

TABLE II
Xe, barium and cerium

Isotopes/A		120	122	124	126	128
Xe	<i>a</i>	0.513689	0.583774	0.584037	0.564995	0.485831
	<i>b</i>	0.274222	0.242671	0.264190	0.309502	0.443833
Ba	<i>a</i>			1.09277	1.0206	1.19041
	<i>b</i>			0.0771717	0.0940969	0.0886635
Ce	<i>a</i>					1.34748
	<i>b</i>					0.055225

		130	132	134	136
Xe	<i>a</i>	0.459017	0.389644	0.283195	
	<i>b</i>	0.605515	1.070610	2.501950	
Ba	<i>a</i>	0.682929	0.618969	0.493459	0.757879
	<i>b</i>	0.222026	0.349205	0.659208	0.564950
Ce	<i>a</i>	1.066590	0.852115	0.860976	0.674259
	<i>b</i>	0.0888326	0.151595	0.195958	0.384597

pole forces. Vibrations of nuclei can be regarded as superpositions of many particle-hole states. There seems to be no understanding yet regarding the role of the various features of nuclear interactions leading to the appearance of vibrations in nuclei. There seems to be no microscopic theory of vibration-rotation interaction. Hence we cannot say what parts of nuclear force are responsible for the observed behaviour of parameters *a* and *b*. It is even possible that features of nuclear force such as are not important from the point of view of the general nature of nuclear force are responsible for the above systematics of *a* and *b*.

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pH METRIC STUDIES OF TARTRONIC ACID COMPLEX WITH METAL IONS

IN an earlier paper, we have reported the stability constants of tartronic acid with Cu (II), Ni (II) and Mn (II). In the present paper, are reported the complexing tendency of tartronic acid with metal ions such as Al (III), Fe (III), Mg (II), Ca (II) and Pb (II). The acid was used by Pavlinova¹, in a titrimetric method for the determination of aluminium. No systematic determination of the stability constants of the above metal ions with tartronic acid has been done, and hence the present investigation has been undertaken.

All the chemicals used in this work were of A.R. quality. All the solutions were standardised against EDTA² before use. For pH metric titrations the metal ion solutions were made in perchloric acid, the strength of the acid being determined titrimetrically³. A Philipps pH meter which has an accuracy of 0.05 pH unit was used for pH measurements, and it was standardised against potassium-hydrogen-phthalate and borax buffers before each experiment. All the experiments were performed at 27° C and ionic strength of 0.2 M.

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TABLE I
pH titration data of the various complexes

Ionic strength	Metal								
0.200 M	Aluminium	pH	3.8	4.0	4.2	4.6	4.8	4.6	5.0
		\bar{n}	0.96	0.98	1.17	1.36	1.58	1.80	1.92
		pL	6.16	5.75	5.27	4.75	4.12	3.45	2.19
0.200 M	Magnesium	pH	3.2	3.8	4.0	4.4	4.8	5.4	
		\bar{n}	0.89	1.24	1.27	1.42	1.64	1.86	
		pL	7.39	6.02	5.61	4.71	3.70	2.89	
0.200 M	Calcium	pH	3.2	3.8	4.0	4.4	4.8	5.0	
		\bar{n}	0.99	1.24	1.27	1.49	1.80	1.97	
		pL	7.33	6.02	5.61	4.66	3.45	2.35	
0.200 M	Iron	pH	3.2	3.8	4.0	4.4	4.8		
		\bar{n}	0.96	1.35	1.39	1.63	1.72		
		pL	7.36	5.96	5.54	4.52	3.59		
0.200 M	Lead	pH	5.0	5.2	5.4	5.5	5.8	6.0	
		\bar{n}	0.53	0.75	0.92	1.20	1.50	1.84	
		pL	3.91	3.44	2.98	2.45	1.84	0.95	

Extermination of Stability Constants

Irving and Rossotti⁴, described a procedure in which a mixture of the acidified solution of metal ion, and the ligand were titrated against alkali. Bjerrum's⁵ pH titration technique has been applied in our present investigations. The method provides proton-ligand stability constants of the ligand, and those are employed for the calculation of the metal-ligand stability constants.

Proton-ligand stability constants have been calculated in our earlier paper (sent for publication) which gave the values :

$$\log K_1^H = 6.95 \text{ and } \log K_2^H = 2.10.$$

The solutions containing perchloric acid, perchloric acid + ligand and perchloric acid + ligand + metal solution, each diluted to a constant volume (50 ml) with conductivity water and maintained at constant ionic strength (0.2 M) by the addition of NaClO₄ were titrated against standard alkali. In all, three titrations were performed. From the titration curves, \bar{n} and pL were obtained by Irving-Rossotti⁴, method which are given in Table I.

From the values of \bar{n} and pL the $\log K_1$ and $\log K_2$ have been calculated by use of mid point method⁶ and interpolation at half \bar{n} value method⁶ respectively, which are given in Table II.

TABLE II
Stepwise stability constants of the various complexes

Metal ion	Log K ₁	Log K ₂	Log β
Al ³⁺	7.15	4.25	11.40
Mg ²⁺	10.05	4.55	14.60
Ca ²⁺	9.60	4.30	13.90
Fe ³⁺	9.15	5.05	14.20
Pb ²⁺	3.64	1.80	5.44

From Table II, it is seen that the stability of the metals increases in the order—Mg > Fe > Ca > Al > Pb.

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