CONCLUSION

The present work is undertaken to investigate the application of the barium impurity doped sodium and potasium chooride thermoluminescence (TL) phosphors as alpha radiation solid state TL dosimeters. The experiments carried out for these materials bring out the following facts :

1. It has been found from the comparison of the thermally stimulated luminesence characteristics of pure and Ba- doped NaCl and KCl that the TL behaviours of these specimens are significantly influenced by two important factors,
   (a) Concentration of the impurity in the specimen and
   (b) Thermal pre-treatments of the specimen.
2. The thermal glow peaks observed in pure NaCl and KCl are respectively 90 and 240°C and 50 and 340°C.
3. The principle glow peaks exhibited by NaCl:Ba are 180, 200, 220 and 230°C, while that displayed by KCl:Ba are 100 and 170°C.
4. The TL emission spectra of "pure" NaCl specimen reveal that the unavoidably present Mg and Ca group impurities probably act as the sites of emission whereas in doped NaCl phosphors Ba- impurity, the component of TL centre, acts as emitter.
5. The isolated Ba- dipole [Ba^{+}- $\boxplus$] or the same higher aggregates or Ba dipole in the vicinity of point defect or dislocation forms the component of TL-centres for the Ba- induced peaks. Crawford-Nelson mechanism is suggested to play an important role in the excitation of TL centres in alpha irradiated specimens. Various properties exhibited by Ba-induced peaks before and after thermal treatments are broadly explainable on the basis of elastic interaction between Ba-dipole and the dislocation.
6. The appearance of well defined dominant peaks at 180 and 200°C is a

striking feature in thermally pre-treated heavily doped NaCl:Ba specimens. This is attributed to the Ba dipole aggregates aligned on {1, 1, 1} planes.

7. TL emission spectra of KCl and KCl:Ba did not give much information. The peak at 50°C in pure KCl is presumed to be the property of pure KCl. It has been proposed that the TL centres, Ba-dipole negative ion vacancy complexes, associated with 100 and 170°C glow peaks, are located respectively in the perfect region and dislocation regions of KCl host lattice.

8. It has been observed that 750°C air-quenched NaCl:Ba (10^{-2}m.f.) and KCl:Ba (10^{-2}m.f.) designated as "NaCl:Ba (T)" and "KCl:Ba (T)" display optimum TL output respectively at 220 and 170°C. The mechanism of TL for these peaks are also suggested in the thesis.

9. The effect of different types of ionizing radiations on TL of NaCl and NaCl:Ba has been examined. It is found that TL output is very low in alpha-irradiated specimens. This can be explained on the basis of the degree of Penetrating power of alpha, beta and gamma radiation.

10. The above two phosphors have been examined for their TL dosimetric properties. The experimental results, presented in this thesis reveal the fact that NaCl:Ba (T) and KCl:Ba (T) phosphors are of use in the estimation of alpha dose in radiation applications, provided few limitations are taken care of.