The chemistry of polymers covers the wide field of pure and applied research since a long time. The structure, behaviour and industrial applications of a variety of organic polymers are well established. It is only recently that some attention has been paid towards the significance of the study of inorganic polymers, both naturally occurring as well as synthetic ones. In some cases studied so far, the inorganic polymers have been found to be more stable at higher temperatures and in the presence of variety of radiations, as compared to organic polymers. The study of complex compounds in solution depends on the physico-chemical methods which yield favourable data on Stoichiometry, stabilities and structural aspects of soluble complexes to the least doubt in normal conditions. Such type of observations have not been found during the course of study of some transitional metal complex compounds. Some of these when dissolved in distilled water or in some suitable solvents, show certain unusual behaviour and undergo cationic and anionic aggregation phenomena, yielding to condensed or polymeric species used in some cases as an ion-exchanger, in normal conditions and more promptly under some specific conditions.
The formation of dinuclear and polynuclear complex ions of Ce(IV), Fe(III), Cr (III & II), V (IV) and Ti (IV) etc., has been made possible through cationic aggregation phenomenon and recently polynuclear behaviour or polymerization of anionic ions e.g., VO$_4^{3-}$, MoO$_4^{2-}$, CrO$_4^{2-}$ and WO$_4^{2-}$ etc. has been studied through anionic aggregation phenomenon. Polynuclear carbonyl and nitrosyl complexes of many transitional metals find a better place in the field of inorganic polymer chemistry than the least studied so far polynuclear cyanide complexes. The field of polynuclear cyanide complexes is still open for study as the three ligands CN$^-$, NO$^+$ and CO are isoelectronic and have many similarities in their physico-chemical behavioural characteristics. The possibility of such type of studies in the field of polynuclear transitional metal complexes paves a way for the present study.

Pot. hexacyanoferrate(II) trihydrate salt, when dissolved in distilled water and protected from aerial oxidation, undergoes some chemical changes, followed by the deepening of the original faint yellow colour. The transformation of $[\text{Fe(CN)}_6]^{4-}$ into $[\text{Fe(CN)}_5\text{H}_2\text{O}]^{3-}$ and the existence of both the species in an equilibrium have been well established by Asperger (Asperger, S., Trans. Faraday Soc. 48 (1952) 617). The present author has envisaged here a possibility for the formation of some polynuclear species through anionic aggregation process, apart from the
Asperger's view and further hypothesizes that this phenomenon is accelerated at the lower pH values of the experimental solution.

pH and conductivity measurements, as well as the study of proton association – dissociation concept, predict the existence of some species of ferrocyanide ion with a greater complexity than the simple monomeric species \([\text{Fe(CN)}_6]^{4-}\) in the normal condition of aqueous aged pot. ferrocyanide solution and more dominantly in the acidified pot. ferrocyanide solution.

Record of optical density data shows that the absorption increases up to a lapse of long time at the same wavelength. From this observation it has been inferred that the \([\text{Fe(CN)}_6]^{4-}\) ions undergo the process of polymerization through the anionic aggregation phenomenon yielding to some polynuclear species and the process of depolymerization may start when the solution has been aged for a longer time. Sometimes it has also been observed that the process of polymerization and depolymerization proceeds simultaneously under some specific conditions.

Peaks recorded by U.V. spectrophotometer in the range (250 - 600 m\(\mu\)) with experimental solutions under different conditions, explore the possibilities for the formation of some polynuclear species, as the nature of the peaks observed
is quite different from the usual peaks of pot. ferro and ferricyanide solutions (aq.).

Study of chromatographic separation technique reveals in the possibility for the formation of dinuclear ferrocyanide species as the coefficient of $R_f$ values (aggregated/non-aggregated) calculated for different spots, comes to be approximately 2.

The above studies have been done in aqueous solution and for the studies in solid form the author has succeeded in precipitating out the different species by adding silver nitrate solution in excess, into the experimental solution, where the existence of polymeric species is hoped. The well washed, dried and powdered ppt. of silver salts have been subjected to I.R. Spectroscopic and magnetic susceptibility studies. The I.R. spectrograms show that the peaks obtained for cyanide stretching frequencies with the compounds under investigation, appear at higher frequencies than those with normal pot. ferrocyanide trihydrate and silver ferrocyanide salts. Further, it has also been observed that these elevated frequencies have no coincidence with the cyanide stretching frequencies of pot. ferrocyanide and silverferricyanide salts. This increase in cyanide stretching frequencies of the compounds under study, is a clear indication for the presence of some polynuclear species formed through the
bridging of cyanide groups. The I.R. study has also become very much fruitful in the elucidation of the structure of possible polymeric ferrocyanide species.

The magnetic susceptibility observations explain about the diamagnetic behaviour of the species and help in illustrating the electronic configuration of the possible polymeric species.

In view of the above studies the author puts up a hypothesis that the ferrocyanide ions in aqueous solution do undergo some chemical transformation through anionic aggregation process and yield polymeric species especially a dimeric one, when the experimental solutions have been aged; and considerably to a greater extent as well as in a speedy manner in those solutions which have been acidified to lower down their pH values. There may be formation of some bigger aggregated species e.g., $[\text{Fe}_3(\text{CN})_{14}]^{8-}$, $[\text{Fe}_4(\text{CN})_{18}]^{10-}$, $[\text{Fe}_5(\text{CN})_{22}]^{12-}$ etc., apart from the $[\text{Fe}_2(\text{CN})_{10}]^{6-}$ species; but in the results of the present studies particularly the coefficient of Rf values in chromatographic separation technique, which was found 2, and the diamagnetic behaviour of the species and also in view of the simple repetition of the monomeric $[\text{Fe} (\text{CN})_5]^{3-}$ or $[\text{Fe} (\text{CN})_5\text{H}_2\text{O}]^{3-}$ unit, the present worker favours the latter species and opines in the former as rarely existing.
The author, however regrets his inability for not extending this type of studies to some other substances of the same group. The investigator is acutely conscious of the several limitations of his study. But considering the constraints of time, energy and resources of a single investigator, who is on a limited study leave from his institution, this is what he could accomplish; while nothing radical is claimed, it is nevertheless hoped that this investigation has promoted a renaissance in the field of inorganic polymer chemistry, with a special mention of transitional metal elements and also raised some hypotheses.