CHAPTER III

DESCRIPTION OF EXPERIMENT

3.1. Irradiation.

Neutron source was Americium-241/ Beryllium and neutron emission on 23rd March 1967 was 1.3×10^6 n/s. A tank was filled with water 50 cm. in depth and 50 cm. in diameter. Bare foils and cadmium covered foils were used. Each was separately irradiated in water with neutron source standing on the rod at the center of water medium as illustrated in figure 3.1.1 and 3.1.2. The rod was also lined along the diameter of the tank at the mid level. The technique of irradiation is to press the foil covered by aluminium, on the rod with a piece of tape at a distance from the source. The irradiation time for bare and cadmium-covered foils were about two hours for indium foils and about five days for gold foils. It is suggested the foil should be irradiated not less than time of their half-life

3.2 Foils.

Foils used for determination of cadmium ratio were indium foils and gold foils. For indium, foil thickness varies from about 10 mg/cm.^{2} to 400 mg/cm.^{2} For gold, two pieces of 1×1 cm.^{2} were used.

Instead of using the same foil for both bare and cadmium-covered irradiation, two foils with approximately the same thickness were used.

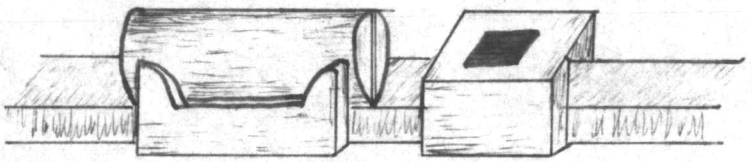

Fig. 3.1.1 Foil was irradiating by a neutron source

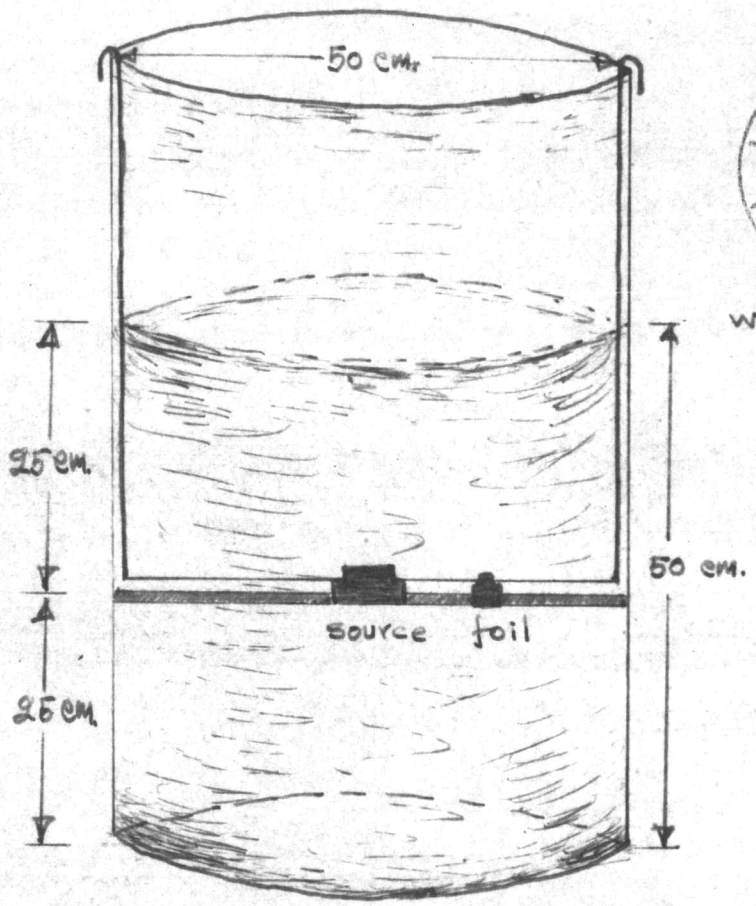

Fig. 3.1.2 A tank filled with water and a neutron mounted at the center of water medium.

3.3 Counting Procedure.

Irradiated foils were counted for activity with a G.M. counter and also a scintillation counter. G.M. counter was set up to count beta radiation and the count rate was kept low in the region of 10,000 cpm. The foil position was far enough so that the count rate would not be too high. The cadmium ratios were obtained as the bare count rate per unit weight divided by cadmium-covered count rate per unit weight.

From the count rate obtained, the well known relation was used to determine the saturated count rate (S), i.e.

$$C_o = \frac{I}{\tau(e^{-t_1/\tau} - e^{-t_2/\tau})(1 - e^{-t/\tau})} \quad \ldots\ldots\ldots(3.3.1)$$

where

C_o is the saturated count rate.

I is the number of counts observed in the interval $t_2 - t_1$ per $cm.^2$ of the foil.

t is the irradiation time.

t_1 is the wait time after interruption of irradiation.

t_2 is the time measured from the interruption of irradiation to the end of counting of emitted particles i.e. wait time t_1 plus counting period.

τ is the mean life of activated foil ($\tau = \frac{1}{\lambda}$).