The studies recorded in the thesis include solar evaporation of Sambhar liquid bittern, X-ray diffraction of Sambhar Solid bittern, the investigation of a flotation process for the direct recovery of anhydrous sodium sulphate from its crystalline mixture with sodium chloride or from anhydrous sodium sulphate bearing material, with a detailed study of the effects, on a flotation process, of the factors such as (1) natural and acquired flotability, (2) particle size, (3) role of a modifier, its form and concentration, (4) role of a collector, its form and concentration, (5) pH of the flotation pulp, (6) comparative effects of various suitable collectors, (7) pulp density, (8) variation in the composition of the raw material and (9) presence of insolubles and slimes. The description and use of a direct reading instrument for contact angle measurement so as to measure the wettability of a mineral surface is also included.

Statement 1: The entire investigation presented in this thesis is my original contribution. For the first time, a systematic solar evaporation study of Sambhar liquid bittern has been carried out to find out the composition of solid bittern being thrown out during concentration.

The X-ray diffraction study of Sambhar solid bittern to examine the presence of chemical species of burkait (2Na₂SO₄·Na₂CO₃) along with other ingredients is another distinct contribution.
For the first time, a flotation process has been successfully investigated for the direct recovery of anhydrous sodium sulphate from Sambhar solid bittern.

Contact angle measurements for the surface of anhydrous sodium sulphate and sodium chloride with a direct reading instrument to find out their wettability is also an independent contribution.

An alternate method for the preparation of the surfaces of anhydrous sodium sulphate and sodium chloride for contact angle measurement has been contributed.

A systematic theoretical approach before undertaking actual applied flotation work to assess the optimum conditions has been adopted.

For the first time, a process for de-sludging Sambhar solid bittern has been investigated.

Statement 2: The sources on which this work is based have been reviewed throughout the text and also systematically indicated in the bibliography.

The results and discussions are entirely original and are based on the research carried out by me as presented in the thesis.

No publication of mine forms an integral part of this thesis for the Ph.D. Degree.
I wish to gratefully acknowledge my immense indebtedness to Dr. D.S. Datar, Director and Dr. D.J. Mehta, Assistant Director of this Institute for suggesting the problem and for their keen interest and guidance during the course of this investigation.

June 1967
Central Salt & Marine Chemicals Research Institute, Bhavnagar-2

Signature of the research guide

(D.J. MEHTA)