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by

R. Gut, E. Iberson, and
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Chemistry Division

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INTRODUCTION

The phase-diagram literature was surveyed to the end of 1960. Information about the binary systems of monovalent with multivalent chlorides was observed. Compounds of double chlorides occurring in these systems are listed in tabular form together with the available structural information.

A key to the abbreviations used in these tables is to be found on page 12.

Valency of Central Ion	Compound	Melting Pt., °C	Crystal Data: Complete or Incomplete	Crystal Data: Crystal Class	Crystal Data: Space Group	Preparation	Literature: Phase Diagram	Literature: Crystal Structure	Literature: Preparation	Remarks
I	Cs_2LiCl_3	I 380					192			
	Rb_2CuCl_3	I 250					100			
	K_2CuCl_3	I 245	Co	Orth	Pnam	aq	101	3	3	
	Tl_2CuCl_3	I 225					201			
	Cs_2AgCl_3		Co	Orth	Pnam	aq		3	3	
	Tl_2AgCl_3	I 252					202			
	$Cs_3Cu_2Cl_5$	I 320					102			
	$Tl_3Ag_2Cl_5$	I 252					203			
	$CsLiCl_2$	I 351					192			
	$RbLiCl_2$	I 321					103			
	$KCuCl_2$					aq			157	
	$CsAgCl_2$	I 310					104			
	$N(CH_3)_4ICl_2$		Co	Tet	$P\bar{4}2_1m$	aq		2	2	
	$Rb_2Cu_3Cl_5$	I 290					100			
	$(NH_4)_2Cu_3Cl_5$					aq			157	
	$CsCu_2Cl_3$	C 274	Co	Orth	Cmcm	aq	102	1	1	
II	K_4MnCl_6	I 444					105			
	Na_4MnCl_6	C 496	Co	Hex	$R\bar{3}c$	aq	105	41	41	
	$K_3NaFeCl_6$		Co	Hex	$R\bar{3}c$	aq		42 43	42 43	Occurs as mineral
	Li_4CoCl_6	I 475					5			
	$(NH_4)_4ZnCl_6$	C 340		(Hex)		aq	107	44	44	(Hex) = crystal habitus
	K_4PdCl_6					aq			184	
	Rb_4CdCl_6		In	Hex	$R\bar{c}c$	aq		46	46	
	K_4CdCl_6	I 461	Co	Hex	$R\bar{3}c$	aq	108	45,46 47	46 47	
	$(NH_4)_4CdCl_6$	C 340	In	Hex	$R\bar{3}c$	aq	107	46 48	46 48	
	Tl_4HgCl_6	I 250					199			
	$(NH_4)_4HgCl_6$	I 243				PD	109 49		49	
	Cs_4PbCl_6					aq		50	177	
	K_4PbCl_6	I 480					106	50		
	Cs_3MgCl_5	C 527					117			
	Cs_3MnCl_5	C 511					112			
	$(N_2H_5)_3MnCl_5$	240				aq			158	
	Cs_3CoCl_5	C 549	Co	Tet	I_4/mcm	aq	5	39	39	
	Rb_3CoCl_5	I 510	In	Tet	I_4/mcm	aq	5	39	39	
	Cs_3ZnCl_5	I 560					118			
	Tl_3ZnCl_5	C 344					205			
	$(NH_4)_3ZnCl_5$	C 340	Co	Orth	Pmna	aq, PD	107	40	40	
	Rb_3CdCl_5	I 471					119			
	Tl_3SnCl_5	C 310					199			
	Cs_3HgCl_5					aq			176	
	Tl_3PbCl_5	C 397					198			
	$Cs_5Co_2Cl_9$	I* 475					5			I* 475, compd. decomposes in solid state
	Na_2BeCl_4	I 310					120			
	Li_2BeCl_4	I 350					120			

Valency of Central Ion	Compound	Melting Pt., °C	Crystal Data			Preparation	Literature			Remarks
			Complete or Incomplete	Crystal Class	Space Group		Phase Diagram	Crystal Structure	Preparation	
II	Tl_2BeCl_4	C 458					120			
	Cs_2MgCl_4	C 545					117			
	Rb_2MgCl_4	C 480					121			
	K_2MgCl_4	C 443					122			
	Na_2MgCl_4	I 485					123			
	K_2TiCl_4	I 675					134			
	Na_2TiCl_4	I* 548					110			I*548, compd. decomposes in solid state
	K_2VCl_4	I* 650					111			I*650, compd. decomposes in solid state
	Cs_2MnCl_4	C 538					112			
	Rb_2MnCl_4	I 462					112			
	$(Ph_3MeAs)_2MnCl_4$					Et OH			171	
	Cs_2FeCl_4	C 566					113			
	K_2FeCl_4	I 380					114			
	$(NH_4)_2FeCl_4$					aq			160	
	$(Ph_3MeAs)_2FeCl_4$					Et OH			171	
	Cs_2CoCl_4	C 597	Co	Orth	Pnma	aq	5	25 26	25 26	
	Rb_2CoCl_4	C 538	In	Orth	Pnma	PD	5	5	5	α form
	K_2CoCl_4	C 436					5			
	Na_2CoCl_4	I* 370					124			I*370, compd. decomposes in solid state
	Li_2CoCl_4	I* 370					5			I*370, compd. decomposes in solid state
	$(NMe_4)_2CoCl_4$		In	Orth	Pnam	aq		27 28	27 28	
	$(Ph_3MeAs)_2CoCl_4$					Et OH			171	
	Cs_2NiCl_4							26		Quadratic coordination?
	Rb_2NiCl_4					aq			183	Mag. susc.[9]
	$(Ph_3MeAs)_2NiCl_4$					Et OH			171	
	Cs_2CuCl_4	472*	Co	Orth	Pnam	aq		30,29 27	30,29 27	Spectra of crystal and solutions 472* separate determination of mp
	K_2CuCl_4	C 330					101			
	$(NMe_4)_2CuCl_4$		In	Orth	Pnam	aq		27,30 31	27,30 31	
	$(Ph_3MeAs)_2CuCl_4$					Et OH			171	
	Cs_2ZnCl_4	C 601	Co	Orth	Pnam	aq	118	32	32	
	Rb_2ZnCl_4	C 528					118			
	K_2ZnCl_4	C 446	In	Orth	Pbm2	aq	125	33	33	
	Na_2ZnCl_4	I 410					126			
	$Na_2ZnCl_4 3H_2O$		Co	Hex	$P3^1m$	aq		34	34	
	Li_2ZnCl_4	I 354					127			
	Tl_2ZnCl_4	C 360					205			
	$(NH_4)_2ZnCl_4$	C 340					107			
	$(NMe_4)_2ZnCl_4$		Co	Orth	Pnam	aq		27,28	27,28	
	$(N_2H_5)_2ZnCl_4$					aq			172	
	$(Ph_3MeAs)_2ZnCl_4$					Et OH			171	
	K_2SrCl_4	C 597					128			
	$(NH_4)_2SrCl_4$		Co	Cub	I 43			35		
	Cs_2CdCl_4	C 462					116			
	Rb_2CdCl_4	C 440					116			
	Na_2CdCl_4	I 426					108			
	$(N_2H_5)_2CdCl_4$					aq			172	
	Cs_2PdCl_4					aq			184	
	Rb_2PdCl_4					aq			184	
	K_2PdCl_4		Co	Tet	$P4^2m$ P4/mmm	aq		36,37	36,37	
	$(NH_4)_2PdCl_4$		Co	Tet	P4/mmm	aq		36	36	

Compound	Crystal data					Literature			Details
	Crystal system	Space group	Unit cell parameters	Volume	Z	Melting point	Decomposition point	Density	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	310		1.72	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	312		1.74	
$[Cu_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	315		1.76	
$[Zn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	318		1.78	
$[Mn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	320		1.79	
$[Fe_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	322		1.80	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	325		1.82	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	327		1.83	
$[Cu_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	330		1.85	
$[Zn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	332		1.86	
$[Mn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	335		1.88	
$[Fe_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	337		1.89	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	340		1.91	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	342		1.92	
$[Cu_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	345		1.94	
$[Zn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	347		1.95	
$[Mn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	350		1.97	
$[Fe_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	352		1.98	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	355		2.00	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	357		2.01	
$[Cu_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	360		2.03	
$[Zn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	362		2.04	
$[Mn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	365		2.06	
$[Fe_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	367		2.07	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	370		2.09	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	372		2.10	
$[Cu_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	375		2.12	
$[Zn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	377		2.13	
$[Mn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	380		2.15	
$[Fe_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	382		2.16	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	385		2.18	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	387		2.19	
$[Cu_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	390		2.21	
$[Zn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	392		2.22	
$[Mn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	395		2.24	
$[Fe_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	397		2.25	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	400		2.27	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	402		2.28	
$[Cu_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	405		2.30	
$[Zn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	407		2.31	
$[Mn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	410		2.33	
$[Fe_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	412		2.34	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	415		2.36	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	417		2.37	
$[Cu_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	420		2.39	
$[Zn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	422		2.40	
$[Mn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	425		2.42	
$[Fe_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	427		2.43	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	430		2.45	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	432		2.46	
$[Cu_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	435		2.48	
$[Zn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	437		2.49	
$[Mn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	440		2.51	
$[Fe_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	442		2.52	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	445		2.54	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	447		2.55	
$[Cu_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	450		2.57	
$[Zn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	452		2.58	
$[Mn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	455		2.60	
$[Fe_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	457		2.61	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	460		2.63	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	462		2.64	
$[Cu_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	465		2.66	
$[Zn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	467		2.67	
$[Mn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	470		2.69	
$[Fe_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	472		2.70	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	475		2.72	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	477		2.73	
$[Cu_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	480		2.75	
$[Zn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	482		2.76	
$[Mn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	485		2.78	
$[Fe_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	487		2.79	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	490		2.81	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	492		2.82	
$[Cu_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	495		2.84	
$[Zn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	497		2.85	
$[Mn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	500		2.87	
$[Fe_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	502		2.88	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	505		2.90	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	507		2.91	
$[Cu_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	510		2.93	
$[Zn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	512		2.94	
$[Mn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	515		2.96	
$[Fe_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	517		2.97	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	520		2.99	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	522		3.00	
$[Cu_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	525		3.02	
$[Zn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	527		3.03	
$[Mn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	530		3.05	
$[Fe_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	532		3.06	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	535		3.08	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	537		3.09	
$[Cu_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	540		3.11	
$[Zn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	542		3.12	
$[Mn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	545		3.14	
$[Fe_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	547		3.15	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	550		3.17	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	552		3.18	
$[Cu_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	555		3.20	
$[Zn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	557		3.21	
$[Mn_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	560		3.23	
$[Fe_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	562		3.24	
$[Ni_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{1}$	$a = 7.8$ Å, $b = 8.4$ Å, $c = 9.1$ Å, $\alpha = 78°$, $\beta = 84°$, $\gamma = 71°$	570 Å^3	1	565		3.26	
$[Co_2(C_{12}H_{12}N_2O_2)_2(H_2O)_2]$	Triclinic	$P\bar{

Valency of Central Ion	Compound	Melting Pt., °C	Crystal Data: Complete or Incomplete	Crystal Data: Crystal Class	Crystal Data: Space Group	Preparation	Literature: Phase Diagram	Literature: Crystal Structure	Literature: Preparation	Remarks
II	Rb_2SnCl_4	I 262					129			
	$(N_2H_5)_2SnCl_4$					aq			173	
	Rb_2BaCl_4	C 670					119			
	K_2BaCl_4	C 654					130			
	Cs_2PtCl_4					aq			194	
	Rb_2PtCl_4					aq			194	
	K_2PtCl_4		Co	Tet	P4/mmm	aq		38	38 194	
	$(NH_4)_2PtCl_4$					aq			195 194	
	Cs_2HgCl_4					aq			176	
	Rb_2HgCl_4					aq,HCl			176	
	K_2HgCl_4	I 245				aq	109		176	
	Na_2HgCl_4					aq			193	
	$(NH_4)_2HgCl_4$	I 210					109			
	$(N_2H_5)_2HgCl_4$					aq			174	
	Cs_2PbCl_4					aq			177	
	Rb_2PbCl_4	I 448					131			
	K_2PbCl_4	I 490					125			
	$(NH_4)_2PbCl_4$					special aqua.			177	Stable above 70°C, crystallize from hot H_2O
	$Rb_3Mn_2Cl_7$	I 475					112			
	$Cs_3Co_2Cl_7$	I* 444					5			I* 444, compd. decomposes in solid state
	$K_3Zn_2Cl_7$	I* 250					125			
	$TlBeCl_3$	C 368					120			
	$CsMgCl_3$	C 610	In	Hex		PD	117	5		Isotype $CsNiCl_3$
	$RbMgCl_3$	C 542					121			
	$KMgCl_3$	C 492					122			
	$NaMgCl_3$	I 465					123			
	$CsCaCl_3$	C 910					132			
	$RbCaCl_3$	C 855					132			
	$KCaCl_3$	C 745					133			
	$TlCaCl_3$	I 683					199			
	$KTiCl_3$	C 775					134			
	$NaTiCl_3$	I 628					110			
	$CsVCl_3$	C 1090	In	Hex		PD	111	6	6	Isotype $CsNiCl_3$
	$KVCl_3$	C 930	In	Hex		PD	111	6	6	Isotype $CsNiCl_3$
	$CsMnCl_3$	C 593					112			
	$RbMnCl_3$	C 552					112			
	$KMnCl_3$	C 496					105			
	$TlMnCl_3$	I 497					204			
	$(PyH)^+MnCl_3$					aq			159	
	$CsFeCl_3$	C 558					113			
	$KFeCl_3$	C 339					114			
	$CsCoCl_3$	C 547	In	Hex		PD	5	5	5	Isotype $CsNiCl_3$
	$RbCoCl_3$	C 485	In	Hex		PD	5	5	5	Isotype $CsNiCl_3$
	$KCoCl_3$	I 360	In	Hex		PD	5	5	5	Isotype $CsNiCl_3$
	$LiCoCl_3$	I* 270					5	5	5	I* 270, compd. decomposes in solid state
	$CsNiCl_3$	730*	Co	Hex	Cmmc	aq		7 9	8	730* separate determination of mp
	$RbNiCl_3$					conc. HCl				Mag. Susc.(9) two unpaired electrons Kz = 6
	NH_4NiCl_3					aq			8	
	$MeNH_3NiCl_3$					Et OH			8	

Valency of Central Ion	Compound	Melting Pt., °C	Crystal Data: Complete or Incomplete	Crystal Data: Crystal Class	Crystal Data: Space Group	Preparation	Literature: Phase Diagram	Literature: Crystal Structure	Literature: Preparation	Remarks
II	$Me_2NH_2NiCl_3$					Et OH			8	
	$(Me_3NH)NiCl_3$					Et OH			8	
	$(Me_4N)NiCl_3$					Et OH			8	
	$PrNH_3NiCl_3$					acid		8	8	
	$BuNH_3NiCl_3$					Et OH		8	8	
	$CsCuCl_3$	441*	Co	Hex	$P6_12$	aq		10 11	10 11	441* mp separately determined
	$KCuCl_3$	C 364	Co	Mon	$P2_1/c$	from HAc	101	12	12	
	$(N_2H_5)ZnCl_3$					aq			172	
	$CsSrCl_3$	C 907					115			
	$RbSrCl_3$	C 705					115			
	$TlSrCl_3$	I 569					199			
	$CsCdCl_3$	C 545	Co Co	Mon Cub	$P2_1/m$ Pm3m?	aq aq	116	13 14,15	13 14,15	
	$RbCdCl_3$	C 466	Co	Orth	Pnma	aq	119	16	16	
	$KCdCl_3$	C 431	In	Orth	Pnma	PD	108	17	17	
	$LiCdCl_3 \cdot \frac{1}{2}H_2O$					aq			175	
	$TlCdCl_3$	C 426					206			
	NH_4CdCl_3	I 289	Co	Orth	Pnma	aq	107	16 18	175	
	$(N_2H_5)CdCl_3$					aq			172	
	$CsSnCl_3$	C 270					129			
	$RbSnCl_3$	C 228					129			
	$KSnCl_3$	C 224					135			
	$TlSnCl_3$	C 244					199			
	$NH_4SnCl_3H_2O$					aq			173	
	$N_2H_5SnCl_3$					Et OH			173	
	$CsHgCl_3$		Co	Mon	$P2_1/m$	aq		13 19	13 19	Pseudo Cubic
			Co	Cub	Pm3m	aq		20	20	
	$KHgCl_3$	C 239				aq	109		174	
	$NaHgCl_3$		Co	Orth	Pnam	aq		21	21	
	$TlHgCl_3$	C 224					200			
	NH_4HgCl_3	I 272	Co	Tet	P4/m	PD	109	22	22	
	$N_2H_5HgCl_3$	157				CCl_4 Et OH			174	
	$CsPbCl_3$	C 590				aq	119		177	
	$RbPbCl_3$	C 440	Co In	Cub Tet	Pm3m	aq	131	24 23	24 23	Above 49°C (24) Below 49°C (23)
	$TlPbCl_3$	I 397					198			
	$K_2Hg_3Cl_8$	I 199					109			
	$(NH_4)_2Hg_3Cl_8$					aq			174	
	$TlMg_2Cl_5$	I 499					199			
	$NaMn_2Cl_5$	I 441					105			
	$CsZn_2Cl_5$	C 294					118			
	$RbZn_2Cl_5$	C 306					118			
	KZn_2Cl_5	C 274					125			
	$TlZn_2Cl_5$	I 260					205			
	$NH_4Zn_2Cl_5$	C 250					107			
	KSr_2Cl_5	C 638					128			
	$NH_4Cd_2Cl_5$	C 366					107			
	$CsSn_2Cl_5$	I 224					129			
	$RbSn_2Cl_5$	C 231					129			
	KSn_2Cl_5	C 208					135			
	$CsHg_2Cl_5$					aq			176	

Valency of Central Ion	Compound	Melting Pt., °C	Crystal Data: Complete or Incomplete	Crystal Data: Crystal Class	Crystal Data: Space Group	Preparation	Literature: Phase Diagram	Literature: Crystal Structure	Literature: Preparation	Remarks
II	KHg_2Cl_5					aq			174	
	$NaHg_2Cl_5$					special			174	Prep uses EtOAc and $NaHgCl_3$
	$NH_4Hg_2Cl_5$	I 214					109			
	$CsPb_2Cl_5$					aq			177	
	$RbPb_2Cl_5$	C 423				aq	131		177	
	KPb_2Cl_5	C 440					125			
	$TlPb_2Cl_5$	C 427					198			
	$NH_4Pb_2Cl_5$		In	Orth		aq		4	4	
	$CsMg_3Cl_7$	I 565					117			
	KSn_3Cl_7	C 208					135			
	$CsMn_4Cl_9$	I 537					112			
	$NH_4Hg_9Cl_{19}$	I 235					109			
	$CsHg_5Cl_{11}$					aq			176	
	$RbHg_5Cl_{11}$					aq			176	
	KHg_7Cl_{15}	I 209					109			
	$NaClCaCl_2$ mixed Xstals					melt		53		
	$LiCl\text{-}MnCl_2$ mixed Xstals					melt		51 52		
	$(EtNH_3)_4FeCl_7$	117°							188	
	$(Me_2NH_2)_4FeCl_7$	48°							188	
	$(PrNH_3)_4FeCl_7$	118°							188	
III	Cs_3ScCl_6	C 815					143			
	Cs_3TiCl_6	C 770					139			
	Rb_3TiCl_6	C 794					139			
	K_3TiCl_6	C 760					139			
	Na_3TiCl_6	I 555					144			
	K_3VCl_6	C 745					145			
	Na_3VCl_6	C 535					145			
	K_3CrCl_6	C 836					140			
	Na_3CrCl_6	C 620					140			
	K_3MoCl_6					aq			168	
	$(NH_4)_3MoCl_6$					aq			168	
	Na_3RhCl_6					spec			169	From Rh, NaCl and CCl_4 at 500°C
	Cs_3InCl_6					conc HCl			179	
	Rb_3InCl_6					conc HCl			179	
	Cs_3LaCl_6	C 777					146			
	K_3LaCl_6	C 625					146			
	Cs_3CeCl_6	C 800					146			
	K_3CeCl_6	C 628					146			
	Cs_3NdCl_6	C 813					146			
	K_3NdCl_6	C 682					146			
	K_3IrCl_6					aq			186	
	Rb_3TlCl_6					spec			179	From Cl_2 concHCl, Tl_2O_3 and RbCl
	Tl_3TlCl_6		In	Hex	$C\bar{3}1c$	aq		68	69	
	Tl_3BiCl_6	C 413					196			
	Rb_3UCl_6	C 775					142			
	K_3PuCl_6	C 685					147			
	$L_7Bl_3Cl_{16}$		In	Hex		aq		71	71	
	K_2TiCl_5	I 610					144			
	Cs_2VCl_5					conc HCl			178	
	Rb_2VCl_5					conc HCl			178	

Valency of Central Ion	Compound	Melting Pt., °C	Crystal Data			Preparation	Literature			Remarks
			Complete or Incomplete	Crystal Class	Space Group		Phase Diagram	Crystal Structure	Preparation	
III	$(NH_4)_2VCl_5$					conc HCl			178	
	Tl_2FeCl_5	I 290					197			
	$(Me_2NH_2)_2FeCl_5$	98							188	
	$(Me_3NH)_2FeCl_5$	143							188	
	$(NH_4)_2RuCl_5$					aq			185	
	K_2SbCl_5					conc HCl			187	
	$(NH_4)_2SbCl_5$		Co	Mon	C2/m	aq		70	70	
	K_2CeCl_5	C 623					146			
	K_2NdCl_5	C 602					122			
	Cs_2TlCl_5					conc HCl			180	
	Tl_2BiCl_5	I 330					196			
	Rb_2UCl_5	I 560					142			
	K_2UCl_5	685					148			
	K_2PuCl_5	I 611					147			
	$K_5W_3Cl_{14}$					aq		170	170	Existence strongly indicated by x-ray powder diagrams
	$Cs_3Sc_2Cl_9$	I 620					143			
	$Cs_3Ti_2Cl_9$		In	Hex	$P6_3/mmc$	spec		59	59	Grown over solid melt
	$Cs_3V_2Cl_9$		In	Hex	$P6_3/mmc$	spec		59	59	Grown over solid melt
	$Cs_3Cr_2Cl_9$		Co	Hex	$P6_3/mmc$	spec		59	59	Grown over solid melt
	$Cs_3Fe_2Cl_9$		In	Hex	$P\bar{3}ml$	aq		60	60	
	$Cs_3As_2Cl_9$		Co	Hex	P32 P321	aq		61 62	61 62	
	$Cs_3Sb_2Cl_9$		In	Hex	$P\bar{3}ml$	aq		60	60	
	$Rb_3Sb_2Cl_9$					HCl			187	
	$K_3Sb_2Cl_9$	I 340					138			
	$(NH_4)_3Sb_2Cl_9$	C 291					138			
	$Cs_3W_2Cl_9$		Co	Hex	$C6_3/m$	aq		63 64	63 64	
	$Rb_3W_2Cl_9$		In	Hex	$C6_3/m$	aq		63 64	63 64	
	$K_3W_2Cl_9$		Co	Hex	$C6_3/m$	aq		63 64 65	63 64 65	
	$(NH_4)_3W_2Cl_9$		In	Hex	$C6_3/m$	aq		63 64	63 64	
	$Tl_3W_2Cl_9$		In	Hex	$C6_3/m$	aq		63 64	63 64	
	$Cs_3Tl_2Cl_9$		Co	Hex	$R\bar{3}c$	aq		66 67	66 67	
	$Cs_3Bi_2Cl_9$					aq			62	
	$Tl_3Bi_2Cl_9$	I 225						196		
	$CsBCl_4$		In			spec		54	54	Rhombohedral. From BCl_3 and CsCl at elevated temp. and pressure
	$CsAlCl_4$	C 377				spec	136			
	$KAlCl_4$	C 256				spec	137			
	$NaAlCl_4$	C 151	Co	Orth	$P2_12_12_1$	PD	137	55	55	
	$LiAlCl_4$	I 143.5					138			
	$TlAlCl_4$	C 297					138			
	$(NH_4)AlCl_4$	C 304				spec	138			
	$CsTiCl_4$	C 781					139			
	$RbTiCl_4$	C 800					139			
	$KTiCl_4$	C 654					139			
	$KVCl_4$					conc HCl			178	
	$KFeCl_4$	C 249					140			

Valency of Central Ion	Compound	Melting Pt., °C	Crystal Data: Complete or Incomplete	Crystal Data: Crystal Class	Crystal Data: Space Group	Preparation	Literature: Phase Diagram	Literature: Crystal Structure	Literature: Preparation	Remarks
III	$NaFeCl_4$	C 163					140			
	$(NH_4)FeCl_4$	C 295					107			
	$(MeNH_3)FeCl_4$	211							188	
	$(Me_2NH_2)FeCl_4$	101							188	
	$(Me_3NH)FeCl_4$								188	
	$(Me_4N)FeCl_4$	>308							188	
	$(EtNH_3)FeCl_4$	85							188	
	$(nPrNH_3)FeCl_4$								188	
	$(nBuNH_3)FeCl_4$	605							188	
	$(Ph_4As)FeCl_4$		In	Tet	$I\bar{4}$	aq		56	56	
	$CsGaCl_4$	385°				spec			181	
	$KGaCl_4$	259°				spec			181	
	NH_4GaCl_4	304°				spec			181	
	$(NH_4)RuCl_4 2H_2O$					aq			185	Loses $2H_2O$ at 220°C
	$NaInCl_4$	C 730					141			
	$KSbCl_4$	I 114					138			
	$NaSbCl_4$					from HCl			187	
	NH_4SbCl_4	I 143					138			
	$KICl_4$		Co	Mon	$P2_1/n$	aq		57	57	
	$KAuCl_4$		In	Mon	$P2_1/c$	Et OH		58	58	
	$TlAuCl_4$					aq			180	
	$RbUCl_4$	I 470					142			
	$TlAl_2Cl_7$	I 163					138			
	$Tl_xAl_yCl_{(x+3y)}$	C 192					138			
	$(NH_4)_xAl_yCl_{(x+3y)}$	C 192.5					138			
	$Cs_2Ag_3AuCl_6$		Co	Cub	I_4/mmm	aq		15	15	Fresh prepared
								162	162	Diamagnetic
			Co	Tet	Pm3m			163	164	Aged
	$Cs_2AuAuCl_6$		Co	Cub	Pm3m	aq		164	164	Aged
			Co	Tet	I_4/mmm			162	162	Aged - $CsAuCl_3$
	$Cs_4Cu(AuCl_6)_2$		In	Cub	(Im3m?)	aq		165 164	165	
	$Cs_4Zn(AuCl_6)_2$		In	Cub	(Im3m?)	aq		164	164	
	$Cs_4Cd(AuCl_6)_2$		In	Cub	(Im3m?)	aq		164	164	
	$Cs_4Hg(AuCl_6)_2$		In	Cub	(Im3m?)	aq		164	164	
	$Cs_4Pd(AuCl_6)_2$		In	Cub	(Im3m?)	aq		165	165	
	$Rb_4Cu(AuCl_6)_2$		In	Cub	(Im3m?)	aq		165	165	
	$Rb_4Pd(AuCl_6)_2$		In	Cub	(Im3m?)	aq		165	165	
	$Cs_2Ag_yAu_{1-y}AuCl_6$		In	Cub	(Im3m?)	aq		166	166	
	$Rb_6Ag_2Au_3Cl_{17}$		In	Orth		aq		167	167	
	$(NH_4)_6Ag_2Au_3Cl_{17}$		In	Orth		aq		167	167	
	$Ag_2Cu_4Au_2Cl_{12}$		In	Cub	(Im3m?)	aq		164	164	
IV	Na_4ZrCl_8	C 535					149			
	K_3ZrCl_7	I* 532					150			I* 532, Compd. decomposes in solid state
	Na_3ZrCl_7	I 530					155			
	Cs_3ThCl_7	C 720					207			
	K_3ThCl_7	C 705					207			
	Cs_2TiCl_6	570	Co	Cub	Fm3m	aq spec		72	72 182	
	Rb_2TiCl_6	605	Co	Cub	Fm3m	aq spec		72	72 182	
	$(NH_4)_2TiCl_6$		Co	Cub	Fm3m	aq		73	73	
	Cs_2GeCl_6		Co	Cub	Fm3m	aq		74	74	
	Cs_2SeCl_6		Co	Cub	Fm3m	aq		72	72	
	Rb_2SeCl_6		Co	Cub	Fm3m	aq		72	72	

Valency of Central Ion	Compound	Melting Pt., °C	Crystal Data: Complete or Incomplete	Crystal Data: Crystal Class	Crystal Data: Space Group	Preparation	Literature: Phase Diagram	Literature: Crystal Structure	Literature: Preparation	Remarks
IV	$(NH_4)_2SeCl_6$		Co	Cub	Fm3m	aq		72	72	
	Cs_2ZrCl_6	C 805	Co	Cub	Fm3m	aq	150	72	72	
	Rb_2ZrCl_6		Co	Cub	Fm3m	aq		72	72	
	K_2ZrCl_6	C 798					150			
	Na_2ZrCl_6	C 700					151			
	Cs_2RuCl_6		In	Cub	Fm3m	aq		75	185 75	
	Rb_2RuCl_6					aq			185	
	K_2RuCl_6		Co	Cub	Fm3m	aq		76	185 76	
	Cs_2RhCl_6		In	Cub	Fm3m	aq		77	77	
	Cs_2PdCl_6		In	Cub	Fm3m	aq		78	78	
	Rb_2PdCl_6		In	Cub	Fm3m	aq		78	78	
	K_2PdCl_6		Co	Cub	Fm3m	aq		78	78	
	$(NH_4)_2PdCl_6$		In	Cub	Fm3m	aq		78	78	
	$(RNH_3)_2PdCl_6$					aq		78	78	R = Me, Et, nPr, Iso-Pr., nButyl, isobutyl, isoamyl, pyridinium, MePy, Me_2Py, Me_3Py, isoquinoline
	$(R_2NH_2)_2PdCl_6$					aq		78	78	
	$(R_3NH)_2PdCl_6$					aq		78	78	
	$(R_4N)_2PdCl_6$					aq		78	78	
	Cs_2SnCl_6		Co	Cub	Fm3m	aq		72 79	72 79	
	Rb_2SnCl_6		Co	Cub	Fm3m	aq		72 79	72 79	
	K_2SnCl_6		Co	Cub	Fm3m	aq		80	80	
	Tl_2SnCl_6		Co	Cub	Fm3m	aq		72	72	
	$(NH_4)_2SnCl_6$		Co	Cub	Fm3m	aq		72 80	72 80	
	$(MeNH_3)_2SnCl_6$		Co	Hex	$R\bar{3}m$	aq		81	81	
	$(Me_2NH_2)_2SnCl_6$		Co	Orth	Pn2m	aq		82	82	
	$(Me_2Et_2N)_2SnCl_6$		Co	Tet	P4nc	aq		83	83	
	$(Me_3NH)_2SnCl_6$		Co	Cub	Th6	aq		84	84	
	$(Me_4N)_2SnCl_6$		Co	Cub	Fm3m	aq		84	84	
	$(EtNH_3)_2SnCl_6$		Co	Hex	$P\bar{3}ml$	aq		85	85	
	Rb_2SbCl_6		Co	Cub	Fm3m	aq		86 87	86 87	
	Cs_2TeCl_6		Co	Cub	Fm3m	aq		72 79	72 79	
	Rb_2TeCl_6		Co	Cub	Fm3m	aq		72 79	72 79	
	K_2TeCl_6		Co Co	Cub Mon	Fm3m 2/m	aq		72	72	Pseudocubic
	$(NH_4)_2TeCl_6$		Co	Cub	Fm3m	aq		72	72	
	Tl_2TeCl_6		Co	Cub	Fm3m	aq		72	72	
	$(N(CH_3)_4)_2CeCl_6$		Co	Cub	Fm3m	aq		88	88	
	$(PyH^+)_2CeCl_6$					MeOH			189	
	$(Quin)_2CeCl_6$					MeOH			189	
	Cs_2HfCl_6	C 820				PD	150		150	
	K_2HfCl_6	C 803				PD	150		150	
	No_2HfCl_6	C 560				PD	150		150	
	K_2ReCl_6		Co	Cub	Fm3m	aq		89	89	
	$(NH_4)_2ReCl_6$					aq		89	89	
	Cs_2OsCl_6		In	Cub	Fm3m	aq		75	75	
	Rb_2OsCl_6					aq			186	
	K_2OsCl_6		Co	Cub	Fm3m	aq		90	90	
	$(NH_4)_2OsCl_6$					aq			186	
	K_2IrCl_6					aq		91	91	

Valency of Central Ion	Compound	Melting Pt., °C	Crystal Data: Complete or Incomplete	Crystal Data: Crystal Class	Crystal Data: Space Group	Preparation	Literature: Phase Diagram	Literature: Crystal Structure	Literature: Preparation	Remarks
IV	$(NH_4)_2IrCl_6$		In	Cub	Fm3m	aq		91	91	
	Cs_2PtCl_6		Co	Cub	Fm3m	aq		72 79/92	72 79/92	
	Rb_2PtCl_6		Co	Cub	Fm3m	aq		72 79 92	72 79 92	
	K_2PtCl_6		Co	Cub	Fm3m	aq		72 93 94	72 93 94	
	$(NH_4)_2PtCl_6$		Co	Cub	Fm3m	aq		72	72	
	$(NH_3CH_3)_2PtCl_6$		In	Hex	$R\bar{3}m$	aq		81	81	
	$(N(CH_3)_4)_2PtCl_6$		Co	Cub	Fm3m	aq		95	95	
	$(NH_3(C_2H_5)_2)_2PtCl_6$		In	Cub	$D\bar{3}m1$	aq		85	85	
	Tl_2PtCl_6		Co	Cub	Fm3m	aq		72	72	
	Cs_2PbCl_6		Co	Cub	Fm3m	aq		72 79	72 79	
	Rb_2PbCl_6		Co	Cub	Fm3m	aq		72 79	72 79	
	$(NH_4)_2PbCl_6$					aq		79	79	
	Cs_2ThCl_6	I 573	Co	Hex	$C\bar{3}m$		207	97		
	K_2ThCl_6	I 406					207			
	Na_2ThCl_6	C 360					207			
	Cs_2UCl_6	C 680	Co	Hex	$C\bar{3}m$			97		
	K_2UCl_6	C 655				PD	152		152	
	Na_2UCl_6	C 440				PD	152		152	
	Li_2UCl_6	C 420				PD	155		154	
	$(N(CH_3)_4)_2UCl_6$		In	Cub	Fm3m	aq		98	98	
	$(N(C_2H_5)_4)_2UCl_6$		In	Orth Cu	Fmmm Fm3m	aq		98	98	Below 94°C Above 94°C
	Cs_2PuCl_6		Co	Hex	$C\bar{3}m$	aq		99	99	
	$(N(CH_3)_4)_2PuCl_6$		In	Cu	Fm3m	aq		98	98	
	$(N(C_2H_5)_4)_2PuCl_6$		In	Orth Cub	Fmmm Fm3m			98	98	Below 97°C Above 97°C
	Cs_2 50% + Rb_2 44% $PtCl_6$			Cub	Fm3m	aq		96	96	Compl. Misc.
	Cs_2PtCl_6 50% Cs_2TeCl_6 50%			Cub	Fm3m	aq		92	92	Compl. Misc.
	$NaZrCl_5$	C 330				PD	149		149	
	NH_4PbCl_5					spec			191	From $PbCl_4$ and NH_4Cl
	$CsThCl_5$	C 490					207			
	$KThCl_5$	C 428					207			
	$NaThCl_5$	I 370				aq	207		190	
	$KUCl_5$	I 360				PD	142		142	
	$Na_3Zr_4Cl_{19}$	I 380				PD	155		155	
	$NaZr_2Cl_9$	I 317				PD	150		150	
	CsU_2Cl_9	I 390				PD	142		142	
	KU_3Cl_{13}	I 390				PD	142		142	
V	$CsNbCl_6$	C 528				PD	153		153	
	$RbNbCl_6$	I 360				PD	153		153	
	$KNbCl_6$	C 400				PD	153		153	
	$NaNbCl_6$	I 458				PD	153		153	
	NH_4NbCl_6	I 272				PD	154		154	
	$CsTaCl_6$	C 555				PD	153		153	
	$RbTaCl_6$	C 416				PD	153		153	

Valency of Central Ion	Compound	Melting Pt., °C	Crystal Data: Complete or Incomplete	Crystal Data: Crystal Class	Crystal Data: Space Group	Preparation	Literature: Phase Diagram	Literature: Crystal Structure	Literature: Preparation	Remarks
V	$KTaCl_6$	I 420				PD	153		153	
	$NaTaCl_6$	I 470				PD	153		153	
	$LiTaCl_6$	I 350				PD	153		153	
	NH_4TaCl_6	C 304				PD	154		154	
	$Cs_4FeSbCl_{12}$		In	Cub		aq		87		
	$Rb_4FeSbCl_{12}$		In	Cub		aq		87		
	$K_4FeSbCl_{12}$		In	Cub		aq		87		
	$(NH_4)_4FeSbCl_{12}$		In	Cub Tet	P4/mmm	aq		87		Fresh prep. Aged
	$(NH_4)_4InSbCl_{12}$		In	Cub		aq		87		
	$(NH_4)_4TlSbCl_{12}$		In	Cub		aq		87		

Remarks:

The compounds are listed according to

a) valency;

b) formula type, in the general order $A_xB_yCl_z$, $A > B$ to $A < B$;

c) atomic number of the central ion (within each formula type);

d) in the order Cs, Rb, K, Na, Li, Tl, NH_4, substituted amines, others;

e) compounds with the ion $AuCl_6^{3-}$ or $M^{III}SbCl_{12}^{4-}$ are listed together.

Abbreviations:

PD	Phase Diagram
I	Incongruent melting
C	Congruent melting
In	Incomplete — Structure data
Co	Complete — Structure data
Mon	Monoclinic
Orth	Orthorhombic
Tet	Tetragonal
Hex	Hexagonal
Cub	Cubic
aq	From aqueous (or acidified) solution
H_2O	Anhydrous compound can be obtained by heating or dehydration under vacuum

under ascumu

H^2O Halogenous compounds can be obtained by passing or deprotration

ed Ethoxe adenous (or acidities) solution

Cap Capic

Hex Hexagonal

Tet Tetragonal

Orth Orthorhombic

Mon Monoclinic

Co Complete

In Incomplete

structure data

C Congruent melting

I Incongruent melting

PD Phase Diagram

Abbreviations:

a) compounds with the line $MnCl_2$ or $MnBr_2$ are listed together.

b) In the order Cs, Rb, K, Na, Li, NH_4, substituted ammonia.

c) atomic number of the central ion (within each formula type).

d) formula type, in the general order $A^xB^yCl^z$, $A > B$ is $A < B$.

e) anhydr:

Tpercompounds are listed according to

Remarks:

| | | |

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