CHAPTER-3

SCOPE OF THE PRESENT INVESTIGATION

A detailed and systematic literature survey indicates that very limited information is available on the different methods of reclamation for CO₂ - Sodium silicate bonded sand and also on the properties of CO₂- sodium silicate bonded sand for different reuse levels of reclaimed sand. The information on chemical reclamation and on the combination of two or more methods of reclamation is practically negligible. Infact ,very negligible information is available on reuse of (chemical reclaimed , horizontal centrifugal scrubbed and combined reclaimed ) reclaimed CO₂ - sodium silicate sand in green sand moulding as well, besides CO₂ moulding.

Due to the inorganic nature of the binder ,CO₂ sand reclamation by thermal methods was not practical. The effective reclamation of sodium silicate bonded sands and the reuse is equally if not more difficult to achieve than for resin bonded sands. Although a lot of data is available for resin bonded sands, data on CO₂ sand is virtually negligible. In order to fill the serious lacuna, chemical reclamation, horizontal centrifugal scrubbing as well as combined reclamation, its reuse sand in CO₂ moulding and green sand moulding the present detailed investigation was carried out in two phases, with the following objectives detailed below.
PHASE - I

Phase I of the work was carried out in reusing the reclaimed CO₂ - sodium silicate sand in the same CO₂ - sodium silicate system. The phase I of the work consisted of and

(i) Fabrication of an experimental pneumatic reclamation cell horizontal centrifugal scrubber for reclamation studies.

(ii) Reclamation of CO₂-Sodium silicate bonded sand by horizontal centrifugal scrubber (HCS) pneumatic reclamation unit, wet reclamation and chemical reclamation.

(iii) Combining the reclamation processes to get the best sand after reclamation viz chemical + wet, HCS + chemical, HCS + wet.

(iv) Assessing the properties of sand reclaimed by the different processes and comparing the same with new sand and used sand without any binder addition.

(v) Assessing the properties of sand reclaimed by different processes and comparing it with new sand and used sand in the CO₂ - Sodium silicate sand system.

(vi) Identification of optimum reuse level of reclaimed sand in the CO₂ - Sodium silicate bonded sand without significantly lowering the properties in comparison with the new sand.

(vii) Production of test castings with the reclaimed sand, new sand and used sand with different reuse levels.

(viii) Re-reclamation of the sand i.e. reusing the sand for more than one cycle.

(ix) Assessment of the quality of test castings produced.

(x) Studies on the economics of the use of reclaimed sand in ferrous foundries.
Even though the investigation was started with a doctoral degree as the main objective, at a later stages it was felt that this investigation is really the need of the hour, to solve the acute problem of depletion of natural resources like foundry sand and more importantly to solve the ecological problems arising out of non reclamation and reclamation.

**PHASE -II**

Phase II of the investigation was carried out with a view to investigate the possibility of using reclaimed CO₂-Sodium silicate bonded sand in conventional green sand moulding as a substitute for new sand.

(i) Assessing the properties of sand reclaimed by different processes and comparing them with new sand and used sand in the green sand system with bentonite binder.

(ii) Assessing the properties of reclaimed CO₂-Sodium silicate bonded sand as a substitute for new sand in the green sand system by assessing the properties with bentonite as the binder and to find out the optimum reuse level.

(iii) Production of test castings by using reclaimed CO₂-Sodium silicate bonded sand as a substitute in the green sand moulding.

(iv) Assessment of the quality of test castings thus produced.