

(Mo,Se,V)

/ / /
/ - /

(NJC)

(2007/ 7/10) (2007/2 /14)

(Ala) (Phe)
(Mo⁺⁶,Se⁺⁴,VO⁺²)
(C.H.N)
()
[VO(AA)₂] (VO⁺²) - 1
(AA)
[M(AA)₂] Cl₂ - 2
Se⁺⁴ (M)
[M(AA)₃]Cl₃ - 3
Mo⁺⁶ (M)
(pH = 6-8)
(:) (1:3)
(-NH₂)

Abstract

This project includes Preparation and identification the complexes of amino acid (*Phenylalanine and Alanine*) with some ions of trace elements which are needed the human body such as (Mo^{+6}, Se^{+4}, V^{+2}) and the prepared complexes which are solid crystals were studied and identified by many ways like Elemental analysis (C.H.N), spectral studied (Infrared Spectra, UV-Visible). Spectral of atomic absorption

From this identification studies can give the structure formula for the complexes which were prepared with amino acids.

1 – Complexes (VO^{+2}) that is a pyramid have a structural formula as $[VO(AA)_2]$, when $AA =$ Amino acid (*Phe, Ala*).

2 – Hexa coordination has octahedral which given the structure formula $[M(AA)_2Cl_2]$ when $M = (Se^{+4})$

3 – Hexa coordination complexes have octahedral which given the structure $[M(AA)_3]Cl_3$ when $M = Mo^{+6}$

The complex which prepare are soluble crystal solid material in buffer solution at ($pH = 6-8$), that have a good thermal stability, and Non – Electrolyte except the complexes of Molybdenum(VI) with amino acid (*Phe, Ala*) are electrolyte as a ratio (1:3) (*Ligand : Ion*).

The amino acids are behavior bidentate Ligands connected with central ion by the atom in carboxyl group and the nitrogen atom in amino group ($-NH_2$)

(2:1)

(Trace Elements)

- 1

- 2

(NH, S)

1981

Shimadzu UV-visible Spectrophotometer -160 Japan

(1)

Kumary⁽³⁾⁽⁴⁾

- 2

Pye Unicom Sp₃ - 300 Infrared Spectrophotometer

(Melting point Apparatus(Stuart))

- 3

(Philips PW-digital meter of conductivity)

- 4

[pH-meter(PW-9418 pH-meter - Philips)]

- 5

1989

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⁽⁵⁾(

- 6

(Atomic Absorption Spectrophotometer A-A-670 Shimadzu)

⁽⁶⁾⁽⁷⁾*(Menbue.L)*

1997

(A.R. Grade)⁽⁸⁾ *(Latife S.M.)*

- 1

*(SeO₂, MoO₃)**(1:1)*

2002

(2)

⁽⁹⁾ *(Hussain -F)**ml)*

-:

SeCl₄

-

-

- N

)

(0.499)

.

(

-

- N

*(50 ml)**SeO₂*⁽¹⁰⁾ 2004*(Ahmad.A.M)**(1:1)**MoCl₆*

-

*MoO₃ (0.605)**(50 ml)**(1:1)*

-

- 1

					- 2
(Ala)		(V,Mo,Se)			-
					(Phe-Na)
	(1:2) (1:3) (1:2)		0.060) (1)		(gm
	(1)				(1)
	(2ml)	(1:1)	(0.165 gm) ((pH=6-7)
					-
72-24)					(Ala-Na)
		((0.060 gm) (1)		(1:1)
	(50 - 40)	(pH=6-	(Ala-Na)		. 7)
					- 3
		(V,Mo,Se)			
		(Phe)			
			(1:2) (1:3) (1:2)		
(Thermal	-:		(1)		
	- 1		(2ml)		
	Stability)				
(1)					
		-24)			
	(200)				(72

- 4

:(1)

(% Yeild)	DEC. (C°)	M.P(C°)	(Color)	(Compound)
-	-	270-272		Phe(Ligand)
87.66	325	-		[VO(Phe) ₂]
80.91	308	-		[Se(Phe) ₂ Cl ₂]
78.95	320	-		[Mo(Phe) ₃]Cl ₃
-	-	258-260		Ala(Ligand)
89.83	-	240		[VO(Ala) ₂]
69.31	295	-		[Se(Ala) ₂ Cl ₂]
90.03	-	225		[Mo(Ala) ₃]Cl ₃

(Solubility) - 2

° (37) (pH=2 - 8)
(2)

(pH=2 - 8) pH

(9)

° (37)

. [Se(Phe)₂Cl₂]

° (37)

-: (2)

pH=8	pH=7	pH=6	pH=5	pH=4	pH=3	pH=2	(Compound) المركب
+	+	+	+	+	+	-----	[VO(Phe) ₂]
-	-	-	-	-	-	-	[Se(Phe) ₂ Cl ₂]
+	+	+	+	+	+	-----	[Mo(Phe) ₃]Cl ₃
+	+	+	+	+	+	+	[VO(Ala) ₂]
+	+	+	+	+	+	-	[Se(Ala) ₂ Cl ₂]
+	+	-----	+	+	-	-----	[Mo(Ala) ₃]Cl ₃

(-----)

(-)

(+))

(Se⁺⁴, VO⁺²)

(Molar

-3

(Non-

Conductivity)

Electrolytes)

(3)

(Mo⁺⁶)

(Phe, Ala)

(11)

(DMF) Dimethyl Formaldehyde

. (1*10⁻³M)

$(10^{-3}M)$

(DMF)

-(3)

$Am[Oh\ m^{-1} \cdot (m^{-2} \cdot mol^{-1})]$	(Complexes)
2.78	Phe(Ligand)
2.94	[VO(Phe) ₂]
10.88	[Se(Phe) ₂ Cl ₂]
215	[Mo(Phe) ₃]Cl ₃
1.21	Ala(Ligand)
4.49	[VO(Ala) ₂]
6.42	[Se(Ala) ₂ Cl ₂]
225	[Mo(Ala) ₃]Cl ₃

(Elemental

- 4

Analysis)

.(4)

(C,H,N)

(C,H,N)

-(4)

نسبة % N		نسبة % H		نسبة % C		الوزن الجزيئي	المعقد (Complex)
عملياً	نظرياً	عملياً	نظرياً	عملياً	نظرياً		
6.26	7.09	4.92	5.06	53.11	54.47	394.94	[VO(Phe) ₂] [VO(C ₉ H ₁₀ NO ₂) ₂]
6.12	5.86	4.88	4.18	44.02	45.19	477.96	[Se(Phe) ₂ Cl ₂] [Se(C ₉ H ₁₀ NO ₂) ₂ Cl ₂]
7.64	6.05	3.81	4.32	45.45	46.65	694.44	[Mo(Phe) ₃]Cl ₃ [Mo(C ₉ H ₁₀ NO ₂) ₃]Cl ₃
9.61	11.52	5.21	4.94	28.08	29.64	242.94	[VO(Ala) ₂] [VO(C ₃ H ₆ NO ₂) ₂]
9.11	8.59	3.22	3.68	21.17	22.08	325.96	[Se(Ala) ₂ Cl ₂] [Se(C ₃ H ₆ NO ₂) ₂ Cl ₂]
8.21	9.00	2.91	3.86	24.5	23.15	466.44	[Mo(Ala) ₃]Cl ₃ [Mo(C ₃ H ₆ NO ₂) ₃]Cl ₃

- 5

(Ala,Phe)

(Mo,Se,V)

.(5)

-: (5)

- 1.43	11.46	12.89	[VO(Phe) ₂]
- 1.28	15.24	16.52	[Se(Phe) ₂ Cl ₂]
- 1.60	15.41	13.81	[Mo(Phe) ₃]Cl ₃
+ 2.26	23.23	20.97	[VO(Ala) ₂]
- 1.48	22.74	24.22	[Se(Ala) ₂ Cl ₂]
- 1.54	19.03	20.57	[Mo(Ala) ₃]Cl ₃

- 6

. (6)

-: (6)

			<i>Complexes</i>
- 2.58	12.27	14.85	Se(Phe) ₂ Cl ₂]
- 1.89	13.44	15.33	[Mo(Phe) ₃]Cl ₃
- 3.65	18.13	21.78	[Se(Ala) ₂ Cl ₂]
- 3.94	18.89	22.83	[Mo(Ala) ₃]Cl ₃

(Spectral Studies)

(IV) ϵ_{max} - - -: - 1

(293nm) -

ϵ_{max} (34129 Cm^{-1}) ()

(2418 $\text{L.Cm}^{-1}.\text{mol}^{-1}$) (C.T (Charge Transfer) (IV) - (36900 Cm^{-1}) (271nm) (1467 $\text{L.Cm}^{-1}.\text{mol}^{-1}$) ($n-\pi^*$)

(31250 (320nm)

	$(34482 \text{ Cm}^{-1}) \text{ nm}$ $(2360 \text{ L.Cm}^{-1}.\text{mol}^{-1})$	$(1253$	$\text{Cm}^{-1})$ $\text{L.Cm}^{-1}.\text{mol}^{-1})$ $(\text{C.T}) \text{ (Charge Transfer)}$	
	-	(VI)	-	
$(1223$	$(35087 \text{ Cm}^{-1}) (285 \text{ nm})$ $\text{L.Cm}^{-1}.\text{mol}^{-1})$ $(\text{C.T}) \text{ (Charge Transfer)}$	(261 nm) (ϵ_{max})	(38314 Cm^{-1}) $(2360 \text{ L.Cm}^{-1}.\text{mol}^{-1})$	
	-	-	- 2	
(VI)		-		
	$(33333 \text{ Cm}^{-1}) (300 \text{ nm})$ $(1537 \text{ L.Cm}^{-1}.\text{mol}^{-1})$	()	$(35714 \text{ Cm}^{-1}) (261 \text{ nm})$ $(195 \text{ L.Cm}^{-1}.\text{mol}^{-1})$ $(\pi - \pi^*)$	
	$(\text{C.T}) \text{ (Charge Transfer)}$ $(\text{L} \rightarrow \text{M}) (\text{M} \rightarrow \text{L})$	(ϵ_{max})		
		(IV)		
		(290		

(10^{-3} M)	$\epsilon \text{ L.Cm}^{-1}.\text{mol}^{-1}$	$\lambda(\text{nm})$	A_{max}	(UV-Visibl)	-(7)
36900	1467	271	1.467	$\text{C}_9\text{H}_{11}\text{NO}_2$	1
34129	2418	293	2.418	$[\text{VO}(\text{C}_9\text{H}_{10}\text{NO}_2)_2]$	2
31250	1253	320	1.253	$[\text{Se}(\text{C}_9\text{H}_{10}\text{NO}_2)_2\text{Cl}_2]$	3
38314	2360	261	2.360	$[\text{Mo}(\text{C}_9\text{H}_{10}\text{NO}_2)_3]\text{Cl}_3$	4
35714	195	263	0.195	$\text{C}_3\text{H}_7\text{NO}_2$	5
34482	2360	290	2.360	$[\text{VO}(\text{C}_3\text{H}_6\text{NO}_2)_2]$	6
35087	1223	285	1.223	$[\text{Se}(\text{C}_3\text{H}_6\text{NO}_2)_2\text{Cl}_2]$	7
33333	1537	300	1.537	$[\text{Mo}(\text{C}_3\text{H}_6\text{NO}_2)_3]\text{Cl}_3$	8

(1625 Cm^{-1}) - 3 -:

(1610 Cm^{-1}) (Infrared Spectra)

δ (N-H)

(COO^-)

(1390 Cm^{-1}))_{sym.} (12)

(1420 Cm^{-1}) :

- 1

(3100-2800 Cm^{-1})

(3340 - 2750 nm)

ν (OCO^-)_{asy.} ν (OCO^-)_{sym.} ν (N-H)

ν (N-H)

(13,14) (3600 - 2700 Cm^{-1}) - 2

(15)

(N- ν (C=O)

ν H) (1560 Cm^{-1}) ν (COO^-)

(1570 Cm^{-1})

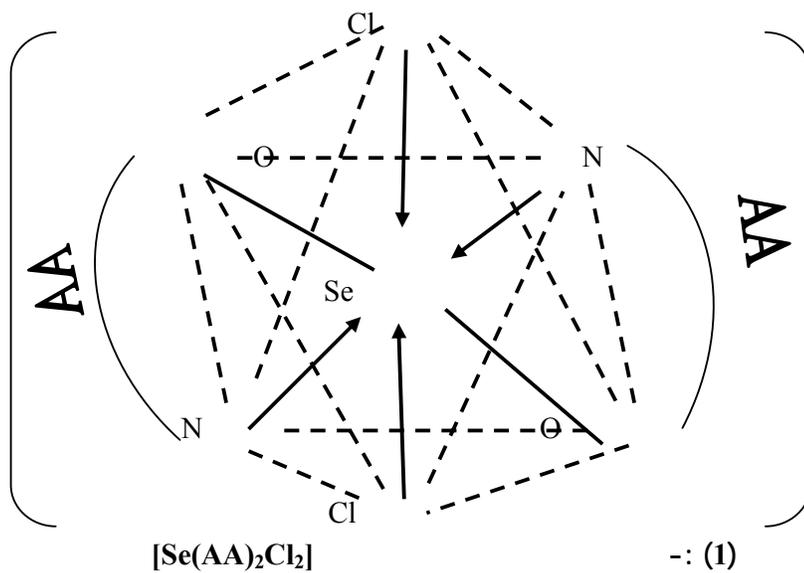
(16)

(Ala, Phe)

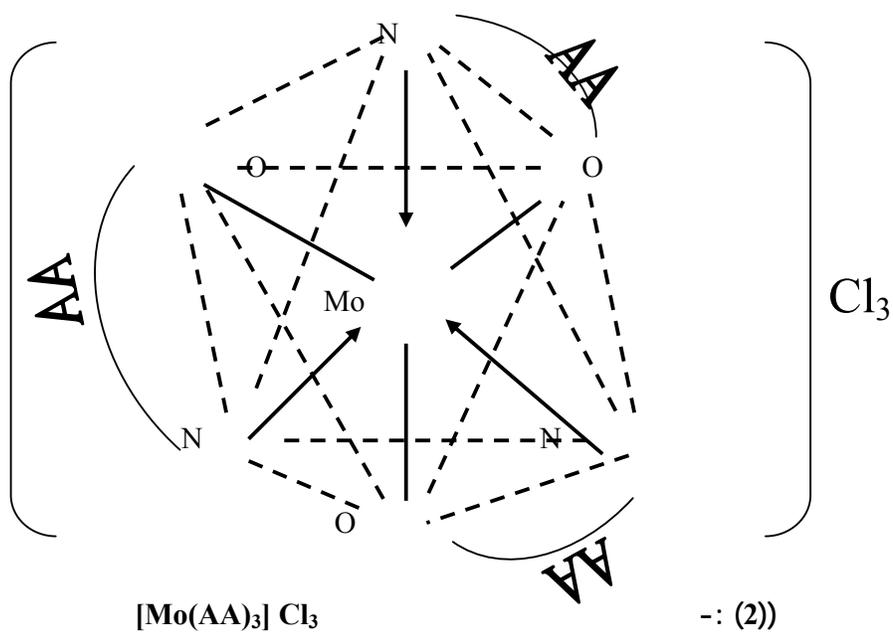
-: (8)

M-O	M-N	$\nu(\text{OCO}^-)_{\text{sym}}$	$\delta(\text{NH})_{\text{sym}}$	$\nu(\text{OCO}^-)_{\text{asy}}$	$\nu(\text{OH})$ and ν (NH) ممتزجة	المركب Compound
-	-	1390 sh	1625 w	1560 sh	3100-2800	Phe(Ligand)
468	603	1446 w	1674 w	1556 m	3460-2964	[VO(Phe)₂]
460	600	1435 mb	1645 m	1540 m	3250-2710	[Se(Phe)₂Cl₂]
460	625	1445 m	1685 m	1535 m	3490-2950	[Mo(Phe)₃]Cl₃
-	-	1420 m	1610 w	1570 m	3340-2750	Ala(Ligand)
515	640	1445 mb	1600 b	1500 w	3110-2810	[VO(Ala)₂]
520	625	1430 mb	1580sh.b	1490 w	3450-2630	[Se(Ala)₂Cl₂]
487	648	1456 w	1620 w	1593 w	3446-2812	[Mo(Ala)₃]Cl₃
V=very , sh=sharp , W=weak , M=medium , b=braod						

() (Ala , Phe)
 . (1)



() (Ala , Phe)
 . (2)

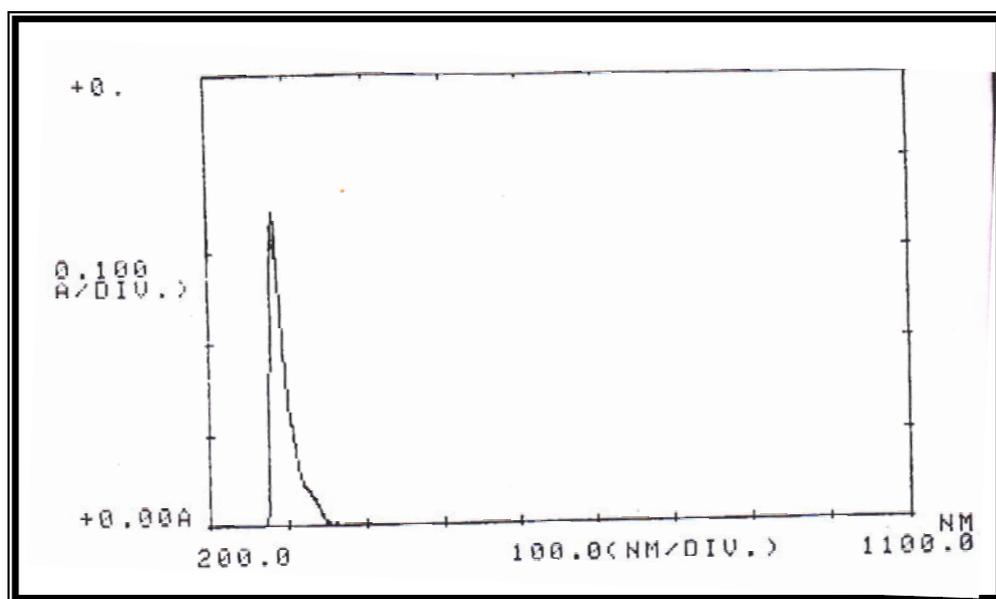
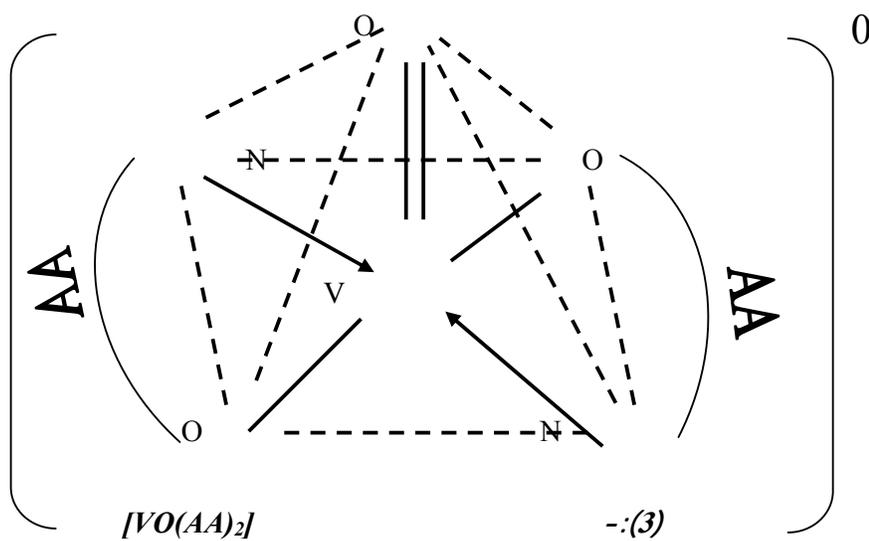


$[VO(AA)_2]$

(Ala,

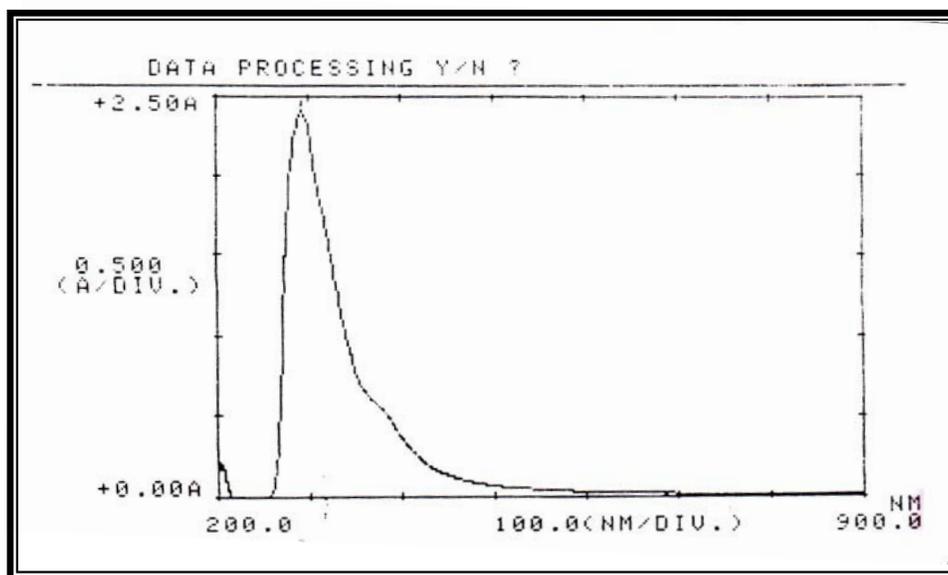
Phe)

. (3)

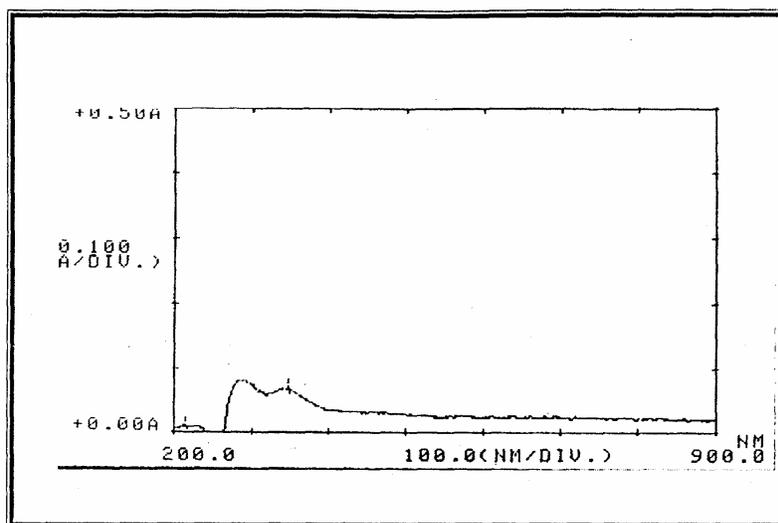


(4)

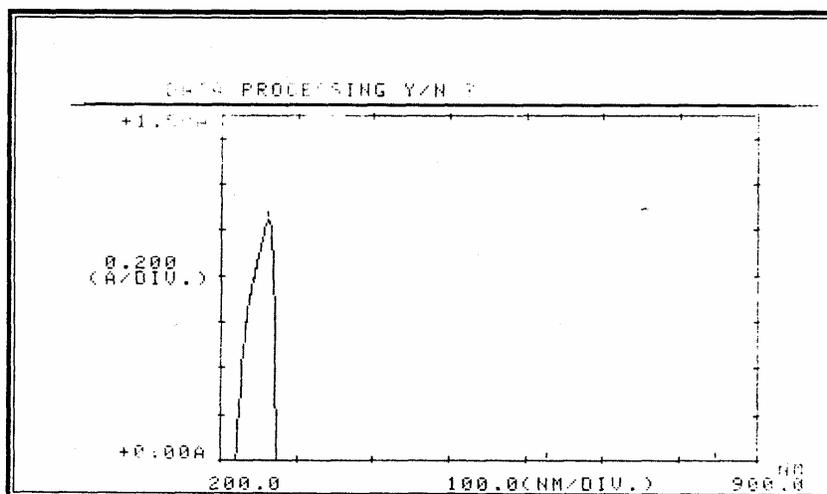
 $(C_9H_{11}NO_2)$



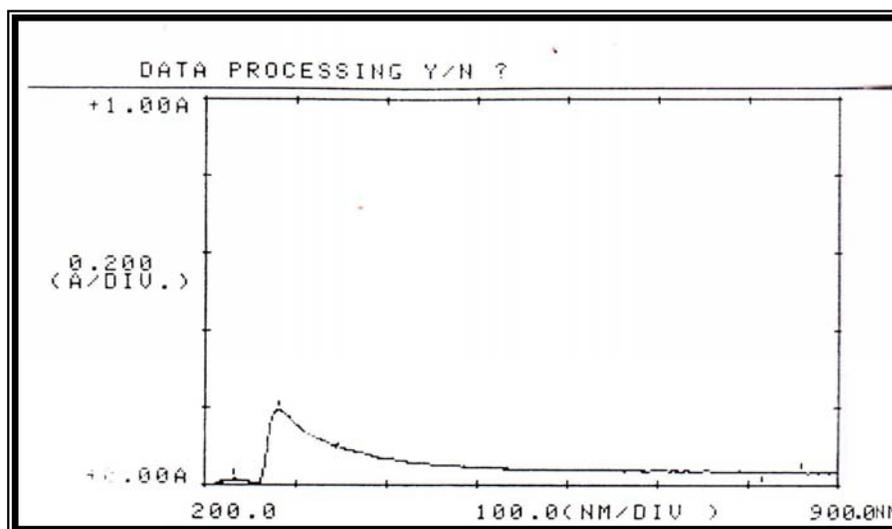
- (5)
[VO (C₉H₁₁NO₂)₂]



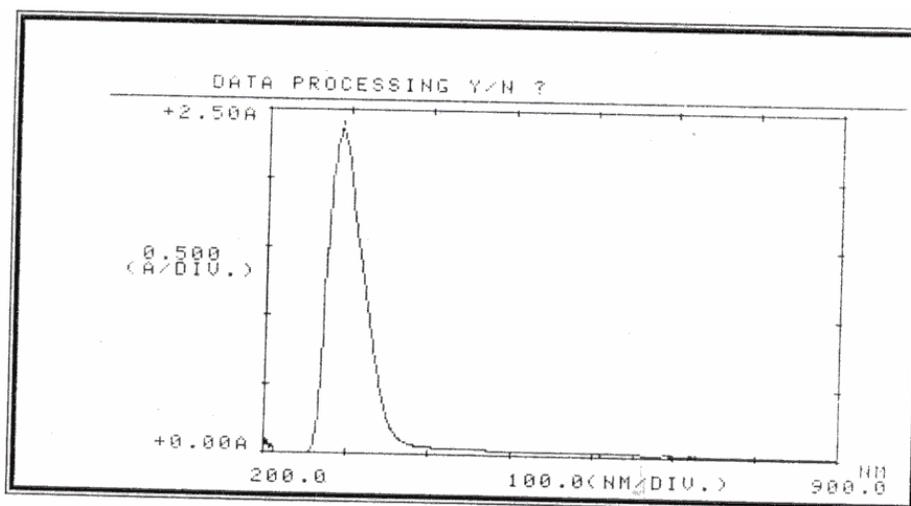
[Se(C₉H₁₀NO₂)₂CL₂] - (6)



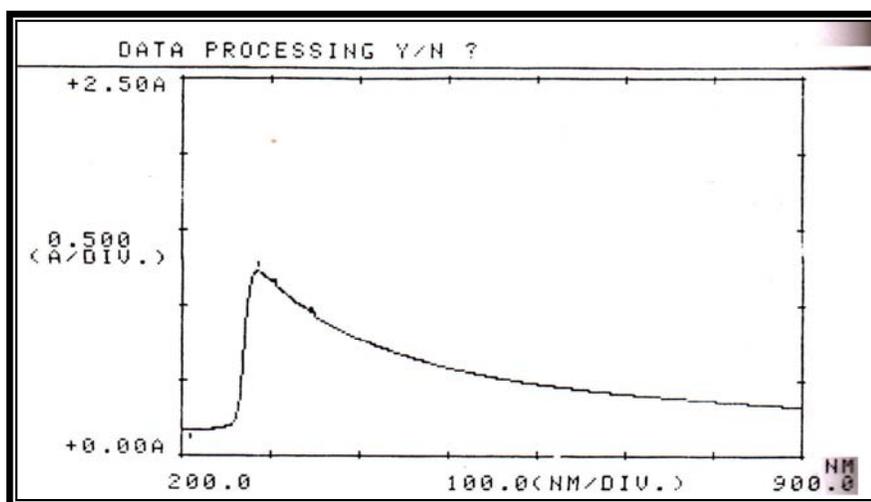
- (7)
[Mo (C₉H₁₀NO₂)₃Cl₃]



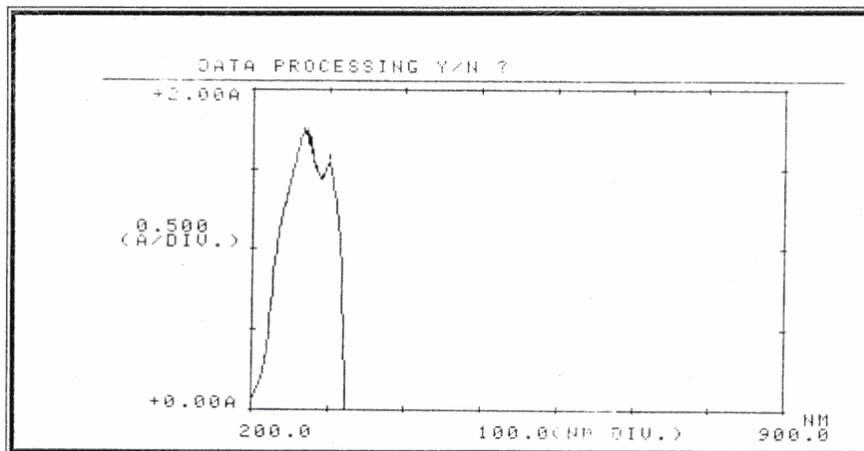
- (8)
(C₃H₇NO₂)



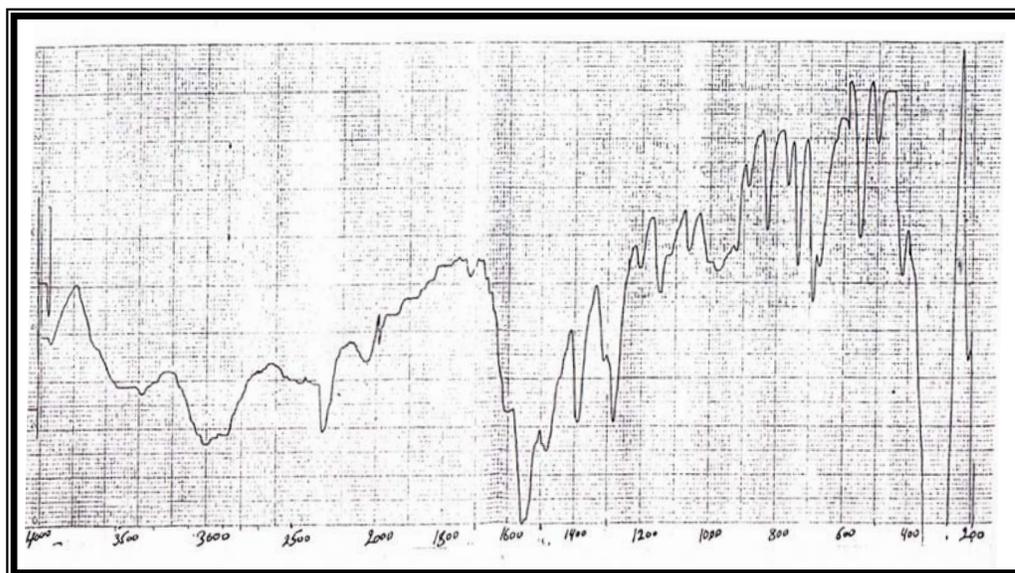
- (9)
[VO(C₃H₆NO₂)₂]



- (10)
[Se(C₃H₆NO₂)₂Cl₂]

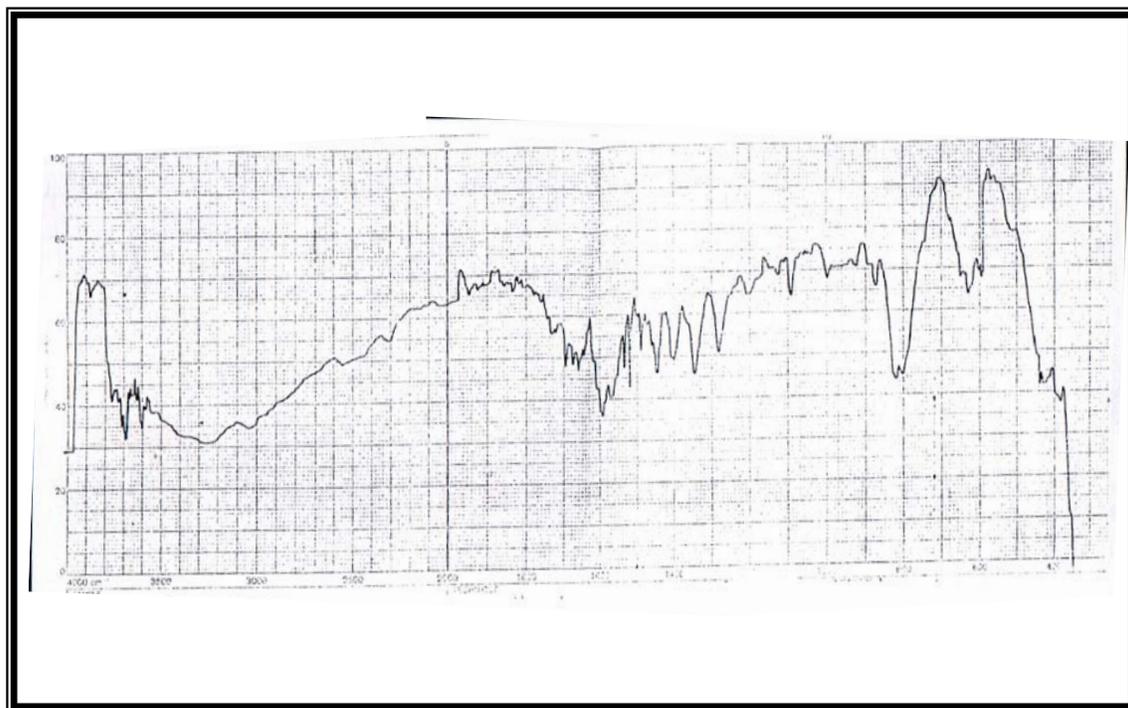


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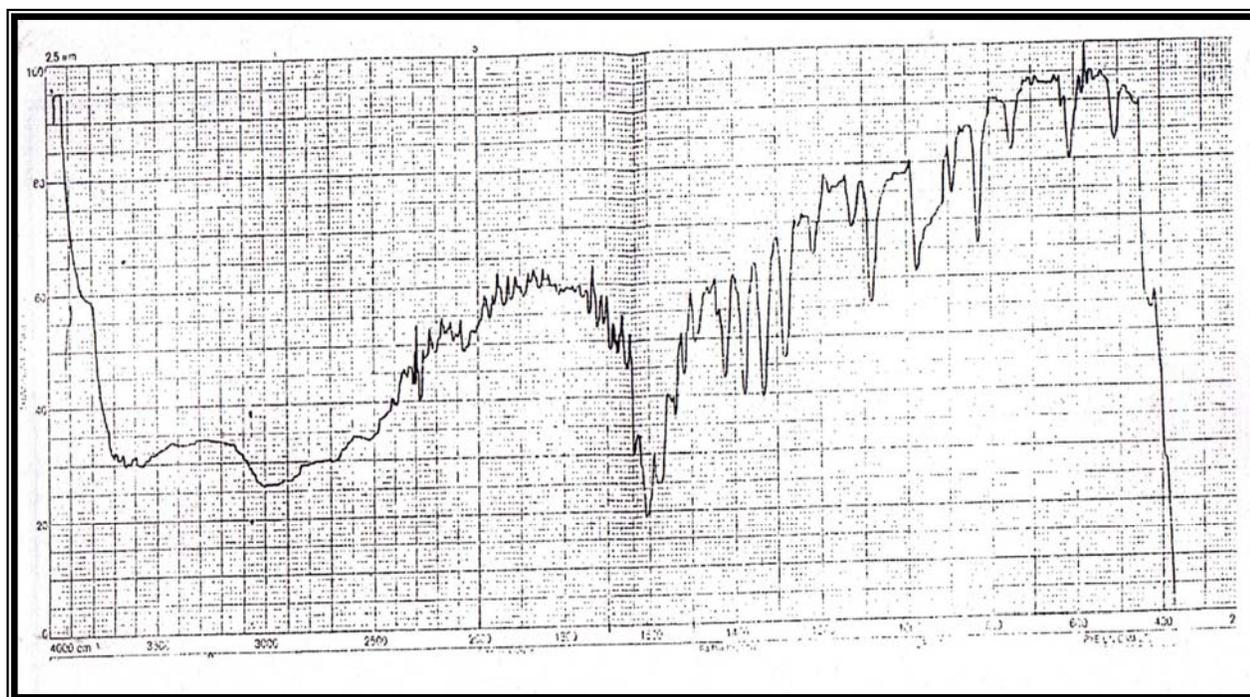


(12)



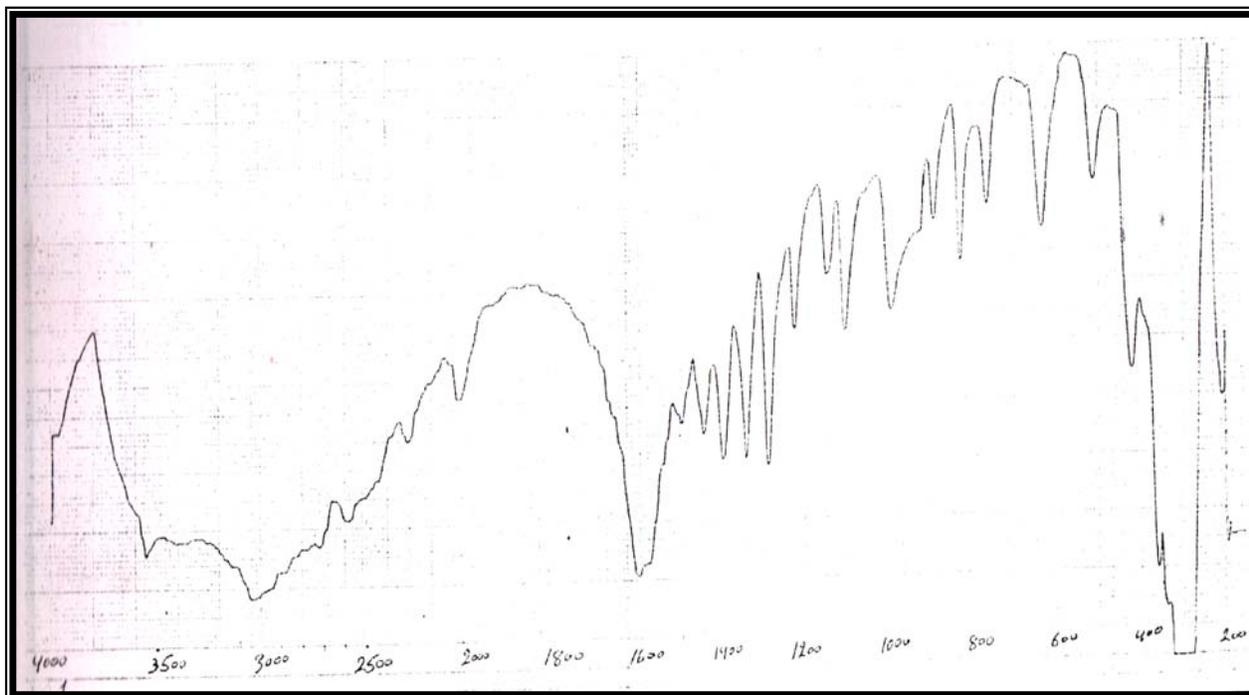


(13)



(14)





(15)



*[International Union of Pure and
Applied Chemistry (IUPAC)]*

(9)

-: (9)

Nomenclature	Complexes
Bis-(Phenylalaninato) Oxo Vanadium(IV)	$[\text{VO}(\text{Phe})_2]$
Bis-(Phenylalaninato)Selenium(IV) diclorid	$[\text{Se}(\text{Phe})_2\text{Cl}_2]$
Tris- (Phenylalaninato) Molibdinium(VI) trichloride	$[\text{Mo}(\text{Phe})_3\text{Cl}_3]$
Bis - (Alaninato) Oxo Vanadium(IV)	$[\text{VO}(\text{Ala})_2]$
Bis-(Alaninato)Selenium(IV) diclorid	$[\text{Se}(\text{Ala})_2\text{Cl}_2]$
Tris- (Alaninato) Molibdinium(VI) trichloride	$[\text{Mo}(\text{Ala})_3\text{Cl}_3]$

() - " - 1
 . 1989 - - "

.1988)

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- 16

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