tion is readily understood. Of course, in the absence of compelling evidence, translation of such large blocks *in toto* must be considered unlikely. The conservative view is to postulate the reorganization of the structure to be brought about by the diffusion of much smaller blocks, consisting of from one to perhaps three atoms each, which then reassemble in a pattern that recreates many of the features of the original structure.

A stereoscopic drawing of the structure of the M' phase is shown in Fig.4.

The Patterson, Fourier, and least-squares calculations were performed at the California Institute of Technology under the CRYRM crystallographic computing system (Duchamp, 1964) through the generosity of Prof. R.E. Marsh, to whom the author is also greatly indebted for his expert advice on data handling. Dr W.R.Busing, Oak Ridge National Laboratory, was kind enough to furnish the computer program ORABS. Thanks are also due Mr W. Gehrer who patiently, over a period of many months, measured the intensities and backgrounds one by one.

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# The Crystal Structure of a Double Oxalate of Yttrium and Ammonium, NH<sub>4</sub>Y(C<sub>2</sub>O<sub>4</sub>)<sub>2</sub>.H<sub>2</sub>O

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A three-dimensional X-ray analysis of NH<sub>4</sub>Y(C<sub>2</sub>O<sub>4</sub>)<sub>2</sub>. H<sub>2</sub>O has yielded the positions of all the atoms except hydrogen with standard deviations of 0.0012 Å for Y, and less than 0.02 Å for the other atoms. The crystals are monoclinic with  $a=9.18\pm0.01$ ,  $b=6.09\pm0.01$ ,  $c=7.89\pm0.01$  Å,  $\beta=90.2^{\circ}\pm0.1^{\circ}$ ; space group P2/n; Z=2. There is ninefold coordination; eight oxygen atoms and the H<sub>2</sub>O form a slightly distorted trigonal prism arrangement around the yttrium, at distances ranging from 2.343 Å (for the H<sub>2</sub>O) to 2.412 Å. The two independent oxalate ions are planar and have crystallographic centres of symmetry. Their dimensions are in agreement with the results of previous work on oxalates.

#### Introduction

Hydrated oxalates of the rare earths having the composition  $Ln_2(C_2O_4)_3$ .  $10H_2O$  (Ln=lanthanide) have been known for some time, and are thought to be interstitial hydrates though their detailed structures are not known (Gilpin & McCrone, 1952). Recently, Barrett, McDonald & Topp (1964) made a study of the precipitation of the rare earth oxalates from oxalic acid solution, in the course of which a new series of double salts was discovered with the composition  $NH_4Ln(C_2O_4)_2.nH_2O$ . Yttrium and the elements in the group Sm-Tm formed monohydrates which appeared to be isomorphous, while the remaining rare earths formed trihydrates exhibiting a number of different X-ray powder diffraction patterns. The monohydrated yttrium salt was obtained as single crystals and the present paper describes an X-ray analysis of the structure. The other members of the monohydrate series presumably also have this structure.

#### Experimental

 $NH_4Y(C_2O_4)_2$ .  $H_2O$  is precipitated from strongly acidic solutions containing an excess of oxalate ion by the addition of ammonia. Prepared in this way, it is a fine powder. Crystals for the present work were grown hydrothermally. The prisms so obtained showed development of the forms  $\{010\}$  and  $\{101\}$  and were invariably twinned.

The intensity data were collected from three sets of equi-inclination Weissenberg photographs: (0-5, k, l), (h, k, 0-6), and (h, 0-4, l). Nickel-filtered Cu K $\alpha$  radia-

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tion was used throughout. The crystal used for the aand c-axis photographs measured  $0.1 \times 0.2 \times 0.3$  mm, and the oscillation directions were approximately along the diagonals of the largest face. A fragment of the same crystal was used for the *b*-axis setting. This crystal, like all the others, was twinned, but one component was much stronger than the other and no difficulty was experienced in indexing the photographs. Intensities were measured visually and brought to the same scale by direct comparison of reflexions common to the different sets of photographs, after correction for Lorentz and polarization factors. Absorption corrections were not applied. The relative  $F^2$  values so obtained were used directly to compute the Patterson function in three dimensions. In all, 938 independent non-zero reflexion intensities were measured.

## Crystal data

The crystals are monoclinic with:

 $a=9.18\pm0.01$ ,  $b=6.09\pm0.01$ ,  $c=7.89\pm0.01$  Å,  $\beta=90.2\pm0.1^{\circ}$ . Systematic absences: h0l for (h+l) odd; space group P2/n (no.13); Z=2; linear absorption coefficient for Cu K $\alpha$ : 58 cm<sup>-1</sup>; density calculated for two formula weights per unit cell: 2.27 g.cm<sup>-3</sup>; density measured by flotation: 2.26 g.cm<sup>-3</sup>.

#### Structure analysis and reflinement

The coordinates of all the atoms except those in NH<sub>4</sub> and H<sub>2</sub>O were readily found from the three-dimensional Patterson sections. A projection of the structure along the *b* axis is shown in Fig.1. The carbon and oxygen atoms are in general positions of P2/n:

$$\pm (x y z; \frac{1}{2} - x y \frac{1}{2} - z);$$

the yttrium atoms and the  $NH_4$  and  $H_2O$  are situated on the twofold axes, while the two pairs of oxalate ions (which are not equivalent) are located on crystallographic centres of symmetry. The asymmetric unit thus consists of one Y atom,  $NH_4$  and  $H_2O$  together with two half oxalate ions, making nine atoms in all, excluding the hydrogen atoms.

Sections of the three-dimensional electron density function, calculated from signs determined by the coordinates of the yttrium atoms and oxalate ions, were used to locate the NH<sub>4</sub> and H<sub>2</sub>O. One extra peak, of about the same height as a carbon atom, was found within the sphere of attraction of the yttrium at  $x=\frac{1}{4}$ , y=0.51,  $z=\frac{1}{4}$ , and a second appeared on the other twofold axis at  $x=\frac{1}{4}$ , y=0.48,  $z=\frac{3}{4}$ . The *R* index at this stage was 31%. Of the two extra peaks, that closer to the yttrium was the larger and was believed to be the H<sub>2</sub>O, but initially both were put in as oxygen atoms for the least-squares refinement.

The scale factor, atomic coordinates and anisotropic thermal parameters were refined on DEUCE with the structure factor least-squares program of J.S. Rollett. The program calculates thermal parameters  $B_{ij}$  for each atom according to:

$$f = f_0 \exp\{-0.693(h^2 B_{11} + k^2 B_{22} + l^2 B_{33} + k l B_{23} + h l B_{31} + h k B_{12})\}.$$

Initially, weighting scheme no. 2 was used:

for 
$$|F_o| \le |F^*|$$
,  $|w_2 = |F_o|/|F^*|$   
for  $|F_o| > |F^*|$ ,  $|w_2 = |F^*|/|F_o|$ 

where  $F^*$  is some fixed value near the middle of the range. The atomic scattering factors used were those of Berghuis, Haanappel, Potters, Loopstra, MacGillavry & Veenendaal (1955) for oxygen and carbon, while that of Thomas & Umeda (1957) was used for yttrium. After six rounds of refinement using this scheme, R was reduced to 11.7%.

At this stage, new electron density sections were calculated through the centres of the atoms, and it was now evident that the H<sub>2</sub>O was associated with the yttrium. This peak was higher than the other in the ratio of 8:7, and it made contacts of  $2 \cdot 7 - 2 \cdot 8$  Å with the neighboring atoms, appropriate to  $O-H\cdots O$ bonds, while the second peak had contacts of  $2 \cdot 9 - 3 \cdot 0$  Å which would be expected for  $N-H\cdots O$  bonds. Another two rounds of refinement were now carried out, making eight in all, with the appropriate scattering factors. The effect of this was to change R to  $11 \cdot 6\%$ , scarcely a significant improvement.

The effect of altering the weighting scheme to no. l was now tried:

for 
$$|F_o| \le |F^*|$$
,  $\sqrt{w_1} = 1$   
for  $|F_o| > |F^*|$ ,  $\sqrt{w_1} = |F^*|/|F_o$ 

When the refinement was continued with this scheme, the R value fluctuated at first, and it was found necessary to apply half-shifts. However, after another eight rounds, satisfactory convergence was achieved with R now equal to 10.5% and no shift greater than 0.0001. The changes in the atomic coordinates brought about by changing the weighting scheme are shown in Table 2. These are the differences between the results of the 8th and the 16th rounds of refinement. In the case of the x and z coordinates, it will be seen that the shifts are all less than the s.d.'s based on round 16 (cf. Table 1), but some of the y shifts are considerably greater than the corresponding s.d.'s. Whether these changes represent a real gain in accuracy is questionable. In any case, the final coordinates listed in Table 1 are taken from the 16th round, as are the individual values of the anisotropic temperature factors listed in Table 3.

# Table 1. Fractional atomic coordinates with standard deviations

	x	y	4
Y	0.7500 (0)	0.1045 (2)	0.7500 (0)
C(1)	0.4556 (14)	0.0967 (20)	0.5347 (18)
C(2)	0.5140 (15)	0.1071 (22)	0.0473 (17)
O(1)	0.3256 (12)	0.1104 (18)	0.4913 (13)
O(2)	0.5227(11)	0.2283 (16)	0.6323 (13)
O(3)	0.4356 (10)	0.1551 (14)	0.1704 (11)
O(4)	0.8840 (10)	0.2286 (14)	0.5104 (12)
H <sub>2</sub> O	0.2500 (0)	0.5108 (21)	0.2500 (0)
NH4	0.2500 (0)	0.4853 (33)	0.7500 (0)

Observed and calculated structure factors are compared in Table 4.

 Table 2. Changes in fractional coordinates

 produced by altering the weighting scheme

	x	у	Z
Y	0	0.0002	0
C(1)	0.0005	0.0036	0.0009
C(2)	0.0001	0.0007	0.0001
O(1)	0.0009	0.0024	0.0002
O(2)	0.0002	0.0010	0.0005
O(3)	0.0006	0.0027	0.0003
O(4)	0.0000	0.0038	0.0003
$H_2O$	0	0.0020	0
NH	0	0.0009	0

## **Description of the structure**

The most interesting feature of the structure is the coordination around the yttrium atom. There are nine oxygen atoms within 2.42 Å of the yttrium, as shown in Fig. 1. Looking down the twofold axis, there appears to be a distorted anti-prism arrangement of eight oxygen atoms with the ninth on the axis. However, if the nine atoms are projected normally onto a plane containing the twofold axis and the bond O(1)-Y-O(1'), the true symmetry of the coordination polyhedron is revealed. The projection is shown in Fig. 2, and it will be seen that there is substantially threefold symmetry



Fig. 1. Projection of the structure along the b axis, with the atoms numbered to correspond to Table 1.

in this direction. The coordination group of the yttrium is thus a distorted trigonal prism with three extra atoms opposite the rectangular faces. The prism is outlined in Fig.3 (a redrawing of part of Fig.1), where its configuration with respect to the twofold axis is clearly shown. The bonds Y–O(1), Y–O(1') and Y–H<sub>2</sub>O must be imagined as perpendicularly intersecting the sides of the prism. The triangular ends, formed by the atoms O(2), O(3) and O(4), are not quite parallel to the plane of the three central bonds, but the deviations from trigonal symmetry are small. The five independent Y-O distances, listed in Table 5, range from 2.412 to 2.343 Å (for Y-H<sub>2</sub>O). The closest approach of two oxygen atoms not belonging to the same oxalate ion

## Table 3. Anisotropic thermal parameters

	B <sub>11</sub>	$B_{22}$	B <sub>33</sub>	$B_{23}$	$B_{31}$	$B_{12}$
Y	0.0036	0.0039	0.0088	0	0.0068	0
C(1)	0.0069	0.0081	0.0175	-0.0067	0.0064	0.0041
C(2)	0.0091	0.0137	0.0134	0.0017	0.0059	0.0036
O(1)	0.0107	0.0220	0.0143	-0.0084	0.0017	0.0039
O(2)	0.0088	0.0141	0.0183	-0.0147	-0.0020	0.0068
O(3)	0.0078	0.0077	0.0131	-0.0018	0.0119	0.0017
O(4)	0.0091	0.0083	0.0149	0.0016	0.0168	0.0084
H <sub>2</sub> O	0.0094	0.0063	0.0207	0	0.0102	0
$NH_4$	0.0147	0.0212	0.0223	0	0.0130	0

Table 4. Observed and calculated structure factors

The columns give respectively l,  $F_c$  and  $KF_o$  for each pair of values h, k.

H=0,K=0 R=0,K=5	B=1,K=1 H=1,K=4	H=1,K=7 H	-2,K-2	H=2,K=4	E=3,K=0	H=3,K=3	8-3,K-6	H=4,K=1
4 420 380 -1 061 08	5 5 -147 141 -7 097 10	2 -2 179 170	-2 183 208	6 -085 086	5 214 236	-4 -262 26	3 -4 143 16	0 7 - 057 077 7 8 077 092
6 -083 091 2 165 17	8 6 -137 146 -6 -124 12 6 7 122 134 -5 -181 17	6 -1 -033 035 · 4 0 -154 142	-1 202 213 0 -288 276	7 064 064	7 -131 154	-3 -084 10	-3 -087 10	9 060 067
10 -104 091 4 -249 23	8 109 123 -3 067 09	1 2 142 114	2 168 157	H=2,K=5	B=3,K=1	-1 061 087	-1 116 16	-9 -113 092
R=0,K=1 5 -032 02	3 9 -066 064 -2 -124 13 10 -055 035 -1 -210 24	3 3 025 017	3 050 064	-6 -144 141	-9 -102 112	0 -349 309	0 167 18	-8 061 066
2 038 076 7 040 05	L H=1,K=2 0 082 09	1 4 -175 114	5 -203 201	-3 -008 012	-7 119 126	2 145 119	2 -105 10	-7 191 195 -6 -031 030
3 -120 116 H=0,X=6	-8 050 074 1 196 17	9 H=2,K=0	6 025 021 7 101 114	-2 -263 297	-6 098 114	3 099 099	3 118 11	-5 -113 127
4 214 174 0 -167 193 5 131 129 1 -103 12	3 -6 -251 254 3 -298 23	8 -8 -204 197	8 -072 077	0 235 250	-4 -122 150	5 -089 095	4 054 073	-4 173 205
6 -049 057 3 154 16	-5 135 147 4 122 11	2 -6 219 223	9 -100 110	1 031 033	-3 127 173	6 160 152	6 -087 07	-2 -055 071
7 -131 133 4 -126 14	2 -3 005 012 6 -050 04	6 -2 384 381	-9 111 093	4 159 138	-1 -273 277	8 -092 087	= 3, K=7	-1 -200 199
9 091 087 6 073 079	-2 -489 394 7 -113 11	2 0 -136 174 -	-8 090 084	5 -041 044	0 -148 132	9 -042 033	-2 -125 13	1 293 236
10 -072 052 H=0,K=7 H=0,K=2 0 -067 08	2 0 175 154 H=1,K=5	4 -403 363 -	-6 -113 112	H=2,K=6	2 417 331	-8 -072 072	0 120 129	2 -023 030
1 204 179 1 -167 168	3 1 -013 049 -7 118 11	2 6 242 266 -	-5 173 165 -4 125 147	-6 -04 3 039	3 -208 206	-7 -084 077	2 -164 150	4 173 174
2 -184 192 3 126 120	3 3 198 167 -5 -199 19	5 10 055 046 -	-3 -193 221	-4 115 134	5 152 164	-5 214 205	H-4.X-0	5 171 178
4 148 149	4 176 149 -4 -034 02	8 H=2,K=1	-2 -097 133	-3 122 149	6 104 122	-4 -155 165	-8 088 084	7 -088 102
5 202 187 E=1,K=0 6 -123 127 -9 157 151	6 -169 175 -2 056 08	4 -7 -105 111	0 073 086	-1 -171 204	9 079 099	-3 -109 132	-6 -312 31	8 029 052
7 -178 174 -7 -124 134	7 055 065 -1 -234 25	8 -6 114 129	1 - 338 265	0 068 082	H=3,X=2	-1 287 351	-2 -460 460	H-4.K-3
9 108 108 -5 149 150 H=0.K=3 =3 -290 290	6 H=1,K=3 1 177 15	6 -4 -129 150	3 177 147	2 -110 108	-8 -152 146	1 -058 059	2 -325 293	-8 -031 017
0 -430 374 -1 436 39	2 -9 -067 057 2 040 04	63460 429	-4 181 165 5 -130 128	3 -103 092	-6 099 106	2 037 043	4 141 150	-6 118 122
1 184 184 3 272 25	-7 037 043 5 116 11	0 -1 027 025	6 -105 099	5 079 090	-4 -236 247	4 -073 076	8 128 157	-5 -158 161
3 -293 267 7 154 17	5 -6 -282 266 7 -136 12	6 0 -007 028	7 131 120	6 -067 065	-3 019 030	5 -135 135	H=4,K-1	-3 263 283
4 -142 143 9 -090 099 5 197 189 E-1.K-1	-4 076 083 -6 155 15	2 2 193 165	9 -092 071	-4 064 065	-1 -261 275	7 124 126	-9 -0/9 0/8	-2 205 220
6 020 017 -10 -050 03	7 -3 064 088 -5 -097 09	5 3 004 017 H 7 4 -169 152 -	-2.K-4 -8 130 119	-3 174 195	0 -343 284	8 -060 049	-7 155 169	0 -150 160
8 -062 067 -8 067 064	-1 -122 152 -3 154 16	5 -206 206 -	-7 -078 081	-1 -078 083	2 378 294	-7 -083 080	-5 -057 072	2 105 101
9 079 071 -7 -099 114	5 0 103 098 -2 166 17	9 6 112 140 - 6 7 042 028 -	-5 071 073	1 169 154	3 -040 037	-6 044 052	-4 137 165	3 -187 171
0 -215 260 -5 161 16	2 - 349 247 0 - 081 09	8 -099 110 -	-4 079 091	3 -106 094	5 040 048	-3 -136 166	-2 -176 208	5 201 191
1 115 134 -4 201 19	3 -124 109 1 080 08	5 9 -066 076 - 0 H=2.K=2 -	-2 -119 158	R= 3. F=0	6 166 172	-2 -034 051	-1 -163 189	6 063 072
3 -105 118 -2 -393 348	5 095 099 3 -059 05	9 -9 069 073 -	-1 076 109	-9 -105 105	8 -054 046	0 105 127	1 276 242	8 -055 056
4 -178 184 -1 307 270	0 6 -119 110 4 -100 09 7 -046 035 5 096 09	7 -8 -058 051	1 -112 118	-7 204 199	8-3,K-3	1 -151 142	2 -074 087	H=4,K=4
6 091 099 1 -275 20	8 107 099 6 081 07	-6 070 072	2 -175 170	-3 214 267	-8 -152 146	5 -133 127	4 105 125	-7 058 058
7 -044 043 2 051 080	9 027 012 H=1,K=7	4 -4 -059 071	4 138 129	-1 -221 247	-7 -094 086	H=3,K=6	5 076 093	-6 104 108
0 = 0 34 0 46 5 201 2 3		• • • •			-0 000 001	-0 -030 02)	0 =000 101	-2 -099 093
E-4,K-4 E-5,K-0	H=5,K=3 H=5,K=6	H=6,K=2 H=	6, <b>K</b> =6 3 132 141	H=7,K=2	H=8,K=0	H=8,K=3	B=7,X=2 -5 061 058	H=10,K=1 0 _111 118
H=4,K=4 H=5,K=0 -4 -214 216 -7 -108 109 -3 132 162 -5 165 18	H-5,K-3 H-5,K-6 -6-156151 2 092 08 -5-052 049 3-111 109	H=6,K=2 B= 3 086 091 = 4 -016 012 =	6,K=6 3 132 141 -2 -105 124	H=7,X=2 6 076 079 7 -034 030	H-8,K-0 -6 -203 182 -4 219 214	H=8,K=3 2 073 076 3 -169 151	B=7,K=2 -5 061 058 -4 129 112	E-10,K-1 0 -111 118 1 -083 088
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	H=6,K=2 H= 3 086 091 = 4 -016 012 = 5 -176 182 = 6 045 052	6,K=6 -3 132 141 -2 -105 124 -1 -078 084 0 053 048	H=7,K=2 6 076 079 7 -034 030 H=7,K=3	H=8,K=0 =6 -203 182 -4 219 214 +2 -151 168	H=8,K=3 2 073 076 3 -169 151 4 -063 059 5 076 066	B=7,K=2 -5 061 058 -4 129 112 -3 -032 030 -2 -137 137	H=10,K=1 0 =111 118 1 =083 088 2 073 076 3 053 052
E=4,K=4 E=5,K=0 -4 -214 216 -7 -108 103 -3 132 162 -5 165 18 -2 136 153 -3 -260 30 -1 -104 117 -1 487 44 0 -175 183 1 -197 18	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{rrrrr} H=6,K=2 & H=\\ 5 & 0.86 & 0.91 & -\\ 4 & -0.16 & 0.12 & -\\ 5 & -1.76 & 1.82 & -\\ 6 & 0.45 & 0.52 & -\\ 7 & 0.96 & 11.3 & -\\ H=6 & K=3 & -\end{array}$	6, <b>K</b> =6 -3 132 141 -2 -105 124 -1 -078 084 0 053 048 1 159 152 - 050 040	H=7, X=2 6 076 079 7 -034 030 H=7, X=3 -7 -067 057 -6 123 111	H=8,K=0 =6 -203 182 -4 219 214 +2 -151 168 0 199 193 2 -207 203	H=8,K=3 2 073 076 3 -169 151 4 -063 059 5 076 066 6 054 059	E-7, K-2* -5 061 058 -4 129 112 -3 -032 030 -2 -137 137 -1 035 037	E=10,K=1 0 =111 118 1 =083 088 2 073 076 3 053 052 4 =070 069 5 =082 083
H=4,K=4 H=5,K=0 -4 -214 216 -7 -108 100 -3 132 162 -5 165 18 -2 136 153 -3 -260 300 -1 -104 117 -1 487 44 0 -175 183 1 -197 18 1 042 039 3 246 24 2 057 033 5 -039 04	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{rrrrr} H=6, K=2 & H=\\ 5 & 3 & 086 & 091 & =\\ 4 & -016 & 012 & =\\ 5 & -176 & 182 & =\\ 6 & 045 & 052 & =\\ 7 & 096 & 113 & \\ H=6, K=3 & &\\ =-7 & -162 & 143 & \\ \end{array}$	-6,K=6 -3 132 141 -2 -105 124 -1 -078 084 0 053 048 1 159 152 2 -055 049 3 -056 049	H=7, X=2 6 076 079 7 -034 030 H=7, K=3 -7 -067 057 -6 123 111 -5 081 073 -4 -158 145	H=8, K=0 =6 -203 182 -4 219 214 +2 -151 168 0 199 193 2 -207 203 4 142 158 6 -115 132	H-8,K-3 2 073 076 3 -169 151 4 -063 059 5 076 066 6 054 059 H-8,K-4 -5 -074 072	B-7, K-2* -5 061 058 -4 129 112 -3 -032 030 -2 -137 137 -1 035 037 0 186 189 2 -139 121	E=10,K=1 0 =111 118 1 =083 088 2 073 076 3 053 052 4 =070 069 5 =082 083 E=10,K=2
$ \begin{array}{rrrr} H=4,K=4 & H=5,K=0 \\ -4,=214 & 216 & -7 & -108 & 100 \\ -3 & 132 & 162 & -5 & 165 & 183 \\ -2 & 136 & 153 & -3 & -260 & 300 \\ -1 & -104 & 117 & -1 & 487 & 44 \\ 0 & -175 & 183 & 1 & -197 & 18^{\circ} \\ 1 & 042 & 039 & 3 & 246 & 24 \\ 2 & 027 & 033 & 5 & -039 & 041 \\ 3 & -054 & 055 & 7 & 107 & 200 \\ \end{array} $	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	6, x=6 -3 132 141 -2 -105 124 -078 084 0 053 048 1 159 152 2 -055 049 3 -056 049 4 063 051 7, x=0	H=7, K=2 6 076 079 7 -034 030 H=7, K=3 -7 -067 057 -6 123 111 -5 081 073 -4 -158 145 -2 185 187 F	H=8,K=0 =6 -203 182 =4 219 214 +2 -151 168 0 199 193 2 -207 203 4 142 158 6 -115 132 H=8,K=1	H=8,K=3 2 073 076 3 -169 151 4 -063 059 5 076 066 6 054 059 H=8,K=4 -5 -074 072 -4 -092 102 -7 070		H=10,K=1 0 =111 118 1 =-083 088 2 073 076 3 053 052 4 =070 069 5 =-082 083 H=10,K=2 =-4 =-055 056 =-3 =113 108
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{rrrr} H=6, K=2 & H=\\ 5 & 3 & 086 & 091 & -\\ 4 & -016 & 012 & -\\ 5 & 5 & -176 & 182 & -\\ 6 & 045 & 052 & 7\\ 7 & 096 & 113 & \\ H=6, K=3 & -\\ -7 & -162 & 143 & -\\ -5 & 142 & 135 & H=\\ -5 & 142 & 135 & H=\\ -4 & 055 & 012 & -\\ \end{array}$	$\begin{array}{c} 66, \mathbf{x} = 6 \\ -3 & 1 & 32 & 1 & 41 \\ -2 & -1 & 05 & 1 & 24 \\ -1 & -0 & 78 & 0 & 84 \\ 0 & 0 & 53 & 0 & 48 \\ 1 & 1 & 59 & 1 & 52 \\ 2 & -0 & 55 & 0 & 49 \\ 3 & -0 & 56 & 0 & 49 \\ 3 & -0 & 56 & 0 & 49 \\ 4 & 0 & 63 & 0 & 51 \\ 7 & \mathbf{x} = 0 \\ 7 & 1 & 39 & 1 & 26 \end{array}$	R=7,K=2 6 076 079 7 -034 030 H=7,K=3 -7 -067 057 -6 123 111 -5 081 073 -4 -158 145 -2 185 187 F -1 054 052 0 -205 205	H=8,K=0 =6 -203 182 -4 219 214 +2 -151 168 0 199 193 2 -207 203 4 142 158 6 -115 132 H=8,K=1 -7 084 080 -6 -131 122	H=8,K=3 2 073 076 3 -169 151 4 -063 059 5 076 066 6 054 059 H=8,K=4 -5 -074 072 -4 -092 102 -3 079 078 -2 156 148		H=10,K=1 0 =111 118 1 -083 088 2 073 076 3 053 052 4 -070 069 5 -082 083 H=10,K=2 -4 -055 056 -3 -113 108 -1 118 112
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{rrrr} H=6, K=2 & H=\\ 5 & 3 & 086 & 091 & -\\ 4 & -016 & 012 & -\\ 5 & 5 & -176 & 182 & -\\ 6 & 045 & 052 & -\\ 7 & 076 & 113 & -\\ 7 & -162 & 143 & -\\ -5 & -142 & 135 & H=\\ -4 & 055 & 072 & -\\ 5 & -3 & -216 & 240 & -\\ -2 & -142 & 163 & -\\ \end{array}$	$\begin{array}{c} 6, \mathbf{x} = 6 \\ 3 132 141 \\ 2 = -105  124 \\ 1  -078  084 \\ 0 053 048 \\ 1 199 152 \\ 2  -055  049 \\ 3  -056  049 \\ 4 063 051 \\ 7 139 126 \\ 7 139 126 \\ 5  -248 235 \\ 3 100 118 \end{array}$	R=7,K=2 6 076 079 7 -034 030 H=7,K=3 -7 -067 057 -6 123 111 -5 081 073 -4 -158 145 -2 185 187 F -1 054 052 0 -205 205 1 -069 063	H=8, K=0 =6 -203 182 -4 219 214 +2 -151 168 0 199 193 2 -207 203 4 142 158 6 -115 132 H=8, K=1 -7 084 080 -6 -131 122 -5 -082 083	H=8,K=3 2 073 076 3 $-169$ 151 4 $-063$ 059 5 076 066 6 054 059 H=8,K=4 -5 $-074$ 072 -4 $-092$ 102 -3 079 078 -2 156 148 -1 $-068$ 064 0 $-068$ 064	$\begin{array}{c} \cdot \\ -5 & 061 & 058 \\ -4 & 129 & 112 \\ -3 & -032 & 030 \\ -2 & -137 & 137 \\ -1 & 035 & 037 \\ 0 & 186 & 189 \\ 2 & -139 & 121 \\ 3 & 072 & 079 \\ 4 & 123 & 112 \\ 5 & -030 & 030 \\ 6 & -073 & 059 \\ \end{array}$	H=10,K=1 0 -111 118 1 -083 088 2 073 076 3 053 052 4 -070 067 5 -082 083 H=10,K=2 -4 -055 056 -3 -113 108 -1 118 112 0 -064 069 1 -129 117
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	46, <b>F</b> = 6 -3 132 141 -2 -105 124 1 -078 084 0 053 048 1 199 152 -055 049 3 -056 049 4 063 051 -7. <b>K</b> = 0 -7. <b>1</b> 39 126 -5 -248 235 -3 100 118 1 -198 230 	E=7, K=2 6 076 079 7 -034 030 E=7, K=3 -7 -067 057 -6 123 111 -5 081 073 -4 -158 145 -2 185 187 E -1 054 052 0 -205 205 1 -069 063 2 128 119 3 101 103	H=8, K=0 =6 -203 182 -4 219 214 +2 -151 168 0 199 193 2 -207 203 4 142 158 6 -115 132 H=8, K=1 -7 084 080 -6 -131 122 -5 -082 083 -4 105 112 -3 086 103	$\begin{array}{c} H=8, K=3\\ 2 & 073 & 076\\ 3 & -169 & 105\\ 4 & -063 & 059\\ 5 & 076 & 066\\ 6 & 054 & 059\\ H=8, K=4\\ -5 & -074 & 072\\ -3 & 079 & 078\\ -4 & -092 & 102\\ -3 & 079 & 078\\ -1 & -068 & 064\\ 0 & -055 & 064\\ 2 & 104 & 091 \end{array}$	- -5 061 058 -4 129 112 -3 -032 030 -2 -137 137 -1 035 037 0 186 189 2 -139 121 3 072 079 4 123 112 5 -030 030 6 -073 059 -5 -051 048	E=10,K=1 0 -111 118 1 -083 088 2 073 076 3 053 052 4 -070 069 5 -082 083 H=10,K=2 -4 -055 056 -3 -113 108 -1 118 112 0 -064 069 1 -129 117 2 053 052
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{c} 46, \mathbf{F} = 6\\ 3  132  141\\ 2 = -105  124\\ 1  -078  084\\ 0  053  048\\ 1  159  152\\ 2  -055  049\\ 4  063  051\\ 7, \mathbf{K} = 0\\ 7  139  126\\ 5  -248  235\\ 1  0118\\ 1  -198  230\\ 1  111  178\\ 3  -237  246 \end{array}$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	i=8, k=0 =6 -203 182 -4 219 214 *-2 -151 164 0 199 193 2 -207 203 4 142 158 6 -115 132 i=8, k=1 -7 084 080 -6 -131 122 -5 -082 083 -4 105 112 -3 086 105 -3 086 105	H-8,K-3 2 073 076 3 -169 151 4 -063 059 5 076 066 6 054 059 H-8,K-4 -5 -074 072 -4 -092 102 -3 079 078 -1 50 148 -1 -068 064 0 -055 043 2 104 091 3 -076 067 4 -074 077	- -5 061 058 -5 061 058 -4 129 112 -3 -032 030 -2 -137 137 -1 035 037 -1 035 037 -1 035 037 -1 035 037 -1 035 037 -1 035 037 -1 035 037 -5 -051 048 -4 139 129 -3 121 125	H=10,K=1 0 -111 118 1 -083 088 2 073 076 3 053 052 4 -070 069 5 -082 083 H=10,K=2 -4 -055 056 -3 -113 108 -1 118 112 0 -064 069 1 -129 117 2 053 052 3 102 936 4 -039 052
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} H=6,K-2; & H=\\ 3 & 086 & 091 & -\\ 5 & -116 & 102 & -\\ 7 & 096 & 113 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & 103 & -\\ -7 & -162 & -163 & -\\ -7 & -7 & -163 & -\\ -7 & -7 & -163 & -\\ -7 & -7 & -163 & -\\ -7 & -7 & -7 & -\\ -7 & -7 & -7 & -$	$\begin{array}{c} \mathbf{46, g=6} \\ 3 132 141 \\ \mathbf{2-105}  124 \\ \mathbf{1-078}  084 \\ \mathbf{1-078}  084 \\ \mathbf{1-197}  152 \\ \mathbf{2-055}  049 \\ \mathbf{3-056}  049 \\ 4 063 051 \\ 7 159 126 \\ \mathbf{3-056}  049 \\ 4 063 051 \\ 7 159 126 \\ \mathbf{5-248}  235 \\ \mathbf{3-100}  118 \\ 171 178 \\ 230 \\ \mathbf{1-171}  178 \\ 277 \\ 246 \\ \mathbf{5-178}  207 \\ 5 178 207 \\ 56 56 \\ 56 178 207 \\ 56 56 \\ 56 \\ 56 \\ 56 56 \\ \mathbf$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{llllllllllllllllllllllllllllllllllll$	-5 061 058 -4 129 112 -3 -032 030 -2 -137 137 -1 035 037 0 186 189 2 -139 121 3 072 079 4 123 112 5 -030 030 6 -073 059 H=9,K=3 -4 139 129 -3 132 127 -3 132 127 -4 139 129 -3 132 127 -4 139 129 -4 139 129 -3 132 127 -4 139 129 -4 139 129 -4 139 129 -4 139 129 -5 132 127 -5 132	H=10,K=1 0 -111 118 1 -083 088 2 073 076 3 053 052 4 -070 069 5 -082 083 H=10,K=2 -4 -055 056 -3 -113 108 -1 118 112 0 -064 069 1 -129 117 2 053 052 3 102 936 4 -049 052 H=10,K=3 -7 07 -7
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{rrrr} H=6_{1}K=6_{2}K=6_{2}K=6_{2}K=2\\ 5-3066012-3\\ 5-3176182-3\\ 5-3176182-7\\ 7096113\\ H=6_{1}K-3\\ -7-162143\\ -5142135\\ -7-162143\\ -5126240\\ -5126240\\ -5126240\\ -2-142135\\ -2-142125\\ -2-142125\\ -2-142125\\ -2-142125\\ -2-142125\\ -2-142125\\ $	$\begin{array}{c} \mathbf{46, g=6} \\ 3 132 141 \\ \mathbf{2=105}  124 \\ \mathbf{1=078}  084 \\ \mathbf{1=078}  084 \\ \mathbf{1=159}  152 \\ \mathbf{2=055}  049 \\ 4 063 051 \\ \mathbf{7, K=0} \\ \mathbf{7, K=0} \\ 7 139 126 \\ \mathbf{3=237}  246 \\ \mathbf{3=237}  246 \\ 5 171 178 \\ \mathbf{3=237}  246 \\ 5 178 207 \\ \mathbf{7, K=1} \\ \mathbf$	$\begin{array}{c} \text{H}-7, \text{K}-2 & \text{I}\\ 6 & 076 & 079 & 079 & 076 & 079 & 076 & 077 & 07$	I=8, K=0 =6 -203 182 =4 219 214 =2 -151 168 0 199 193 2 -207 203 4 142 158 6 -115 132 I=8, K=1 =7 084 080 =6 -131 122 =5 -082 083 4 105 112 =3 086 103 =2 -114 132 =1 -152 192 0 083 084 1 2 -115 20 124	H-8, K-3 2 073 076 3 -169 151 4 -063 079 5 076 066 6 054 059 H-8, K-4 -5 -074 072 -4 -092 102 -3 079 078 -2 156 148 -1 -068 064 0 -055 043 2 104 091 3 -076 067 4 -074 067 5 044 048 H-8, K-5 -3 -010 027 -3 -010 04 -3 -010 04 -3 -010 04 -5 -014 027 -5 -014 027 -3 -010 04 -5 -014 027 -5 -014 027 -3 -010 04 -5 -014 027 -5 -014 027 -3 -010 04 -5 -014 027 -5 -014 02	-5 061 058 -4 129 112 -3 -032 030 -2 -137 137 -1 035 037 0 186 189 2 -139 121 3 072 079 4 123 112 5 -030 030 6 -073 059 E=9,E-3 -5 -030 030 6 -073 059 E=9,E-3 -5 -030 030 6 -073 059 E=9,E-3 -5 -030 04 -1 121 125 -2 -139 118 -1 -046 044 0 123 133 -5 123 133	H=10,K=1 0 =111 118 1 =083 088 2 073 076 3 053 052 4 =070 069 5 =082 083 H=10,K=2 -4 =055 056 -3 =113 108 -1 118 112 0 =064 069 1 =129 117 2 0 30 076 4 =049 052 H=10,K=3 -3 =077 067 -2 =101 105
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{rrrr} H=6_1f=2 & B=\\ 5 & 366 \ coll = -\\ 4 & -016 \ 012 & -\\ 5 & -176 \ 182 & -\\ 6 & 045 \ 052 & -\\ 7 & 096 \ 113 & \\ H=6_1f=3 & -\\ 7 & -76 \ 113 & \\ H=6_1f=3 & -\\ -7 & -162 \ 143 & -\\ -5 & 142 \ 135 \ B^- & \\ -5 & 142 \ 135 \ B^- & \\ -5 & 142 \ 135 \ B^- & \\ -2 & -142 \ 163 & -\\ -2 & -142 \ 163 & -\\ -1 & -105 \ 114 & \\ -3 & -105 \ 114 & \\ -3 & -105 \ 114 & \\ -105 \ 114 & -\\ $	$\begin{array}{c} 6, K=6\\ 3  132  141\\ 2=105  124\\ 1=078  084\\ 1  197  152\\ 2=055  049\\ 3=056  049\\ 3=056  049\\ 3=056  049\\ 3=056  049\\ 1  198  230\\ 1  198  230\\ 1  198  230\\ 1  198  230\\ 1  1178\\ 3=237  246\\ 1  178\\ 3=237  246\\ 1  178\\ 3=040  042\\ 1  178\\ 3=040  042\\ 1  178\\ 1  178\\ 3=040  042\\ 1  178\\ 1  178\\ 3=040  042\\ 1  178\\ 1  188$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} \mathbf{z} = 0, \mathbf{x} = 0 \\ -6 & -203 & 182 \\ -4 & -219 & 214 \\ +2 & -151 & 168 \\ 0 & 199 & 193 \\ 2 & -207 & 203 \\ 4 & 142 & 158 \\ 6 & -115 & 132 \\ -7 & -044 & 080 \\ -6 & -131 & 122 \\ -7 & -044 & 080 \\ -6 & -131 & 122 \\ -3 & -086 & 103 \\ -2 & -114 & 132 \\ -2 & -125 & 192 \\ -1 & -152 & 192 \\ 0 & 083 & 084 \\ 2 & -116 & 1226 \\ 2 & -116 & 126 \\ 2 & -116 \\ $	$\begin{array}{c} H=8,K=3\\ 2&07,3&076\\ 3&-169&151\\ 4&-063&079\\ 5&076&066\\ 6&054&059\\ -4&-071&072\\ -4&-072&102\\ -4&-070&102\\ -4&-070&102\\ -4&-070&102\\ -3&-075&043\\ 2&104&091\\ 3&-076&067\\ 4&-076&067\\ -3&-014&021\\ -2&202&183\\ -2&202&182\\ -2&2&20&182\\ -2&2&2&2&2\\ -2&2&2&2&2\\ -2&2&2&2&2\\ -2&2&2&2$	$\begin{array}{c} .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ $	H=10,K=1 0 -111 118 1 -083 088 2 073 076 3 053 052 4 -070 089 5 -082 083 H=10,K=2 -4 -055 056 -3 -113 108 H=10,K=3 1 -128 112 0 -064 069 1 -129 117 2 053 052 1 -054 059 1 -029 117 2 053 052 -3 -077 067 -3 -071 0155 -3 -077 057 -1 139 118 - 077 757 -1 139 118 - 077 757 - 077
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{rrrr} H^+ 6_1 6_7 e^- 6_2 & m \\ 5 & 3 & 066 & 091 & - \\ 4 & -016 & 012 & - \\ 5 & -176 & 182 & - \\ 6 & 045 & 052 & - \\ 7 & 706 & 113 & - \\ -7 & -10 & 142 & 135 & - \\ -7 & -10 & 142 & 135 & - \\ -4 & 055 & 077 & - \\ 5 & -3 & -216 & 240 & - \\ 5 & -3 & -216 & 240 & - \\ -2 & -142 & 135 & - \\ -3 & -2 & -142 & 135 & - \\ -3 & -105 & 123 & - \\ -3 & -105 & 123 & - \\ -3 & -105 & 123 & - \\ -3 & -105 & 123 & - \\ -3 & -105 & 123 & - \\ -3 & -105 & 123 & - \\ -3 & -105 & 123 & - \\ -3 & -105 & 123 & - \\ -3 & -363 & - \\ $	$\begin{array}{c} 6, \mathbf{x} = 6 \\ 3  132  141 \\ 2 = 105  124 \\ 1  -078  084 \\ 1  197  152 \\ 2  -055  049 \\ 3  -056  049 \\ 3  -056  049 \\ 3  -056  049 \\ 3  -056  049 \\ 1  198  230 \\ 117  178 \\ 3  -198  230 \\ 117  178 \\ 3  -198  237  246 \\ 5  178  207 \\ 7, \mathbf{x} = 084 \\ 7, \mathbf{x} = 18 \\ \mathbf{x} = 084 \\ 062 \\ \mathbf{x} = 084 \\ 062 \\ \mathbf{x} = 141 \\ 114  113 \\ \mathbf{x} = 084 \\ 062 \\ \mathbf{x} = 084 \\ 062 \\ \mathbf{x} = 084 \\ \mathbf{x} = 08$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} \mathbf{z} = \mathbf{\beta}, \mathbf{x} = 0 \\ -6 - 203 \ 182 \\ -4 - 229 \ 214 \\ -2 - 151 \ 168 \\ 0 \ 199 \ 193 \\ 2 - 207 \ 203 \\ 4 \ 142 \ 158 \\ 6 - 115 \ 132 \\ \mathbf{z} = 6, \mathbf{K} = 1 \\ -7 \ 084 \ 080 \\ -6 - 13 \ 122 \\ 7 \ 084 \ 080 \\ -6 - 13 \ 122 \\ 7 \ 083 \ 083 \\ -1 - 152 \ 192 \\ 0 \ 083 \ 083 \\ 1 \ 141 \ 165 \\ 1 \ 121 \\ 2 - 116 \ 126 \\ 2 - 116$	$\begin{array}{c} \mathtt{H} = 8, \mathtt{K} = 3 \\ 2 & 07, 3 & 076 \\ 3 & -169 & 151 \\ 4 & -063 & 059 \\ 5 & 076 & 066 \\ 6 & 054 & 059 \\ -3 & 074 & 072 & 102 \\ -3 & 077 & 078 \\ -1 & -068 & 064 \\ -1 & -068 & 064 \\ -1 & -068 & 064 \\ -1 & -068 & 064 \\ -1 & -068 & 064 \\ -1 & -068 & 064 \\ -1 & -068 & 064 \\ -1 & -068 & 064 \\ -1 & -068 & 064 \\ -1 & -068 & 064 \\ -1 & -068 & 064 \\ -1 & -068 & 064 \\ -2 & -074 & 067 \\ -3 & -074 & 067 \\ -5 & -044 & 068 \\ -3 & -054 & 068 \\ -3 &$	$\begin{array}{c} .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ $	E=10,K=1 0 -111 118 1 -083 088 2 073 073 4 -070 078 4 -070 208 1 -105 056 -3 -113 108 -3 -113 108 -3 -075 056 1 -128 105 4 -047 095 1 -128 108 0 -054 059 1 -128 108 0 -077 076 1 -128 108
$ \begin{array}{c} \textbf{Het}_1 \textbf{Yet}_1 & \textbf{He}_7 \textbf{Yet}_0 \\ \textbf{-1} & \textbf{-214} & \textbf{216} & \textbf{-71-106} \\ \textbf{-1} & \textbf{-166} & \textbf{-71-106} \\ \textbf{-2} & \textbf{-156} & \textbf{155} & \textbf{165} \\ \textbf{-2} & \textbf{-156} & \textbf{155} & \textbf{-165} \\ \textbf{-2} & \textbf{-156} & \textbf{155} & \textbf{-165} \\ \textbf{-2} & \textbf{-156} & \textbf{155} & \textbf{-167} \\ \textbf{-2} & \textbf{-166} & \textbf{155} & \textbf{-167} \\ \textbf{-175} & \textbf{156} & \textbf{-157} & \textbf{-167} \\ \textbf{-175} & \textbf{-157} & \textbf{-157} & \textbf{-167} \\ \textbf{-175} & \textbf{-157} & \textbf{-167} & \textbf{-167} \\ \textbf{-175} & \textbf{-175} & \textbf{-175} & \textbf{-175} \\ \textbf{-175} & \textbf{-175} & \textbf{-175} \\ \textbf{-175} & \textbf{-175} & \textbf{-175} \\ \textbf{-175} & \textbf{-175} & \textbf{-175} & \textbf{-175} \\ \textbf{-175} & \textbf{-175} & \textbf{-175} & \textbf{-175} \\ \textbf{-175} & \textbf{-175} & \textbf{-175} \\ \textbf{-175} & -17$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{rrrr} H=6_1 fer \leq 2 & m \\ s=3 & 066 & 091 & - \\ s=3 & 0.06 & 012 & - \\ s=176 & 182 & - \\ s=6 & 0.45 & 0.52 & - \\ s=7 & -162 & 143 & - \\ s=7 & -126 & 240 & - \\ s=7 & -126 & 240 & - \\ s=7 & -105 & 123 & - \\ s=7 & -106 & 0078 & B_{-} & - \\ s=7 & -106 & 0078 & B_{-} & - \\ s=7 & -106 & 0078 & B_{-} & - \\ s=7 & -106 & 0078 & B_{-} & - \\ s=7 & -106 & 0078 & - \\ s=7 & -106 & 0078 & - \\ s=7 & -106 & 0078 & - \\ s=7 & -106 & 008 & - \\ s=7 & -106 & -08 & -1 \\ s=7 & -106 & -08 & -106 & -08 & -1 \\ s=7 & -106 & -08 & -106 & -08 & -106 & -106 & -08 & -08 & -08 & -08 & -08 & -08 & -08 & -08 & -08 & -08 & -$	$\begin{array}{c} 6, K=6\\ 3 & 132\\ 2 & -105 & 124\\ 1 & -076 & 084\\ 1 & -076 & 084\\ 2 & -055 & 049\\ 3 & -056 & 049\\ 3 & -056 & 049\\ 3 & -056 & 049\\ 3 & -056 & 049\\ 3 & -056 & 049\\ 3 & -056 & 049\\ 1 & -108 & 218\\ 5 & -108 & 218\\ 3 & -062 & 054\\ 1 & -118 & 218\\ 3 & -062 & 054\\ 1 & -118 & 218\\ 3 & -062 & 054\\ 1 & -118 & 218\\ 3 & -064 & 062\\ 7 & -114 & 113\\ 5 & -136 & 156\\ 7 & -114 & 113\\ 5 & -136 & 156\\ 7 & -114 & 113\\ 5 & -136 & 156\\ 7 & -114 & 113\\ 7 & -054 & 056\\ 7 & -114 & 113\\ 7 & -056 & 056\\ 7 & -114 & 113\\ 7 & -056 & 056\\ 7 & -114 & 113\\ 7 & -056 & 056\\ 7 & -114 & 113\\ 7 & -056 & 056\\ 7 & -114 & 113\\ 7 & -056 & 056\\ 7 & -0$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} \mathtt{H-8},\mathtt{K-3}\\ 2 & 07,3 & 076\\ 3 & -169 & 151\\ 4 & -063 & 059\\ 5 & 076 & 066\\ 6 & 054 & 059\\ -5 & -074 & 072\\ -3 & 079 & 078\\ -2 & 156 & 148\\ -1 & -068 & 064\\ -1 & -068 & 064\\ 0 & -055 & 043\\ 2 & 104 & 091\\ 3 & -076 & 074\\ 0 & -075 & 044\\ 0 & -055 & 043\\ 2 & 104 & 091\\ 3 & -076 & 044\\ -3 & -014 & 023\\ -3 & -014 & 021\\ -3 & -014 & 021\\ -3 & -014 & 021\\ -3 & -014 & 021\\ -3 & -014 & 021\\ -2 & 202 & 183\\ -1 & -165 & 081\\ 0 & -124 & 123\\ 2 & 152 & 130\\ \end{array}$	$\begin{array}{c} & & & & & & & & & & & & & & & & & & &$	H=10,K=1 0 -111 118 2 073 076 3 053 052 4 -070 059 5 -082 083 H=10,K=2 4 -070 059 5 -082 083 H=10,K=2 -3 -111 108 0 -045 055 1 -125 056 4 -053 052 4 -053 052 4 -053 057 -3 -111 108 1 -045 057 -1 19 118 0 077 076 -2 -177 057 -1 19 118 0 077 076 -2 -045 013 -3 -045 015 -3 -045 015 -3 -045 015 -3 -045 015 -3 -045 015 -3 -045 015
$ \begin{array}{c} \textbf{H}=4, \textbf{K}=4 \\ \textbf{H}=4, \textbf{K}=4, \textbf$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 6_{5} \mathbf{x} = 6\\ 5_{1} 13_{2} 141\\ -2_{-} 105_{12} 141\\ -2_{-} 105_{12} 141\\ -2_{-} 105_{12} 141\\ -2_{-} 055_{-} 084\\ 0_{-} 055_{-} 084\\ -2_{-} 055_{-} 049\\ -4_{-} 063_{-} 051\\ -248_{-} 235\\ -3_{-} 100_{-} 118\\ -198_{-} 238\\ -3_{-} 17_{-} 178\\ -3_{-} 128_{-} 248\\ -3_{-} 158_{-} 054\\ -3_{-} 128_{-} 248\\ -3_{-} 288_{-} 288\\ -3_{-} 288_{-} 288\\ -3_{-} 288_{-} 288\\ -3_{-} 288_{-} 288\\ -3_{-} 288_{-} 288\\ -3_{-} 288_{-} 288\\ -3_{-} 288_{-} 288\\ -3_{-} 288_{-} 288\\ -3_{-} 288_{-} 288\\ -3_{-} 288_{-} 288\\ -3_{-} 288_{-} 288\\ -3_{-} 288_{-} 2$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} \text{H-8}, \text{K-3} \\ 2 & 073 & 076 \\ 3 & -166 & 151 \\ 4 & -063 & 059 \\ 5 & 076 & 056 & 056 \\ \text{H-8}, \text{K-4} & 072 & 072 \\ -3 & -073 & 076 & 067 \\ -3 & -073 & 078 \\ -2 & 156 & 148 \\ 0 & -055 & 043 \\ 2 & 104 & 067 \\ 5 & 044 & 048 \\ -3 & -076 & 067 \\ -3 & -076 & 067 \\ -3 & -076 & 067 \\ -3 & -076 & 067 \\ -3 & -076 & 067 \\ -3 & -014 & 067 \\ -3 & -014 & 067 \\ -3 & -014 & 067 \\ -3 & -014 & 067 \\ -3 & -014 & 067 \\ -3 & -014 & 067 \\ -3 & -014 & 067 \\ -3 & -014 & 067 \\ -3 & -014 & 067 \\ -3 & -014 & 067 \\ -3 & -014 & 067 \\ -3 & -014 & 067 \\ -3 & -156 & 100 \\ -3 & 017 & 021 \\ -3 & 017 & 021 \\ \end{array}$	$\begin{array}{c} \cdot \\ \cdot \\ -5 \\ -5 \\ -5 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1$	$\begin{array}{c} \textbf{H}=10,\textbf{K}=1\\ \textbf{O}=111,\ 118\\ \textbf{I}=-083,\ 018\\ \textbf{O}=73,\ 076\\ \textbf{O}=73,\ 076\ \textbf{O}=73,\ $
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccc} H^{+} c_{5} (c_{7} c_{2} & m \\ s & 3 & 086 & 091 & - \\ s & - & 016 & 012 & - \\ s & - & 176 & 1822 & - \\ s & - & 176 & 1822 & - \\ r & - & 007 & 0133 & - \\ - & - & 077 & 045 & H \\ - & - & 1033 & 072 & - \\ - & - & - & 077 & 045 & H \\ - & - & 1033 & 072 & - \\ - & - & - & 1033 & 072 & - \\ - & - & - & 1033 & 072 & - \\ - & - & - & 1033 & 072 & - \\ - & - & - & 1033 & 072 & - \\ - & - & - & 1034 & 186 & - \\ - & - & - & 1034 & 186 & - \\ - & - & - & 1034 & 186 & - \\ - & - & - & 1034 & 186 & - \\ - & - & - & 1034 & 186 & - \\ - & - & - & 1034 & 186 & - \\ - & - & - & 1034 & 186 & - \\ - & - & - & 1034 & 186 & - \\ - & - & - & 1037 & 186 & - \\ - & - & - & - & 1077 & 080 & - \\ - & - & - & 077 & 080 & - \\ - & - & - & 077 & 080 & - \\ - & - & - & 077 & 080 & - \\ - & - & - & 077 & 080 & - \\ \end{array}$	$\begin{array}{c} 61 - 6 \\ 61 - 6 \\ 1 & 13 \\ 2 & 103 \\ 1 & 123 \\ 1 & -175 \\ 0 & 051 \\ 1 & -175 \\ 0 & 051 \\ 0 & 053 \\ 0 & 0 & 053 \\ 0 & 0 & 053 \\ 0 & 0 & 053 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 &$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c} \mathbf{z} = \mathbf{\delta}, \mathbf{x} = 0 \\ = -\mathbf{\delta} - 23 \\ = \mathbf{\delta} \\ = 23 \\ = 24 \\ = 24 \\ = 24 \\ = 24 \\ = 24 \\ = 13 \\ = $	$\begin{array}{c} \mathbf{H} = 0, \mathbf{k} = 3 \\ 2 0^{-1}  3 0^{-1}  6 \\ 3  -16 6 \\ 3  -16 6 \\ 5 0^{-1}  6 6 \\ 5 0^{-1}  6 6 \\ 5 0^{-1}  6 6 \\ 5 0^{-1}  6 10 \\ 5 10^{-1}  10^{-1}  10^{-1} \\ 5 10^{-1}  0^{-1}  5 \\ 10^{-1}  0^{-1}  5 64 \\ 0  -0^{-1}  5 64 \\ 0  -0^{-1}  5 64 \\ 0  -0^{-1}  5 64 \\ 0  -10^{-1}  0^{-1} \\ 5 64 0^{-1}  0^{-1} \\ 5 64 0^{-1}  0^{-1} \\ 5 64 0^{-1} \\ 0 0^{-1}  5 64 \\ 0  -10^{-1}  0^{-1} \\ 5 10 0^{-1} \\ 5 10 0^{-1} \\ 5 10 0^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5 10^{-1} \\ 5^{-1} \\ 5 10^{-1} \\ 5^{-1} \\ 5 10^{-1} \\ 5^{-1} \\ $	$\begin{array}{c} \begin{array}{c} \begin{array}{c} - & - & - & - \\ - & - & - & - & - \\ - & - &$	$ \begin{array}{c} \textbf{B}=100\textbf{k}-1 \\ \textbf{1} & -131 & 118 \\ \textbf{1} & -033 & 088 \\ \textbf{2} & 073 & 076 \\ \textbf{3} & 053 & 052 \\ \textbf{4} & -070 & 089 \\ \textbf{5} & -082 & 083 \\ \textbf{4} & -070 & 089 \\ \textbf{5} & -082 & 083 \\ \textbf{4} & -053 & 056 \\ \textbf{4} & -053 & 056 \\ \textbf{4} & -053 & 056 \\ \textbf{4} & -049 & 052 \\ \textbf{5} & -118 & 112 \\ \textbf{5} & -253 & 052 \\ \textbf{5} & -139 & 118 \\ \textbf{5} & -238 & 077 \\ \textbf{5} & -2 & -2101 & 057 \\ \textbf{5} & -2 & -2101 & 057 \\ \textbf{5} & -2 & -2101 & 057 \\ \textbf{5} & -139 & 118 \\ \textbf{5} & 0 & 077 & 076 \\ \textbf{5} & -139 & 118 \\ \textbf{5} & 0 & 077 & 076 \\ \textbf{5} & -139 & 118 \\ \textbf{5} & 0 & 077 & 076 \\ \textbf{5} & -139 & 118 \\ \textbf{5} & 0 & 077 & 076 \\ \textbf{5} & -139 & 118 \\ \textbf{5} & 0 & 077 & 076 \\ \textbf{5} & -139 & 118 \\ \textbf{5} & -139 & 118 \\ \textbf{5} & -139 & 118 \\ \textbf{5} & -138 & 108 \\ \textbf{5} & -138 & 118 \\ \textbf{5} & -1$
$ \begin{array}{c} \textbf{He}_1, \textbf{re}_1 & \textbf{He}_7, He$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccc} H^{+}6_{1}6_{1}c_{2}c_{2} & \\ S & 0.86 & 0.91 & \\ - & 0.16 & 0.12 & \\ S & -1.76 & 1.82 & - \\ - & 0.63 & 0.52 & \\ - & 0.63 & 0.52 & \\ - & 0.63 & 0.52 & \\ - & 0.63 & 0.53 & \\ - & -1.62 & 1.43 & \\ - & -1.62 & 1.43 & \\ - & -1.42 & 1.53 & \\ - & -1.42 & 1.53 & \\ - & -1.42 & 1.53 & \\ - & -1.42 & 1.53 & \\ - & -1.42 & 1.53 & \\ - & -1.42 & 1.53 & \\ - & -1.42 & 1.53 & \\ - & -1.42 & 1.53 & \\ - & -1.42 & 1.53 & \\ - & -1.42 & 1.53 & \\ - & -1.42 & 1.53 & \\ - & -1.48 & 1.86 & \\ - & -5.75 & 0.55 & \\ - & -1.12 & 1.14 & \\ - & -1.12 & 1.14 & \\ - & -7.7 & -1.52 & 1.14 & \\ - & -7.7 & -7.66 & 0.65 & \\ - & -7.7 & -7.66 & 0.65 & \\ - & -7.7 & -7.97 & 9.00 & \\ - & -7.7 & -7.97 & 9.00 & \\ - & -2. & -7.56 & 1.74 & \\ \end{array}$	$\begin{array}{c} 61-6\\ 61-6\\ 1&12&141\\ 2&-105&124\\ 1&-076&084\\ 0&053&048\\ 1&159&152\\ 2&-055&049\\ 3&-056&049\\ 4&063&051\\ 7&176&05\\ 2&2&055&049\\ 3&-056&049\\ 4&063&051\\ 1&176&05\\ 1&20&05\\$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c} 1+8, \mathbf{x}=0 \\ =-6 & -203 & 182 \\ =-4 & 219 & 214 \\ =-2 & -133 & 184 \\ =-2 & -133 & 184 \\ =-2 & -133 & 184 \\ =-2 & -133 & 184 \\ =-2 & -133 & 184 \\ =-2 & -133 & 184 \\ =-2 & -134 & 184 \\ =-12 & -124 & 184 \\ =-6 & -112 & 112 \\ =-6 & -112 & 112 \\ =-6 & -112 & 112 \\ =-6 & -112 & 112 \\ =-6 & -112 & 112 \\ =-6 & -105 & 112 \\ =-7 & -042 & 005 \\ =-6 & -105 & 112 \\ =-7 & -042 & 005 \\ =-7 & -042 & 005 \\ =-7 & -042 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & 005 \\ =-16 & -105 & -105 \\ =-16 $	$\begin{array}{c} {}^{H+8}, k^{-3} \\ {}^{2} & {}^{O1} & {}^{O1} & {}^{O1} & {}^{O1} \\ {}^{4} & {}^{O0} & {}^{O1} & {}^{O2} \\ {}^{6} & {}^{O1} & {}^{O2} & {}^{O2} \\ {}^{6} & {}^{O1} & {}^{O2} & {}^{O2} \\ {}^{6} & {}^{O1} & {}^{O2} & {}^{O2} \\ {}^{-4} & {}^{-O2} & {}^{O2} & {}^{O2} \\ {}^{-4} & {}^{-O2} & {}^{O2} & {}^{O2} \\ {}^{-3} & {}^{O7} & {}^{O7} & {}^{O8} \\ {}^{-3} & {}^{O7} & {}^{O7} & {}^{O8} \\ {}^{4} & {}^{-O1} & {}^{O7} & {}^{O7} \\ {}^{5} & {}^{O6} & {}^{O8} \\ {}^{-5} & {}^{O6} & {}^{O8} \\ {}^{-5} & {}^{O6} & {}^{O8} \\ {}^{O6} & {}^{O9} \\ {}^{-5} & {}^{O6} & {}^{O8} \\ {}^{O7} & {}^{O7} & {}^{O7} & {}^{O7} \\ {}^{O7} & {}^{O7} & {}^{O7} & {}^{O7} \\ {}^{O7} & {}^{O7} & {}^{O7} & {}^{O7} \\ {}^{O7} & {}^{O7} & {}^{O7} \\ {}^{$	$\begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \begin{array}{c} \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} $	$ \begin{array}{c} \textbf{B=10, \textbf{R=1}} \\ \textbf{B=10, \textbf{R=1}} \\ \textbf{1}  -\textbf{03}  \textbf{068} \\ \textbf{3}  \textbf{033}  \textbf{052} \\ \textbf{2}  \textbf{073}  \textbf{076} \\ \textbf{3}  \textbf{033}  \textbf{052} \\ \textbf{5}  -\textbf{082}  \textbf{033} \\ \textbf{5}  \textbf{5}  \textbf{082}  \textbf{033} \\ \textbf{5}  \textbf{5}  \textbf{082} \\ \textbf{033}  \textbf{5} \\ \textbf{5}  \textbf{-71}  \textbf{1111112} \\ \textbf{1111112} \\ \textbf{2}  \textbf{033}  \textbf{052} \\ \textbf{-71}  \textbf{1131112} \\ \textbf{2}  \textbf{033}  \textbf{052} \\ \textbf{-71}  \textbf{1331112} \\ \textbf{2}  \textbf{033}  \textbf{052} \\ \textbf{-71}  \textbf{071}  \textbf{067} \\ \textbf{-71}  \textbf{071}  \textbf{071} \\ \textbf{-71}  \textbf{071}  \textbf{071} \\ \textbf{-71}  \textbf{071}  \textbf{071} \\ \textbf{-71}  \textbf{071}  \textbf{071} \\ \textbf{071}  \textbf{071} \\ \textbf{071}  \textbf{071}  \textbf{071}  \textbf{071} \\ \textbf{071}  \textbf{071}  \textbf{071}  \textbf{071} \\ \textbf{071}  \textbf{071}  \textbf{071}  \textbf{071}  \textbf{071} \\ \textbf{071}  \textbf{071}$
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} \mathbf{H}^{+}\mathbf{c}_{1}\mathbf{c}_{1}\mathbf{c}_{2}\mathbf{c}_{2}\\ \mathbf{s} & 0601\mathbf{c}\\ \mathbf{s} & 01601\mathbf{c}\\ \mathbf{s} & 116101\mathbf{c}\\ \mathbf{s} & -116101\mathbf{c}\\ \mathbf{s} & -116101\mathbf{c}\\ \mathbf{s} & -11010111\\ \mathbf{s} & -1010111\\ \mathbf{s} & -1010111\\ \mathbf{s} & -1011111111$	$\begin{array}{c} 6_{1}\mathbf{F}=6\\ 6_{1}\mathbf{F}=6\\ 1\ 12\ 13\ 12\ 14\\ 2\ -105\ 124\\ 1\ -076\ 085\\ 0\ 055\ 049\ 9\\ 1\ 179\ 152\\ 2\ -055\ 049\ 9\\ 1\ -065\ 055\\ 1\ 139\ 152\\ 14\ -065\ 055\\ 14\ -143\ 126\ 055\\ 14\ -152\ 176\ 15\\ 14\ 152\ 176\ 15\\ 14\ 177\ 176\\ 15\ 176\ 165\ 055\\ 177\ 156\ 176\ 177\ 157\ 156\\ 177\ 157\ 157\ 157\ 157\\ 177\ 157\ $	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 1+8, x=0 \\ -6 & -203 & 182 \\ -4 & -223 & 181 \\ -4 & -223 & 181 \\ -4 & -223 & 181 \\ -2 & -237 & 293 \\ -2 & -277 & 293 \\ -2 & -277 & 293 \\ -2 & -277 & 293 \\ -2 & -277 & -273 \\ -2 & -277 & -273 \\ -2 & -273 \\ -2 & -273 & -273 \\ -2 & -273 $	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} \mathbf{p}_{-1}, \mathbf{r}_{-2} \\ \mathbf{r}_{-2} \\ \mathbf{r}_{-2} \\ \mathbf{r}_{-2} \\ \mathbf{r}_{-2} \\ \mathbf{r}_{-1} \\ $	$ \begin{array}{c} {\rm e} -10, {\rm e} -1 \\ {\rm o} -111 \\ {\rm i} -631 \\ {\rm o} 683 $
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c} \textbf{H}=\textbf{5}, \textbf{K}=\textbf{3}, \textbf{H}=\textbf{5}, \textbf{K}=\textbf{5} \\ \textbf{H}=\textbf{5}, \textbf{K}=\textbf{3} \\ \textbf{J}=\textbf{5}=\textbf{5}=\textbf{5} \\ \textbf{J}=\textbf{5}=\textbf{5}=\textbf{5}=\textbf{3} \\ \textbf{J}=\textbf{5}=\textbf{5}=\textbf{5}=\textbf{3}=\textbf{3} \\ \textbf{J}=\textbf{5}=\textbf{5}=\textbf{5}=\textbf{3} \\ \textbf{J}=\textbf{5}=\textbf{5}=\textbf{5}=\textbf{5} \\ \textbf{J}=\textbf{5}=\textbf{5}=\textbf{5}=\textbf{5}=\textbf{5} \\ \textbf{J}=\textbf{J}=\textbf{J}=\textbf{J}=\textbf{J}=\textbf{J}=\textbf{J}=\textbf{J}=$	$\begin{array}{cccc} H^{+} c_{1} c_{1} c_{2} c_{2} \\ s & 0.66 \ col 1 & - \\ s & -1.06 \ col 2 & - \\ s & -1.76 \ 1.82 & - \\ s & -1.76 \ 1.82 & - \\ s & -1.76 \ 1.82 & - \\ s & -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 1.13 \\ -7 \ -1.62 \ 0.15 \\ -7 \ -1.66 \ 0.75 \\ -7 \ -1.66 \ 0.75 \\ -7 \ -1.15 \ 1.14 \\ -7 \ -1.56 \ 1.12 \ 1.14 \\ -7 \ -1.56 \ 1.12 \ 1.14 \\ -7 \ -1.56 \ 1.12 \ 1.14 \\ -7 \ -1.56 \ 1.12 \ 1.14 \\ -7 \ -1.56 \ 1.15 \\ -7 \ -7 \ 1.56 \ 1.15 \\ -7 \ -7 \ 1.56 \ 1.56 \ 1.56 \\ -7 \ -7 \ 1.56 \ 1.$	$\begin{array}{c} 6_1 r = 6\\ 6_1 r = 6\\ 3 & 12 & 141\\ 2^2 & -105 & 124\\ 1 & -1078 & 036\\ 1 & -078 & 036\\ 1 & -078 & 036\\ 1 & 197 & 152\\ 2 & -055 & 049\\ 3 & -055 & 049\\ 3 & -055 & 049\\ 3 & -055 & 049\\ 1 & -105 & 051\\ 7 & -105 & 051\\ 7 & -105 & 051\\ 1 & -108 & 230\\ 1 & -108 & -108 & 200\\ 1 & -108 & -108 & 200\\ 1 & -108 & -108 & 2$	$\begin{array}{c} 1 \\ 1 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\$	$ \begin{array}{c} 1+8, \mathbf{x}=0 \\ =-6 & -203 & 182 \\ =-6 & -203 & 182 \\ =-2 & 213 & 182 \\ =-2 & 213 & 183 \\ =-2 & 217 & 203 \\ =-2 & 217 & 203 \\ =-1 & 218 & 218 \\ =-5 & -138 & 12$	$\begin{array}{c} \textbf{H} = \textbf{0}, \textbf{k} = \textbf{3} \\ \textbf{2}  \textbf{0}  \textbf{3}  \textbf{0}  \textbf{1}  \textbf{3} \\ \textbf{3}  \textbf{-1}  \textbf{0}  \textbf{1}  \textbf{3} \\ \textbf{3}  \textbf{1}  \textbf{0}  \textbf{0}  \textbf{3} \\ \textbf{6}  \textbf{0}  \textbf{3}  \textbf{0} \\ \textbf{3}  \textbf{0}  \textbf{1}  \textbf{0} \\ \textbf{3}  \textbf{1}  \textbf{0} \\ \textbf{3}  \textbf{1}  \textbf{0} \\ \textbf{3}  \textbf{1}  \textbf{0}  \textbf{1} \\ \textbf{3}  \textbf{1}  \textbf{0} \\ \textbf{3}  \textbf{1}  \textbf{0}  \textbf{0} \\ \textbf{5}  \textbf{0}  \textbf{1} \\ \textbf{3}  \textbf{1}  \textbf{0} \\ \textbf{5}  \textbf{1}  \textbf{0} \\ \textbf{5}  \textbf{1}  \textbf{0} \\ \textbf{5}  \textbf{1}  \textbf{0}  \textbf{0} \\ \textbf{5}  \textbf{0} \ \textbf{0} \ \textbf{0} \\ \textbf{5}  \textbf{0} \ \textbf{0} \ \textbf{0} \\ \textbf{0} \ \textbf{0} $	$\begin{array}{c} \mathbf{p}_{-1}, \mathbf{r}_{-2} \\ \mathbf{r}_{-2} \\ \mathbf{r}_{-3} \\ \mathbf{r}_{-1} \\ \mathbf{r}_{-3} \\ \mathbf{r}_{-1} \\ $	$ \begin{array}{c} \textbf{F}=10, \textbf{F}=1 \\ \textbf{0}-111 \\ \textbf{1}-681 \\ \textbf{088} \\ \textbf{088} \\ \textbf{088} \\ \textbf{1}-681 \\ \textbf{088} \\ \textbf{088} \\ \textbf{1}-681 \\ $
$ \begin{array}{c} \textbf{H} = \textbf{I}, \textbf{H} = \textbf{I}, \textbf{H} = \textbf{I}, \textbf{H} = \textbf{I}, \textbf{H} = \textbf{I} \\ = \textbf{I} \\ = \textbf{I} = \textbf{I} = \textbf{I} = \textbf{I} = \textbf{I} \\ = \textbf{I} = \textbf{I} = \textbf{I} = \textbf{I} \\ = \textbf{I} = \textbf{I} = \textbf{I} \\ $	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccc} H^{+}6_{1}6_{1}c_{2}c_{2}\\ s& 3& 066& 071 & -\\ s& -& 106& 012 & -\\ s& -& 106& 012 & -\\ s& -& 106& 016& 016& 016& 016& 016& 016& 016$	$ \begin{array}{c} 6_{1} = 6 \\ 6_{1} = 6 \\ 1 & 12 \\ 2 & 10 \\ 1 & 12 \\ 1 & 107 \\ 0 & 03 \\ 1 & 07 \\ 0 & 03 \\ 1 & 07 \\ 0 & 03 \\ 1 & 07 \\ 0 & 03 \\ 1 & 07 \\ 0 & 03 \\ 1 & 07$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 1-8, \mathbf{x}=0\\ -2, -30, 102\\ -2, -30, 102\\ -2, -30, 102\\ -2, -30, 102\\ -2, -30, 102\\ -2, -30, 102\\ -2, -30, 102\\ -2, -2, -20, 102\\ -2, -2, -20, 102\\ -2, -2, -20, 102\\ -2, -2, -2, -20, 102\\ -2, -2, -2, -20, 102\\ -2, -2, -2, -20, 102\\ -2, -2, -2, -2, -2, -20, 102\\ -2, -2, -2, -2, -2, -2, -2, -2, -2, -2,$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} \mathbf{a}_{1}, \mathbf{a}_{2}, \mathbf{c}_{3}\\ \mathbf{c}_{3}, \mathbf{c}_{3}\\ \mathbf{c}_{3}\\ \mathbf{c}_{3}, \mathbf{c}_{3}\\ \mathbf{c}_{3}, \mathbf{c}_{3}\\ \mathbf{c}_{3}\\ \mathbf{c}_{3}, \mathbf{c}_{3}\\ \mathbf{c}_{3}\\ \mathbf{c}_{3}, \mathbf{c}_{3}\\ \mathbf{c}_{3}\\ \mathbf{c}_{3}\\ \mathbf{c}_{3}, \mathbf{c}_{3}\\ \mathbf{c}_{3}\\ \mathbf{c}_{3}, \mathbf{c}_{3}\\ \mathbf{c}_{3}\\ \mathbf{c}_{3}\\ \mathbf{c}_{3}\\ \mathbf{c}_{3}\\ \mathbf{c}_{3}\\$	$ \begin{array}{c} \textbf{P}=0, \textbf{P}=1\\ \textbf{0}-111 & \textbf{1}-033 & 088 & \textbf{0}\\ \textbf{0}-111 & \textbf{1}-033 & 088 & \textbf{0}\\ \textbf{1}-033 & 083 & \textbf{0}\\ \textbf{3}-033 & 052 & \textbf{0}\\ \textbf{3}-101 & \textbf{1}00 & \textbf{0}\\ \textbf{3}-033 & \textbf{0}\\ \textbf{3}-113 & 108 & \textbf{0}\\ \textbf{3}-123 & 108 & \textbf{0}\\ \textbf{3}-123 & 108 & \textbf{0}\\ \textbf{3}-133 & \textbf{3}-13 & \textbf{0}\\ \textbf{3}-133 & \textbf{3}-13 & \textbf{0}\\ \textbf{3}-133 & \textbf{0}-133 & \textbf{0}-133 & \textbf{0}-133 & \textbf{0}\\ \textbf{3}-133 & \textbf{0}-133 & \textbf{0}-133 & \textbf{0}-133 & \textbf{0}\\ \textbf{3}-133 & \textbf{0}-133 & \textbf{0}-1$
$ \begin{array}{c} \textbf{H} = \textbf{H}, \textbf{H} = \textbf{H} = \textbf{H} = \textbf{H}, \textbf{H} = \textbf{H} $	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c} \mathbf{H}^{+}\mathbf{c}_{1}\mathbf{c}_{1}\mathbf{c}_{2}\mathbf{c}_{2} \\ \mathbf{s} \\ 0 \\ \mathbf{s} \\ 0 \\ $	$\begin{array}{c} 6_{1}7 = 6_{1} \\ 5_{1}7 = 1_{2}1_{3} \\ 1_{2}2_{1}1_{3}2_{1} \\ 1_{2}7_{1}1_{2}7_{1} \\ 1_{2}7_{1}7_{1}7_{2}7_{3} \\ 1_{2}7_{2}7_{3}7_{3} \\ 1_{2}7_{2}7_{3}7_{3} \\ 1_{2}7_{3}7_{3}7_{3} \\ 1_{2}7_{3}7_{3}7_{3} \\ 1_{2}7_{3}7_{3} \\ 1_{2}7_{3}7_{3} \\ 1_{2}7_{3}7_{3} \\ 1_{2}7_{3}7_{3} \\ 1_{2}7_{3}7_{3} \\ 1_{2}7_{3}7_{3} \\ 1_{3}7_{3} \\ 1_{3}7_{3}7_{3} \\ 1_{3}7_{3}7_{3} \\ 1_{3}7_{3}7_{3} \\ 1_{3}1_{3}1_{3} \\ 1_{3}1_{3} \\ 1_{3}1_{3} \\ 1_{3}1$	$n_{-7}^{+7}$ , $k_{-2}^{+7}$ = $\frac{1}{100}$ $k_{-7}^{+7}$ , $k_{-7}^{-6}$ = $\frac{1}{100}$ = $\frac{1}{1000}$ = $\frac{1}{1000}$ = $\frac{1}{1000}$ = $\frac{1}{10000}$ = $\frac{1}{10000000000000000000000000000000000$	$\begin{array}{c} 1-8, 1-0 \\ -1-4 \\ -209 \\ 214 \\ -1-4 \\ -209 \\ 214 \\ -1-4 \\ $	$ \begin{array}{c} \mathbf{u} = 0, \mathbf{u} = 0 \\ \mathbf{z} = \mathbf{z} \\ \mathbf{z} \\ \mathbf{z} = \mathbf{z} \\ $	$\begin{array}{c} \mathbf{p}_{1}, \mathbf{p}_{2}, \mathbf{r}_{2}, \mathbf{r}_{2}\\ \mathbf{r}_{2}, \mathbf{r}_{2}, \mathbf{r}_{3}, \mathbf{r}_{3},$	
$ \begin{array}{c} \textbf{H} = \textbf{H}, \textbf{H} = \textbf{H} = \textbf{H} = \textbf{H}, \textbf{H} = \textbf{H}$	$ \begin{array}{c} \mathbf{u} = \mathbf{y}, \mathbf{v}_1 \\ \mathbf{u} = \mathbf{y}, \mathbf{v}_1 \\ \mathbf{u} = -5 + 5 & \mathbf{i} \\ \mathbf{u} = -5 + 5 & \mathbf{u} \\ \mathbf{u} = -5 & \mathbf{u} \\ \mathbf{u} = -5 + 5 & \mathbf{u} \\ \mathbf{u} = -5 & \mathbf{u} \\ \mathbf$	$\begin{array}{cccc} H^{+} 6_{1}6_{1}c_{2}c_{2} & \\ S & 086 & 091 & - \\ 4 & -016 & 012 & - \\ 5 & -176 & 182 & - \\ 6 & 045 & 058 & \\ -6 & -067 & 044 & \\ -7 & 145 & 151 & \\ -7 & -162 & 143 & \\ -7 & -162 & 143 & \\ -7 & -162 & 143 & \\ -7 & -162 & 143 & \\ -7 & -162 & 143 & \\ -7 & -162 & 143 & \\ -7 & -162 & 143 & \\ -7 & -162 & 143 & \\ -7 & -162 & 142 & \\ -7 & -162 & 142 & \\ -7 & -162 & 143 & \\ -7 & -164 & 143 & \\ -7 & -164 & 048 & \\ -7 & -764 & 048 & \\ -7 & -764 & \\ -7 & -764 & 048 & \\ -7 & -764 & 048 & \\ -7 & -764 & 048 & \\ -7 & -764 & 048 & \\ -7 & -764 & 048 & \\ -7 & -764 $	$\begin{array}{c} 6_{11}\mathbf{F}=6\\ 6_{11}\mathbf{F}=6\\ 1\\ 1\\ 2\\ 1\\ 1\\ 2\\ 1\\ 1\\ 2\\ 1\\ 1\\ 2\\ 1\\ \mathbf$	$\begin{array}{c} 1\\ m^{-7}, k^{-2} & c^{-7}\\ c^{-7}, c^{-9}\\ m^{-7}, c^{-9}\\ m^{-7}\\ m^{-7}, c^{-9}\\ m^{-7}\\ m^{$	$\begin{array}{c} 1-8, \mathbf{x} = 0 \\ -5 \\ -5 \\ -5 \\ -5 \\ -5 \\ -5 \\ -5 \\ $	$\begin{array}{c} \mu = 0, \ \mu = 1 \\ 2 & -1 \ ( 16) \ ( 15) \\ 4 & -0 \ ( 6) \ ( 7) \\ 4 & -0 \ ( 6) \ ( 7) \\ 4 & -0 \ ( 6) \ ( 7) \\ 4 & -0 \ ( 7) \ ( 7) \\ -3 \ ( 7) \ ( 7) \ ( 7) \\ -3 \ ( 7) \ ( 7) \ ( 7) \\ -3 \ ( 7) \ ( 7) \ ( 7) \\ -3 \ ( 7) \ ( 7) \ ( 7) \\ -3 \ ( 7) \ ( 7) \ ( 7) \\ -3 \ ( 7) \ ( 7) \ ( 7) \\ -3 \ ( 7) \ ( 7) \ ( 7) \ ( 7) \\ -3 \ ( 7) \ ( 7$	$\begin{array}{c} \mathbf{c}_{1}, \mathbf{c}_{2}, \mathbf{c}_{3}\\ \mathbf{c}_{3}, \mathbf{c}_{3}, \mathbf{c}_{3}, \mathbf{c}_{3}\\ \mathbf{c}_{3}, \mathbf{c}_{3},$	
$ \begin{array}{c} \mathbf{H} = \mathbf{H} + \mathbf{H} = \mathbf{H} \\ \mathbf{H} = \mathbf{H} + \mathbf{H} = \mathbf{H} \\ \mathbf$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c} \mathbf{H}^{+}\mathbf{c}_{1}\mathbf{c}_{1}\mathbf{c}_{2}\mathbf{c}_{2}\\ \mathbf{a} & \mathbf{c}_{2}\mathbf{b}\\ \mathbf{a} & \mathbf{c}_{1}\mathbf{b}\mathbf{c}\\ \mathbf{c}_{1} & \mathbf{c}_{2}\mathbf{b}\mathbf{c}\\ \mathbf{c}_{1} & \mathbf{c}_{1}\mathbf{b}\mathbf{c}\\ \mathbf{c}_{2} & \mathbf{c}_{1}\mathbf{c}\\ \mathbf{c}_{1} & \mathbf{c}_{2}\mathbf{c}\\ \mathbf{c}_{1} & \mathbf{c}_{1}\mathbf{c}\\ \mathbf{c}_{2} & \mathbf{c}_{1}\mathbf{c}\\ \mathbf{c}_{1} & \mathbf{c}_{2}\mathbf{c}\\ \mathbf{c}_{1} & \mathbf{c}_{2}\mathbf{c}\\ \mathbf{c}_{1} & \mathbf{c}_{2}\mathbf{c}\\ \mathbf{c}_{2} & \mathbf{c}_{1}\mathbf{c}\\ \mathbf{c}_{3} & \mathbf{c}_{1}\mathbf{c}\\ \mathbf{c}_{3} & \mathbf{c}_{3} & \mathbf{c}\\ \mathbf{c}_{3} & \mathbf{c}_{1}\mathbf{c}\\ \mathbf{c}_{3} & \mathbf{c}_{3} & \mathbf{c}\\ \mathbf{c}_{3} & \mathbf{c}_{3} & \mathbf{c}\\ \mathbf{c}_{3} & \mathbf{c}_{3} & \mathbf{c}\\ \mathbf{c}\\ \mathbf{c}_{3} & \mathbf{c}\\ \mathbf{c}\\ \mathbf{c}_{3} & \mathbf{c}\\ \mathbf{c}\\ \mathbf{c}_{3} & \mathbf{c}\\ c$	$ \begin{array}{c} \mathbf{c}_{11}\mathbf{c}_{12}\mathbf{c}_{13}\mathbf{c}$	$\begin{array}{c} 1 \\ 1 \\ 0 \\ 1 \\ 0 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\$	$\begin{array}{c} 1_{2}5, \mathbf{x} = 0 \\ \mathbf{z} < 0 \\ \mathbf{z} > 0 \\ \mathbf$	$ \begin{array}{c} \mu = 0, \mu = 3 \\ 2 & 0.716 & 0.65 \\ 4 & -0.65 & 0.97 \\ 5 & 0.76 & 0.66 \\ 6 & 0.54 & 0.75 \\ -5 & -0.74 & 0.72 \\ -5 & -0.74 & 0.72 \\ -5 & -0.74 & 0.72 \\ -5 & -0.74 & 0.72 \\ -5 & -0.74 & 0.72 \\ -2 & -0.75 & 0.76 \\ -1 & -0.68 & 0.64 \\ -1 & -0.68 & 0.64 \\ -1 & -0.68 & 0.64 \\ -1 & -0.68 & 0.64 \\ -1 & -0.68 & 0.64 \\ -1 & -0.68 & 0.64 \\ -1 & -0.68 & 0.64 \\ -1 & -0.68 & 0.64 \\ -1 & -0.68 & 0.64 \\ -1 & -0.68 & 0.64 \\ -1 & -0.75 & 0.76 \\ -3 & -0.14 & 0.21 \\ -2 & -0.25 & 0.16 \\ -3 & -0.16 & 0.16 \\ -1 & -0.56 & 0.24 \\ -1 & -0.5$	$\begin{array}{c} \mathbf{a}_{1}, \mathbf{a}_{2}, \mathbf{a}_{2}, \mathbf{a}_{3}, \mathbf{a}_{3},$	$ \begin{array}{c} \textbf{P}=0, \textbf{P}=1\\ \textbf{P}=0, \textbf{P}=1\\ \textbf{I}=0, \textbf{S}=0, \textbf{S}=0$
$ \begin{array}{c} \textbf{H} = \textbf{H}, \textbf{H} = \textbf{H} $	$ \begin{array}{c} \mathbf{\mu} = \mathbf{y}_{1} \mathbf{y}_{$	$ \begin{array}{c} \mathbf{H}^{+}\mathbf{G}_{1}\mathbf{G}_{1}\mathbf{C}_{2}\mathbf{C}_{2} \\ \mathbf{J} & \mathbf{G}\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{I}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{I}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{I}\mathbf{G}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{I}\mathbf{G}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{I}\mathbf{G}\mathbf{I}\mathbf{G}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{I}\mathbf{G}\mathbf{I}\mathbf{G}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{I}\mathbf{G}\mathbf{I}\mathbf{G}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{G}\mathbf{I}\mathbf{G}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{G}\mathbf{I}\mathbf{G}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{I}\mathbf{G}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{I}\mathbf{I}\mathbf{G}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{I}\mathbf{I}\mathbf{G}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I} \\ \mathbf{J} & -\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I} \\ \mathbf{J} & -\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I} \\ \mathbf{J} & -\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I} \\ \mathbf{J} & -\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I} \\ \mathbf{J} & -\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I} \\ \mathbf{J} & -\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I} \\ \mathbf{J} & -\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I} \\ \mathbf{J} \\ \mathbf{J} & -\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I} \\ \mathbf{J} \\ \mathbf{J} & -\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I}\mathbf{I} \\ \mathbf{J} \\ J$	$ \begin{array}{c} \mathbf{f_{1}} \mathbf{f_{2}} = \mathbf{f_{2}} \\ \mathbf{f_{3}} & 122 \\ 142 \\ \mathbf{1-076} & 084 \\ \mathbf{1-1076} & 1186 \\ \mathbf{1-1076} & 1186 \\ \mathbf{1-176} & 1176 \\ \mathbf{1-176} \\ \mathbf{1-176} & 1176 \\ 1$	$\begin{array}{c} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 $	$\begin{array}{c} 1-8, 1-0, \\ 1-4, -2, 20, 20, 21, 22, 23, 21, 24, 24, 25, 25, 24, 24, 24, 25, 25, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24$	<b>µ</b> :9, <b>µ</b> :3 2 ) - 169 151 3 - 169 151 4 - 063 079 5 076 0659 <b>µ</b> :3, -176 065 <b>µ</b> :3, -176 065 <b>µ</b> :3, -176 065 <b>µ</b> :3, -176 065 <b>µ</b> :3, -176 067 <b>µ</b> :4, -176 077 <b>µ</b> :4, -177 077 <b>µ</b> (1, -177) 077 <b>µ</b> :4, -177 077 <b>µ</b> :4	$\begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} $	$ \begin{array}{c} \textbf{F}=0, \textbf{F}=1\\ \textbf{0}-111\\ \textbf{1}-683& 088\\ \textbf{2}-71\\ \textbf{1}-683& 088\\ \textbf{1}-71\\ $
$ \begin{array}{c} \textbf{H} = \textbf{H}, \textbf{H} = \textbf{H} = \textbf{H} = \textbf{H}, \textbf{H} = \textbf{H}$	$ \begin{array}{c} \mathbf{u} = \mathbf{y}_{1} \mathbf{v}_{1} \\ \mathbf{u} = \mathbf{y}_{1} \mathbf{v}_{2} \mathbf{v}_{1} \\ \mathbf{u} = -5 \mathbf{v}_{2} \mathbf{v}_{2} \mathbf{v}_{3} \\ \mathbf{u} = -5 \mathbf{v}_{2} \mathbf{v}_{3} \mathbf{v}_{3} \\ \mathbf{u} = -5 \mathbf{v}_{2} \mathbf{v}_{3} \mathbf{v}_{3} \\ \mathbf{u} = -5 \mathbf{v}_{2} \mathbf{v}_{3} \mathbf{v}_{3} \mathbf{u}_{3} \\ \mathbf{u} = -5 \mathbf{v}_{2} \mathbf{v}_{3} \mathbf{u}_{3} \mathbf{u}_{3} \mathbf{u}_{3} \mathbf{u}_{3} \mathbf{u}_{3} \mathbf{u}_{3} \\ \mathbf{u}_{3} \\ \mathbf{u}_{3} \\ \mathbf{u}_{3} \\ \mathbf{u}_{3} \mathbf$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c} 6_1 \mathbf{r} - 6_1 \\ \mathbf{r} - 6_1 \\ \mathbf{r} - 1 \\ 2^2 - 10^2 \\ 1 \\ 2^2 - 10^2 \\ 1 \\ 2^2 - 10^2 \\ 1 \\ 1 \\ 2^2 - 10^2 \\ 1 \\ \mathbf$	$\begin{array}{c} {}^{\mu} {}^{\tau} {}^{\tau} {}^{\kappa} {}^{2} {}^{\tau} {}^{\tau} {}^{\tau} {}^{\tau} {}^{\sigma} {}$	$\begin{array}{c} 1-8, \mathbf{x} = 0 \\ -8 \\ -8 \\ -8 \\ -8 \\ -8 \\ -8 \\ -8 \\ $	$\begin{array}{c} \mu = 8 , \mu = 3 \\ 2 & -106 & 151 \\ 4 & -065 & 097 \\ 5 & -076 & 0659 \\ 4 & -065 & 077 \\ -1 & 077 & 078 \\ -1 & -077 & 078 \\ -1 & -077 & 078 \\ -1 & -077 & 078 \\ -1 & -077 & 078 \\ -1 & -077 & 078 \\ -1 & -078 & 074 \\ -1 & -071 & 078 \\ -1 & -058 & 044 \\ -1 & -058 & 044 \\ -1 & -058 & 044 \\ -1 & -058 & 044 \\ -1 & -074 & 077 \\ -5 & -044 & 048 \\ -1 & -058 & 044 \\ -1 & -058 & 044 \\ -1 & -058 & 048 \\ -1 & -058 & 048 \\ -1 & -058 & 048 \\ -1 & -058 & 048 \\ -1 & -058 & 048 \\ -1 & -058 & 048 \\ -1 & -058 & 048 \\ -1 & -058 & 048 \\ -1 & -058 & 048 \\ -1 & -058 & 048 \\ -1 & -058 & 048 \\ -1 & -058 & 048 \\ -1 & -058 & 048 \\ -1 & -058 & 048 \\ -1 & -078 & 057 \\ -1 & -078 & 048 \\ -1 & -077 & 078 \\ -1 & 078 & 078 \\ -1 & 078 & 078 \\ -$	$ \begin{array}{c} \mathbf{x}_{1}, \mathbf{x}_{2} \\ \mathbf{x}_{2} \\ \mathbf{x}_{3} \\ \mathbf{x}$	
$ \begin{array}{c} \mathbf{H} = \mathbf$	$ \begin{array}{c} u = y_{1} v_{3} \\ u = y_{1} v_{3} \\ u = -5 + 5 \\ 0 = -5 + 5 \\ 0 = -5 + 5 \\ 0 = -5 + 5 \\ 0 = -5 + 5 \\ 0 = -5 \\ 0 $	$ \begin{array}{c} \mathbf{H}^{+}\mathbf{G}_{1}\mathbf{G}_{1}\mathbf{C}_{2}\mathbf{G}_{2}\\ \mathbf{J} & \mathbf{G}\mathbf{G}\mathbf{G} & \mathbf{G}\mathbf{I} & \mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{I} & \mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{I} & \mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{I} & \mathbf{G}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{I} & \mathbf{G}\mathbf{G}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{I} & \mathbf{G}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{I} & \mathbf{G}\mathbf{G}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{I} \\ \mathbf{J} & -\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{G}\mathbf{I} \\ \mathbf{J} \\ J$	$\begin{array}{c} \mathbf{f_{s}} \mathbf{f_{s}} = \mathbf{f_{s}} \\ \mathbf{f_{s}} \\ \mathbf{f_{s}} = \mathbf{f_{s}} \\ \mathbf{f_{s}} = \mathbf{f_{s}} \\ \mathbf{f_{s}} = \mathbf{f_{s}} \\ \mathbf{f_{s}} \\ \mathbf{f_{s}} = \mathbf{f_{s}} \\ \mathbf{f_{s}} \\ \mathbf{f_{s}} = \mathbf{f_{s}} \\ f_{s$	$ \begin{array}{c} & & & & & & \\ & & & & & & \\ & & & & & $	$\begin{array}{c} 1-3, 1-0 \\ -1-4 \\ -2-3 \\ -1-4 \\ -2-3 $	$ \begin{array}{c} \mu = 0, \\ \mu = 0, \\ 2 \\ 3 \\ 2 \\ 4 \\ - 063 \\ 0 \\ 5 \\ - 064 \\ 0 \\ - 064 \\ 0 \\ - 064 \\ 0 \\ - 064 \\ 0 \\ - 064 \\ 0 \\ - 064 \\ 0 \\ - 064 \\ 0 \\ - 0 \\ - 064 \\ 0 \\ - $	$\begin{array}{c} \mathbf{p}_{1}, \mathbf{p}_{2} < \\ \mathbf{-5}^{-2}, \mathbf{c}_{3} < \mathbf{c}_{3} \\ \mathbf{-5}^{-1}, \mathbf{c}_{3} < \mathbf{c}_{3} \\ \mathbf{-5}^{-1}, \mathbf{c}_{3} < \mathbf{c}_{3} \\ \mathbf{-1}^{-1}, \mathbf{c}_{3} \\ \mathbf{c}_{3}$	$ \begin{array}{c} p=0,p+1\\ 0,-111\\ 1,-081\\ 0,081\\ 0,081\\ 0,082\\ 0,08$
$ \begin{array}{c} \textbf{H}_{-1} \textbf{K}_{-1} \textbf{K}_{-1$	$ \begin{array}{c} \mathbf{u} = \mathbf{y}, \mathbf{u} \} & \mathbf{u} = \mathbf{y}, \mathbf{u} \} \\ \mathbf{u} = \mathbf{y}, \mathbf{u} \} & \mathbf{u} = \mathbf{y}, \mathbf{u} \\ \mathbf{u} = \mathbf{z}, \mathbf{u} \in \mathbf{y} \\ \mathbf{u} = \mathbf{z}, \mathbf{u} \in \mathbf{z}, \mathbf{u} \\ \mathbf{u} = \mathbf{z}, \mathbf{u} \\ \mathbf{u} \\ \mathbf{u} \\ \mathbf{u} \\ \mathbf{u} = \mathbf{z}, \mathbf{u} \\ \mathbf{u} \\ \mathbf{u} \\ \mathbf{u} = \mathbf{z}, \mathbf{u} \\ \mathbf{u} \\$	$ \begin{array}{c} \mathbf{H}^{-} \mathbf{G}_{1} \mathbf{G}_{2} \mathbf{G}_{2} \\ \mathbf{J} & \mathbf{G}_{2} \mathbf{G}_{3} \\ \mathbf{J} & \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \\ \mathbf{J} & \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \\ \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \\ \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \\ \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \\ \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \\ \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \mathbf{G}_{3} \\ \mathbf{G}_{3} \mathbf$	$ \begin{array}{c} 6_{1} \mathbf{r} = 6 \\ \mathbf{r} = 1 \\ \mathbf{r} = 1$	$\begin{array}{c} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 $	$ \begin{array}{c} 1 \\ 1 \\ 2 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1$	$\begin{array}{c} \mu = 0, \\ \mu = 0, \\ 2 & -166 & 151 \\ 2 & -166 & 151 \\ 4 & -063 & 079 \\ 5 & 076 & 0656 \\ 6 & 054 & 075 \\ -3 & 077 & 078 \\ -3 & -77 & 078 \\ -3 & -77 & 078 \\ -3 & -77 & 078 \\ -3 & -77 & 078 \\ -2 & -125 & 148 \\ -1 & -1055 & 044 \\ -1 & -1055 & 044 \\ -1 & -1055 & 044 \\ -1 & -1055 & 044 \\ -1 & -1055 & 044 \\ -1 & -1055 & 044 \\ -1 & -1055 & 044 \\ -1 & -1055 & 044 \\ -1 & -1055 & 044 \\ -1 & -1050 & 057 \\ -1 & -1050$	$\begin{array}{c} \mathbf{x}_1 \mathbf{x}_2 \mathbf{x}_2 \\ \mathbf{x}_1 \mathbf{x}_2 \mathbf{x}_1 \mathbf{x}_2 \mathbf{x}_1 $	$ \begin{array}{c} \textbf{p}=10, \textbf{r}=1 \\ \textbf{0}-111 \\ \textbf{1}-683 \\ \textbf{088} \\ \textbf{0}=12 \\ \textbf{0}-111 \\ \textbf{1}-683 \\ \textbf{088} \\ \textbf{0}=12 \\ \textbf{0}=10 $
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$ \begin{array}{c} \textbf{H}_{-1}, \textbf{H}_{-1} & \textbf{H}_{-1}, \textbf{H}_{-1} & \textbf{H}_{-1}, \textbf{H}_{-1} & \textbf{H}_{-1}, \textbf{H}_{-1} & $	$ \begin{array}{c} \mathbf{u} = \mathbf{y} (\mathbf{v}) & \mathbf{u} = \mathbf{y} (\mathbf{v}) \\ \mathbf{u} = -5 (\mathbf{v}) & \mathbf{z} & \mathbf{z} & \mathbf{z} & \mathbf{z} \\ \mathbf{u} = -5 (\mathbf{v}) & \mathbf{z} & \mathbf{z} & \mathbf{z} & \mathbf{z} & \mathbf{z} \\ \mathbf{u} = -5 (\mathbf{v}) & \mathbf{z} & \mathbf{u} & \mathbf{z} & \mathbf{z} & \mathbf{z} & \mathbf{z} \\ \mathbf{u} = -2 (\mathbf{u}) & \mathbf{z} \\ \mathbf{u} = -2 (\mathbf{u}) & \mathbf{z} \\ \mathbf{u} = -2 (\mathbf{u}) & \mathbf{z} \\ \mathbf{u} = -2 (\mathbf{u}) & \mathbf{z} \\ \mathbf{u} = -2 (\mathbf{u}) & \mathbf{z} \\ \mathbf{u} = -2 (\mathbf{u}) & \mathbf{z} \\ \mathbf{u} = -2 (\mathbf{u}) & \mathbf{u} & \mathbf{z} & \mathbf{u} & \mathbf{z} & $		$ \begin{array}{c} 6_{1} \mathbf{r} = 6 & \mathbf{i} \\ \mathbf{i} $	$\begin{array}{c} \begin{array}{c} 1 \\ r_1, r_2, r_2 \\ r_1, r_2, r_3 \\ r_1, r_2, r_3, r_1, r_1, r_2, r_3, r_3, r_1, r_2, r_3, r_3, r_2, r_3, r_3, r_3, r_3, r_3, r_3, r_3, r_3$	$\begin{array}{c} 1 \\ 1 \\ 2 \\ - 1 \\$	$\begin{array}{c} \mu = 8, \mu = 3 \\ 2 & -106 & 151 \\ 3 & -106 & 151 \\ 4 & -065 & 079 \\ 5 & 076 & 0656 \\ 6 & 054 & 077 \\ -3 & 079 & 078 \\ -3 & 079 & 078 \\ -3 & -79 & 078 \\ -3 & -79 & 078 \\ -3 & -79 & 078 \\ -1 & -205 & 1248 \\ -1 & -2058 & 0444 \\ -1 & -2058 & 0444 \\ -1 & -2058 & 0444 \\ -1 & -2058 & 0444 \\ -1 & -2058 & 0444 \\ -1 & -2058 & 0444 \\ -1 & -2058 & 0444 \\ -1 & -2058 & 0444 \\ -1 & -2058 & 0444 \\ -1 & -2058 & 0444 \\ -1 & -2058 & 0444 \\ -1 & -2058 & 0444 \\ -1 & -2058 & 0444 \\ -1 & -2058 & 0454 \\ -1 & -2058 & 0454 \\ -1 & -2058 & 0454 \\ -1 & -2058 & 0454 \\ -1 & -2058 & 0454 \\ -1 & -2058 & 0454 \\ -1 & -2058 & 0454 \\ -1 & -2058 & 0454 \\ -1 & -2058 & 0454 \\ -1 & -2058 & 0454 \\ -1 & -1 & 0717 & 0726 \\ -1 $	$\begin{array}{c} \mathbf{x}_{1}, \mathbf{x}_{2} \\ \mathbf{x}_{2} \\ \mathbf{x}_{2} \\ \mathbf{x}_{2} \\ \mathbf{x}_{3} \\ \mathbf{x}_{4} \\ \mathbf{x}_{3} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{2} \\ \mathbf{x}_{2} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{2} \\ \mathbf{x}_{2} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{2} \\ \mathbf{x}_{2} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{2} \\ \mathbf{x}_{2} \\ \mathbf{x}_{1} \\ \mathbf{x}_{2} \\ \mathbf{x}_{2} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{2} \\ \mathbf{x}_{2} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{2} \\ \mathbf{x}_{2} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{2} \\ \mathbf{x}_{2} \\ \mathbf{x}_{1} \\ \mathbf{x}_{2} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{2} \\ \mathbf{x}_{1} \\ \mathbf{x}_{2} \\ \mathbf{x}_{1} \\ \mathbf{x}_{2} \\ \mathbf{x}_{1} \\ \mathbf{x}_{2} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{2} \\ \mathbf{x}_{1} \\ \mathbf{x}_{1} \\ \mathbf{x}_{2} \\ \mathbf{x}_{1} \\ \mathbf{x}_$	

is 2.732 Å [O(1)–O(3)]. The Y–C distances are very uniform, falling within the narrow range 3.18-3.20 Å.

 Table 5. Yttrium-oxygen distances in the coordination group with standard deviations

Sum of Goldschmidt radii for  $Y^{3+}$  and  $O^{2-}$  is 2.38 Å.

Y-O(1)	2·412 (0·011) Å
Y-O(2)	2.405 (0.010)
Y-O(3)	2.408 (0.009)
Y-O(4)	2.379 (0.009)
Y-H <sub>2</sub> O	2.343 (0.013)

Ninefold coordination is not uncommon in rareearth compounds. A number of solid salts are known which have been shown to contain the group  $Ln(H_2O)_3^{3+}$  with the same trigonal prismatic geometry as has been found in the present study (Moeller, Martin, Thompson, Ferrus, Feistel & Randall, 1965). This configuration is also found in the rare-earth hydroxides, though its presence in Y(OH)<sub>3</sub> has not been established (Roy & McKinstry, 1953). In YF<sub>3</sub>, the ninth fluorine atom is only slightly farther from the central atom than are the other eight (Zalkin & Templeton, 1953). It seems probable that the bonding in coordination compounds of yttrium and the rare earths is largely electrostatic in character, in view of the preponderance of high coordination numbers.

# Oxalate ions

The oxalate ions in the present structure are planar; both have a centre of symmetry. The dimensions shown in Table 6 agree with those found in other oxalate structures, including ammonium oxalate monohydrate in which the ions are non-planar (Jeffrey & Parry, 1952, 1954; Sterling, 1964, 1965; Padmanabhan, Srikantha & Medhi Ali, 1965). The differences exhibited by the individual C-O bonds and O-C-C angles in Table 6 are probably not significant.

Table 6. B	ond lengths a	nd angles in th	e two
independent	oxalate ions,	with standard	' deviations

C(1)-C(1')	1·534 (0·026) Å
C(1)-O(1)	1·244 (0·017)
C(1)-O(2)	1·270 (0·016)
C(2)-C(2')	1·524 (0·026)
C(2)-O(3)	1·244 (0·016)
C(2)-O(4)	1·277 (0·016)
O(1)-C(1)-O(2)	126·2 (1·3)°
O(1)-C(1)-C(1')	117·6 (1·2)
O(2)-C(1)-C(1')	116·3 (1·1)
O(3)-C(2)-O(4)	124·5 (1·2)
O(3)-C(2)-C(2')	119·1 (1·1)
O(4)-C(2)-C(2')	116·4 (1·1)

# Environments of H<sub>2</sub>O and NH<sub>4</sub> (Table 7)

The ammonium ion is at the centre of a distorted tetrahedron formed by the pairs O(2) and O(4) which are at a suitable distance for hydrogen bond formation, but the angles are not favorable. The angle O(4)-N-O(4') is 107.9°, not too far removed from the tetrahedral value, but O(2)-N-O(2') is 119.2° and the traces

of the planes containing these angles are at only  $79^{\circ}$  to one another (Fig. 1). This bonding arrangement would thus be associated with considerable strain, but no other is possible.

On energetic grounds one would expect the hydrogen atoms of the water molecule to point away from the yttrium ions, and this condition would be fulfilled by bonding to the pair O(3), O(3'), but unfortunately the angle O(3)-H<sub>2</sub>O-O(3') is only 80°, which seems al-



Fig.2. Projection of the coordination group onto the plane containing the twofold axis and the bond Y-O(1), showing the threefold symmetry. Y at  $\frac{3}{4}$ , 0.1045,  $\frac{3}{4}$ .



Fig. 3. A redrawing of part of Fig. 1, with the trigonal prism outlined.

Table 7. Environments of  $H_2O$  and  $NH_4$ : distances from neighboring oxygen atoms, with angles of interest

$H_2O-O(1)$	3·170 Å
$H_2O-O(2)$	2·783
$H_2O-O(3)$	2·827
$H_2O-O(4)$	2·758
NH4-O(1)	3·140
NH4-O(2)	3·095
NH4-O(3)	3·677
NH4-O(4)	2·962
O(2)-H <sub>2</sub> O-O(2')	110·3°
O(4)-H <sub>2</sub> O-O(4')	109·7
O(3)-H <sub>2</sub> O-O(3')	80·0
O(2)–NH <sub>4</sub> –O(2')	119·2
O(4)–NH <sub>4</sub> –O(4')	107·9

together too small. The angles  $O(2)-H_2O-O(2')$  and  $O(4)-H_2O-O(4')$  are close to the tetrahedral value, but bonding to either O(2) or O(4) would bring the hydrogen atoms in towards the yttrium. The question of the bonding of the water molecule must therefore remain open.

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# An Accurate Correction Procedure for Equi-inclination Weissenberg Diagrams

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A method is presented by which the inclination error and the goniometer setting error can be derived from the deviations from linearity of lines of reciprocal-lattice points in upper-layer equi-inclination Weissenberg patterns. The method is most suitable for crystals having large unit cells and for rotation axes close to reciprocal-lattice directions.

#### Introduction

For crystals having large unit cells, the low-order reflexions in upper-layer equi-inclination Weissenberg patterns are quite close to the trace of the undeviated beam, or central axis. Even though the crystal alignment and inclination angle seem to be correct, these reflexions are often displaced from their proper positions. These displacements may serve as particularly sensitive diagnostic tools for improving these adjustments.

We shall here treat only the situation when the rotation axis is intended to coincide with a reciprocallattice axis. If this is not the case, the lack of coincidence could be treated as a known error, and we would be only interested in deviations from this. If this lack of coincidence were large, the reflexions involved would not be near the central axis of the Weissenberg diagram where all the sensitivity of this technique resides, so this method would not be recommended.

In the case treated here, the upper-layer zone is intended to rotate about a central reciprocal-lattice point which should remain stationary on the Ewald sphere. If all adjustments are correct, all straight lines of reciprocal-lattice points in the upper-layer zone that pass through the central stationary point become parallel straight lines on the Weissenberg pattern. If there is only an inclination error, the upper-layer zone rotates about the central stationary reciprocal-lattice point which is displaced from the surface of the Ewald sphere. If there is only a goniometer-setting error, the central reciprocal-lattice point rotates about the point on the Ewald sphere where it would be had there been no error. When each type of error occurs, the straight lines of reciprocal-lattice points that pass through the central point are no longer straight lines on the Weissenberg pattern. The resultant curves approach the undeviated straight lines far from the central axis of the pattern. The more closely the points on each curve approach the central axis, the more they deviate from