# SUMMARY

In the present modern scientific world, the application potential of ionizing radiations is very high. Among different types of ionizing radiations, ultraviolet (UV) radiation is found to be very useful in Quality control, Printing, Textile, Diamond industries, Defence, Agriculture, Medicine, Optical and Electrical Engineerings, Applied Electronics and many other fields including research. Though UV radiation serves as a powerful tool in numerous applications, it has adverse effects on the different parts of human body. Careless use of UV radiation can lead to Erythema, Burns of skin (skin cancer) and keratoconjuctivities, for those who are exposed to this radiation ( $\lambda < 320$ nm ). Therefore, the basic need of the professional workers is the estimation of the radiant exposure of UV radiation for its better actual applications and ascertaining requisite precautionary measures.

The detection and measurement of radiant exposure of UV radiation are designated as "UV-DOSIMETRY" in radiation application. The three major available types of UV detectors are i) Physical detectors, ii) Chemical detectors, and iii) Biological detectors. Thermoluminescence(TL) dosimeters fall under the category of physical detectors while photographic film dosimeters are chemical detectors. In both the cases, dosimeter probe comprises of simply piece of material in which an effect is integrated

and no measurements or connections are necessary during the irradiation. The evaluation of UV-dose is done later by using appropriate electronic instruments. In the past decade, the film badge - spectroscopic method (chemical detector) was considered to be the most common in practice in spite of being time consuming and expensive. Recently it is established that TL dosimeters in particular have the advantage of high sensitivity, small size, ease of positioning, stability under varying climates (temperature, humidity etc.) compared to photographic film dosimeters.

Large number of organic as well as inorganic materials exhibit emission of visible light (TL) on warming them with constant heating rate after excitation with ionizing radiation. Amongst them, few TL phosphors are selected as efficient dosimeter materials to fabricate solid state dosimeters in radiation dosimetry. They perform satisfactory and excellent jobs in various applications. In spite of the commercially available efficient TL dosimeter materials ( LiF TLD - 100, $CaF_2$ etc.) the use of Sodium Chloride in pure and doped forms in gamma and beta radiation dosimetry has recently attracted special attention. In view of this, the main aim of the present work is to investigate the usefulness of NaCl:Ca material in UV dosimetry. In this context, the

study of the TL behaviours of UV (253.7 nm) irradiated NaCl:Ca phosphors, prepared under different physical conditions, their explanations on the basis of the current state of understanding and the study of UV dosimetric characteristic of a well defined isolated prominent glow peak ( 167°C ) are presented in the thesis.

It is observed that ( NaCl:Ca $10^{-3}$ m.f. ) obtained by crystallization from aqueous solution and subsequently annealed at 750°C for two hours followed by sudden quenching in air, the specimen so obtained being designated as NaCl:Ca (T) in the thesis, can be used as a suitable TLD material in UV dosimetry.

The thesis comprises of five chapters. The first chapter presents a formal introduction to the research work embodying the thesis. The general principle, different theories and applications of thermoluminescence are described in the second chapter. The third chapter narrates briefly the information regarding the techniques involved in the detection and measurements of UV radiation. The experimental techniques used in the present work are described in chapter four. The last chapter reports the results obtained in the present study along with their interpretations. The conclusions drawn are given at the end. This is followed by the references which have direct or indirect bearing on the present work and are compiled to the extent of availability.