greater then the threshold frequency is incident on photocathode C, photoelectrons are emitted and attracted by the anode A. The photoelectric current thus produced in the circuit is very small and detected by the galvanometer G. As the potential of the anode is increased, the photoelectric current increases until saturation occurs. As the number of electrons emitted depends upon the intensity of incident light, the variation in the intensity of light produces a corresponding change in the photoelectric current.

The vacuum cells are extremely accurate in their response to incident light and the photoelectric current is proportional to the intensity of the incident beam. Such cells are generally employed for photoelectric measurements, where no lag of time should occur between the incidence of light and the response of the photoelectric cells. They are suitable for the accurate comparison of intensities of light and are used in television and photometry.

In vacuum type cell the photoelectric current is very small. To increase the value of this current the cell is filled with a suitable inert gas (*e.g.*, Helium, Neon etc.) at a pressure of 0.1 to 1 mm of mercury. In gas filled type photoelectric cells the current is magnified due to the ionisation produced in the gas by the ejected photoelectrons. The defect of such a cell lies in the fact that the photoelectric current does not vary linearly with the intensity of light. In industry, gas filled cells containing caesium oxide ace very widely used, on account of their better response than any other cell. They consist of a cylindrical silver cathode, the surface of which is coated with a thin layer of caesium about one molecule thick in an atmosphere of oxygen and the anode is in the form of a rod mounted parallel of the axis of the cylinder.

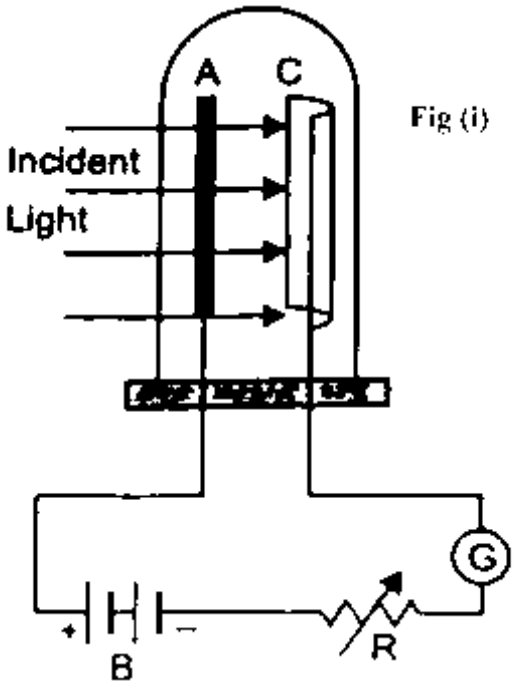

Fig (i)