GAMMA RAY AND NEUTRON IRRADIATION EFFECT ON MAKROFOL (D-E) DETECTORS

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ABSTRACT

A direct method for measuring doses of gamma radiation and neutron has been achieved through measuring the induced coloration in Makrofol (D-E) detector after being exposed to pure gamma rays and gamma pluse neutron.

A characteristic absorption with different intensities in the photon energy range between 1.470 eV and 3.84 eV, was observed when the samples were exposed to gamma radiation and neutrons.

An emperical formula for calculating the gamma doses for Makrofol (D-E) detector in the range 227.520-790.320 krad have been achieved.

1. INTRODUCTION

The study of optical properties of solid is a powerful tool in our understanding the amount of damage produced in materials by nuclear radiation, and recently a lot of work have been done by using Makrofol (D-E) detector as solid state nuclear track detector[1-4], since the use of such detectors makes some experiments possibilities widely used in a variety of experiments such as nuclear physics[5,6], fusion research[7]. The latent tracks can mears of suitable chemical etching, become visible under an optical microdeope.

Generally, the interaction of ionizing radiation, gamma rays or neutron on Makrofol (D-E) detector results in rupturing of bonds and displacement of electrons and toms. These displaced electrons and ions migrate through the plastic network until they are trapped somewhere in the lattice configurations may causes preferential light absorption. Thus the neutrons and gamma rays induced damage effects on the light absorption of plastic detector Makrofol (D-E). So it seems to be interesting with respect to their application as a tool for the measurement of neutron and gamma doses.

The literature contain no information in the fundamental absorption as a function of doses for the Makrofol (D-E) detector plastic used in the present