Summary

Electroplating is commercial exploitation of a process of electrodeposition in which a metal (or metals) is deposited on a cathode during the process of electrolysis. Deposition of noble metals like gold and silver, on some low valued base metals was successfully tried by the alchemists and since 1850, electroplating became an established practice and was considered to be an art. However, the experts used to conceal the available information from others, by keeping it in custudy with perfect secrecy to preserve professional competence. Initially the same age – old methods were followed for years together, with practically no modifications eversince. However. with the advant of knowledge and scientific achievements in other fields, the electro-chemists became aware of their short – sighted approach and a new era in electrophating of metals and alloys came into reality.

Deposition potentials over voltage and electrode processes are intimately associated with electrodeposition, a special case of electrolysis. Thus, a careful study of such parameters becomes a part of the work on electrodeposition of metals.

In aqueous solutions, other cations such as H^+, become a main interference in metal – deposition. Considering the position of noble metals and hydrogen in electro – chemical series, the latter cannot be discharged even in strong acidic media because of its high discharge potential as compared to noble metals which can thus be deposited fairly easily on base matrix. In presence of the metals which lie above hydrogen in the E. C. series, it is the hydrogen which would be discharged first and hence deposition of base metals may appear to be impossible, had it not been for the over – voltage of hydrogen. The overvoltage thus becomes a boon in electroplating of metals and alloys. Adjustment of activities and over – voltage of hydrogen. The overvoltage thus becomes a boon in electroplating of metals and alloys. Adjustment of activities and over – voltages (or polarisation) makes it possible to deposit an alloy of any metals of ones choice.

In addition to polarisation and deposition potentials, there are other controlling factors such as composition of the bath solution, pH, current density temperature and influence of addition agents, which have got to be properly studied

to arrive at the optimum conditions for getting a uniform., fine grained and adherent deposit of a metal, on desired matrix. Thus, a careful study of the above factors, makes the art of electroplating, a science based practice. Electrode processes are equally important in electrodeposition.

The first chapter concerns with literature survey and basic principles of electrodeposition.

The second chapter is devoted to "Experimental " and the main work is embodied in the third and forth chapter of the dissertation .

In the third chapter we have selected nickel metal and established conditions to obtain good quality deposites using ammonical acetate bath. Different parameters such as conc. of nickel sulphate, conc. of complexing agent,pH of the bath solution, C.D. and temperature of the bath solution are studied in greater details to arrive at optimum condition to get bright,adherent and satisfactory deposits of nickel. In the fourth chapter the roll of overvoltage or polarization has been studied along with electrode kinetics by selecting the parameters like concentration of complexing agent, pH of the bath solution, temperature of bath solution and addition agents and this forms the subject matter of the IV chapter

Few of the observation of great interest sited to give an over all picture of the work done by us.

1) The ammonical aceate bath used for the entire work is non poisonous bath. It gave shining ,fine grain and adherent deposits of nickel using very dilute solutions .Thus, the problems of extraction of metal containt from waste solution is solved and the cost of deposition is minimized. Therefore the bath is economical.
2) It is astonishing that no direct correlation can be found between polarization changes due to addition of different addition agents and changes in the mettalographic structure of the deposites for instance, Agar agar changes the slope of polarization curves to maximum .The large deviation in polarization may be attributed to a change in a path of electrodeposition process from a normal one or a different step not known ,may be slowing down the rate of deposition .Thus deposits obtained are smooth with reduction in grain size. On the contrary although the deviation in polarization is small for urea the

deposits obtained are satisfactory. Hence the action of addition agents is very specific. More detailed investigation are thus necessary in order to derive which part of the polarization is really responsible for the metallographic structure of the deposits.In spite of all these shortcomings ,it is great pleasure to see that polarization measurement are now coming into industrial practice.