

SUMMARY

Thermoluminescence (TL) 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 incandescence. TL is thermally stimulated emission of light following the previous absorption of energy from radiation. There are three factors necessary for the production of TL. 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 luminescent emission is triggered by heating the material with uniform heating rate.

TL has been found to be directly proportional to the dose of incident radiation. After standardized calibration, unknown doses of the exciting radiations have been determined by measuring the TL intensity displayed by the particular material, after exposure to that ionizing radiation.

In last decade, TL - technique has been very well established for the estimation of radiation doses of different sources. Many materials like LiF, CaF_2 , CaSO_4 etc. have been investigated for their applications as solid state dosimeters for ionizing radiations. Not much is found reported for the use of other alkali halides as Thermoluminescence Dosimetry (TLD) materials. Recently, the examination of TL properties of NaCl doped with Ca, Ba and Tl impurities have been extensively studied in our laboratory¹⁵⁻²¹. It has been investigated that 750°C air-quenched NaCl:Tl, NaCl:Ca, NaCl:Ba and KCl:Ba materials are useful in estimation of doses of X-, Beta-, Gamma and Ultraviolet radiations. Survey of literature indicated that not much is reported about the use of these materials for the determination of doses of alpha radiation. Therefore, the examination of TL properties of sodium and potassium chlorides in pure and Ba activated forms after subjecting them to different pre-treatments and their possibilities

as efficient solid state TLD materials are undertaken in the present thesis. The experimental data reported in this thesis throw light on the understanding of the TL displayed by NaCl:Ba and KCl:Ba phosphors in different physical conditions and the mechanism involved in the TL emission from them.

The attempts have also been made to find out the influence of different type of (energy) radiations namely alpha, beta, gamma and UV on the thermoluminescent properties of Ba doped NaCl and KCl.

It clearly bring out the fact that whether these materials are suitable for their use in alpha radiation dosimetry or not.

The thesis is divided mainly in six chapters. The first chapter accounts briefly the general introduction to the present work. The general understanding of different types of TL and their applications are described in chapter two. The production, properties, uses and techniques of estimation of energy and doses of alpha radiation are presented in chapter three.

Chapter four contains the informations about the experimental details and the apparatus used. The experimental results obtained are displayed in chapter five. The interpretations of the experimental data form the chapter six. This chapter follows the conclusions drawn from the experimental work. The references which have direct or indirect bearing on the present work are listed at the end.