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TITRIMETRIC STUDIES ON COMPLEXES

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Abstract:

The physical properties of mixed salt solutions having same ionic strength shows never additive in the dilute solutions. This may be due to ion-pairing complex formation difference in ionic interaction due to size difference and difference in hydration. In the study of the complex formation of the salt in solutions the measurement of physico-chemical properties like E. M. F., conductivity, magnetic susceptibility, refractivity, spectrophotometry, surface tension, viscosity, depression in freezing point etc have been used.

The formation of complex salt between the compound deduced by the use of these properties born out by the study of phase rule and sometimes isolation of the complex salts themselves in the solid state. The use of these properties has been made study exhaustively the system containing two salts for complex formation.

Various salts of magnesium chloride, calcium chloride, strontium chloride and barium chloride with ammonium chloride, methyl ammonium chloride, di-methyl ammonium chloride, tri-methyl ammonium chloride and tetra- methyl ammonium chloride were used to study the effects.

KEY WORDS:

physico-chemical properties , spectrophotometry, surface tension, viscosity.

INTRODUCTION:

The determination of the possibility of complex formation in the solution can be done varying the strength of one of the salt and keeping that of other fixed. We get different possible ratios from 0 to n of one with the one gram mole of the other. This method has the advantage indicating the complex formation in the solution even though complexes are unstable in the solid states.

Existence of the complexes in the solution can be determined by measuring conductance of mixture of salts of simple salts in suitable concentrations in the molecular ratio corresponding to the composition of the supposed complex and construction of the conductometric isotherms to ascertain whether the formation of the complexes disclosed by the breaks in the curve. A sharp break indicates that the definite complex is formed. If the break is short and rounded the complex corresponding to that ratio is not so suitable. The use of conductivity measurements for this purpose was made by Britton and Dodd in the case of solution of potassium cyanide and calcium chloride and by the Stroschi in the case of the solutions of cadmium chloride and alkali chloride.

The deviation in the conductivity of mixed electrolytes is from additivity and positive as well as negative. All the existing data showing deviation have been interpreted in terms hydrolysis and ion pair, complex ion formation and hydration.

In the present work the study of complex formation between chlorides of alkaline earth metals (Mg, Ca, Sr and Ba) ions and effect of substitution of organic group on the formation of complexes in the ammonium salts by electrochemical titration conductometrically at 30 °C.

EXPERIMENTAL:

Magnesium chloride, calcium chloride, strontium chloride and barium chloride were procured from BDH AnalR grade for the preparation of solutions. The standard solutions of these were prepared by dissolving appropriate quantities of the said salts and standardized with EDTA solution. Ammonium chloride, methyl ammonium chloride, di-methyl ammonium chloride, tri-methyl ammonium chloride and tetra- methyl ammonium chloride were obtained from BDH AnalR grade chemicals.

Decimolar solutions of the salts were prepared. 5 ml of salt solutions were taken in 100 ml beaker and 25 conductivity water were added. The titration cell was placed in the thermostat and the temperature was maintained constant at 30°C for all the systems. A microburette was used for adding the solution during the titration. The reverse titration was carried out to observe the higher ratios which faded out in the forward titration.

Following systems have been studied at 30 °C.

1. $\text{MgCl}_2\text{-NH}_4\text{Cl-H}_2\text{O}$
2. $\text{CaCl}_2\text{-NH}_4\text{Cl-H}_2\text{O}$
3. $\text{SrCl}_2\text{-NH}_4\text{Cl-H}_2\text{O}$
4. $\text{BaCl}_2\text{-NH}_4\text{Cl-H}_2\text{O}$
5. $\text{MgCl}_2\text{-CH}_3\text{-NH}_2\text{HCl-H}_2\text{O}$
6. $\text{CaCl}_2\text{-CH}_3\text{-NH}_2\text{HCl-H}_2\text{O}$
7. $\text{SrCl}_2\text{-CH}_3\text{-NH}_2\text{HCl-H}_2\text{O}$
8. $\text{BaCl}_2\text{-CH}_3\text{-NH}_2\text{HCl-H}_2\text{O}$
9. $\text{MgCl}_2\text{-(CH}_3)_2\text{-NH.HCl-H}_2\text{O}$
10. $\text{CaCl}_2\text{-(CH}_3)_2\text{-NH.HCl-H}_2\text{O}$
11. $\text{SrCl}_2\text{-(CH}_3)_2\text{-NH.HCl-H}_2\text{O}$
12. $\text{BaCl}_2\text{-(CH}_3)_2\text{-NH.HCl-H}_2\text{O}$
13. $\text{MgCl}_2\text{-(CH}_3)_3\text{-N.HCl-H}_2\text{O}$
14. $\text{CaCl}_2\text{-(CH}_3)_3\text{-N.HCl-H}_2\text{O}$
15. $\text{SrCl}_2\text{-(CH}_3)_3\text{-N.HCl-H}_2\text{O}$
16. $\text{BaCl}_2\text{-(CH}_3)_3\text{-N.HCl-H}_2\text{O}$
17. $\text{MgCl}_2\text{-(CH}_3)_4\text{-N.Cl-H}_2\text{O}$
18. $\text{CaCl}_2\text{-(CH}_3)_4\text{-N.Cl-H}_2\text{O}$
19. $\text{SrCl}_2\text{-(CH}_3)_4\text{-N.Cl-H}_2\text{O}$
20. $\text{BaCl}_2\text{-(CH}_3)_4\text{-N.Cl-H}_2\text{O}$

The graphs are plotted 1) specific conductivity against ml of titrant added and 2) κ_{sp} . Conductance / ml against mean ml of the titrant.

RESULTS AND DISCUSSION:

The results have been graphically represented and have been summarized and shown in the following table.

Table 1.
0.1 M MgCl₂-NH₄Cl-H₂O

Ratio MgCl ₂ /NH ₄ Cl	Cal. ml	Obs. ml	Δk/Δml
20:1	0.25	0.25	0.55
5:1	1.00	1.05	0.55
4:1	1.25	1.25	0.66
2:1	2.50	2.55	0.64
5:4	4.00	3.95	0.48
1:1	5.00	5.05	0.39
2:3	7.50	7.55	0.57
3:5	8.33	8.25	0.50
1:2	10.00	9.85	0.46

Similarly other systems have been carried out. From the experimental result it is observed that the peak values of the reverse titrations show more striking inflections than the forward titrations.

The results obtained from the conductometric study of alkaline earth metals and organo-(methyl) substituted ammonium salts shows the striking changes in the value of $\Delta k/\Delta ml$ against mean ml at different stoichiometric ratios. The breaks in the curve at some of these simple ratios eg. 1:1, 1:2, 2:1 etc confirms the findings of the complexes or double salts.

It has been observed from the graphs that there are some sharp breaks at stoichiometric addition in the reaction. There are also many small but well defined breaks at even as well as odd equivalents. The significance indicates the formation of different combination of double salts. The inflections having large ratios which are more prominent are observed when one of the component in the mixture is excess and intensities slowly decreases as proportion of one of the components to the other becomes equal.

It has been observed that for all the systems studied the reverse titrations shows more striking inflections at the stoichiometric ratios from the forward titrations.

From the conductometric study it may be said that the formation of complexes or cluster is conditioned by the order of alkaline earth metal in the periodic table. This is true in case of ammonium chloride and methyl amine hydrochloride. The tendency of formation of complexes goes on increasing with the size of the ions. The size of the ions increases from Mg⁺⁺ to Ba⁺⁺, the complexing tendency also increases. This is on the basis of standard ionic radius values. The specific conductivity observed by the introduction of methyl group in ammonium salts shows decrease in values.

The order of complexing tendency of the alkaline earth metal is observed as follows



REFERENCES:

1. Samoilar O. Ya., Diss, Far. Soc., 24, 141. 1957.
2. Shukla and Rao, Sagar Uni. J., 7, Pt. II (1958), J. Vikarm Uni., 1959.
3. Smith A. K., Gortner R. A., J. Phys. Chem., 37, 79, 1933.
4. Stroschi P. M., Gazz. Chim. Ital, 41-50, 1949.
5. Zunjurwad N. G., Ph. D. Thesis, Poona University, Poona, 1967.

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