

Photovoltaic cell

- It operates without the use of a battery.



- It consists of-

- metal base plate (Fe or Al) which acts as one electrode
- thin layer of semiconductor (selenium)
- thin layer of silver/gold, which acts as second collector electrode.

- Working - Radiation is incident upon surface of selenium $\rightarrow e^-$ are generated at selenium-silver interface which are collected by silver \rightarrow this creates voltage difference b/w silver surface and base of cell \rightarrow photocurrent will flow which (if $R = 400 \Omega$ or less) is directly proportional to intensity of incident radiation beam \rightarrow detected through galvanometer.

Advantages: • Rugged (ability to withstand rough conditions)

- requires no external power supply
- sensitive over the whole visible region.

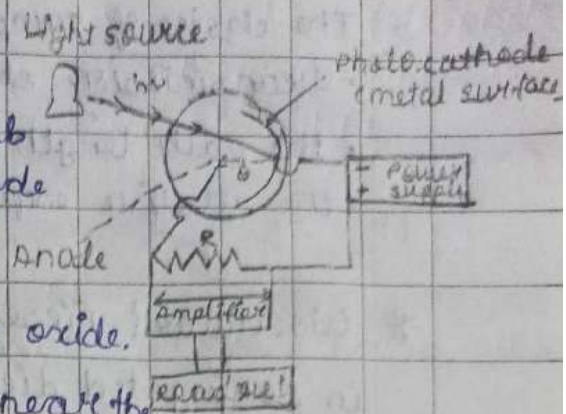
Disadvantages: • less sensitive in blue region

- current produced cannot be readily amplified by conventional electronic circuits
- shows fatigue effect

Uses: Used in inexpensive filter photometers

- Phototubes-

- It consists of -
 - an evacuated glass bulb
 - a light sensitive cathode whose inner surface is coated with cesium or potassium oxide and silver oxide.
 - a metal ring inserted near the centre of bulb (acts as an anode)



- Working - Radiation is incident upon cathode \rightarrow photoelectrons are emitted \rightarrow attracted and collected by anode \rightarrow returned via external circuit \rightarrow a IR drop occurs across the resistor R which is proportional to the current \rightarrow this current is amplified and taken as a measure of the light incident.
- Phototubes are more sensitive than photovoltaic cells.
- Their output currents can be easily amplified and therefore used for measuring low intensities of illumination.
- sodium coating is utilized in 350-450 nm region.

• SAMPLE CELLS-

- The cells holding the sample should be transparent to the wavelength region being recorded.
- thickness = 1 cm
- For visible region, they are generally made of colour-converted fused glass.