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COMPARATIVE STUDIES ON THE THERMAL FADING OF CALCIUM FLUORIDE DYSPROSIUM CAF_2:DY (TL-D200) CRYSTAL AND POWDER

*Riydh Ch. Abul Hail
**Sharifa Ahmed Talib
Physics Department, Education College for Pure Sciences, Basrah University, Basrah,Iraq

Abstract
In the present study, thermal fading of calcium fluoride dysprosium CaF_2:Dy (TL-D200) crystal and powder have been investigated in detail, for storage time in different temperatures .The rate of thermal fading of both measurements of calcium fluoride dysprosium crystal ,and powder, found to be equal (0.11%, 0.14%, 0.16%,0.25% -0.12%, 0.15%.0.18% 0.30%) respectively at storage time for six weeks indicate that there is a slight difference in the thermal fading for them. This enhances their use in dosimeters to measurement of radon emanation rate resulting from background radiation for difference sources.
Keywords: Thermoluminescence, Thermal fading, CaF_2:Dy (TL-D200) crystal, CaF_2:Dy powder.

INTRODUCTION

Thermoluminescence is the emission of light from an insulator or semiconductor when it is heated. This is not to be confused with the light spontaneously emitted from a substance when it is heated to candescence. Thermoluminescence is the thermally stimulated emission of light following the previous absorption of energy from radiation. In this statement can be found the three essential ingredients necessary for the production of thermoluminescence. Firstly, the material must be an insulator or a semiconductor –metals do not exhibit luminescent properties .Secondly, the material must have at some time absorbed energy during exposure to radiation .Thirdly , the luminescence emission is triggered by heating the material [1].Several thermoluminescence phosphors are now used routinely in machdosimeteric application. Many thermoluminescence phosphors, like LiF, $CaSo_4$, CaF_2 and $CaSo_4$: Dy have been examined for their use in dose estimation [2-4]. A thermoluminescence dosimeter should possess many features such as :(a)-it should have small size and should tissue equivalent ,which is useful for a variety of application in medicine[5], (b)-it should be sensitive to large rang of exposure such as from low of about 0.2µGy to 10^3Gy with good linearity[6],(c)-it should be usable many time by annealing with a minimum change of