S U M M A R Y

This thesis concerns with the study of the excitation and emission spectra of thallium-doped sodium chloride phosphors. Though luminescent properties of thallium-doped alkali halide phosphors have been studied extensively, much of the earlier work concerned mainly with the investigation of the properties of KCl:Tl, KBr:Tl and KI:Tl systems. A detail ed study of other thallium-doped alkali halide phosphors was not undertaken earlier, since it was believed that they possessed properties similar to those exhibited by previously studied thallium-doped alkali halide phosphors. Present investigation however, indicates that such an assumption is in error. It is proposed that in NaCl:Tl system TlCl molecules and negatively charged complex ions of the type $(TlCl_n)^-$ also act as luminescence centres besides earlier suggested luminescence centres namely, isolated substitutional Tl^+ ions and Tl^+ ions in pairs. The present investigation involves the study of heavily doped (Tl conc. 10^{-4} m.f. or more) sodium chloride phosphors. The specimens for the study of luminescence properties were prepared by crystallization from aqueous solution. The luminescence spectra were examined for untreated and variously pretreated NaCl:Tl specimens namely, (i) in as-received condition, (ii) after mechanical treatment, (iii) after thermal treatment, (iv) after thermal treatment followed by mechanical treatment. In a related study, the excitation and emission spectra of thallous chloride powder and of TlCl in NaCl-solution were also examined.

The thesis is divided mainly into five chapters. The first chapter represents a general introduction to the present work. The second chapter covers the theories of different kinds of luminescent processes. The third chapter deals with a brief survey of the past work in the field of optical absorption or excitation, emission and thermoluminescence of thallium-doped alkali halides. The description of the experimental apparatus and other experimental details form chapter No.4. The results obtained and their interpretation are presented in the fifth chapter.