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Chemistry

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X-RAY FLUORESCENCE TABLES: TOPAZ CRYSTAL

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Y-12 PLANT
Oak Ridge, Tennessee

**UNION
CARBIDE**

UNION CARBIDE CORPORATION
NUCLEAR DIVISION

Operating the

- OAK RIDGE GASEOUS DIFFUSION PLANT
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UNION CARBIDE CORPORATION
Nuclear Division

Y-12 PLANT

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X-RAY FLUORESCENCE TABLES: TOPAZ CRYSTAL

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Oak Ridge, Tennessee
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ABSTRACT

A critical compilation of standard reference tables of X-ray fluorescence lines has been published in convenient form for experimental use. This section of the report contains tables calculated for a topaz crystal.

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CONTENTS

INTRODUCTION	7
SUMMARY	9
REFERENCES	11
TABLE 1 (GONIOMETER ANGLES ARRANGED BY ELEMENT, LINE, AND ORDER).	13
TABLE 2 (GONIOMETER ANGLES ARRANGED BY ANGLE MAGNITUDE). . .	55

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INTRODUCTION

Standard X-ray fluorescence tables contain rounding errors and a few disjointed entries. Furthermore, their format is not the most convenient one in some experimental situations, leaving to the experimenter the task of hunting and comparing before coming to a definite conclusion about the composition of his sample. For a specific analyzing crystal, the experimenter needs a table that is arranged according to element, order, and line; and an angular tabulation. This section of the report provides these tables for the topaz crystal.

Wavelength data from three authors: Müller,⁽¹⁾ Powers,⁽²⁾ and Liebhafsky,⁽³⁾ were punched into cards, compared, sorted, and sifted with a computer, and a "best" value determined from the acceptable values. Goniometer angles were generated for specific analyzing crystals and the resulting angles were printed in two tables. One of the tables is arranged by element, order, and line and the other by angle magnitude. Tables may be generated for any crystal with known spacing.

The tables have been compiled for all emissions having 2θ reflections less than 150 degrees. Reflections above $150^\circ 2\theta$ are not considered as practical since the reflection efficiency becomes increasingly poorer with increasing angles. Few instruments are capable of even operating in this range. The logical approach when the desired emission falls at these high angles would be the selection of an analyzing crystal with more appropriate d-spacing. Orders from 1 through 5 for elements from sodium (11) through californium (98) have been included in the tables. Data where available for the more prominent M spectra have also been included.

Relative intensity data have not been included as a part of this report since such data are readily available to those who desire it; however, in some cases there are large variations in the relative values that are assigned to a given energy level. It is felt that the data of Powers⁽²⁾ are satisfactory for most uses so to include such data in this report would only consume unnecessary space.

This report is being published in several sections. Each section contains both tables for a specific analyzing crystal. The first section⁽⁴⁾ lists and explains the operation of the computer programs which have generated the tables. The reader is invited to refer to this section of the report for further information.

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SUMMARY

Tables arranged by element, order, and line, and also angular tabulations for a specific analyzing crystal, were derived from a critical amalgamation of three standard reference tables of X-ray fluorescence lines. The format of these tables was designed to increase the efficiency of the experimenter by decreasing the time spent in table searches. This section of the report contains both tables for a topaz crystal.

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REFERENCES

- (1) Müller, Dr. Phil. E. A. W., Wellenlängen - und Winkeltafeln zur Röntgenspektralanalyse, Siemens and Halske Aktiengesellschaft, Karlsruhe, West Germany (1960).
- (2) Powers, Maurice C., X-Ray Fluorescent Spectrometer Conversion Tables for Topaz, LiF, NaCl, EDDT, and ADP Crystals, Phillips Electronics, Inc, Instruments Division, Mount Vernon, New York (1957).
- (3) Liebhafsky, H. A., Pfeiffer, H. A., Winslow, E. W., Zeman, P. D., X-Ray Absorption and Emission in Analytical Chemistry, John Wiley and Sons, Inc, New York (1960).
- (4) Amsbury, W. P., Lee, W. W., Rowan, J. H., Walden, G. E., X-Ray Fluorescence Tables: Program Description, Y-1470-A, Union Carbide Corporation, Nuclear Division, Y-12 Plant, Oak Ridge, Tennessee (to be issued).

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TABLE 1
GONIOMETER ANGLES ARRANGED BY ELEMENT, LINE, AND ORDER

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21 SC		TOPAZ CRYSTAL, D# 1.356 ANGSTROMS								
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1										
2										
3										
4										
5										
1	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
2										
3										
4										
5										
1	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
2										
3										
4										
5										
1	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
2										
3										
4										
5										
22 TI										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1			135.94		135.94		134.17			
2										
3										
4										
5										
1	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
2										
3										
4										
5										
1	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
2										
3										
4										
5										
1	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
2										
3										
4										
5										

23 V TOPAZ CRYSTAL, D# 1.356 ANGSTROMS										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	134.72	135.16	114.74		114.74		113.58			
2										
3										
4										
5										
1	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
2										
3										
4										
5										
1	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
2										
3										
4										
5										
1	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
2										
3										
4										
5										
24 CR										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	115.21	115.53	100.49		100.49		99.57			
2										
3										
4										
5										
1	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
2										
3										
4										
5										
1	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
2										
3										
4										
5										
1	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
2										
3										
4										
5										

25	MN	TOPAZ CRYSTAL, D# 1.356 ANGSTROMS									
	ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
	1	101.52	101.89	89.54				88.77			
	2										
	3										
	4										
	5										
		LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
	1										
	2										
	3										
	4										
	5										
		LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
	1										
	2										
	3										
	4										
	5										
		KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
	1										
	2										
	3										
	4										
	5										
26	FE										
	ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
	1	91.10	91.34	82.76				80.04			
	2										
	3										
	4										
	5										
		LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
	1										
	2										
	3										
	4										
	5										
		LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
	1										
	2										
	3										
	4										
	5										
		KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
	1										
	2										
	3										
	4										
	5										

27	CO	TOPAZ CRYSTAL, D# 1.356 ANGSTROMS								
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	82.55	82.77	73.41				72.78			
2										
3										
4										
5										
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1										
2										
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1										
2										
3										
4										
5										
	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										
28	NI									
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	75.38	75.59	67.16	66.60			66.60			
2										
3										
4										
5										
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1										
2										
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1										
2										
3										
4										
5										
	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										

29 CU		TOPAZ CRYSTAL, D# 1.356 ANGSTROMS								
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	69.25	69.41	51.76	61.22	61.81		61.27			
2										
3										
4										
5										
1	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
2										
3										
4										
5										
1	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
2										
3										
4										
5										
1	KB0	LB15	LB17	LB17	LY8	LY13	LYP4	LYP8	LS	LT
2										
3										
4										
5										
30 ZN										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	63.89	64.09	57.05	56.52			56.57			
2			145.50	142.49			142.75			
3										
4										
5										
1	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
2										
3										
4										
5										
1	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
2										
3										
4										
5										
1	KB0	LB15	LB17	LB17	LY8	LY13	LYP4	LYP8	LS	LT
2										
3										
4										
5										

33 AS		TOPAZ CRYSTAL, D# 1.356 ANGSTROMS								
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	51.40	51.58	45.88	45.33	45.92		45.51			
2	120.26	120.97	102.43	100.82	102.56		101.36			
3										
4										
5										
1	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
2										
3										
4										
5										
1	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
2										
3										
4										
5										
1	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
2										
3										
4										
5										
34 SE										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	48.09	48.27	42.91	42.37	42.96		42.55			
2	109.15	109.74	94.04	92.56	94.16		93.05			
3										
4										
5										
1	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
2										
3										
4										
5										
1	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
2										
3										
4										
5										
1	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
2										
3										
4										
5										

37 RB		TOPAZ CRYSTAL, D# 1.356 ANGSTROMS								
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	39.93	40.11	35.60	35.02	35.60		35.29			
2	86.14	86.60	75.38	73.99	75.38		74.63			
3			132.99	129.02	132.99		130.82			
4										
5										
1	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
2										
3										
4										
5										
1	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
2										
3										
4										
5										
1	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
2										
3										
4										
5										
38 SR										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	37.65	37.82	33.56	33.03	33.56		33.21			
2	80.37	80.92	70.54	69.30	70.54		69.71			
3			120.03	117.05	120.03		118.03			
4										
5										
1	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
2										
3										
4										
5										
1	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
2										
3										
4										
5										
1	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
2										
3										
4										
5										

[illegible]

41	N8	TOPAZ CRYSTAL, D# 1.356 ANGSTROMS								
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	31.93	32.11	28.43	27.91	28.43		28.17			
2	66.75	67.16	58.83	57.67	58.83		58.25			
3	111.22	112.12	94.91	92.68	94.91		93.79			
4				149.42						
5										
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1										
2										
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1										
2										
3										
4										
5										
	KB0	LB15	LB17	LB19	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										
42	M0									
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	30.31	30.49	26.75	26.47	27.00	26.43	26.73			
2	63.05	63.45	55.56	54.51	55.66	54.42	55.08			
3	103.31	104.13	88.71	86.78	88.89	86.60	87.83			
4			137.55	132.68	138.02	132.26	135.27			
5										
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1										
2										
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1										
2										
3										
4										
5										
	KB0	LB15	LB17	LB19	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										

45 RH		TOPAZ CRYSTAL, D# 1.356 ANGSTROMS								
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	26.13	26.34	23.23	22.75	23.23		23.01			
2	53.75	54.23	47.49	46.47	47.49		47.03			
3	85.39	86.26	74.31	72.57	74.31		73.52			
4	129.41	131.43	107.28	104.20	107.28		125.67			
5										
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1										
2										
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1										
2										
3										
4										
5										
	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										
46 PD										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	24.91	25.13	22.15	21.68	22.15		21.98			
2	51.11	51.53	45.19	44.19	45.19		44.82			
3	80.65	81.48	70.39	68.69	70.39		69.77			
4	112.27	120.97	100.43	97.56	100.43		99.38			
5			147.70	140.19	147.70		144.79			
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1										
2										
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1										
2										
3										
4										
5										
	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										

49 IN		TOPAZ CRYSTAL, D# 1.356 ANGSTROMS								
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	21.76	21.98	19.32	18.89	19.32		19.15			
2	44.37	44.82	39.21	38.32	39.21		38.85			
3	69.03	69.77	60.44	58.98	60.44		59.85			
4	98.08	99.38	84.30	82.04	84.30		83.39			
5	141.45	144.79	114.04	110.26	114.04		112.50			
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1										
2										
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1										
2										
3										
4										
5										
	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										
50 SN										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	20.86	21.03	18.46	18.07	18.50		18.33			
2	42.46	42.82	37.42	36.62	37.51		37.15			
3	65.80	66.40	57.53	56.23	57.67		57.09			
4	92.80	93.79	79.82	77.85	80.54		79.16			
5	129.71	131.74	106.64	103.52	107.00		105.59			
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1										
2										
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1										
2										
3										
4										
5										
	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										

[illegible]

53 I		TOPAZ CRYSTAL, D# 1.356 ANGSTROMS								
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	18.37	18.59	16.28	15.95	16.32					
2	37.24	37.69	32.90	32.11	32.99					
3	57.24	57.96	50.27	49.02	50.41					
4	79.38	80.48	69.00	67.16	69.20					
5	105.94	107.71	90.14	87.48	90.44					
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1									144.38	128.92
2										
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1	128.92	123.68								
2										
3										
4										
5										
	KBD	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										
54 XE										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	17.65	17.82	15.60	15.26						
2	35.73	36.09	31.49	30.79						
3	54.80	55.37	48.04	46.94						
4	75.70	76.55	65.75	64.14						
5	100.16	101.49	85.45	83.17						
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1									130.41	
2										
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1										
2										
3										
4										
5										
	KBC	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										

[illegible]

57 LA		TOPAZ CRYSTAL, D# 1.356 ANGSTROMS								
ORDER	KA1	KA2	KBI	KB2	KB3	KB4	KB5	LA1	LA2	LBI
1	15.73	15.90	13.99	13.55	13.94		13.81			130.01
2	31.76	32.11	28.00	27.30	28.08		27.82			
3	48.46	49.02	42.55	41.46	42.68		42.28			
4	66.35	67.16	57.86	56.33	58.06		57.48			
5	86.31	87.48	74.42	72.31	74.68		73.89			
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	116.25	125.41	129.12		122.62	114.04	114.59	115.21	104.34	97.95
2										
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1	97.63	93.97	108.79							
2										
3										
4										
5										
	KBI	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										
58 CE										
ORDER	KA1	KA2	KBI	KB2	KB3	KB4	KB5	LA1	LA2	LBI
1	15.13	15.34	13.38	13.04	13.38			141.58	142.75	120.62
2	30.53	30.97	26.95	26.26	26.95					
3	46.52	47.21	40.92	39.84	40.92					
4	63.55	64.54	55.56	54.04	55.56					
5	82.32	83.73	71.27	69.20	71.27					
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	109.08	116.89	120.03		114.51	107.00	107.57	108.07	98.08	92.56
2										
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1	92.25	88.89	102.16							
2										
3										
4										
5										
	KBI	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										

61 PM		TOPAZ CRYSTAL, D# 1.356 ANGSTROMS								
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	13.60	13.77	11.94	11.68	11.98			114.66	115.37	100.23
2	27.39	27.73	24.01	23.49	24.09					
3	41.60	42.14	36.35	35.55	36.49					
4	56.52	57.29	49.16	48.04	49.34					
5	72.57	73.62	62.65	61.17	62.90					
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	92.77								84.07	
2										
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1										
2										
3										
4										
5										
	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										
62 SM										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	13.08	13.30	11.55	11.26	11.60			108.36	109.15	94.91
2	26.34	26.78	23.23	22.63	23.32					
3	39.97	40.65	35.15	34.22	35.29					
4	54.23	55.18	47.49	46.20	47.67					
5	69.46	70.75	60.44	58.74	60.68					
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	87.89	92.68	95.03	81.99	91.71	86.37	86.66	87.13	79.11	75.43
2										
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1	75.22	72.62	81.99		109.74	132.47				
2										
3										
4										
5										
	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
2										
3										
4										
5										

65 TB										
TCPAZ CRYSTAL, D# 1.356 ANGSTROMS										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	11.81	11.98	10.41	10.15	10.41			93.48	94.16	81.82
2	23.75	24.09	20.90	20.39	20.90					
3	35.95	36.49	31.58	30.79	31.58					
4	48.60	49.34	42.55	41.46	42.55					
5	61.91	62.90	53.94	52.52	53.94					
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	76.66	80.15	82.32	71.11	79.88	75.43		75.86	68.69	66.00
2										
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1	65.69	63.50	71.11		93.36	110.92				
2										
3										
4										
5										
	KB0	LB15	LB17	LB17	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										
66 DY										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	11.43	11.60	10.03	9.81	10.07			89.48	90.14	78.18
2	22.97	23.32	20.13	19.70	20.22					
3	34.76	35.29	30.40	29.74	30.53					
4	46.94	47.67	40.92	40.02	41.10					
5	59.71	60.68	51.82	50.65	52.05					
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	73.52	76.61	78.72		76.61	72.26	72.31	72.68	65.80	63.30
2										
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1	63.00	60.88	68.07		88.77	105.45				
2										
3										
4										
5										
	KB0	LB15	LB17	LB17	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										

69 TM TOPAZ CRYSTAL, D# 1.356 ANGSTROMS										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	10.32	10.54	9.09	8.88	9.14			79.35	79.66	68.69
2	20.73	21.16	18.25	17.82	18.33					
3	31.32	31.98	27.52	26.87	27.65					
4	42.19	43.09	36.98	36.09	37.15					
5	53.47	54.65	46.70	45.56	46.94					
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	65.29	67.41	69.41		67.92			64.19	53.01	56.04
2										139.94
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1	55.75	53.89	59.95	56.81	77.42	92.25				
2	138.49	130.01		144.10						
3										
4										
5										
	KB0	LB15	LB17	LBP7	LY9	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										
70 YB										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	10.03	10.20	8.84	8.63	8.84			76.12	76.72	65.95
2	20.13	20.47	17.73	17.31	17.73					
3	30.40	30.92	26.73	26.08	26.73					
4	40.92	41.64	35.91	35.02	35.91					
5	51.82	52.76	45.33	44.19	45.33					
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	62.90	64.74	66.70	61.52	65.44	61.91	61.37	61.72	55.75	53.89
2									138.49	130.01
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1	53.56	51.82	57.58	54.56	74.21	88.59				
2	128.63	121.83	148.78	132.89						
3										
4										
5										
	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										

73 TA		TCPAZ CRYSTAL, D# 1.356 ANGSTROMS								
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	9.09	9.31	8.03	7.82	8.08	7.78	7.99	68.28	68.84	58.59
2	18.25	18.67	16.11	15.68	16.19	15.60	16.02			
3	27.52	28.17	24.27	23.62	24.40	23.49	24.14			
4	36.98	37.87	32.55	31.67	32.72	31.49	32.37			
5	46.70	47.86	41.01	39.88	41.24	39.66	40.79			
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	56.52	57.62	59.51	55.13	58.78	55.56	54.70	55.08	49.62	48.09
2	142.49	149.10		135.49		137.55	133.53	135.27	114.12	109.15
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1	47.81	46.25	51.26	48.51	65.69	79.16				
2	108.28	103.52	119.78	110.43						
3										
4										
5										
	KB0	LB15	LB17	LB17	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										
74 W										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	9.84	9.05	7.78	7.57	7.82	7.57	7.74	65.95	66.50	56.42
2	17.73	18.16	15.60	15.17	15.68	15.17	15.51			141.97
3	26.73	27.39	23.49	22.84	23.62	22.84	23.36			
4	35.91	36.80	31.49	30.62	31.67	30.62	31.32			
5	45.33	46.47	39.66	38.54	39.83	38.54	39.44			
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	54.65	55.51	57.38	53.23	56.81	53.66	52.71	53.09	47.81	46.38
2	133.31	137.31	147.55	127.28	144.10	129.02	125.22	126.71	108.28	103.93
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1	46.11	44.55	49.34	46.66	63.20	76.45				
2	103.11	98.60	113.19	104.75						
3										
4										
5										
	KB0	LB15	LB17	LB17	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										

77 IR		TCPAZ CRYSTAL, D# 1.356 ANGSTROMS								
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	8.08	3.29	7.15	6.93	7.15	6.89	7.06	59.76	60.29	50.55
2	16.19	16.62	14.32	13.89	14.32	13.81	14.15			117.30
3	24.40	25.04	21.55	20.90	21.55	20.78	21.29			
4	32.72	33.61	28.87	28.00	28.87	27.82	28.52			
5	41.24	42.37	36.31	35.20	36.31	34.98	35.86			
	LR2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	49.48	49.76	51.58	48.14	51.49	48.55	47.40	47.72	42.87	41.69
2	113.65	114.59	120.97	109.30	120.62	110.63	107.00	108.00	93.91	90.74
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1	41.42	39.97	44.28	41.78	56.52	69.25				
2	90.02	86.26	97.82	90.98	142.49					
3										
4										
5										
	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										
78 PT										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	7.87	8.03	6.93	6.72	6.93	6.72	6.89	57.91	58.44	48.78
2	15.77	16.11	13.89	13.47	13.89	13.47	13.81			111.37
3	23.75	24.27	20.90	20.26	20.90	20.26	20.78			
4	31.84	32.55	28.00	27.13	28.00	27.13	27.82			
5	40.11	41.01	35.20	34.09	35.20	34.09	34.98			
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	47.95	48.04	49.81	46.57	49.90	47.03	45.74	46.11	41.37	40.29
2	108.72	109.01	114.74	104.48	115.06	105.87	102.03	103.11	89.90	87.07
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1	40.02	38.63	42.73	40.29	54.56	67.11				
2	86.37	82.83	93.54	87.07	132.89					
3										
4										
5										
	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										

79 AU		TOPAZ CRYSTAL, D# 1.356-ANGSTROMS								
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	7.61	7.82	6.72	6.55	6.76	6.51	6.68	56.13	56.71	47.12
2	15.26	15.66	13.47	13.13	13.55	13.04	13.38	140.44	143.56	106.15
3	22.97	23.62	20.26	19.75	20.39	19.62	20.13			
4	30.79	31.67	27.13	26.43	27.30	26.26	26.95			
5	38.76	39.88	34.09	33.21	34.31	32.99	33.87			
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	46.47	46.38	48.18	45.10	48.37	45.56	44.23	44.55	39.97	38.94
2	104.20	103.93	109.45	100.16	110.03	101.49	97.69	98.60	86.26	83.62
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1	38.67		41.28	38.90	52.67	65.14				
2	82.94		89.66	83.51	125.04					
3										
4										
5										
	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										
80 HG										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	7.40	7.61	6.51	6.34	6.55			54.46	55.04	45.51
2	14.83	15.26	13.04	12.70	13.13			132.47	135.05	101.36
3	22.32	22.97	19.62	19.10	19.75					
4	29.92	30.79	26.26	25.56	26.43					
5	37.65	38.76	32.99	32.11	33.21					
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	45.10	44.82	46.57	43.73	46.94	44.14	42.64	43.09	38.63	37.65
2	100.16	99.38	104.48	96.29	105.59	97.44	93.29	94.53	82.83	80.37
3										
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1	37.38	36.04	39.84	37.56	50.83	63.25				
2	79.71	76.45	85.91	80.15	118.28					
3	148.01	136.28		149.90						
4										
5										
	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										

81 TL TOPAZ CRYSTAL, DH 1.356 ANGSTROMS										
ORDER	KA1	KA2	KBI	KB2	KB3	KB4	KB5	LA1	LA2	LBI
1	7.19	7.40	6.34	6.17	6.38			52.85	53.42	43.96
2	14.40	14.83	12.70	12.36	12.79			125.78	128.05	96.93
3	21.68	22.32	19.10	18.59	19.23					
4	29.04	29.92	25.56	24.87	25.74					
5	36.53	37.65	32.11	31.23	32.33					
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	43.73	43.32	45.05	42.41	45.55	42.82	41.33	41.64	37.33	36.44
2	96.29	95.16	100.03	92.68	101.49	93.79	89.78	90.62	79.60	77.42
3									147.55	139.45
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1	36.13	34.84	38.54	36.26	49.16	61.42				
2	76.66	73.57	82.60	76.99	112.58					
3	136.97	127.85		136.02						
4										
5										
	KBC	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										
82 PB										
ORDER	KA1	KA2	KBI	KB2	KB3	KB4	KB5	LA1	LA2	LBI
1	6.98	7.19	6.17	6.00	6.21	5.96	6.13	51.35	51.87	42.46
2	13.98	14.40	12.36	12.02	12.45	11.94	12.28	120.11	122.00	92.80
3	21.03	21.68	18.59	18.07	18.72	17.95	18.46			
4	28.17	29.04	24.87	24.18	25.04	24.01	24.70			
5	35.42	36.53	31.23	30.35	31.45	30.13	31.01			
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	42.50	41.87	43.59	41.15	44.23	41.55	39.97	40.29	36.09	35.24
2	92.93	91.22	95.91	89.30	97.69	90.38	86.26	87.07	76.55	74.52
3									136.62	130.51
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1	34.98	33.69	37.24	35.07	47.49	59.71				
2	73.89	70.85	79.38	74.10	107.28					
3	123.72	120.79	146.66	129.31						
4										
5										
	KBC	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										

85 AT		TOPAZ CRYSTAL, D# 1.356 ANGSTROMS								
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	6.43	6.64	5.66	5.54				47.17	47.72	38.49
2	12.87	13.30	1.34	11.09				106.29	108.00	82.49
3	19.36	20.00	7.05	16.66						
4	25.91	26.78	22.80	22.28						
5	32.55	33.65	28.61	27.95						
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	38.99								32.68	
2	83.73								68.48	
3									115.14	
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1										
2										
3										
4										
5										
	KBC	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										
86 RN										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	6.26	6.47	5.54	5.37				45.88	46.43	37.24
2	12.53	12.96	11.09	10.75				102.43	104.06	79.38
3	18.85	19.49	16.66	16.15						146.66
4	25.22	26.08	22.28	21.59						
5	31.67	32.77	27.95	27.08						
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	37.91								31.63	
2	81.04								66.05	
3									109.67	
4										
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1										
2										
3										
4										
5										
	KBD	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										

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89 AC		TOPAZ CRYSTAL, D# 1.356 ANGSTROMS									
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1	
1	5.75	5.96	5.11	4.95				42.37	42.91	33.63	
2	11.51	11.94	10.24	9.90				92.56	94.04	71.16	
3	17.31	17.95	15.38	14.87						121.57	
4	23.14	24.01	20.56	19.87							
5	29.04	30.13	25.78	24.91							
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2	
1	34.93								23.78		
2	73.78								59.61		
3	128.43								96.42		
4											
5											
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY	
1											
2											
3											
4											
5											
	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT	
1											
2											
3											
4											
5											
90 TH											
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1	
1	5.62	5.83	4.95	4.82	4.99		4.90	41.28	41.82	32.77	
2	11.26	11.68	9.90	9.65	9.98		9.81	89.66	91.10	68.69	
3	16.92	17.56	14.87	14.49	15.00		14.74			115.61	
4	22.63	23.49	19.87	19.36	20.05		19.70				
5	28.39	29.48	24.91	24.27	25.13		24.70				
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2	
1	34.05	32.33	34.00	32.77	35.55	33.17	30.92	31.23	27.87	27.39	
2	71.68	67.67	71.58	68.69	75.27	69.61	64.44	65.14	57.58	56.52	
3	122.88	113.27	122.62	115.61	132.68	117.78	106.22	107.71	92.50	90.50	
4									148.78	142.49	
5											
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY	
1	27.13	26.04	28.82	26.95	36.71	48.55					
2	55.94	53.56	59.71	55.56	78.07	110.63					
3	89.42	85.05	96.61	88.71	141.71						
4	139.45	120.63		137.55							
5											
	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT	
1											
2											
3											
4											
5											

93 NP		TOPAZ CRYSTAL, D# 1.356 ANGSTROMS								
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	5.20	5.41	4.61	4.44				38.27	38.81	29.83
2	17.41	17.83	9.22	8.88				81.93	83.28	61.96
3	15.64	16.28	13.85	13.34						101.09
4	20.90	21.76	18.50	17.82						
5	26.21	27.30	23.19	22.32						
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	31.49								25.43	
2	65.75								52.24	
3	109.01								82.66	
4									123.41	
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1										
2										
3										
4										
5										
	KBC	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										
94 PU										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	5.07	5.28	4.48	4.35				37.33	37.87	28.96
2	10.15	10.58	8.97	8.71				79.60	80.93	60.00
3	15.26	15.90	13.47	13.08				147.55		97.18
4	20.39	21.25	17.99	17.48						
5	25.56	26.65	22.54	21.89						
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	30.70								24.65	
2	63.94								50.55	
3	105.17								79.66	
4									117.30	
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1										
2										
3										
4										
5										
	KBC	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										

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97 BK		TOPAZ CRYSTAL, D# 1.356 ANGSTROMS								
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	4.69	4.90	4.14	4.01				34.76	35.29	26.47
2	9.39	9.81	8.29	8.03				73.36	74.63	54.51
3	14.11	14.74	12.45	12.06				127.28	130.82	86.78
4	18.85	19.70	16.62	16.11						132.68
5	23.62	24.70	20.82	20.17						
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	28.56								22.54	
2	57.12								46.02	
3	95.47								71.79	
4									102.84	
5										
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1										
2										
3										
4										
5										
	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										
98 CF										
ORDER	KA1	KA2	KB1	KB2	KB3	KB4	KB5	LA1	LA2	LB1
1	4.56	4.78	4.10	3.93				33.96	34.49	25.69
2	9.14	9.56	8.20	7.87				71.47	72.73	52.81
3	13.72	14.36	12.32	11.81				122.35	125.59	83.68
4	18.33	19.19	16.45	15.77						125.59
5	22.97	24.05	20.60	19.75						
	LB2	LB3	LB4	LB5	LB6	LB7	LB9	LB10	LY1	LY2
1	27.87								21.89	
2	57.58								44.64	
3	92.50								69.46	
4	148.78								98.86	
5									143.42	
	LY3	LY4	LY5	LY6	LN	LL	MA1	MA2	MB	MY
1										
2										
3										
4										
5										
	KB0	LB15	LB17	LBP7	LY8	LY13	LYP4	LYP8	LS	LT
1										
2										
3										
4										
5										

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TABLE 2
GONIOMETER ANGLES ARRANGED BY ANGLE MAGNITUDE

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TOPAZ CRYSTAL, D# 1.356 ANGSTROMS							3.93 TO 5.75						
ANGLE	ELEM	LINE	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF	
3.93	98 CF	KB2	1	0.093	1		4.94	95 AM	KA1	1	0.117	1	
4.01	97 BK	KB2	1	0.095	1		4.94	90 TH	KB1	1	0.117	1,2,3	
4.10	98 CF	KB1	1	0.097	1		4.99	90 TH	KB3	1	0.118	1,2	
4.14	96 CM	KB2	1	0.098	1		5.03	96 CM	KA2	1	0.119	1	
4.14	97 BK	KB1	1	0.098	1		5.07	88 RA	KB2	1	0.120	1	
4.23	95 AM	KB2	1	0.100	1		5.07	94 PU	KA1	1	0.120	1	
4.27	96 CM	KB1	1	0.101	1		5.11	89 AC	KB1	1	0.121	1	
4.35	95 AM	KB1	1	0.103	1		5.16	95 AM	KA2	1	0.122	1	
4.35	94 PU	KB2	1	0.103	1		5.20	93 NP	KA1	1	0.123	1	
4.44	93 NP	KB2	1	0.105	1		5.24	88 RA	KB1	1	0.124	1	
4.48	94 PU	KB1	1	0.106	1		5.24	87 FR	KB2	1	0.124	1	
4.56	98 CF	KA1	1	0.108	1		5.28	94 PU	KA2	1	0.125	1	
4.61	92 U	KB2	1	0.109	1,2,3		5.33	92 U	KA1	1	0.126	1,2,3	
4.61	93 NP	KB1	1	0.109	1		5.37	87 FR	KB1	1	0.127	1	
4.69	92 U	KB1	1	0.111	1,2,3		5.37	86 RN	KB2	1	0.127	1	
4.69	91 PA	KB2	1	0.111	1		5.41	93 NP	KA2	1	0.129	1	
4.69	97 BK	KA1	1	0.111	1		5.45	91 PA	KA1	1	0.129	1	
4.73	92 U	KB3	1	0.112	1,2		5.54	85 AT	KB2	1	0.131	1	
4.78	98 CF	KA2	1	0.113	1		5.54	92 U	KA2	1	0.131	1,2,3	
4.82	96 CM	KA1	1	0.114	1		5.54	86 RN	KB1	1	0.131	1	
4.82	90 TH	KB2	1	0.114	1,3		5.62	90 TH	KA1	1	0.133	1,2,3	
4.82	91 PA	KB1	1	0.114	1		5.66	85 AT	KB1	1	0.134	1	
4.90	97 BK	KA2	1	0.116	1		5.66	91 PA	KA2	1	0.134	1	
4.90	90 TH	KB5	1	0.116	1,2		5.66	84 PO	KB2	1	0.134	1	
4.94	89 AC	KB2	1	0.117	1		5.75	89 AC	KA1	1	0.136	1	

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						5.83 TO 7.36					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
5.83	84 PO	KB1	1	0.138	1	6.55	80 HG	KB3	1	0.155	1
5.83	90 TH	KA2	1	0.138	1,2,3	6.59	84 PO	KA1	1	0.156	1
5.83	83 BI	KB2	1	0.138	1,3	6.64	85 AT	KA2	1	0.157	1
5.92	88 RA	KA1	1	0.140	1	6.68	79 AU	KB5	1	0.158	1
5.96	82 PB	KB4	1	0.141	1,2	6.72	78 PT	KB2	1	0.159	1,3
5.96	89 AC	KA2	1	0.141	1	6.72	78 PT	KB4	1	0.159	1,2
6.00	83 BI	KB1	1	0.142	1,2,3	6.72	79 AU	KB1	1	0.159	1,2,3
6.00	82 PB	KB2	1	0.142	1,3	6.76	79 AU	KB3	1	0.160	1,2
6.04	83 BI	KB3	1	0.143	1,2	6.81	84 PO	KA2	1	0.161	1
6.09	87 FR	KA1	1	0.144	1	6.81	83 BI	KA1	1	0.161	1,2,3
6.13	88 RA	KA2	1	0.145	1	6.89	78 PT	KB5	1	0.163	1
6.13	82 PB	KB5	1	0.145	1	6.89	77 IR	KB4	1	0.163	1,2
6.17	82 PB	KB1	1	0.146	1,2,3	6.93	78 PT	KB1	1	0.164	1,2,3
6.17	81 TL	KB2	1	0.146	1	6.93	77 IR	KB2	1	0.164	1,3
6.21	82 PB	KB3	1	0.147	1	6.93	78 PT	KB3	1	0.164	1,2
6.26	86 RN	KA1	1	0.148	1	6.98	82 PB	KA1	1	0.165	1,2,3
6.30	87 FR	KA2	1	0.149	1	7.02	83 BI	KA2	1	0.166	1,2,3
6.34	81 TL	KB1	1	0.150	1,2,3	7.06	77 IR	KB5	1	0.167	1
6.34	80 HG	KB2	1	0.150	1	7.14	77 IR	KB1	1	0.169	1,2,3
6.38	81 TL	KB3	1	0.151	1,2	7.14	76 OS	KB2	1	0.169	1,3
6.43	85 AT	KA1	1	0.152	1	7.14	77 IR	KB3	1	0.169	1,2
6.47	86 RN	KA2	1	0.153	1	7.19	81 TL	KA1	1	0.170	1,2,3
6.51	80 HG	KB1	1	0.154	1	7.19	82 PB	KA2	1	0.170	1,2,3
6.51	79 AU	KB4	1	0.154	1,2	7.36	76 OS	KB3	1	0.174	1,2
6.55	79 AU	KB2	1	0.155	1,3	7.36	75 RE	KB2	1	0.174	1,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						7.36 TO 9.09					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
7.36	76 OS	KB1	1	0.174	1,2,3	8.29	72 HF	KB3	1	0.196	1,2
7.40	80 HG	KA1	1	0.175	1	8.29	97 BK	KB1	2	0.098	1
7.40	81 TL	KA2	1	0.175	1,2,3	8.29	72 HF	KB1	1	0.196	1,2,3
7.57	74 W	KB2	1	0.179	1,2,3	8.29	96 CM	KB2	2	0.098	1
7.57	74 W	KB4	1	0.179	1	8.29	77 IR	KA2	1	0.196	1,2,3
7.57	75 RE	KB1	1	0.179	1,2,3	8.33	71 LU	KB2	1	0.197	1,2,3
7.57	75 RE	KB3	1	0.179	1,2	8.33	76 OS	KA1	1	0.197	1,2,3
7.61	79 AU	KA1	1	0.180	1,2,3	8.46	95 AM	KB2	2	0.106	1
7.61	80 HG	KA2	1	0.180	1	8.54	96 CM	KB1	2	0.101	1
7.74	74 W	KB5	1	0.183	1	8.54	71 LU	KB1	1	0.202	1,2,3
7.78	73 TA	KB4	1	0.184	1	8.54	76 OS	KA2	1	0.202	1,2,3
7.78	74 W	KB1	1	0.184	1,2,3	8.58	71 LU	KB3	1	0.203	1,2
7.82	74 W	KB3	1	0.185	1,2	8.58	75 RE	KA1	1	0.203	1,2,3
7.82	79 AU	KA2	1	0.185	1,2,3	8.63	70 YB	KB2	1	0.204	1,2,3
7.82	73 TA	KB2	1	0.185	1,2,3	8.71	95 AM	KB1	2	0.103	1
7.86	78 PT	KA1	1	0.186	1,2,3	8.71	94 PU	KB2	2	0.103	1
7.86	98 CF	KB2	2	0.093	1	8.80	75 RE	KA2	1	0.208	1,2,3
7.99	73 TA	KB5	1	0.189	1	8.84	70 YB	KB3	1	0.209	1,2
8.03	78 PT	KA2	1	0.190	1,2,3	8.84	70 YB	KB1	1	0.209	1,2,3
8.03	73 TA	KB1	1	0.190	1,2,3	8.84	74 W	KA1	1	0.209	1,2,3
8.03	97 BK	KB2	2	0.095	1	8.88	93 NP	KB2	2	0.105	1
8.08	73 TA	KB3	1	0.191	1,2	8.88	69 TM	KB2	1	0.210	1
8.08	72 HF	KB2	1	0.191	1,2,3	8.97	94 PU	KB1	2	0.106	1
8.08	77 IR	KA1	1	0.191	1,2,3	9.05	74 W	KA2	1	0.214	1,2,3
8.20	98 CF	KB1	2	0.097	1	9.09	73 TA	KA1	1	0.215	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						9.09 TO 10.66					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
9.09	69 TM	KB1	1	0.215	1,2,3	9.90	90 TH	KB1	2	0.117	1,2,3
9.14	69 TM	KB3	1	0.216	1,2	9.90	95 AM	KA1	2	0.117	1
9.14	98 CF	KA1	2	0.108	1	9.90	89 AC	KB2	2	0.117	1
9.18	68 ER	KB2	1	0.217	1,2,3	9.90	71 LU	KA2	1	0.234	1,2,3
9.22	93 NP	KB1	2	0.109	1	9.98	90 TH	KB3	2	0.118	1,2
9.22	92 U	KB2	2	0.109	1,2,3	10.03	70 YB	KA1	1	0.237	1,2,3
9.31	73 TA	KA2	1	0.220	1,2,3	10.03	66 DY	KB1	1	0.237	1,2,3
9.39	72 HF	KA1	1	0.222	1,2,3	10.07	66 DY	KB3	1	0.238	1,2
9.39	92 U	KB1	2	0.111	1,2,3	10.07	96 CM	KA2	2	0.119	1
9.39	97 BK	KA1	2	0.111	1	10.15	65 TB	KB2	1	0.240	1,2,3
9.39	91 PA	KB2	2	0.111	1	10.15	98 RA	KB2	2	0.120	1
9.43	68 ER	KB1	1	0.223	1,2,3	10.15	94 PU	KA1	2	0.120	1
9.43	68 ER	KB3	1	0.223	1,2	10.20	70 YB	KA2	1	0.241	1,2,3
9.48	67 HG	KB2	1	0.224	1	10.24	89 AC	KB1	2	0.121	1
9.48	92 U	KB3	2	0.112	1,2	10.32	95 AM	KA2	2	0.122	1
9.56	98 CF	KA2	2	0.113	1	10.32	69 TM	KA1	1	0.244	1,2,3
9.60	72 HF	KA2	1	0.227	1,2,3	10.41	65 TB	KB3	1	0.246	1,2
9.64	96 CM	KA1	2	0.114	1	10.41	65 TB	KB1	1	0.246	1,2,3
9.64	91 PA	KB1	2	0.114	1	10.41	93 NP	KA1	2	0.123	1
9.64	90 TH	KB2	2	0.114	1,3	10.49	64 GD	KB2	1	0.248	1,2,3
9.69	71 LU	KA1	1	0.229	1,2,3	10.49	88 RA	KB1	2	0.124	1
9.73	67 HO	KB1	1	0.230	1	10.49	87 FR	KB2	2	0.124	1
9.81	66 DY	KB2	1	0.232	1,2,3	10.54	69 TM	KA2	1	0.249	1,2,3
9.81	90 TH	KB5	2	0.116	1,2	10.58	94 PU	KA2	2	0.125	1
9.81	97 BK	KA2	2	0.116	1	10.66	92 U	KA1	2	0.126	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						10.66 TO 12.36					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
10.66	68 ER	KA1	1	0.252	1,2,3	11.60	66 DY	KA2	1	0.274	1,2,3
10.75	87 FR	KB1	2	0.127	1	11.68	90 TH	KA2	2	0.138	1,2,3
10.75	64 GD	KB1	1	0.254	1,2,3	11.68	61 PM	KB2	1	0.276	1
10.75	86 RN	KB2	2	0.127	1	11.68	84 PO	KB1	2	0.138	1
10.79	64 GD	KB3	1	0.255	1,2	11.68	83 BI	KB2	2	0.138	1,3
10.83	93 NP	KA2	2	0.128	1	11.81	65 TB	KA1	1	0.279	1,2,3
10.88	68 ER	KA2	1	0.257	1,2,3	11.81	98 CF	KB2	3	0.093	1
10.88	63 EU	KB2	1	0.257	1,2,3	11.85	88 RA	KA1	2	0.140	1
10.92	91 PA	KA1	2	0.129	1	11.94	89 AC	KA2	2	0.141	1
11.04	67 HO	KA1	1	0.261	1,2,3	11.94	61 PM	KB1	1	0.282	1,2,3
11.09	85 AT	KB2	2	0.131	1	11.94	82 PB	KB4	2	0.141	1,2
11.09	92 U	KA2	2	0.131	1,2,3	11.98	65 TB	KA2	1	0.283	1,2,3
11.09	86 RN	KB1	2	0.131	1	11.98	61 PM	KB3	1	0.283	2
11.17	63 EU	KB3	1	0.264	1,2	12.02	82 PB	KB2	2	0.142	1,3
11.17	63 EU	KB1	1	0.264	1,2,3	12.02	83 BI	KB1	2	0.142	1,2,3
11.26	90 TH	KA1	2	0.133	1,2,3	12.06	97 BK	KB2	3	0.095	1
11.26	62 SM	KB2	1	0.266	1,2,3	12.11	60 ND	KB2	1	0.286	1,2,3
11.26	67 HO	KA2	1	0.266	1,2,3	12.11	83 BI	KB3	2	0.143	1,2
11.34	85 AT	KB1	2	0.134	1	12.19	64 GD	KA1	1	0.288	1,2,3
11.34	84 PO	KB2	2	0.134	1	12.19	87 FR	KA1	2	0.144	1
11.34	91 PA	KA2	2	0.134	1	12.28	98 RA	KA2	2	0.145	1
11.43	66 DY	KA1	1	0.270	1,2,3	12.28	82 PB	KB5	2	0.145	1
11.51	89 AC	KA1	2	0.136	1	12.32	98 CF	KB1	3	0.097	1
11.55	62 SM	KB1	1	0.273	1,2,3	12.36	82 PB	KB1	2	0.146	1,2,3
11.60	62 SM	KB3	1	0.274	1,2	12.36	81 TL	KB2	2	0.146	1

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						12.40 TO 13.85					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
12.40	60 ND	KB1	1	0.293	1,2,3	13.08	94 PU	KB2	3	0.103	1
12.40	64 GD	KA2	1	0.293	1,2,3	13.13	80 HG	KB3	2	0.155	1
12.45	96 CM	KD2	3	0.098	1	13.13	79 AU	KB2	2	0.155	1,3
12.45	82 PB	KR3	2	0.147	1	13.21	84 PO	KA1	2	0.156	1
12.45	60 ND	KB3	1	0.294	1,2	13.30	85 AT	KA2	2	0.157	1
12.45	97 BK	KB1	3	0.098	1	13.30	62 SM	KA2	1	0.314	1,2,3
12.53	86 RN	KA1	2	0.148	1	13.34	93 NP	KB2	3	0.105	1
12.57	59 PR	KB2	1	0.297	1,2,3	13.38	58 CE	KB3	1	0.316	1,2
12.62	87 FR	KA2	2	0.149	1	13.38	79 AU	KB5	2	0.158	1
12.66	63 EU	KA1	1	0.299	1,2,3	13.38	58 CE	KB1	1	0.316	1,2,3
12.70	80 HG	KB2	2	0.150	1	13.47	78 PT	KB2	2	0.159	1,3
12.70	95 AM	KB2	3	0.100	1	13.47	78 PT	KB4	2	0.159	1,2
12.70	81 TL	KB1	2	0.150	1,2,3	13.47	94 PU	KB1	3	0.106	1
12.79	81 TL	KD3	2	0.151	1,2	13.47	79 AU	KB1	2	0.159	1,2,3
12.83	63 EU	KA2	1	0.303	1,2,3	13.55	57 LA	KB2	1	0.320	1,2,3
12.83	96 CM	KB1	3	0.101	1	13.55	79 AU	KB3	2	0.160	1,2
12.87	59 PR	KB1	1	0.304	1,2,3	13.59	61 PM	KA1	1	0.321	1,2,3
12.87	85 AT	KA1	2	0.152	1	13.64	83 BI	KA1	2	0.161	1,2,3
12.91	59 PR	KB3	1	0.305	1,2	13.64	84 PO	KA2	2	0.161	1
12.96	86 RN	KA2	2	0.153	1	13.72	98 CF	KA1	3	0.108	1
13.04	58 CE	KB2	1	0.308	1,2,3	13.76	61 PM	KA2	1	0.325	1,2,3
13.04	79 AU	KB4	2	0.154	1,2	13.81	78 PT	KB5	2	0.163	1
13.04	80 HG	KB1	2	0.154	1	13.81	77 IR	KB4	2	0.163	1,2
13.08	62 SM	KA1	1	0.309	1,2,3	13.81	57 LA	KB5	1	0.326	1
13.08	95 AM	KB1	3	0.103	1	13.85	92 U	KB2	3	0.109	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS							13.85 TO 15.17					
ANGLE	ELEM	LINE	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF
13.85	93 NP	KB1	3	0.109	1		14.49	91 PA	KB1	3	0.114	1
13.89	77 IR	KB2	2	0.164	1,3		14.49	96 CM	KA1	3	0.114	1
13.89	78 PT	KB3	2	0.164	1,2		14.49	90 TH	KB2	3	0.114	1,3
13.89	78 PT	KB1	2	0.164	1,2,3		14.57	59 PR	KA1	1	0.344	1,2,3
13.89	57 LA	KB1	1	0.328	1,2,3		14.66	55 CS	KB2	1	0.346	1,2,3
13.94	57 LA	KB3	1	0.329	1,2		14.74	76 OS	KB1	2	0.174	1,2,3
13.98	82 PB	KA1	2	0.165	1,2,3		14.74	90 TH	KB5	3	0.116	1,2
14.06	60 ND	KA1	1	0.332	1,2,3		14.74	75 RE	KB2	2	0.174	1,3
14.06	83 BI	KA2	2	0.166	1,2,3		14.74	76 OS	KB3	2	0.174	1,2
14.11	91 PA	KB2	3	0.111	1		14.74	97 BK	KA2	3	0.116	1
14.11	56 BA	KB2	1	0.333	1,2,3		14.79	59 PR	KA2	1	0.349	1,2,3
14.11	92 U	KR1	3	0.111	1,2,3		14.83	81 TL	KA2	2	0.175	1,2,3
14.11	97 BK	KA1	3	0.111	1		14.83	80 HG	KA1	2	0.175	1
14.15	77 IR	KB5	2	0.167	1		14.87	89 AC	KB2	3	0.117	1
14.23	92 U	KB3	3	0.112	1,2		14.87	95 AM	KA1	3	0.117	1
14.23	60 ND	KA2	1	0.336	1,2,3		14.87	90 TH	KB1	3	0.117	1,2,3
14.32	56 BA	KB5	1	0.338	1		15.00	90 TH	KB3	3	0.118	1,2
14.32	77 IR	KB3	2	0.169	1,2		15.00	55 CS	KB1	1	0.354	1,2,3
14.32	77 IR	KB1	2	0.169	1,2,3		15.04	55 CS	KB3	1	0.355	1,2
14.32	76 OS	KB2	2	0.169	1,3		15.13	96 CM	KA2	3	0.119	1
14.36	98 CF	KA2	3	0.113	1		15.13	58 CE	KA1	1	0.357	1,2,3
14.40	81 TL	KA1	2	0.170	1,2,3		15.17	75 RE	KB1	2	0.179	1,2,3
14.40	82 PB	KA2	2	0.170	1,2,3		15.17	75 RE	KB3	2	0.179	1,2
14.45	56 BA	KB1	1	0.341	1,2,3		15.17	74 W	KB4	2	0.179	1
14.45	56 BA	KB3	1	0.341	1,2		15.17	74 W	KB2	2	0.179	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						15.26 TO 16.66					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
15.26	80 HG	KA2	2	0.180	1	16.02	73 TA	KB5	2	0.189	1
15.26	79 AU	KA1	2	0.180	1,2,3	16.11	73 TA	KB1	2	0.190	1,2,3
15.26	88 RA	KB2	3	0.120	1	16.11	78 PT	KA2	2	0.190	1,2,3
15.26	54 XE	KB2	1	0.360	1,2,3	16.11	97 BK	KB2	4	0.095	1
15.26	94 PU	KA1	3	0.120	1	16.15	86 RN	KB2	3	0.127	1
15.34	58 CC	KA2	1	0.362	1,2,3	16.15	87 FR	KB1	3	0.127	1
15.38	89 AC	KB1	3	0.121	1	16.19	77 IR	KA1	2	0.191	1,2,3
15.51	74 W	KB5	2	0.183	1	16.19	72 HF	KB2	2	0.191	1,2,3
15.51	95 AM	KA2	3	0.122	1	16.19	73 TA	KB3	2	0.191	1,2
15.60	74 W	KB1	2	0.184	1,2,3	16.28	53 I	KB1	1	0.384	1,2,3
15.60	73 TA	KB4	2	0.184	1	16.28	93 NP	KA2	3	0.128	1
15.60	54 XE	KB1	1	0.368	1,2,3	16.32	56 BA	KA1	1	0.385	1,2,3
15.64	93 NP	KA1	3	0.123	1	16.32	53 I	KB3	1	0.385	1,2
15.68	73 TA	KB2	2	0.185	1,2,3	16.41	91 PA	KA1	3	0.129	1
15.68	79 AU	KA2	2	0.185	1,2,3	16.45	98 CF	KB1	4	0.097	1
15.68	74 W	KB3	2	0.195	1,2	16.54	56 BA	KA2	1	0.390	1,2,3
15.72	57 LA	KA1	1	0.371	1,2,3	16.58	52 TE	KB2	1	0.391	1,2,3
15.77	88 RA	KB1	3	0.124	1	16.62	72 HF	KB1	2	0.196	1,2,3
15.77	98 CF	KB2	4	0.093	1	16.62	96 CM	KB2	4	0.098	1
15.77	87 FR	KB2	3	0.124	1	16.62	97 BK	KB1	4	0.098	1
15.77	78 PT	KA1	2	0.186	1,2,3	16.62	77 IR	KA2	2	0.196	1,2,3
15.90	57 LA	KA2	1	0.375	1,2,3	16.62	72 HF	KB3	2	0.196	1,2
15.90	53 I	KB2	1	0.375	1,2,3	16.66	92 U	KA2	3	0.131	1,2,3
15.90	94 PU	KA2	3	0.125	1	16.66	85 AT	KB2	3	0.131	1
16.02	92 U	KA1	3	0.126	1,2,3	16.66	86 RN	KB1	3	0.131	1

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS							16.71 TO 18.33						
ANGLE	ELEM	LINE	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF	
16.71	71 LU	KB2	2	0.197	1,2,3		17.65	75 RE	KA2	2	0.208	1,2,3	
16.71	76 OS	KA1	2	0.197	1,2,3		17.65	54 XE	KA1	1	0.416	1,2,3	
16.92	90 TH	KA1	3	0.133	1,2,3		17.69	51 SB	KB1	1	0.417	1,2,3	
16.96	52 TE	KB1	1	0.400	1,2,3		17.73	51 SB	KB3	1	0.418	1,2	
16.96	55 CS	KA1	1	0.400	1,2,3		17.73	70 YB	KB3	2	0.209	1,2	
16.96	95 AM	KB2	4	0.100	1		17.73	74 W	KA1	2	0.209	1,2,3	
17.01	52 TE	KB3	1	0.401	1,2		17.73	70 YB	KB1	2	0.209	1,2,3	
17.05	84 PO	KB2	3	0.134	1		17.82	69 TM	KB2	2	0.210	1	
17.05	91 PA	KA2	3	0.134	1		17.82	54 XE	KA2	1	0.420	1,2,3	
17.05	85 AT	KB1	3	0.134	1		17.82	93 NP	KB2	4	0.105	1	
17.13	76 OS	KA2	2	0.202	1,2,3		17.82	88 RA	KA1	3	0.140	1	
17.13	71 LU	KB1	2	0.202	1,2,3		17.95	82 PB	KB4	3	0.141	1,2	
17.13	96 CM	KB1	4	0.101	1		17.95	89 AC	KA2	3	0.141	1	
17.18	55 CS	KA2	1	0.405	1,2,3		17.99	94 PU	KB1	4	0.106	1	
17.22	71 LU	KB3	2	0.203	1,2		18.07	82 PE	KB2	3	0.142	1,3	
17.22	75 RE	KA1	2	0.203	1,2,3		18.07	83 BI	KB1	3	0.142	1,2,3	
17.30	70 YB	KB2	2	0.204	1,2,3		18.07	50 SN	KB2	1	0.426	1,2,3	
17.30	89 AC	KA1	3	0.136	1		18.16	74 W	KA2	2	0.214	1,2,3	
17.30	51 SB	KB2	1	0.408	1,2,3		18.20	83 BI	KB3	3	0.143	1,2	
17.48	94 PU	KB2	4	0.103	1		18.25	73 TA	KA1	2	0.215	1,2,3	
17.48	95 AM	KB1	4	0.103	1		18.25	69 TM	KB1	2	0.215	1,2,3	
17.56	84 PO	KB1	3	0.138	1		18.33	87 FR	KA1	3	0.144	1	
17.56	90 TH	KA2	3	0.138	1,2,3		18.33	98 CF	KA1	4	0.108	1	
17.56	83 BI	KB2	3	0.138	1,3		18.33	69 TM	KB3	2	0.216	1,2	
17.56	51 SB	KB5	1	0.414	1		18.33	50 SN	KB5	1	0.432	1	

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS							18.37 TO 19.74					
ANGLE	ELEM	LINE	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF
18.37	53 I	KA1	1	0.433	1,2,3		19.10	80 HG	KB2	3	0.150	1
18.42	68 ER	KB2	2	0.217	1,2,3		19.14	52 TE	KA1	1	0.451	1,2,3
18.46	82 PB	KB5	3	0.145	1		19.14	49 IN	KB5	1	0.451	1
18.46	50 SN	KB1	1	0.435	1,2,3		19.19	98 CF	KA2	4	0.113	1
18.46	88 RA	KA2	3	0.145	1		19.23	81 TL	KB3	3	0.151	1,2
18.50	92 U	KB2	4	0.109	1,2,3		19.27	72 HF	KA2	2	0.227	1,2,3
18.50	50 SN	KB3	1	0.436	1,2		19.32	49 IN	KB3	1	0.455	1,2
18.50	93 NP	KB1	4	0.109	1		19.32	49 IN	KB1	1	0.455	1,2,3
18.59	81 TL	KB2	3	0.146	1		19.36	85 AT	KA1	3	0.152	1
18.59	53 I	KA2	1	0.438	1,2,3		19.36	96 CM	KA1	4	0.114	1
18.59	82 PB	KB1	3	0.146	1,2,3		19.36	52 TE	KA2	1	0.456	1,2,3
18.67	73 TA	KA2	2	0.220	1,2,3		19.36	91 PA	KB1	4	0.114	1
18.72	82 PB	KB3	3	0.147	1		19.36	90 TH	KB2	4	0.114	1,3
18.84	97 BK	KA1	4	0.111	1		19.44	71 LU	KA1	2	0.229	1,2,3
18.84	91 PA	KB2	4	0.111	1		19.49	86 RN	KA2	3	0.153	1
18.84	92 U	KB1	4	0.111	1,2,3		19.53	67 HO	KB1	2	0.230	1
18.84	86 RN	KA1	3	0.148	1		19.62	79 AU	KB4	3	0.154	1,2
18.84	72 HF	KA1	2	0.222	1,2,3		19.62	80 HG	KB1	3	0.154	1
18.89	49 IN	KB2	1	0.445	1,2,3		19.70	97 BK	KA2	4	0.116	1
18.93	68 ER	KB1	2	0.223	1,2,3		19.70	66 DY	KB2	2	0.232	1,2,3
18.93	68 ER	KB3	2	0.223	1,2		19.70	90 TH	KB5	4	0.116	1,2
18.97	87 FR	KA2	3	0.149	1		19.74	98 CF	KB2	5	0.093	1
19.02	92 U	KB3	4	0.112	1,2		19.74	79 AU	KB2	3	0.155	1,3
19.02	67 HO	KB2	2	0.224	1		19.74	48 CD	KB2	1	0.465	1,2,3
19.10	81 TL	KB1	3	0.150	1,2,3		19.74	80 HG	KB3	3	0.155	1

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						19.87 TO 19.96					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
19.87	89 AC	KB2	4	0.117	1						
19.87	95 AM	KA1	4	0.117	1						
19.87	71 LU	KA2	2	0.234	1,2,3						
19.87	84 PD	KA1	3	0.156	1						
19.87	90 TH	KB1	4	0.117	1,2,3						
19.96	51 SB	KA1	1	0.470	1,2,3						

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						20.00 TO 21.29					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
20.00	85 AT	KA2	3	0.157	1	20.73	95 AM	KA2	4	0.122	1
20.05	90 TH	KB3	4	0.118	1,2	20.78	77 IR	KB4	3	0.163	1,2
20.13	79 AU	KB5	3	0.158	1	20.78	78 PT	KB5	3	0.163	1
20.13	70 YB	KA1	2	0.237	1,2,3	20.82	96 CM	KB2	5	0.098	1
20.13	66 DY	KB1	2	0.237	1,2,3	20.82	97 BK	KB1	5	0.098	1
20.17	97 BK	KB2	5	0.095	1	20.86	50 SN	KA1	1	0.491	1,2,3
20.17	51 SB	KA2	1	0.475	1,2,3	20.90	65 TB	KB3	2	0.246	1,2
20.17	48 CD	KB1	1	0.475	1,2,3	20.90	77 IR	KB2	3	0.164	1,3
20.22	48 CD	KB3	1	0.476	1,2	20.90	78 PT	KB3	3	0.164	1,2
20.22	66 DY	KB3	2	0.238	1,2	20.90	93 NP	KA1	4	0.123	1
20.22	96 CM	KA2	4	0.119	1	20.90	65 TB	KB1	2	0.246	1,2,3
20.26	78 PT	KB4	3	0.159	1,2	20.90	78 PT	KB1	3	0.164	1,2,3
20.26	79 AU	KB1	3	0.159	1,2,3	20.95	47 AG	KB5	1	0.493	1
20.26	78 PT	KB2	3	0.159	1,3	21.03	50 SN	KA2	1	0.495	1,2,3
20.39	65 TR	KB2	2	0.240	1,2,3	21.03	82 PB	KA1	3	0.165	1,2,3
20.39	79 AU	KB3	3	0.160	1,2	21.08	64 CD	KB2	2	0.248	1,2,3
20.39	94 PU	KA1	4	0.120	1	21.08	88 RA	KB1	4	0.124	1
20.39	88 RA	KB2	4	0.120	1	21.08	87 FR	KB2	4	0.124	1
20.47	70 YB	KA2	2	0.241	1,2,3	21.12	47 AG	KB1	1	0.497	1,2,3
20.52	84 PO	KA2	3	0.161	1	21.16	47 AG	KB3	1	0.498	1,2
20.52	83 BI	KA1	3	0.161	1,2,3	21.16	83 BI	KA2	3	0.166	1,2,3
20.56	89 AC	KB1	4	0.121	1	21.16	69 TM	KA2	2	0.249	1,2,3
20.60	98 CF	KB1	5	0.097	1	21.25	94 PU	KA2	4	0.125	1
20.69	47 AG	KB2	1	0.487	1,2,3	21.25	95 AM	KB2	5	0.100	1
20.73	69 TH	KA1	2	0.244	1,2,3	21.29	77 IR	KB5	3	0.167	1

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS							21.42 TO 22.84						
ANGLE	ELEM	LINE	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF	
21.42	92 U	KA1	4	0.126	1,2,3		22.19	76 OS	KB3	3	0.174	1,2	
21.42	68 ER	KA1	2	0.252	1,2,3		22.19	75 RE	KB2	3	0.174	1,3	
21.46	96 CM	KB1	5	0.101	1		22.19	67 HO	KA1	2	0.261	1,2,3	
21.55	76 OS	KB2	3	0.169	1,3		22.19	76 OS	KB1	3	0.174	1,2,3	
21.55	77 IR	KB3	3	0.169	1,2		22.28	85 AT	KB2	4	0.131	1	
21.55	77 IR	KB1	3	0.169	1,2,3		22.28	86 RN	KB1	4	0.131	1	
21.59	87 FR	KB1	4	0.127	1		22.28	92 U	KA2	4	0.131	1,2,3	
21.59	86 RN	KB2	4	0.127	1		22.32	81 TL	KA2	3	0.175	1,2,3	
21.59	64 GD	KB1	2	0.254	1,2,3		22.32	80 HG	KA1	3	0.175	1	
21.68	82 PB	KA2	3	0.170	1,2,3		22.32	93 NP	KB2	5	0.105	1	
21.68	46 PD	KB2	1	0.510	1,2,3		22.45	63 EU	KB1	2	0.264	1,2,3	
21.68	81 TL	KA1	3	0.170	1,2,3		22.45	53 EU	KB3	2	0.264	1,2	
21.68	64 GD	KB3	2	0.255	1,2		22.54	97 BK	LY1	1	0.530	1	
21.76	93 NP	KA2	4	0.128	1		22.54	94 PU	KB1	5	0.106	1	
21.76	49 IN	KA1	1	0.512	1,2,3		22.63	90 TH	KA1	4	0.133	1,2,3	
21.85	63 EU	KB2	2	0.257	1,2,3		22.63	67 HO	KA2	2	0.266	1,2,3	
21.85	68 ER	KA2	2	0.257	1,2,3		22.63	62 SM	KB2	2	0.266	1,2,3	
21.89	98 CF	LY1	1	0.515	1		22.75	48 CD	KA1	1	0.535	1,2,3	
21.89	95 AX	KB1	5	0.103	1		22.75	45 RH	KB2	1	0.535	1,2,3	
21.89	94 PU	KB2	5	0.103	1		22.80	84 PO	KB2	4	0.134	1	
21.94	91 PA	KA1	4	0.129	1		22.80	85 AT	KB1	4	0.134	1	
21.98	46 PD	KB5	1	0.517	1		22.80	91 PA	KA2	4	0.134	1	
21.98	49 IN	KA2	1	0.517	1,2,3		22.84	74 W	KB4	3	0.179	1	
22.15	46 PD	KB1	1	0.521	1,2,3		22.84	74 W	KB2	3	0.179	1,2,3	
22.15	46 PD	KB3	1	0.521	1,2		22.84	75 RE	KB1	3	0.179	1,2,3	

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						22.84 TO 24.26					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
22.84	75 RE	KB3	3	0.179	1,2	23.62	91 PA	KB2	5	0.111	1
22.93	48 CD	KA2	1	0.539	1,2,3	23.62	74 W	KB3	3	0.185	1,2
22.97	66 DY	KA1	2	0.270	1,2,3	23.62	73 TA	KB2	3	0.185	1,2,3
22.97	79 AU	KA1	3	0.180	1,2,3	23.62	79 AU	KA2	3	0.185	1,2,3
22.97	98 CF	KA1	5	0.108	1	23.75	78 PT	KA1	3	0.186	1,2,3
22.97	90 HG	KA2	3	0.180	1	23.75	65 TB	KA1	2	0.279	1,2,3
23.01	45 RH	KB5	1	0.541	1	23.79	47 AG	KA1	1	0.559	1,2,3
23.14	89 AC	KA1	4	0.136	1	23.83	88 RA	KA1	4	0.140	1
23.19	73 NP	KB1	5	0.109	1	23.83	92 U	KB3	5	0.112	1,2
23.19	92 U	KB2	5	0.109	1,2,3	23.92	44 RU	KB2	1	0.562	1,2,3
23.23	45 RH	KB3	1	0.546	1,2	23.92	95 AM	LY1	1	0.562	1,3
23.23	96 CH	LY1	1	0.546	1	24.01	89 AC	KA2	4	0.141	1
23.23	62 SM	KB1	2	0.273	1,2,3	24.01	47 AG	KA2	1	0.564	1,2,3
23.23	45 RH	KB1	1	0.546	1,2,3	24.01	82 PB	KB4	4	0.141	1,2
23.31	66 DY	KA2	2	0.274	1,2,3	24.01	61 PM	KB1	2	0.282	1,2,3
23.31	62 SM	KB3	2	0.274	1,2	24.05	98 CF	KA2	5	0.113	1
23.36	74 W	KB5	3	0.183	1	24.09	65 TB	KA2	2	0.283	1,2,3
23.49	74 W	KB1	3	0.184	1,2,3	24.09	61 PM	KB3	2	0.283	2
23.49	51 PM	KB2	2	0.276	1	24.14	73 TA	KB5	3	0.189	1
23.49	90 TH	KA2	4	0.138	1,2,3	24.18	82 PB	KB2	4	0.142	1,3
23.49	73 TA	KB4	3	0.184	1	24.18	44 RU	KB5	1	0.568	1
23.49	83 BI	KB2	4	0.138	1,3	24.18	83 BI	KB1	4	0.142	1,2,3
23.49	84 PO	KB1	4	0.138	1	24.26	90 TH	KB2	5	0.114	1,3
23.62	92 U	KB1	5	0.111	1,2,3	24.26	73 TA	KB1	3	0.190	1,2,3
23.62	97 BK	KA1	5	0.111	1	24.26	78 PT	KA2	3	0.190	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						24.26 TO 25.65					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
24.26	91 PA	KB1	5	0.114	1	25.64	77 IR	KA2	3	0.196	1,2,3
24.26	96 CM	KA1	5	0.114	1	25.04	60 ND	KB3	2	0.294	1,2
24.35	83 BI	KB3	4	0.143	1,2	25.04	72 HF	KB1	3	0.196	1,2,3
24.35	60 ND	KB2	2	0.286	1,2,3	25.04	72 HF	KB3	3	0.196	1,2
24.35	44 RU	KB1	1	0.572	1,2,3	25.13	43 TC	KB2	1	0.590	1
24.39	77 IR	KA1	3	0.191	1,2,3	25.13	46 PD	KA2	1	0.590	1,2,3
24.39	72 HF	KB2	3	0.191	1,2,3	25.13	43 TC	KB4	1	0.590	1
24.39	73 TA	KB3	3	0.191	1,2	25.13	90 TH	KB3	5	0.118	1,2
24.39	44 RU	KB3	1	0.573	1,2	25.17	76 OS	KA1	3	0.197	1,2,3
24.52	64 GD	KA1	2	0.288	1,2,3	25.17	71 LU	KB2	3	0.197	1,2,3
24.52	87 FR	KA1	4	0.144	1	25.22	86 RN	KA1	4	0.148	1
24.65	94 PU	LY1	1	0.579	1	25.30	59 PR	KB2	2	0.297	1,2,3
24.70	88 RA	KA2	4	0.145	1	25.30	91 PA	LY4	1	0.594	1,2
24.70	92 PB	KB5	4	0.145	1	25.35	92 U	LY6	1	0.595	1,2
24.70	90 TH	KB5	5	0.116	1,2	25.35	96 CM	KA2	5	0.119	1
24.70	97 BK	KA2	5	0.116	1	25.39	87 FR	KA2	4	0.149	1
24.87	31 TL	KB2	4	0.146	1	25.43	93 NP	LY1	1	0.597	1,2,3
24.87	82 PB	KB1	4	0.146	1,2,3	25.48	92 U	LY3	1	0.598	1,2,3
24.91	95 AM	KA1	5	0.117	1	25.48	63 EU	KA1	2	0.299	1,2,3
24.91	90 TH	KB1	5	0.117	1,2,3	25.56	81 TL	KB1	4	0.150	1,2,3
24.91	46 PD	KA1	1	0.585	1,2,3	25.56	80 HG	KB2	4	0.150	1
24.91	89 AC	KB2	5	0.117	1	25.56	94 PU	KA1	5	0.120	1
24.96	60 ND	KA1	2	0.293	1,2,3	25.56	88 RA	KB2	5	0.120	1
24.96	64 GD	KA2	2	0.293	1,2,3	25.61	43 TC	KB3	1	0.601	1,2
25.04	82 PB	KB3	4	0.147	1	25.65	43 TC	KB1	1	0.602	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS							25.69 TO 26.95						
ANGLE	ELEM	LINE	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF	
25.69	98 CF	LB1	1	0.603	1		26.34	62 SM	KA1	2	0.309	1,2,3	
25.74	91 TL	KB3	4	0.151	1,2		26.43	88 RA	KB1	5	0.124	1	
25.78	89 AC	KB1	5	0.121	1		26.43	42 MO	KB4	1	0.620	2	
25.78	92 U	LY2	1	0.605	1,2,3		26.43	80 HG	KB3	4	0.155	1	
25.82	71 LU	KB1	3	0.202	1,2,3		26.43	79 AU	KB2	4	0.155	1,3	
25.82	76 OS	KA2	3	0.202	1,2,3		26.43	87 FR	KB2	5	0.124	1	
25.82	63 EU	KA2	2	0.303	1,2,3		26.47	97 BK	LB1	1	0.621	1	
25.91	85 AT	KA1	4	0.152	1		26.47	42 MO	KB2	1	0.621	1,2,3	
25.91	59 PR	KB1	2	0.304	1,2,3		26.60	84 PO	KA1	4	0.156	1	
25.95	71 LU	KB3	3	0.203	1,2		26.60	75 RE	KA2	3	0.208	1,2,3	
25.95	75 RE	KA1	3	0.203	1,2,3		26.60	91 PA	LY2	1	0.624	1,2,3	
26.00	95 AM	KA2	5	0.122	1		26.65	94 PU	KA2	5	0.125	1	
26.00	59 PR	KB3	2	0.305	1,2		26.73	70 YB	KB1	3	0.209	1,2,3	
26.04	90 TH	LY4	1	0.611	1,2		26.73	70 YB	KB3	3	0.209	1,2	
26.08	70 YB	KB2	3	0.204	1,2,3		26.73	74 W	KA1	3	0.209	1,2,3	
26.08	86 RN	KA2	4	0.153	1		26.73	42 MO	KB5	1	0.627	1	
26.13	91 PA	LY6	1	0.613	1,2		26.78	85 AT	KA2	4	0.157	1	
26.13	45 RH	KA1	1	0.613	1,2,3		26.78	62 SM	KA2	2	0.314	1,2,3	
26.21	92 U	LY1	1	0.615	1,2,3		26.86	69 TM	KB2	3	0.210	1	
26.21	93 NP	KA1	5	0.123	1		26.86	92 U	KA1	5	0.126	1,2,3	
26.26	79 AU	KB4	4	0.154	1,2		26.95	58 CE	KB1	2	0.316	1,2,3	
26.26	80 HG	KB1	4	0.154	1		26.95	42 MO	KB1	1	0.632	1,2,3	
26.26	58 CE	KB2	2	0.308	1,2,3		26.95	90 TH	LY6	1	0.632	1,2	
26.30	71 PA	LY3	1	0.617	1,2,3		26.95	79 AU	KB5	4	0.158	1	
26.34	45 RH	KA2	1	0.618	1,2,3		26.95	58 CE	KB3	2	0.316	1,2	

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						26.99 TO 28.43					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
26.99	42 MO	KB3	1	0.633	1,2	27.73	61 PM	KA2	2	0.325	1,2,3
27.04	91 PA	LY1	1	0.634	1,2,3	27.78	68 ER	KB2	3	0.217	1,2,3
27.08	87 FR	KB1	5	0.127	1	27.82	77 IR	KB4	4	0.163	1,2
27.08	92 U	LY5	1	0.635	1,2	27.82	57 LA	KB5	2	0.326	1
27.08	86 RN	KB2	5	0.127	1	27.82	78 PT	KB5	4	0.163	1
27.13	79 AU	KB1	4	0.159	1,2,3	27.86	98 CF	LB2	1	0.653	1
27.13	78 PT	KB2	4	0.159	1,3	27.86	90 TH	LY1	1	0.653	1,2,3
27.13	90 TH	LY3	1	0.636	1,2,3	27.91	41 NB	KB2	1	0.654	1,2,3
27.13	78 PT	KB4	4	0.159	1,2	27.95	86 RN	KB1	5	0.131	1
27.26	96 CM	LB1	1	0.639	1	27.95	85 AT	KB2	5	0.131	1
27.30	79 AU	KB3	4	0.160	1,2	27.95	92 U	KA2	5	0.131	1,2,3
27.30	57 LA	KB2	2	0.320	1,2,3	27.95	91 PA	LY5	1	0.655	1,2
27.30	93 NP	KA2	5	0.128	1	28.00	77 IR	KB2	4	0.164	1,3
27.39	74 W	KA2	3	0.214	1,2,3	28.00	57 LA	KB1	2	0.328	1,2,3
27.39	90 TH	LY2	1	0.642	1,2,3	28.00	78 PT	KB3	4	0.164	1,2
27.39	61 PM	KA1	2	0.321	1,2,3	28.00	78 PT	KB1	4	0.164	1,2,3
27.43	44 RU	KA1	1	0.643	1,2,3	28.08	57 LA	KB3	2	0.329	1,2
27.47	83 BI	KA1	4	0.161	1,2,3	28.08	95 AM	LB1	1	0.658	1,3
27.47	84 PG	KA2	4	0.161	1	28.17	82 PB	KA1	4	0.165	1,2,3
27.52	91 PA	KA1	5	0.129	1	28.17	73 TA	KA2	3	0.220	1,2,3
27.52	73 TA	KA1	3	0.215	1,2,3	28.17	41 NB	KB5	1	0.660	1
27.52	69 TM	KB1	3	0.215	1,2,3	28.34	60 ND	KA1	2	0.332	1,2,3
27.60	44 RU	KA2	1	0.647	1,2,3	28.34	83 BI	KA2	4	0.166	1,2,3
27.65	69 TM	KB3	3	0.216	1,2	28.39	90 TH	KA1	5	0.133	1,2,3
27.69	88 RA	LY4	1	0.649	1,2	28.43	72 HF	KA1	3	0.222	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS							28.43 TO 29.92					
ANGLE	ELEM	LINE	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF
28.43	41 NB	KB3	1	0.666	1,2		29.04	81 TL	KA1	4	0.170	1,2,3
28.43	41 NB	KB1	1	0.666	1,2,3		29.09	72 HF	KA2	3	0.227	1,2,3
28.43	56 BA	KB2	2	0.333	1,2,3		29.09	92 U	LB9	1	0.681	1,2
28.52	77 IR	KB5	4	0.167	1		29.13	56 BA	KB1	2	0.341	1,2,3
28.56	68 ER	KB1	3	0.223	1,2,3		29.13	88 RA	LY2	1	0.682	1,2,3
28.56	97 BK	LB2	1	0.669	1		29.13	56 BA	KB3	2	0.341	1,2
28.56	68 ER	KB3	3	0.223	1,2		29.26	96 CM	LB2	1	0.685	1
28.61	91 PA	KA2	5	0.134	1		29.35	92 U	LB10	1	0.687	1,2
28.61	84 PO	KB2	5	0.134	1		29.35	71 LU	KA1	3	0.229	1,2,3
28.61	85 AT	KB1	5	0.134	1		29.39	59 PR	KA1	2	0.344	1,2,3
28.69	60 ND	KA2	2	0.336	1,2,3		29.48	67 HO	KB1	3	0.230	1
28.69	67 HO	KB2	3	0.224	1		29.48	90 TH	KA2	5	0.138	1,2,3
28.74	43 TC	KA1	1	0.673	2,3		29.48	84 PO	KB1	5	0.138	1
28.74	88 RA	LY6	1	0.673	1,2		29.48	83 BI	KB2	5	0.138	1,3
28.78	89 AC	LY1	1	0.674	1		29.48	40 ZR	KB2	1	0.690	1,2,3
28.82	90 TH	LY5	1	0.675	1,2		29.57	55 CS	KB2	2	0.346	1,2,3
28.82	88 RA	LY3	1	0.675	1,2,3		29.70	88 RA	LY1	1	0.695	1,2,3
28.87	77 IR	KB3	4	0.169	1,2		29.74	66 DY	KB2	3	0.232	1,2,3
28.87	43 TC	KA2	1	0.676	2,3		29.74	76 OS	KB3	4	0.174	1,2
28.87	76 OS	KB2	4	0.169	1,3		29.74	75 RE	KB2	4	0.174	1,3
28.87	56 BA	KB5	2	0.338	1		29.74	40 ZR	KB5	1	0.696	1
28.87	77 IR	KB1	4	0.169	1,2,3		29.74	76 OS	KB1	4	0.174	1,2,3
28.95	94 PU	LB1	1	0.678	1		29.83	59 PR	KA2	2	0.349	1,2,3
29.04	89 AC	KA1	5	0.136	1		29.83	93 NP	LB1	1	0.698	1,2,3
29.04	82 PB	KA2	4	0.170	1,2,3		29.92	81 TL	KA2	4	0.175	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						29.92 TO 31.41					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
29.92	80 HG	KA1	4	0.175	1	30.62	74 W	KB4	4	0.179	1
29.92	88 RA	KA1	5	0.140	1	30.62	75 RE	KB3	4	0.179	1,2
29.96	91 PA	LB2	1	0.701	1,2	30.66	88 RA	LY5	1	0.717	1,2
29.96	95 AM	LB2	1	0.701	1,3	30.70	94 PU	LB2	1	0.718	1
30.00	40 ZR	KB3	1	0.702	1,2	30.79	87 FR	KA1	5	0.144	1
30.00	71 LU	KA2	3	0.234	1,2,3	30.79	92 U	LB1	1	0.720	1,2,3
30.00	40 ZR	KB1	1	0.702	1,2,3	30.79	54 XE	KB2	2	0.360	1,2,3
30.13	89 AC	KA2	5	0.141	1	30.79	80 HG	KA2	4	0.180	1
30.13	82 PB	KB4	5	0.141	1,2	30.79	79 AU	KA1	4	0.180	1,2,3
30.27	91 PA	LB10	1	0.708	1,2	30.79	65 TB	KB2	3	0.240	1,2,3
30.27	55 CS	KB1	2	0.354	1,2,3	30.92	90 TH	LB9	1	0.723	1,2
30.31	42 MO	KA1	1	0.709	1,2,3	30.92	70 YB	KA2	3	0.241	1,2,3
30.35	82 PB	KB2	5	0.142	1,3	30.97	58 CE	KA2	2	0.362	1,2,3
30.35	83 BI	KB1	5	0.142	1,2,3	31.01	89 RA	KA2	5	0.145	1
30.35	55 CS	KB3	2	0.355	1,2	31.01	82 PB	KB5	5	0.145	1
30.35	92 U	LB3	1	0.710	1,2,3	31.05	92 U	LB5	1	0.726	1,2
30.40	66 DY	KB1	3	0.237	1,2,3	31.10	39 Y	KB4	1	0.727	2
30.40	70 YB	KA1	3	0.237	1,2,3	31.19	39 Y	KB2	1	0.729	1,2,3
30.48	42 MO	KA2	1	0.713	1,2,3	31.23	82 PB	KB1	5	0.146	1,2,3
30.53	66 DY	KB3	3	0.238	1,2	31.23	90 TH	LB10	1	0.730	1,2
30.53	58 CE	KA1	2	0.357	1,2,3	31.23	81 TL	KB2	5	0.146	1
30.57	83 BI	KB3	5	0.143	1,2	31.32	91 PA	LB3	1	0.732	1,2,3
30.62	74 W	KB2	4	0.179	1,2,3	31.32	74 W	KB5	4	0.183	1
30.62	75 RE	KB1	4	0.179	1,2,3	31.32	69 TM	KA1	3	0.244	1,2,3
30.62	87 FR	LY1	1	0.716	1,2,3	31.41	39 Y	KB5	1	0.734	1

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS							31.45 TO 32.77						
ANGLE	ELEM	LINC	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF	
31.45	82 PB	KB3	5	0.147	1		32.11	80 HG	KB2	5	0.150	1	
31.49	54 XE	KB1	2	0.368	1,2,3		32.11	41 NB	KA2	1	0.750	1,2,3	
31.49	93 NP	LB2	1	0.736	1,2,3		32.11	81 TL	KB1	5	0.150	1,2,3	
31.49	74 W	KB1	4	0.184	1,2,3		32.11	57 LA	KA2	2	0.375	1,2,3	
31.49	92 U	LB7	1	0.736	1,2		32.33	81 TL	KB3	5	0.151	1,2	
31.49	73 TA	KB4	4	0.184	1		32.33	92 U	LB2	1	0.755	1,2,3	
31.58	65 TB	KB1	3	0.246	1,2,3		32.33	91 PA	LB7	1	0.755	1,2	
31.58	65 TB	KB3	3	0.246	1,2		32.33	90 TH	LB3	1	0.755	1,2,3	
31.63	86 RN	LY1	1	0.739	1		32.37	73 TA	KB5	4	0.189	1	
31.67	79 AU	KA2	4	0.185	1,2,3		32.37	68 ER	KA1	3	0.252	1,2,3	
31.67	86 RN	KA1	5	0.148	1		32.55	78 PT	KA2	4	0.190	1,2,3	
31.67	73 TA	KB2	4	0.185	1,2,3		32.55	85 AT	KA1	5	0.152	1	
31.67	74 W	KB3	4	0.185	1,2		32.55	73 TA	KB1	4	0.190	1,2,3	
31.71	39 Y	KB1	1	0.741	1,2,3		32.59	83 BI	LY4	1	0.761	1,2	
31.71	39 Y	KB3	1	0.741	1,2		32.64	64 GD	KB1	3	0.254	1,2,3	
31.76	91 PA	LB1	1	0.742	1,2,3		32.68	85 AT	LY1	1	0.763	1	
31.76	57 LA	KA1	2	0.371	1,2,3		32.72	73 TA	KB3	4	0.191	1,2	
31.84	64 GD	KB2	3	0.248	1,2,3		32.72	77 IR	KA1	4	0.191	1,2,3	
31.84	78 PT	KA1	4	0.186	1,2,3		32.72	72 HF	KB2	4	0.191	1,2,3	
31.89	91 PA	LB5	1	0.745	1,2		32.72	84 PO	LY3	1	0.764	1,2,3	
31.89	87 FR	KA2	5	0.149	1		32.72	84 PO	LY6	1	0.764	1,2	
31.93	41 NB	KA1	1	0.746	1,2,3		32.77	86 RN	KA2	5	0.153	1	
31.98	69 TM	KA2	3	0.249	1,2,3		32.77	90 TH	LB5	1	0.765	1,2	
32.02	92 U	LB4	1	0.748	1,2,3		32.77	90 TH	LB1	1	0.765	1,2,3	
32.11	53 I	KB2	2	0.375	1,2,3		32.77	64 GD	KB3	3	0.255	1,2	

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS							32.90 TO 34.31						
ANGLE	ELEM	LINE	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF	
32.90	53	KB1	2	0.384	1,2,3		33.65	85	AT	KA2	5	0.157	1
32.94	88	RA	LB9	1	0.769	1,2	33.69	82	PB	LY4	1	0.766	1
32.99	79	AU	KB4	5	0.154	1,2	33.69	40	ZR	KA1	1	0.786	1,2,3
32.99	53	I	KB3	2	0.385	1,2	33.74	84	PO	LY1	1	0.787	1,2,3
32.99	80	HC	KB1	5	0.154	1	33.78	76	OS	KA1	4	0.197	1,2,3
32.99	56	BA	KA1	2	0.385	1,2,3	33.78	92	U	LB6	1	0.788	1,2,3
32.99	91	PA	LB4	1	0.770	1,2,3	33.78	71	LU	KB2	4	0.197	1,2,3
33.03	38	SR	KP2	1	0.771	1,2,3	33.83	89	AC	LB1	1	0.789	1
33.03	63	EU	KB2	3	0.257	1,2,3	33.83	83	BI	LY3	1	0.789	1,2,3
33.03	68	ER	KA2	3	0.257	1,2,3	33.87	83	BI	LY6	1	0.790	1,2
33.16	90	TH	LS7	1	0.774	1,2	33.87	40	ZR	KA2	1	0.790	1,2,3
33.16	91	PA	LB2	1	0.774	1,2,3	33.87	79	AU	KB5	5	0.158	1
33.21	38	SR	KB5	1	0.775	1	33.96	98	CF	LA1	1	0.792	1
33.21	79	AU	KB2	5	0.155	1,3	33.96	63	EU	KB1	3	0.264	1,2,3
33.21	80	HC	KB3	5	0.155	1	33.96	63	EU	KB3	3	0.264	1,2
33.21	88	RA	LB1	1	0.775	1,2	34.00	90	TH	LB4	1	0.793	1,2,3
33.43	84	PO	KA1	5	0.156	1	34.05	90	TH	LB2	1	0.794	1,2,3
33.43	56	BA	KA2	2	0.390	1,2,3	34.09	78	PT	KB2	5	0.159	1,3
33.52	52	TE	KB2	2	0.391	1,2,3	34.09	79	AU	KB1	5	0.159	1,2,3
33.56	67	HO	KA1	3	0.261	1,2,3	34.09	78	PT	KB4	5	0.159	1,2
33.56	38	SR	KB1	1	0.783	1,2,3	34.14	83	BI	LY2	1	0.796	1,2,3
33.56	38	SR	KB5	1	0.783	1,2	34.22	67	HO	KA2	3	0.266	1,2,3
33.61	72	HF	KB3	4	0.196	1,2	34.22	62	SH	KB2	3	0.266	1,2,3
33.61	77	IR	KA2	4	0.196	1,2,3	34.31	52	TE	KB1	2	0.400	1,2,3
33.61	72	HF	KB1	4	0.196	1,2,3	34.31	55	CS	KA1	2	0.400	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						34.31 TO 35.78					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
34.31	79 AU	KB3	5	0.160	1,2	35.02	51 SB	KB2	2	0.408	1,2,3
34.40	52 TE	KB3	2	0.401	1,2	35.02	37 RB	KB2	1	0.816	1,2,3
34.45	88 RA	LB3	1	0.803	1,2,3	35.07	82 PB	LY6	1	0.817	1,2
34.49	98 CF	LA2	1	0.804	1	35.15	62 SM	KB1	3	0.273	1,2,3
34.53	92 U	LN	1	0.805	1,2,3	35.20	78 PT	KB3	5	0.164	1,2
34.53	84 PO	KA2	5	0.161	1	35.20	77 IR	KB2	5	0.164	1,3
34.53	83 BI	KA1	5	0.161	1,2,3	35.20	78 PT	KB1	5	0.164	1,2,3
34.58	88 RA	LB5	1	0.806	1,2	35.24	82 PB	LY2	1	0.821	1,2,3
34.67	91 PA	LB6	1	0.808	1,2,3	35.29	37 RB	KB5	1	0.822	1
34.67	71 LU	KB1	4	0.202	1,2,3	35.29	62 SM	KB3	3	0.274	1,2
34.67	76 OS	KA2	4	0.202	1,2,3	35.29	66 DY	KA2	3	0.274	1,2,3
34.76	55 CS	KA2	2	0.405	1,2,3	35.29	97 BK	LA2	1	0.822	1
34.76	66 DY	KA1	3	0.270	1,2,3	35.42	82 PB	KA1	5	0.165	1,2,3
34.76	77 BK	LA1	1	0.810	1	35.55	61 PM	KB2	3	0.276	1
34.84	81 TL	LY4	1	0.812	1,2	35.55	90 TH	LB6	1	0.828	1,2,3
34.84	71 LU	KB3	4	0.203	1,2	35.55	51 SB	KB5	2	0.414	1
34.84	75 RE	KA1	4	0.203	1,2,3	35.60	96 CM	LA1	1	0.829	1
34.89	83 BI	LY1	1	0.813	1,2,3	35.60	37 RB	KB1	1	0.829	1,2,3
34.93	89 AC	LB2	1	0.814	1	35.60	91 PA	LN	1	0.829	1,2,3
34.93	88 RA	LB1	1	0.814	1,2,3	35.60	37 RB	KB3	1	0.829	1,2
34.98	82 PB	LY3	1	0.815	1,2,3	35.60	39 Y	KA1	1	0.829	1,2,3
34.98	77 IR	KB4	5	0.163	1,2	35.64	83 BI	KA2	5	0.166	1,2,3
34.98	78 PT	KB5	5	0.163	1	35.73	75 RE	KA2	4	0.208	1,2,3
35.02	88 RA	LB7	1	0.816	1,2	35.73	54 XE	KA1	2	0.416	1,2,3
35.02	70 YB	KB2	4	0.204	1,2,3	35.78	39 Y	KA2	1	0.833	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						35.82 TO 37.42					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
35.82	51 SB	KA1	2	0.417	1,2,3	36.49	61 PM	KB3	3	0.283	2
35.86	88 RA	LB2	1	0.835	1,2,3	36.53	81 TL	KA1	5	0.170	1,2,3
35.86	77 IR	KB5	5	0.167	1	36.53	82 PB	KA2	5	0.170	1,2,3
35.91	70 YB	KR1	4	0.209	1,2,3	36.62	50 SN	KB2	2	0.426	1,2,3
35.91	74 W	KA1	4	0.209	1,2,3	36.71	90 TH	LN	1	0.854	1,2,3
35.91	70 YB	KB3	4	0.209	1,2	36.80	74 W	KA2	4	0.214	1,2,3
35.91	51 SB	KB3	2	0.418	1,2	36.89	87 FR	LB2	1	0.858	1,2,3
35.95	65 TB	KA1	3	0.279	1,2,3	36.89	60 ND	KB2	3	0.286	1,2,3
36.04	80 HG	LY4	1	0.839	1,2	36.98	69 TM	KB1	4	0.215	1,2,3
36.04	93 BI	LY5	1	0.839	1,2	36.98	73 TA	KA1	4	0.215	1,2,3
36.09	82 PB	LY1	1	0.840	1,2,3	36.98	95 AM	LA2	1	0.860	1,3
36.09	54 XE	KA2	2	0.420	1,2,3	37.15	69 TM	KB3	4	0.216	1,2
36.09	87 FR	LB1	1	0.840	1,2,3	37.15	64 GD	KA1	3	0.268	1,2,3
36.09	69 TM	KB2	4	0.210	1	37.15	50 SN	KB5	2	0.432	1
36.13	96 CM	LA2	1	0.841	1	37.24	36 KR	KB2	1	0.866	1,2,3
36.13	88 RA	LB4	1	0.841	1,2,3	37.24	82 PB	LY5	1	0.866	1,2
36.13	81 TL	LY3	1	0.841	1,2,3	37.24	36 KR	KB4	1	0.866	2
36.26	81 TL	LY6	1	0.844	1,2	37.24	86 RN	LB1	1	0.866	1
36.31	77 IR	KB1	5	0.169	1,2,3	37.24	53 I	KA1	2	0.433	1,2,3
36.31	77 IR	KB3	5	0.169	1,2	37.33	68 ER	KB2	4	0.217	1,2,3
36.31	76 OS	KB2	5	0.169	1,3	37.33	94 PU	LA1	1	0.868	1
36.35	61 PM	KB1	3	0.282	1,2,3	37.33	81 TL	LY1	1	0.868	1,2,3
36.44	95 AM	LA1	1	0.848	1,3	37.38	80 HG	LY3	1	0.869	1,2,3
36.44	81 TL	LY2	1	0.848	1,2,3	37.42	76 OS	KB1	5	0.174	1,2,3
36.49	65 TB	KA2	3	0.283	1,2,3	37.42	76 OS	KB3	5	0.174	1,2

TGPAZ CRYSTAL, D# 1.356 ANGSTROMS						37.42 TO 39.12					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
37.42	75 RE	KB2	5	0.174	1,3	38.40	68 ER	KB3	4	0.223	1,2
37.42	50 SN	KB1	2	0.435	1,2,3	38.49	85 AT	LB1	1	0.894	1
37.47	88 RA	LY6	1	0.871	1,2,3	38.54	74 W	KB2	5	0.179	1,2,3
37.47	36 KR	KB5	1	0.871	1,2	38.54	75 RE	KB1	5	0.179	1,2,3
37.51	50 SN	KB3	2	0.436	1,2	38.54	81 TL	LY5	1	0.895	1,2
37.56	80 HG	LY6	1	0.873	1,2	38.54	75 RE	KB3	5	0.179	1,2
37.64	38 SR	KA1	1	0.875	1,2,3	38.54	74 W	KB4	5	0.179	1
37.64	80 HG	LY2	1	0.875	1,2,3	38.58	67 HO	KB2	4	0.224	1
37.64	80 HG	KA1	5	0.175	1	38.63	80 HG	LY1	1	0.897	1,2,3
37.64	81 TL	KA2	5	0.175	1,2,3	38.63	78 PT	LY4	1	0.897	1,2
37.69	53 I	KA2	2	0.438	1,2,3	38.63	63 EU	KA1	3	0.299	1,2,3
37.78	36 KR	KB1	1	0.878	1,2,3	38.67	79 AU	LY3	1	0.898	1,2,3
37.82	36 KR	KB3	1	0.879	1,2	38.67	83 BI	LB9	1	0.898	1,2
37.82	38 SR	KA2	1	0.879	1,2,3	38.72	84 PO	LB5	1	0.899	1,2
37.82	64 GD	KA2	3	0.293	1,2,3	38.76	79 AU	KA1	5	0.180	1,2,3
37.82	60 ND	KB1	3	0.293	1,2,3	38.76	80 HG	KA2	5	0.180	1
37.87	94 PU	LA2	1	0.880	1	38.81	93 NP	LA2	1	0.901	1
37.87	73 TA	KA2	4	0.220	1,2,3	38.85	49 IN	KB5	2	0.451	1
37.91	86 RN	LB2	1	0.881	1	38.85	52 TE	KA1	2	0.451	1,2,3
37.96	60 ND	KB3	3	0.294	1,2	38.90	79 AU	LY6	1	0.903	1,2
38.23	72 HF	KA1	4	0.222	1,2,3	38.94	79 AU	LY2	1	0.904	1,2,3
38.27	93 NP	LA1	1	0.889	1,2,3	38.99	83 BI	LB10	1	0.905	1,2
38.32	49 IN	KB2	2	0.445	1,2,3	38.99	85 AT	LB2	1	0.905	1
38.36	59 PR	KB2	3	0.297	1,2,3	39.08	88 RA	LN	1	0.907	1,2,3
38.40	68 ER	KB1	4	0.223	1,2,3	39.12	72 HF	KA2	4	0.227	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						39.17 TO 40.92					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
39.17	84 PO	LB3	1	0.909	1,2,3	39.97	62 SM	KA1	3	0.309	1,2,3
39.17	63 EU	KA2	3	0.303	1,2,3	39.97	77 IR	LY4	1	0.927	1,2
39.21	49 IN	KB1	2	0.455	1,2,3	39.97	79 AU	LY1	1	0.927	1,2,3
39.21	49 IN	KB3	2	0.455	1,2	40.02	66 DY	KB2	4	0.232	1,2,3
39.26	92 U	LA1	1	0.911	1,2,3	40.02	78 PT	LY3	1	0.928	1,2,3
39.30	59 PR	KB1	3	0.304	1,2,3	40.06	84 PU	LB2	1	0.929	1,2,3
39.30	52 TE	KA2	2	0.456	1,2,3	40.11	78 PT	KA1	5	0.166	1,2,3
39.44	59 PR	KB3	3	0.305	1,2	40.11	48 CD	KB2	2	0.465	1,2,3
39.44	74 W	KB5	5	0.183	1	40.11	37 RB	KA2	1	0.930	1,2,3
39.48	71 LU	KA1	4	0.229	1,2,3	40.24	91 PA	LA1	1	0.933	1,2,3
39.66	67 HO	KB1	4	0.230	1	40.24	35 BR	KB3	1	0.933	1,2
39.66	74 W	KB1	5	0.184	1,2,3	40.24	35 BR	KB1	1	0.933	1,2,3
39.66	73 TA	KB4	5	0.184	1	40.29	78 PT	LY2	1	0.934	1,2,3
39.70	35 BR	KB2	1	0.921	1,2,3	40.29	78 PT	LY6	1	0.934	1,2
39.75	92 U	LA2	1	0.922	1,2,3	40.29	82 PB	LB10	1	0.934	1,2
39.75	84 PO	LB1	1	0.922	1,2,3	40.33	83 BI	LB7	1	0.935	1,2
39.84	80 HG	LY5	1	0.924	1,2	40.38	71 LU	KA2	4	0.234	1,2,3
39.84	58 CE	KB2	3	0.306	1,2,3	40.51	83 BI	LB3	1	0.939	1,2,3
39.88	79 AU	KA2	5	0.185	1,2,3	40.56	51 SB	KA1	2	0.470	1,2,3
39.88	74 W	KB3	5	0.185	1,2	40.65	62 SM	KA2	3	0.314	1,2,3
39.88	73 TA	KB2	5	0.185	1,2,3	40.78	73 TA	KB5	5	0.189	1
39.88	35 BR	KB5	1	0.925	1,2	40.78	91 PA	LA2	1	0.945	1,2,3
39.93	63 BI	LB5	1	0.926	1,2	40.88	84 PO	LB4	1	0.947	1,2,3
39.93	37 RB	KA1	1	0.925	1,2,3	40.92	66 DY	KB1	4	0.237	1,2,3
39.97	82 PB	LB9	1	0.927	1,2	40.92	70 YB	KA1	4	0.237	1,2,3

TOPAZ CRYSTAL, DH 1.356 ANGSTROMS						40.92 TO 42.55					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
40.92	58 CE	KB3	3	0.316	1,2	41.64	70 YB	KA2	4	0.241	1,2,3
40.92	58 CE	KB1	3	0.316	1,2,3	41.69	77 IR	LY2	1	0.965	1,2,3
41.01	51 SB	KA2	2	0.475	1,2,3	41.78	77 IR	LY6	1	0.967	1,2
41.01	48 CD	KB1	2	0.475	1,2,3	41.78	84 PO	LB6	1	0.967	1,2,3
41.01	78 PT	KA2	5	0.190	1,2,3	41.82	90 TH	LA2	1	0.968	1,2,3
41.01	73 TA	KB1	5	0.190	1,2,3	41.87	82 PB	LB3	1	0.969	1,2,3
41.10	48 CD	KB3	2	0.476	1,2	42.09	47 AG	KB2	2	0.487	1,2,3
41.10	66 DY	KB3	4	0.238	1,2	42.14	61 PM	KA2	3	0.325	1,2,3
41.10	83 BI	LB1	1	0.952	1,2,3	42.19	69 TM	KA1	4	0.244	1,2,3
41.15	82 PB	LB5	1	0.953	1,2	42.23	83 BI	LB4	1	0.977	1,2,3
41.24	83 BI	LB2	1	0.955	1,2,3	42.28	57 LA	KB5	3	0.326	1
41.24	73 TA	KB3	5	0.191	1,2	42.37	36 KR	KA1	1	0.980	1,2,3
41.24	77 IR	KA1	5	0.191	1,2,3	42.37	89 AC	LA1	1	0.980	1
41.24	72 HF	KB2	5	0.191	1,2,3	42.37	72 HF	KB3	5	0.196	1,2
41.28	79 AU	LY5	1	0.956	1,2	42.37	77 IR	KA2	5	0.196	1,2,3
41.28	90 TH	LA1	1	0.956	1,2,3	42.37	34 SE	KB2	1	0.980	1,2,3
41.33	81 TL	LB9	1	0.957	1,2	42.37	72 HF	KB1	5	0.196	1,2,3
41.37	78 PT	LY1	1	0.958	1,2,3	42.41	81 TL	LB5	1	0.981	1,2
41.42	76 OS	LY4	1	0.959	1,2	42.46	50 SN	KA1	2	0.491	1,2,3
41.42	77 IR	LY3	1	0.959	1,2,3	42.46	82 PB	LB1	1	0.982	1,2,3
41.46	65 TB	KB2	4	0.240	1,2,3	42.50	82 PB	LB2	1	0.983	1,2,3
41.46	57 LA	KB2	3	0.320	1,2,3	42.55	57 LA	KB1	3	0.328	1,2,3
41.55	82 PB	LB7	1	0.962	1,2	42.55	34 SE	KB5	1	0.984	1,2
41.60	61 PM	KA1	3	0.321	1,2,3	42.55	65 TB	KB3	4	0.246	1,2
41.64	81 TL	LB10	1	0.964	1,2	42.55	36 KR	KA2	1	0.984	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						42.55 TO 44.37					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
42.55	65 TB	KB1	4	0.246	1,2,3	43.32	81 TL	LB3	1	1.001	1,2,3
42.59	71 LU	KB2	5	0.197	1,2,3	43.50	88 RA	LA1	1	1.005	1,2,3
42.59	76 OS	KA1	5	0.197	1,2,3	43.59	82 PB	LB4	1	1.007	1,2,3
42.64	80 HG	LB9	1	0.986	1,2	43.64	60 ND	KA2	3	0.336	1,2,3
42.64	47 AG	KB5	2	0.493	1	43.64	68 ER	KA1	4	0.252	1,2,3
42.68	57 LA	KB3	3	0.329	1,2	43.73	80 HG	LB5	1	1.010	1,2
42.73	78 PT	LY5	1	0.988	1,2	43.73	81 TL	LB2	1	1.010	1,2,3
42.82	50 SN	KA2	2	0.495	1,2,3	43.73	71 LU	KB1	5	0.202	1,2,3
42.82	81 TL	LB7	1	0.990	1,2	43.73	76 OS	KA2	5	0.202	1,2,3
42.87	77 IR	LY1	1	0.991	1,2,3	43.91	56 BA	KB5	3	0.338	1
42.91	75 RE	LY4	1	0.992	1,2	43.96	81 TL	LB1	1	1.015	1,2,3
42.91	34 SE	KB1	1	0.992	1,2,3	43.96	75 RE	KA1	5	0.203	1,2,3
42.91	89 AC	LA2	1	0.992	1	43.96	71 LU	KB3	5	0.203	1,2
42.91	76 OS	LY3	1	0.992	1,2,3	44.00	64 GD	KB1	4	0.254	1,2,3
42.91	64 GD	KB2	4	0.248	1,2,3	44.00	88 RA	LA2	1	1.016	1,2,3
42.96	83 BI	LB6	1	0.993	1,2,3	44.14	80 HG	LB7	1	1.019	1,2
42.96	34 SE	KB3	1	0.993	1,2	44.18	70 YB	KB2	5	0.204	1,2,3
43.00	47 AG	KB1	2	0.497	1,2,3	44.18	46 PD	KB2	2	0.510	1,2,3
43.09	47 AG	KB3	2	0.498	1,2	44.18	64 GD	KB3	4	0.255	1,2
43.09	80 HG	LB10	1	0.996	1,2	44.23	79 AU	LB9	1	1.021	1,2
43.09	69 TM	KA2	4	0.249	1,2,3	44.23	82 PB	LB5	1	1.021	1,2,3
43.09	60 ND	KA1	3	0.332	1,2,3	44.28	77 IR	LY5	1	1.022	1,2
43.18	76 OS	LY2	1	0.998	1,2,3	44.32	56 BA	KB3	3	0.341	1,2
43.23	56 BA	KB2	3	0.333	1,2,3	44.32	56 BA	KB1	3	0.341	1,2,3
43.32	76 OS	LY6	1	1.001	1,2	44.37	49 IN	KA1	2	0.512	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						44.41 TO 44.96					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
44.41	76 OS	LY1	1	1.025	1,2,3						
44.46	75 RE	LY3	1	1.026	1,2,3						
44.55	79 AU	LB10	1	1.028	1,2						
44.55	63 EU	KB2	4	0.257	1,2,3						
44.55	68 ER	KA2	4	0.257	1,2,3						
44.55	74 W	LY4	1	1.028	1,2						
44.64	98 CF	LY1	2	0.515	1						
44.64	87 FR	LA1	1	1.030	1,2,3						
44.73	59 PR	KA1	3	0.344	1,2,3						
44.73	75 RE	LY2	1	1.032	1,2,3						
44.82	80 HG	LB3	1	1.034	1,2,3						
44.82	49 IN	KA2	2	0.517	1,2,3						
44.82	46 PD	KB5	2	0.517	1						
44.96	75 RE	LY6	1	1.037	1,2						

TOPAZ CRYSTAL, DW 1.356 ANGSTROMS							45.01 TO 46.66						
ANGLE	ELEM	LINE	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF	
45.01	55 CS	KB2	3	0.346	1,2,3		45.88	86 RN	LA1	1	1.057	1	
45.05	81 TL	LB4	1	1.039	1,2,3		45.88	33 AS	KB1	1	1.057	1,2,3	
45.10	75 RE	KA2	5	0.208	1,2,3		45.92	33 AS	KB3	1	1.058	1,2	
45.10	79 AU	LB5	1	1.040	1,2		45.97	83 BI	LN	1	1.059	1,2,3	
45.10	35 BR	KA1	1	1.040	1,2,3		46.01	97 BK	LY1	2	0.530	1	
45.10	80 HG	LB2	1	1.040	1,2,3		46.06	75 RE	LY1	1	1.061	1,2,3	
45.19	87 FR	LA2	1	1.042	1		46.11	55 CS	KB1	3	0.354	1,2,3	
45.19	46 PD	KB1	2	0.521	1,2,3		46.11	78 PT	LB10	1	1.062	1,2	
45.19	46 PD	KB3	2	0.521	1,2		46.11	74 W	LY3	1	1.062	1,2,3	
45.28	67 HC	KA1	4	0.261	1,2,3		46.20	67 HO	KA2	4	0.266	1,2,3	
45.28	35 BR	KA2	1	1.044	1,2,3		46.20	62 SM	KB2	4	0.266	1,2,3	
45.33	70 YB	KB1	5	0.209	1,2,3		46.24	55 CS	KB3	3	0.355	1,2	
45.33	74 W	KA1	5	0.209	1,2,3		46.24	73 TA	LY4	1	1.065	1,2	
45.33	70 YB	KB3	5	0.209	1,2		46.34	92 U	LL	1	1.067	2,3	
45.33	33 AS	KB2	1	1.045	1,2,3		46.38	74 W	LY2	1	1.068	1,2,3	
45.42	57 PR	KA2	3	0.349	1,2,3		46.38	79 AU	LB3	1	1.068	1,2,3	
45.51	33 AS	KB5	1	1.049	1,2		46.43	86 RN	LA2	1	1.069	1	
45.51	80 HG	LB1	1	1.049	1,2,3		46.47	74 W	KA2	5	0.214	1,2,3	
45.56	79 AU	LB7	1	1.050	1,2		46.47	79 AU	LB2	1	1.070	1,2,3	
45.56	69 TM	KB2	5	0.210	1		46.47	45 RH	KB2	2	0.535	1,2,3	
45.56	81 TL	LB6	1	1.050	1,2,3		46.47	48 CD	KA1	2	0.535	1,2,3	
45.74	78 PT	LB9	1	1.054	1,2		46.52	58 CE	KA1	3	0.357	1,2,3	
45.83	63 EU	KB1	4	0.264	1,2,3		46.57	80 HG	LB4	1	1.072	1,2,3	
45.83	63 EU	KB3	4	0.264	1,2		46.57	78 PT	LB5	1	1.072	1,2	
45.88	76 OS	LY5	1	1.057	1,2		46.66	74 W	LY6	1	1.074	1,2	

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS							46.70 TO 48.69						
ANGLE	ELEM	LINE	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF	
46.70	73 TA	KA1	5	0.215	1,2,3		47.81	74 W	LY1	1	1.099	1,2,3	
46.70	69 TM	KB1	5	0.215	1,2,3		47.81	73 TA	LY3	1	1.099	1,2,3	
46.84	48 CD	KA2	2	0.539	1,2,3		47.86	73 TA	KA2	5	0.220	1,2,3	
46.93	69 TM	KB3	5	0.216	1,2		47.95	78 PT	LB2	1	1.102	1,2,3	
46.93	80 HG	LB6	1	1.030	1,2,3		48.00	72 HF	LY4	1	1.103	1,2	
46.93	54 XE	KB2	3	0.360	1,2,3		48.04	78 PT	LB3	1	1.104	1,2,3	
46.93	66 DY	KA1	4	0.270	1,2,3		48.04	54 XE	KB1	3	0.368	1,2,3	
47.03	45 RH	KB5	2	0.541	1		48.04	61 PM	KB2	4	0.276	1	
47.03	78 PT	LB7	1	1.082	1,2		48.09	34 SE	KA1	1	1.105	1,2,3	
47.12	79 AU	LB1	1	1.084	1,2,3		48.09	73 TA	LY2	1	1.105	1,2,3	
47.17	68 ER	KB2	5	0.217	1,2,3		48.14	77 IR	LB5	1	1.106	1,2	
47.17	85 AT	LA1	1	1.085	1		48.18	79 AU	LB4	1	1.107	1,2,3	
47.21	58 CE	KA2	3	0.362	1,2,3		48.27	34 SE	KA2	1	1.109	1,2,3	
47.40	77 IR	LB9	1	1.090	1,2		48.32	72 HF	KA1	5	0.222	1,2,3	
47.44	91 PA	LL	1	1.091	1,2,3		48.37	79 AU	LB6	1	1.111	1,2,3	
47.49	62 SM	KB1	4	0.273	1,2,3		48.46	57 LA	KA1	3	0.371	1,2,3	
47.49	45 RH	KB3	2	0.546	1,2		48.51	73 TA	LY6	1	1.114	1,2	
47.49	96 CM	LY1	2	0.546	1		48.51	84 PO	LA1	1	1.114	1,2,3	
47.49	82 PB	LN	1	1.092	1,2,3		48.55	68 ER	KB3	5	0.223	1,2	
47.49	45 RH	KB1	2	0.546	1,2,3		48.55	77 IR	LB7	1	1.115	1,2	
47.58	75 RE	LY5	1	1.094	1,2		48.55	90 TH	LL	1	1.115	1,2,3	
47.67	62 SM	KB3	4	0.274	1,2		48.55	68 ER	KB1	5	0.223	1,2,3	
47.67	66 DY	KA2	4	0.274	1,2,3		48.60	65 TB	KA1	4	0.279	1,2,3	
47.72	85 AT	LA2	1	1.097	1		48.64	32 GE	KB2	1	1.117	1,2,3	
47.72	77 IR	LB10	1	1.097	1,2		48.69	47 AG	KA1	2	0.559	1,2,3	

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS							48.74 TO 51.11						
ANGLE	ELEM	LINE	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF	
48.74	32 GE	KB5	1	1.119	1,2		49.81	78 PT	LB4	1	1.142	1,2,3	
48.78	78 PT	LB1	1	1.120	1,2,3		49.85	71 LU	LY4	1	1.143	1	
48.78	67 HO	KB2	5	0.224	1		49.90	83 BI	LA1	1	1.144	1,2,3	
48.97	44 RU	KB2	2	0.562	1,2,3		49.90	72 HF	LY2	1	1.144	1,2,3	
48.97	95 AM	LY1	2	0.562	1,3		49.90	44 RU	KB1	2	0.572	1,2,3	
49.02	53 I	KB2	3	0.375	1,2,3		49.90	60 NU	KB2	4	0.286	1,2,3	
49.02	57 LA	KA2	3	0.375	1,2,3		49.90	78 PT	LB6	1	1.144	1,2,3	
49.06	84 PO	LA2	1	1.126	1,2,3		49.95	71 LU	KA1	5	0.229	1,2,3	
49.06	76 OS	LB9	1	1.126	1,2		49.99	44 RU	KB3	2	0.573	1,2	
49.16	81 TL	LN	1	1.128	1,2,3		50.13	76 OS	LB7	1	1.149	1,2	
49.16	47 AG	KA2	2	0.564	1,2,3		50.18	67 HO	KB1	5	0.230	1	
49.16	61 PM	KB1	4	0.282	1,2,3		50.27	53 I	KB1	3	0.384	1,2,3	
49.20	32 GE	KB3	1	1.129	1,2		50.27	64 GD	KA1	4	0.288	1,2,3	
49.20	32 GE	KB1	1	1.129	1,2,3		50.41	56 BA	KA1	3	0.385	1,2,3	
49.34	65 TB	KA2	4	0.283	1,2,3		50.41	83 BI	LA2	1	1.155	1,2,3	
49.34	74 W	LY5	1	1.132	1,2		50.41	72 HF	LY6	1	1.155	1,2	
49.34	61 PM	KB3	4	0.282	2		50.41	53 I	KB3	3	0.385	1,2	
49.39	76 OS	LB10	1	1.132	1,2		50.55	94 PU	LY1	2	0.579	1	
49.48	72 HF	KA2	5	0.221	1,2,3		50.55	77 IR	LB1	1	1.158	1,2,3	
49.48	77 IR	LB2	1	1.135	1,2,3		50.65	66 DY	KB2	5	0.232	1,2,3	
49.53	44 RU	KB5	2	0.566	1		50.83	80 HG	LN	1	1.164	1,2,3	
49.62	72 HF	LY3	1	1.138	1,2,3		50.88	75 RE	LB9	1	1.165	1,2	
49.62	73 TA	LY1	1	1.138	1,2,3		50.97	88 RA	LL	1	1.167	1,2,3	
49.71	76 OS	LB5	1	1.140	1,2		51.11	76 OS	LB2	1	1.170	1,2,3	
49.76	77 IR	LB3	1	1.141	1,2,3		51.11	71 LU	KA2	5	0.234	1,2,3	

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						51.11 TO 52.90					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
51.11	56 BA	KA2	3	0.390	1,2,3	51.86	82 PB	LA2	1	1.186	1,2,3
51.11	46 PD	KA1	2	0.585	1,2,3	51.96	91 PA	LY4	2	0.594	1,2
51.21	60 ND	KB1	4	0.293	1,2,3	51.96	59 PR	KB2	4	0.297	1,2,3
51.21	75 RE	LB10	1	1.172	1,2	52.05	92 U	LY6	2	0.595	1,2
51.21	64 GD	KA2	4	0.293	1,2,3	52.05	66 DY	KB3	5	0.238	1,2
51.25	52 TE	KB2	3	0.391	1,2,3	52.24	93 NP	LY1	2	0.597	1,2,3
51.25	73 TA	LY5	1	1.173	1,2	52.34	92 U	LY3	2	0.598	1,2,3
51.35	82 PB	LA1	1	1.175	1,2,3	52.34	63 EU	KA1	4	0.299	1,2,3
51.40	60 ND	KB3	4	0.294	1,2	52.34	31 GA	KB2	1	1.196	1,2,3
51.40	33 AS	KA1	1	1.176	1,2,3	52.38	31 GA	KB5	1	1.197	1,2
51.44	75 RE	LB5	1	1.177	1,2	52.38	76 OS	LB1	1	1.197	1,2,3
51.49	77 IR	LB6	1	1.178	1,2,3	52.43	71 LU	LY6	1	1.198	1,2
51.54	72 HF	LY1	1	1.179	1,2,3	52.52	65 TB	KB2	5	0.240	1,2,3
51.54	71 LU	LY3	1	1.179	1,2,3	52.52	55 CS	KA1	3	0.400	1,2,3
51.58	77 IR	LB4	1	1.180	1,2,3	52.52	52 TE	KB1	3	0.400	1,2,3
51.58	46 PD	KA2	2	0.590	1,2,3	52.62	43 TC	KB3	2	0.601	1,2
51.58	43 TC	KB4	2	0.590	1	52.67	52 TE	KB3	3	0.401	1,2
51.58	43 TC	KB2	2	0.590	1	52.67	79 AU	LN	1	1.203	1,2,3
51.58	33 AS	KA2	1	1.190	1,2,3	52.71	74 W	LB9	1	1.204	1,2
51.58	76 OS	LB3	1	1.180	1,2,3	52.71	43 TC	KB1	2	0.602	1,2,3
51.82	70 YB	KA1	5	0.237	1,2,3	52.76	70 YB	KA2	5	0.241	1,2,3
51.82	66 DY	KB1	5	0.237	1,2,3	52.81	98 CF	LB1	2	0.603	1
51.82	70 YB	LY4	1	1.185	1,2	52.85	75 RE	LB2	1	1.207	1,2,3
51.82	71 LU	LY2	1	1.185	1,2,3	52.85	81 TL	LA1	1	1.207	1,2,3
51.86	75 RE	LB7	1	1.186	1,2	52.90	31 GA	KB1	1	1.208	1,2,3

TOPAZ CRYSTAL, DH 1.356 ANGSTROMS						52.90 TO 55.08					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
52.90	31 GA	K83	1	1.208	1,2	53.94	65 TB	K81	5	0.246	1,2,3
53.00	92 U	LY2	2	0.605	1,2,3	54.04	58 CE	K82	4	0.308	1,2,3
53.09	74 W	LB10	1	1.212	1,2	54.13	91 PA	LY3	2	0.617	1,2,3
53.09	63 EU	KA2	4	0.303	1,2,3	54.23	45 RH	KA2	2	0.618	1,2,3
53.14	76 OS	LB6	1	1.213	1,2,3	54.23	62 SM	KA1	4	0.309	1,2,3
53.23	74 W	LB5	1	1.215	1,2	54.37	75 RE	LB1	1	1.239	1,2,3
53.23	55 CS	KA2	3	0.405	1,2,3	54.42	42 MO	K84	2	0.620	2
53.23	72 HF	LY5	1	1.215	1,2	54.42	64 GD	K82	5	0.243	1,2,3
53.28	59 PR	K81	4	0.304	1,2,3	54.46	80 HG	LA1	1	1.241	1,2,3
53.37	76 OS	LB4	1	1.218	1,2,3	54.51	51 SB	K85	3	0.414	1
53.42	81 TL	LA2	1	1.219	1,2,3	54.51	97 BK	LB1	2	0.621	1
53.47	69 TM	KA1	5	0.244	1,2,3	54.51	42 MO	K82	2	0.621	1,2,3
53.47	75 RE	LB3	1	1.220	1,2,3	54.56	70 YB	LY6	1	1.243	1,2
53.47	59 PR	K83	4	0.305	1,2	54.56	78 PT	LN	1	1.243	1,2,3
53.56	70 YB	LY3	1	1.222	1,2,3	54.65	69 TM	KA2	5	0.249	1,2,3
53.56	71 LU	LY1	1	1.222	1,2,3	54.65	74 W	LB2	1	1.245	1,2,3
53.56	90 TH	LY4	2	0.611	1,2	54.70	73 TA	LB9	1	1.246	1,2
53.66	51 SB	K82	3	0.408	1,2,3	54.80	91 PA	LY2	2	0.624	1,2,3
53.66	74 W	LB7	1	1.224	1,2	54.80	54 XE	KA1	3	0.416	1,2,3
53.75	91 PA	LY6	2	0.613	1,2	54.94	51 SB	K81	3	0.417	1,2,3
53.75	45 RH	KA1	2	0.613	1,2,3	54.94	75 RE	LB6	1	1.251	1,2,3
53.89	70 YB	LY2	1	1.229	1,2,3	55.05	80 HG	LA2	1	1.253	1,2,3
53.89	69 TM	LY4	1	1.229	1	55.08	42 MO	K85	2	0.627	1
53.94	92 U	LY1	2	0.615	1,2,3	55.08	32 GE	KA1	1	1.254	1,2,3
53.94	65 TB	K83	5	0.246	1,2	55.08	73 TA	LB10	1	1.254	1,2

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						55.08 TO 57.29					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
55.08	51 SB	KB3	3	0.418	1,2	56.23	50 SN	KB2	3	0.426	1,2,3
55.13	73 TA	LB5	1	1.255	1,2	56.23	96 CM	LB1	2	0.639	1
55.18	62 SM	KA2	4	0.314	1,2,3	56.32	57 LA	KB2	4	0.320	1,2,3
55.27	32 GE	KA2	1	1.258	1,2,3	56.42	74 W	LB1	1	1.282	1,2,3
55.32	75 RE	LB4	1	1.259	1,2,3	56.52	61 PM	KA1	4	0.321	1,2,3
55.37	68 ER	KA1	5	0.252	1,2,3	56.52	73 TA	LB2	1	1.284	1,2,3
55.37	71 LU	LY5	1	1.260	1,2	56.52	90 TH	LY2	2	0.642	1,2,3
55.37	54 XE	KA2	3	0.420	1,2,3	56.52	77 IR	LN	1	1.284	1,2,3
55.51	74 W	LB3	1	1.263	1,2,3	56.52	30 ZN	KB2	1	1.284	1,2,3
55.56	58 CE	KB3	4	0.316	1,2	56.56	30 ZN	KB5	1	1.285	1,2
55.56	90 TH	LY6	2	0.632	1,2	56.56	68 ER	KA2	5	0.257	1,2,3
55.56	73 TA	LB7	1	1.264	1,2	56.56	63 EU	KB2	5	0.257	1,2,3
55.56	42 MO	KB1	2	0.632	1,2,3	56.61	44 RU	KA1	2	0.643	1,2,3
55.56	58 CE	KB1	4	0.316	1,2,3	56.71	79 AU	LA2	1	1.288	1,2,3
55.65	42 MO	KB3	2	0.633	1,2	56.80	74 W	LB6	1	1.290	1,2,3
55.75	69 TM	LY3	1	1.268	1,2,3	56.80	72 HF	LB9	1	1.290	1,2
55.75	70 YB	LY1	1	1.268	1,2,3	56.80	69 TM	LY6	1	1.290	1
55.75	91 PA	LY1	2	0.634	1,2,3	57.00	44 RU	KA2	2	0.647	1,2,3
55.85	92 U	LY5	2	0.635	1,2	57.04	30 ZN	KB1	1	1.295	1,2,3
55.85	64 GD	KB1	5	0.254	1,2,3	57.09	50 SN	KB5	3	0.432	1
55.94	90 TH	LY3	2	0.636	1,2,3	57.19	72 HF	LB5	1	1.298	1,2
56.04	69 TM	LY2	1	1.274	1,2,3	57.19	88 RA	LY4	2	0.649	1,2
56.09	64 GD	KB3	5	0.255	1,2	57.19	72 HF	LB10	1	1.298	1,2
56.13	79 AU	LA1	1	1.276	1,3	57.24	53 I	KA1	3	0.433	1,2,3
56.13	68 ER	LY4	1	1.276	1,2	57.29	61 PM	KA2	4	0.325	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS							57.38 TO 59.71						
ANGLE	ELEM	LINE	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF	
57.38	74 W	LB4	1	1.332	1,2,3		58.44	78 PT	LA2	1	1.324	1,2,3	
57.48	57 LA	KB5	4	0.326	1		58.54	72 HF	LB2	1	1.326	1,2,3	
57.53	67 HC	KA1	5	0.261	1,2,3		58.59	73 TA	LB1	1	1.327	1,2,3	
57.53	50 SN	KB1	3	0.435	1,2,3		58.64	60 ND	KA1	4	0.332	1,2,3	
57.57	70 YB	LY5	1	1.306	1,2		58.64	76 OS	LN	1	1.328	1,2,3	
57.57	90 TH	LY1	2	0.653	1,2,3		58.73	67 HO	KA2	5	0.266	1,2,3	
57.57	78 CF	LB2	2	0.653	1		58.73	62 SM	KB2	5	0.266	1,2,3	
57.57	72 HF	LB7	1	1.306	1,2		58.78	73 TA	LB6	1	1.331	1,2,3	
57.62	73 TA	LB3	1	1.307	1,2,3		58.83	41 NB	KB3	2	0.666	1,2	
57.67	50 SN	KB3	3	0.436	1,2		58.83	41 NB	KB1	2	0.666	1,2,3	
57.67	41 NB	KB2	2	0.654	1,2,3		58.83	56 BA	KB2	4	0.333	1,2,3	
57.77	91 PA	LY5	2	0.655	1,2		58.98	49 IN	KB2	5	0.445	1,2,3	
57.86	57 LA	KB1	4	0.328	1,2,3		59.03	71 LU	LB9	1	1.336	1,2	
57.91	78 PT	LA1	1	1.313	1,2,3		59.12	97 BK	LB2	2	0.669	1	
57.96	53 I	KA2	3	0.438	1,2,3		59.22	31 GA	KA1	1	1.340	1,2,3	
58.01	69 TM	LY1	1	1.315	1,2,3		59.32	71 LU	LB5	1	1.342	1,2	
58.01	68 ER	LY3	1	1.315	1,2,3		59.37	71 LU	LB10	1	1.343	1,2	
58.06	83 BI	LL	1	1.316	1,2,3		59.41	31 GA	KA2	1	1.344	1,2,3	
58.06	95 AM	LB1	2	0.658	1,3		59.41	60 ND	KA2	4	0.336	1,2,3	
58.06	57 LA	KB3	4	0.329	1,2		59.51	73 TA	LB4	1	1.346	1,2,3	
58.25	41 NB	KB5	2	0.660	1		59.51	43 TC	KA1	2	0.673	2,3	
58.25	63 EU	KB3	5	0.264	1,2		59.51	88 RA	LY6	2	0.673	1,2	
58.25	63 EU	KB1	5	0.264	1,2,3		59.61	89 AC	LY1	2	0.674	1	
58.30	68 ER	LY2	1	1.321	1,2,3		59.66	71 LU	LB7	1	1.349	1,2	
58.35	67 HO	LY4	1	1.322	1,2		59.71	82 PB	LL	1	1.350	1,2,3	

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						59.71 TO 61.91					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
59.71	88 RA	LY3	2	0.675	1,2,3	60.68	66 DY	KA2	5	0.274	1,2,3
59.71	90 TH	LY5	2	0.675	1,2	60.68	62 SM	KB3	5	0.274	1,2
59.71	66 DY	KA1	5	0.270	1,2,3	60.83	75 RE	LN	1	1.373	1,2,3
59.76	77 IR	LA1	1	1.351	1,2,3	60.88	66 DY	LY4	1	1.374	1,2
59.80	43 TC	KA2	2	0.676	2,3	60.88	92 U	LB10	2	0.687	1,2
59.80	56 BA	KB5	4	0.338	1	60.88	72 HF	LB1	1	1.374	1,2,3
59.85	49 IN	KB5	3	0.451	1	60.88	72 HF	LB6	1	1.374	1,2,3
59.85	72 HF	LB3	1	1.353	1,2,3	60.98	59 PR	KA1	4	0.344	1,2,3
59.85	52 TE	KA1	3	0.451	1,2,3	61.17	61 PM	KB2	5	0.276	1
59.95	69 TM	LY5	1	1.355	1,2	61.17	40 ZR	KB2	2	0.690	1,2,3
60.00	94 PU	LB1	2	0.678	1	61.22	29 CU	KB2	1	1.381	2,3
60.29	77 IR	LA2	1	1.362	1,2,3	61.27	29 CU	KB5	1	1.382	2
60.29	92 U	LB9	2	0.681	1,2	61.37	70 YB	LB9	1	1.384	1,2
60.39	56 BA	KB3	4	0.341	1,2	61.37	55 CS	KB2	4	0.346	1,2,3
60.39	67 HO	LY3	1	1.364	1,2,3	61.42	81 TL	LL	1	1.385	1,2,3
60.39	88 RA	LY2	2	0.682	1,2,3	61.52	70 YB	LB5	1	1.387	1,2
60.39	68 ER	LY1	1	1.364	1,2,3	61.67	88 RA	LY1	2	0.695	1,2,3
60.39	56 BA	KB1	4	0.341	1,2,3	61.71	76 OS	LA1	1	1.391	1,2,3
60.44	62 SM	KB1	5	0.273	1,2,3	61.71	70 YB	LB10	1	1.391	1,2
60.44	49 IN	KB1	3	0.455	1,2,3	61.76	40 ZR	KB5	2	0.696	1
60.44	49 IN	KB3	3	0.455	1,2	61.76	29 CU	KB1	1	1.392	1,2,3
60.59	52 TE	KA2	3	0.456	1,2,3	61.76	72 HF	LB4	1	1.392	1,2,3
60.68	67 HO	LY2	1	1.370	1,2,3	61.81	29 CU	KB3	1	1.393	1,2
60.68	96 CM	LB2	2	0.685	1	61.91	65 TR	KA1	5	0.279	1,2,3
60.68	71 LU	LB2	1	1.370	1,2,3	61.91	70 YB	LB7	1	1.395	1,2

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						61.91 TO 64.74					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
61.91	48 CD	KH2	3	0.465	1,2,3	63.30	66 DY	LY2	1	1.423	1,2,3
61.96	59 PR	KA2	4	0.349	1,2,3	63.35	71 LU	LB1	1	1.424	1,2,3
61.96	73 NP	LB1	2	0.698	1,2,3	63.40	48 CD	KB1	3	0.475	1,2,3
62.21	71 LU	LB3	1	1.401	1,2,3	63.40	51 SB	KA2	3	0.475	1,2,3
62.26	75 AM	LB2	2	0.701	1,3	63.45	42 MO	KA2	2	0.713	1,2,3
62.26	91 PA	LB9	2	0.701	1,2	63.49	65 TB	LY4	1	1.427	1,2
62.26	76 OS	LA2	1	1.402	1,2,3	63.54	48 CD	KB3	3	0.476	1,2
62.36	40 ZR	KB1	2	0.702	1,2,3	63.54	58 CE	KA1	4	0.357	1,2,3
62.36	40 ZR	KB3	2	0.702	1,2	63.64	60 ND	KB2	5	0.266	1,2,3
62.45	68 ER	LY5	1	1.406	1,2	63.74	87 FR	LY1	2	0.716	1,2,3
62.65	61 PM	KB1	5	0.282	1,2,3	63.79	75 RE	LA1	1	1.433	1,2,3
62.65	51 SB	KA1	3	0.470	1,2,3	63.84	88 RA	LY5	2	0.717	1,2
62.90	65 TB	KA2	5	0.283	1,2,3	63.89	30 ZN	KA1	1	1.435	1,2,3
62.90	61 PM	KB3	5	0.283	2	63.94	94 PU	LB2	2	0.718	1
62.90	70 YB	LB2	1	1.415	1,2,3	64.09	30 ZN	KA2	1	1.439	1,2,3
62.95	91 PA	LB10	2	0.708	1,2	64.14	92 U	LB1	2	0.720	1,2,3
62.95	55 CS	KB1	4	0.354	1,2,3	64.14	64 GD	KA1	5	0.288	1,2,3
63.00	67 HO	LY1	1	1.417	1,2,3	64.14	54 XE	KB2	4	0.360	1,2,3
63.00	66 DY	LY3	1	1.417	1,2,3	64.14	71 LU	LB4	1	1.440	1,2,3
63.05	42 MO	KA1	2	0.709	1,2,3	64.19	69 TM	LB10	1	1.441	1
63.10	71 LU	LB6	1	1.419	1,2,3	64.34	75 RE	LA2	1	1.444	1,2,3
63.15	55 CS	KB3	4	0.355	1,2	64.44	90 TH	LB9	2	0.723	1,2
63.15	92 U	LB3	2	0.710	1,2,3	64.54	58 CE	KA2	4	0.362	1,2,3
63.20	74 W	LN	1	1.421	1,2,3	64.74	92 U	LB5	2	0.726	1,2
63.25	80 HG	LL	1	1.422	1,2,3	64.74	70 YB	LB3	1	1.452	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						64.84 TO 67.16					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
64.84	39 Y	KB4	2	0.727	2	66.10	47 AG	KB5	3	0.493	1
65.04	39 Y	KB2	2	0.729	1,2,3	66.25	39 Y	KB1	2	0.741	1,2,3
65.14	90 TH	LB10	2	0.730	1,2	66.25	39 Y	KB3	2	0.741	1,2
65.14	79 AU	LL	1	1.460	1,2,3	66.35	91 PA	LB1	2	0.742	1,2,3
65.19	47 AG	KB2	3	0.487	1,2,3	66.35	57 LA	KA1	4	0.371	1,2,3
65.24	67 HO	LY5	1	1.462	1,2	66.40	59 PR	KB2	5	0.297	1,2,3
65.29	69 TM	LB2	1	1.463	1,2,3	66.40	64 GD	LY4	1	1.485	1,2
65.34	91 PA	LB3	2	0.732	1,2,3	66.40	68 ER	LB9	1	1.485	1,2
65.39	64 GD	KA2	5	0.293	1,2,3	66.40	50 SN	KA2	3	0.495	1,2,3
65.39	60 ND	KB1	5	0.293	1,2,3	66.50	74 W	LA2	1	1.487	1,2,3
65.44	70 YB	LB6	1	1.466	1,2,3	66.60	28 NI	KB5	1	1.489	1,2
65.54	39 Y	KB5	2	0.734	1	66.60	28 NI	KB2	1	1.489	1,2,3
65.64	60 ND	KB3	5	0.294	1,2	66.65	91 PA	LB5	2	0.745	1,2
65.69	73 TA	LN	1	1.471	1,2,3	66.70	47 AG	KB1	3	0.497	1,2,3
65.69	65 TB	LY3	1	1.471	1,2,3	66.70	70 YB	LB4	1	1.491	1,2,3
65.74	92 U	LB7	2	0.736	1,2	66.75	41 NB	KA1	2	0.746	1,2,3
65.74	93 NP	LB2	2	0.736	1,2,3	66.86	68 ER	LB7	1	1.494	1,2
65.74	54 XE	KB1	4	0.368	1,2,3	66.86	47 AG	KB3	3	0.498	1,2
65.80	66 DY	LY1	1	1.473	1,2,3	66.86	68 ER	LB10	1	1.494	1,2
65.80	50 SN	KA1	3	0.491	1,2,3	66.91	63 EU	KA1	5	0.299	1,2,3
65.95	70 YB	LB1	1	1.476	1,2,3	66.96	92 U	LB4	2	0.748	1,2,3
65.95	74 W	LA1	1	1.476	1,2,3	67.11	78 PT	LL	1	1.499	1,2,3
66.00	65 TB	LY2	1	1.477	1,2,3	67.16	41 NB	KA2	2	0.750	1,2,3
66.05	86 RN	LY1	2	0.739	1	67.16	28 NI	KB1	1	1.500	1,2,3
66.05	71 LU	LN	1	1.478	1,2	67.16	53 I	KB2	4	0.375	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						67.16 TO 67.41					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
67.16	57 LA	KA2	4	0.375	1,2,3						
67.41	69 TM	LB3	1	1.505	1,2,3						

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						67.67 TO 70.44					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
67.67	90 TH	LB3	2	0.755	1,2,3	69.10	88 RA	LB9	2	0.769	1,2
67.67	91 PA	LB7	2	0.755	1,2	69.20	53 I	KB3	4	0.385	1,2
67.67	92 U	LB2	2	0.755	1,2,3	69.20	91 PA	LB4	2	0.770	1,2,3
67.87	68 ER	LB2	1	1.514	1,2,3	69.20	58 CE	KB2	5	0.308	1,2,3
67.92	63 EU	KA2	5	0.303	1,2,3	69.20	56 BA	KA1	4	0.385	1,2,3
67.92	69 TM	LB6	1	1.515	1,2,3	69.25	77 IR	LL	1	1.541	1,2,3
68.07	66 DY	LY5	1	1.518	1,2	69.25	29 CU	KA1	1	1.541	1,2,3
68.18	59 PR	KB1	5	0.304	1,2,3	69.30	38 SR	KB2	2	0.771	1,2,3
68.28	83 BI	LY4	2	0.761	1,2	69.41	69 TM	LB4	1	1.544	1,2,3
68.28	73 TA	LA1	1	1.522	1,2,3	69.41	63 EU	LY4	1	1.544	1,2
68.33	72 HF	LN	1	1.523	1,2,3	69.41	29 CU	KA2	1	1.544	1,2,3
68.43	59 PR	KB3	5	0.305	1,2	69.46	98 CF	LY1	3	0.515	1
68.48	85 AT	LY1	2	0.763	1	69.46	62 SM	KA1	5	0.309	1,2,3
68.59	84 PO	LY3	2	0.764	1,2,3	69.61	91 PA	LB2	2	0.774	1,2,3
68.59	84 PO	LY6	2	0.764	1,2	69.61	90 TH	LB7	2	0.774	1,2
68.64	64 GD	LY3	1	1.529	1,2,3	69.66	67 HO	LB10	1	1.549	1
68.69	65 TB	LY1	1	1.530	1,2,3	69.71	88 RA	LB10	2	0.775	1,2
68.69	90 TH	LB1	2	0.765	1,2,3	69.71	38 SR	KB5	2	0.775	1
68.69	90 TH	LB5	2	0.765	1,2	69.77	49 IN	KA2	3	0.517	1,2,3
68.69	46 PD	KB2	3	0.510	1,2,3	69.77	46 PD	KB5	3	0.517	1
68.69	69 TM	LB1	1	1.530	1,2,3	70.23	56 BA	KA2	4	0.390	1,2,3
68.84	73 TA	LA2	1	1.533	1,2,3	70.28	68 ER	LB3	1	1.561	1,2,3
68.89	64 GD	LY2	1	1.534	1,2,3	70.38	46 PD	KB3	3	0.521	1,2
68.99	53 I	KB1	4	0.384	1,2,3	70.38	46 PD	KB1	3	0.521	1,2,3
68.99	49 IN	KA1	3	0.512	1,2,3	70.44	52 TE	KB2	4	0.391	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						70.54 TO 73.31					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
70.54	38 SR	KB1	2	0.783	1,2,3	71.84	63 EU	LY3	1	1.591	1,2,3
70.54	38 SR	KB3	2	0.783	1,2	71.89	64 GD	LY1	1	1.592	1,2,3
70.59	67 HO	LB2	1	1.567	1,2,3	71.89	83 BI	LY2	2	0.795	1,2,3
70.59	68 ER	LB6	1	1.567	1,2,3	72.15	63 EU	LY2	1	1.597	1,2,3
70.70	72 HF	LA1	1	1.569	1,2,3	72.26	66 DY	LB7	1	1.599	1,2
70.75	62 SM	KA2	5	0.314	1,2,3	72.31	55 CS	KA1	4	0.400	1,2,3
70.85	40 ZR	KA1	2	0.786	1,2,3	72.31	52 TE	KB1	4	0.400	1,2,3
70.85	82 PB	LY4	2	0.786	1	72.31	66 DY	LB9	1	1.600	1
70.95	84 PO	LY1	2	0.787	1,2,3	72.31	57 LA	KB2	5	0.320	1,2,3
71.06	92 U	LB6	2	0.788	1,2,3	72.36	68 ER	LB4	1	1.601	1,2,3
71.11	65 TB	LB5	1	1.577	2	72.52	52 TE	KB3	4	0.401	1,2
71.11	65 TB	LY5	1	1.577	1	72.57	45 RH	KB2	3	0.535	1,2,3
71.16	89 AC	LB1	2	0.789	1	72.57	61 PM	KA1	5	0.321	1,2,3
71.16	83 BI	LY3	2	0.789	1,2,3	72.57	48 CD	KA1	3	0.535	1,2,3
71.27	40 ZR	KA2	2	0.790	1,2,3	72.62	62 SM	LY4	1	1.606	1,2
71.27	58 CE	KB3	5	0.316	1,2	72.62	88 RA	LB3	2	0.803	1,2,3
71.27	58 CE	KB1	5	0.316	1,2,3	72.68	66 DY	LB10	1	1.607	1
71.27	83 BI	LY6	2	0.790	1,2	72.73	98 CF	LA2	2	0.804	1
71.27	72 HF	LA2	1	1.580	1,2,3	72.78	27 CO	KB5	1	1.609	1,2
71.47	98 CF	LA1	2	0.792	1	72.83	92 U	LN	2	0.805	1,2,3
71.53	76 OS	LL	1	1.585	1,2,3	72.94	88 RA	LB5	2	0.806	1,2
71.58	90 TH	LB4	2	0.793	1,2,3	73.15	91 PA	LB6	2	0.808	1,2,3
71.63	68 ER	LB1	1	1.587	1,2,3	73.20	48 CD	KA2	3	0.539	1,2,3
71.68	90 TH	LB2	2	0.794	1,2,3	73.31	67 HO	LB3	1	1.619	1,2,3
71.79	97 BK	LY1	3	0.530	1	73.31	71 LU	LA1	1	1.619	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS							73.36 TO 75.91						
ANGLE	ELEM	LINE	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF	
73.36	55 CS	KA2	4	0.405	1,2,3		74.52	82 PB	LY2	2	0.821	1,2,3	
73.36	97 BK	LA1	2	0.810	1		74.63	97 BK	LA2	2	0.822	1	
73.41	27 CO	KB1	1	1.621	1,2,3		74.63	37 RB	KB5	2	0.822	1	
73.46	67 HO	LB6	1	1.622	1,2,3		74.68	57 LA	KB3	5	0.329	1,2	
73.52	45 RH	KB5	3	0.541	1		74.79	67 HO	LB1	1	1.647	1,2,3	
73.52	66 DY	LB2	1	1.623	1,2,3		75.21	62 SM	LY3	1	1.655	1,2,3	
73.57	81 TL	LY4	2	0.812	1,2		75.27	90 TH	LB6	2	0.828	1,2,3	
73.62	61 PM	KA2	5	0.325	1,2,3		75.27	51 SB	KB5	4	0.414	1	
73.68	83 BI	LY1	2	0.813	1,2,3		75.38	37 RB	KB1	2	0.829	1,2,3	
73.78	88 RA	LB1	2	0.814	1,2,3		75.38	37 RB	KB3	2	0.829	1,2	
73.78	89 AC	LB2	2	0.814	1		75.38	96 CM	LA1	2	0.829	1	
73.89	57 LA	KB5	5	0.326	1		75.38	39 Y	KA1	2	0.829	1,2,3	
73.89	71 LU	LA2	1	1.630	1,2,3		75.38	28 NI	KA1	1	1.658	1,2,3	
73.89	75 RE	LL	1	1.630	1,2,3		75.38	91 PA	LN	2	0.829	1,2,3	
73.89	82 PB	LY3	2	0.815	1,2,3		75.38	63 EU	LY1	1	1.658	1,2,3	
73.99	37 RB	KB2	2	0.816	1,2,3		75.43	67 HO	LB4	1	1.659	1,2,3	
73.99	51 SB	KB2	4	0.408	1,2,3		75.43	65 TB	LB7	1	1.659	1,2	
73.99	88 RA	LB7	2	0.816	1,2		75.43	62 SM	LY2	1	1.659	1,2,3	
74.10	82 PB	LY6	2	0.817	1,2		75.48	60 ND	KA1	5	0.332	1,2,3	
74.20	70 YB	LN	1	1.636	1,2,3		75.59	28 NI	KA2	1	1.662	1,2,3	
74.31	45 RH	KB1	3	0.546	1,2,3		75.70	54 XE	KA1	4	0.416	1,2,3	
74.31	96 CM	LY1	3	0.546	1		75.75	56 BA	KB2	5	0.333	1,2,3	
74.31	45 RH	KB3	3	0.546	1,2		75.80	39 Y	KA2	2	0.833	1,2,3	
74.42	57 LA	KB1	5	0.328	1,2,3		75.86	65 TB	LB10	1	1.667	1,2	
74.47	64 GD	LY5	1	1.641	1		75.91	51 SB	KB1	4	0.417	1,2,3	

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						76.02 TO 79.38					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
76.02	88 RA	LB2	2	0.835	1,2,3	77.42	81 TL	LY2	2	0.848	1,2,3
76.13	51 SB	KB3	4	0.418	1,2	77.85	44 RU	KB5	3	0.568	1
76.13	70 RA	LA1	1	1.672	1,2,3	77.85	50 SN	KB2	4	0.426	1,2,3
76.39	47 AG	KA1	3	0.559	1,2,3	77.91	56 BA	KB3	5	0.341	1,2
76.45	74 W	LL	1	1.678	1,2,3	77.91	56 BA	KB1	5	0.341	1,2,3
76.45	80 HG	LY4	2	0.839	1,2	78.07	63 EU	LY5	1	1.708	1,2
76.45	83 BI	LY5	2	0.839	1,2	78.07	90 TH	LN	2	0.854	1,2,3
76.55	54 KE	KA2	4	0.420	1,2,3	78.18	66 DY	LB1	1	1.710	1,2,3
76.55	87 FR	LB1	2	0.840	1,2,3	78.51	44 RU	KB1	3	0.572	1,2,3
76.55	60 ND	KA2	5	0.336	1,2,3	78.51	87 FR	LB2	2	0.858	1,2,3
76.55	82 PB	LY1	2	0.840	1,2,3	78.67	44 RU	KB3	3	0.573	1,2
76.61	66 DY	LB3	1	1.681	1,2,3	78.72	59 PR	KA1	5	0.344	1,2,3
76.61	66 DY	LB6	1	1.681	1,2,3	78.72	95 AM	LA2	2	0.860	1,3
76.66	96 SM	LA2	2	0.841	1	78.72	66 DY	LB4	1	1.720	1,2,3
76.66	65 TB	LB2	1	1.682	1,2,3	78.89	64 GD	LB7	1	1.723	1,2
76.66	88 RA	LB4	2	0.841	1,2,3	78.94	64 GD	LB2	1	1.724	1
76.66	81 TL	LY3	2	0.841	1,2,3	79.05	69 TM	LA1	1	1.726	1,2,3
76.72	70 YB	LA2	1	1.683	1,2,3	79.11	62 SM	LY1	1	1.727	1,2,3
76.88	44 RU	KB2	3	0.562	1,2,3	79.16	50 SN	KB5	4	0.432	1
76.88	95 AM	LY1	3	0.562	1,3	79.16	73 TA	LL	1	1.728	1,2,3
76.99	81 TL	LY6	2	0.844	1,2	79.27	55 CS	KB2	5	0.346	1,2,3
77.09	56 BA	KB5	5	0.338	1	79.33	64 GD	LB10	1	1.731	1,2
77.20	47 AG	KA2	3	0.564	1,2,3	79.38	53 I	KA1	4	0.433	1,2,3
77.42	95 AM	LA1	2	0.848	1,3	79.30	86 RN	LB1	2	0.866	1
77.42	69 TM	LN	1	1.696	1,2,3	79.38	36 KR	KB4	2	0.866	2

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						79.38 TO 82.66					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
79.38	82 PB	LY5	2	0.866	1,2	80.82	38 SR	KA2	2	0.879	1,2,3
79.38	36 KR	KB2	2	0.866	1,2,3	80.82	36 KR	KB3	2	0.879	1,2
79.60	94 PU	LA1	2	0.868	1	80.93	94 PU	LA2	2	0.880	1
79.60	81 TL	LY1	2	0.868	1,2,3	81.04	86 RN	LB2	2	0.881	1
79.66	69 TM	LA2	1	1.737	1,2,3	81.48	43 TC	KB4	3	0.590	1
79.66	94 PU	LY1	3	0.579	1	81.48	43 TC	KB2	3	0.590	1
79.71	80 HG	LY3	2	0.869	1,2,3	81.48	46 PD	KA2	3	0.590	1,2,3
79.82	50 SN	KB1	4	0.435	1,2,3	81.48	55 CS	KB1	5	0.354	1,2,3
79.88	65 TB	LB6	1	1.741	1,2,3	81.76	55 CS	KB3	5	0.355	1,2
79.93	88 RA	LB6	2	0.871	1,2,3	81.82	65 TR	LB1	1	1.776	1,2,3
79.93	36 KR	KB5	2	0.871	1,2	81.93	93 NP	LA1	2	0.889	1,2,3
80.04	60 ND	LY4	1	1.744	1,2	81.99	62 SM	LB5	1	1.779	2
80.04	50 SN	KB3	4	0.436	1,2	81.99	62 SM	LY5	1	1.779	1
80.04	26 FE	KB5	1	1.744	1,2	82.04	49 IN	KB2	4	0.445	1,2,3
80.10	64 GD	LB2	1	1.745	1,2,3	82.10	72 HF	LL	1	1.781	1,2,3
80.10	59 PR	KA2	5	0.349	1,2,3	82.15	91 PA	LY4	3	0.594	1,2
80.15	80 HG	LY6	2	0.873	1,2	82.27	68 ER	LA1	1	1.784	1,2,3
80.15	65 TB	LB3	1	1.746	1,2,3	82.32	65 TR	LB4	1	1.785	1,2,3
80.37	80 HG	LY2	2	0.875	1,2,3	82.32	92 U	LY6	3	0.595	1,2
80.37	38 SR	KA1	2	0.875	1,2,3	82.32	58 CE	KA1	5	0.357	1,2,3
80.48	53 I	KA2	4	0.438	1,2,3	82.49	63 EU	LB7	1	1.788	1,2
80.65	46 PD	KA1	3	0.585	1,2,3	82.49	85 AT	LB1	2	0.894	1
80.71	36 KR	KB1	2	0.878	1,2,3	82.55	27 CO	KA1	1	1.789	1,2,3
80.71	68 ER	LN	1	1.756	1,2,3	82.60	81 TL	LY5	2	0.895	1,2
80.76	26 FE	KB1	1	1.757	1,2,3	82.66	93 NP	LY1	3	0.597	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						82.72 TO 86.02					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
82.72	63 EU	LB2	1	1.792	1,2	33.85	63 EU	LB2	1	1.812	1,2,3
82.77	27 DO	KA2	1	1.793	1,2,3	33.96	88 RA	LN	2	0.907	1,2,3
82.83	92 U	LY3	3	0.598	1,2,3	34.02	64 GD	LB3	1	1.815	1,2,3
82.83	80 HG	LY1	2	0.897	1,2,3	34.02	92 U	LY2	3	0.605	1,2,3
82.83	78 PT	LY4	2	0.897	1,2	34.07	61 PM	LY1	1	1.816	1
82.94	68 ER	LA2	1	1.796	1,2,3	34.19	84 PO	LB3	2	0.909	1,2,3
82.94	83 BI	LB9	2	0.898	1,2	34.25	59 PR	LY4	1	1.819	1,2
82.94	60 ND	LY3	1	1.796	1,2,3	34.30	49 IN	KB3	4	0.455	1,2
82.94	79 AU	LY3	2	0.898	1,2,3	34.30	49 IN	KB1	4	0.455	1,2,3
83.05	84 PO	LB5	2	0.899	1,2	34.42	92 U	LA1	2	0.911	1,2,3
83.17	63 EU	LB10	1	1.800	1,2	34.53	52 TE	KA2	4	0.456	1,2,3
83.17	54 XE	KB2	5	0.360	1,2,3	34.64	67 HO	LN	1	1.826	1,2,3
83.22	60 ND	LY2	1	1.801	1,2,3	35.05	90 TH	LY4	3	0.611	1,2
83.28	93 NP	LA2	2	0.901	1	35.22	71 LU	LL	1	1.836	1,2,3
83.34	43 TC	KB3	3	0.601	1,2	35.39	45 RH	KA1	3	0.613	1,2,3
83.39	49 IN	KB5	4	0.451	1	35.39	91 PA	LY6	3	0.613	1,2
83.39	52 TE	KA1	4	0.451	1,2,3	35.45	54 XE	KB1	5	0.368	1,2,3
83.51	79 AU	LY6	2	0.903	1,2	35.56	35 BR	KB2	2	0.921	1,2,3
83.51	43 TC	KB1	3	0.602	1,2,3	35.68	84 PO	LB1	2	0.922	1,2,3
83.56	64 GD	LB6	1	1.807	1,2,3	35.68	92 U	LA2	2	0.922	1,2,3
83.62	79 AU	LY2	2	0.904	1,2,3	35.74	92 U	LY1	3	0.615	1,2,3
83.68	98 CF	LB1	3	0.603	1	35.74	67 HO	LA1	1	1.845	1,2,3
83.73	59 CE	KA2	5	0.362	1,2,3	35.79	64 GD	LB1	1	1.846	1,2,3
83.73	85 AT	LB2	2	0.905	1	35.91	80 HG	LY5	2	0.924	1,2
83.73	83 BI	LB10	2	0.905	1,2	36.02	35 BR	KB5	2	0.925	1,2

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS							86.08 TO 88.95						
ANGLE	ELEM	LINE	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF	
86.08	91 PA	LY3	3	0.617	1,2,3		87.07	82 PB	LB10	2	0.934	1,2	
86.14	37 RB	KA1	2	0.926	1,2,3		87.13	62 SM	LB10	1	1.869	1,2	
86.14	83 BI	LG5	2	0.926	1,2		87.19	83 BI	LB7	2	0.935	1,2	
86.20	64 GD	LB4	1	1.853	1,2,3		87.30	91 PA	LY2	3	0.624	1,2,3	
86.26	77 IR	LY4	2	0.927	1,2		87.42	59 PR	LY3	1	1.874	1,2,3	
86.26	79 AU	LY1	2	0.927	1,2,3		87.42	63 EU	LB6	1	1.874	1,2,3	
86.26	82 PB	LB9	2	0.927	1,2		87.48	53 I	KB2	5	0.375	1,2,3	
86.26	45 RH	KA2	3	0.618	1,2,3		87.48	57 LA	KA2	5	0.375	1,2,3	
86.31	65 ND	LY6	1	1.855	2		87.65	60 ND	LY1	1	1.878	1,2,3	
86.31	57 LA	KA1	5	0.371	1,2,3		87.65	83 BI	LB3	2	0.939	1,2,3	
86.37	78 PT	LY3	2	0.928	1,2,3		87.71	59 PR	LY2	1	1.879	1,2,3	
86.37	67 HO	LA2	1	1.856	1,2,3		87.77	51 SB	KA1	4	0.470	1,2,3	
86.37	62 SM	LB7	1	1.856	1,2		87.83	42 MO	KB5	3	0.627	1	
86.49	84 PO	LB2	2	0.929	1,2,3		87.89	62 SM	LB2	1	1.882	1,2,3	
86.60	37 RB	KA2	2	0.930	1,2,3		88.18	63 EU	LB3	1	1.887	1,2,3	
86.60	48 CD	KB2	4	0.465	1,2,3		88.36	91 PA	LA2	2	0.945	1,2,3	
86.60	42 MO	KB4	3	0.620	2		88.59	84 PO	LB4	2	0.947	1,2,3	
86.66	62 SM	LB9	1	1.861	1,2		88.59	70 YB	LL	1	1.894	1,2,3	
86.78	97 BK	LB1	3	0.621	1		88.71	42 MO	KB1	3	0.632	1,2,3	
86.78	42 MO	KB2	3	0.621	1,2,3		88.71	90 TH	LY6	3	0.632	1,2	
86.95	35 BR	KB3	2	0.933	1,2		88.77	66 DY	LN	1	1.897	1,2,3	
86.95	35 BR	KB1	2	0.933	1,2,3		88.77	25 MN	KB5	1	1.897	1,2	
86.95	91 PA	LA1	2	0.933	1,2,3		88.89	42 MO	KB3	3	0.633	1,2	
87.07	78 PT	LY2	2	0.934	1,2,3		88.89	58 CE	LY4	1	1.899	1,2	
87.07	78 PT	LY6	2	0.934	1,2		88.95	51 SB	KA2	4	0.475	1,2,3	

TOFAZ CRYSTAL, D# 1.356 ANGSTROMS							88.95 TO 89.96						
ANGLE	ELEM	LINE	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF	
88.95	4B	CD	KB1	4	0.475	1,2,3							
89.07	91	PA	LY1	3	0.634	1,2,3							
89.19	4B	CD	KB3	4	0.476	1,2							
89.19	83	BI	LB1	2	0.952	1,2,3							
89.24	92	U	LY5	3	0.635	1,2							
89.30	32	PB	LB5	2	0.953	1,2							
89.42	90	TH	LY3	3	0.636	1,2,3							
89.48	65	DY	LA1	1	1.909	1,2,3							
89.54	25	MN	KB1	1	1.910	1,2,3							
89.54	83	BI	LB2	2	0.955	1,2,3							
89.66	79	AU	LY5	2	0.956	1,2							
89.66	90	TH	LA1	2	0.956	1,2,3							
89.78	81	TL	LB9	2	0.957	1,2							
89.90	78	PT	LY1	2	0.958	1,2,3							
89.96	95	CM	LB1	3	0.639	1							

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS							90.02 TO 93.42						
ANGLE	ELEM	LINE	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF	
90.02	77 IR	LY3	2	0.959	1,2,3		92.19	83 BI	LB4	2	0.977	1,2,3	
90.02	76 OS	LY4	2	0.959	1,2		92.25	58 CE	LY3	1	1.955	1,2,3	
90.14	53 I	KB1	5	0.384	1,2,3		92.25	69 TM	LL	1	1.955	1,2,3	
90.14	66 DY	LA2	1	1.920	1,2,3		92.25	52 TE	KB2	5	0.391	1,2,3	
90.14	63 EU	LB1	1	1.920	1,2,3		92.38	61 PM	LB2	1	1.957	1	
90.38	82 PB	LB7	2	0.962	1,2		92.50	90 TH	LY1	3	0.653	1,2,3	
90.44	53 I	KB3	5	0.385	1,2		92.50	98 CF	LB2	3	0.653	1	
90.44	56 BA	KA1	5	0.385	1,2,3		92.56	58 CE	LY2	1	1.960	1,2,3	
90.50	63 EU	LB4	1	1.926	1,2,3		92.56	34 SE	KB2	2	0.980	1,2,3	
90.50	90 TH	LY2	3	0.642	1,2,3		92.56	36 KR	KA1	2	0.980	1,2,3	
90.62	81 TL	LB10	2	0.964	1,2		92.56	89 AC	LA1	2	0.980	1	
90.68	44 RU	KA1	3	0.643	1,2,3		92.62	59 PR	LY1	1	1.961	1,2,3	
90.74	77 IR	LY2	2	0.965	1,2,3		92.68	81 TL	LB5	2	0.981	1,2	
90.98	84 PO	LB6	2	0.967	1,2,3		92.68	41 NB	KB2	3	0.654	1,2,3	
90.98	77 IR	LY6	2	0.967	1,2		92.68	62 SM	LB3	1	1.962	1,2,3	
91.04	60 ND	LY5	1	1.935	1,2		92.80	82 PB	LB1	2	0.982	1,2,3	
91.10	26 FE	KA1	1	1.936	1,2,3		92.80	50 SN	KA1	4	0.491	1,2,3	
91.10	90 TH	LA2	2	0.968	1,2,3		92.86	91 PA	LY5	3	0.655	1,2	
91.22	82 PB	LB3	2	0.969	1,2,3		92.92	82 PB	LB2	2	0.983	1,2,3	
91.34	26 FE	KA2	1	1.940	1,2,3		93.05	34 SE	KB5	2	0.984	1,2	
91.40	44 RU	KA2	3	0.647	1,2,3		93.05	36 KR	KA2	2	0.984	1,2,3	
91.70	62 SM	LB6	1	1.946	1,2,3		93.29	47 AG	KB5	4	0.493	1	
91.77	98 RA	LY4	3	0.649	1,2		93.29	80 HG	LB9	2	0.986	1,2	
91.83	47 AG	KB2	4	0.487	1,2,3		93.36	65 TB	LN	1	1.973	1	
91.95	56 BA	KA2	5	0.390	1,2,3		93.42	95 AM	LB1	3	0.658	1,3	

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						93.48 TO 97.56					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
93.48	65 TB	LA1	1	1.975	1,2,3	95.16	81 TL	LB3	2	1.001	1,2,3
93.54	78 PT	LY5	2	0.988	1,2	95.34	52 TE	KB3	5	0.401	1,2
93.79	50 SN	KA2	4	0.495	1,2,3	95.47	97 BK	LB2	3	0.669	1
93.79	81 TL	LB7	2	0.990	1,2	95.60	60 ND	LB7	1	2.009	1,2
93.79	41 NB	KB5	3	0.660	1	95.66	88 RA	LA1	2	1.005	1,2,3
93.91	77 IR	LY1	2	0.991	1,2,3	95.91	82 PB	LB4	2	1.007	1,2,3
93.97	57 LA	LY4	1	1.903	1,2	96.04	60 ND	LB9	1	2.016	1,2
94.03	34 SE	KB1	2	0.992	1,2,3	96.23	68 ER	LL	1	2.019	1,2,3
94.03	76 OS	LY3	2	0.992	1,2,3	96.23	43 TC	KA1	3	0.673	2,3
94.03	75 RE	LY4	2	0.992	1,2	96.23	88 RA	LY6	3	0.673	1,2
94.03	89 AC	LA2	2	0.992	1	96.29	59 PR	LY5	1	2.020	1,2
94.16	83 BI	LB6	2	0.993	1,2,3	96.29	80 HG	LB5	2	1.010	1,2
94.16	34 SE	KB3	2	0.993	1,2	96.29	81 TL	LB2	2	1.010	1,2,3
94.16	65 TB	LA2	1	1.986	1,2,3	96.42	89 AC	LY1	3	0.674	1
94.28	47 AG	KB1	4	0.497	1,2,3	96.48	60 ND	LB10	1	2.023	1,2
94.53	47 AG	KB3	4	0.498	1,2	96.61	90 TH	LY5	3	0.675	1,2
94.53	80 HG	LB10	2	0.996	1,2	96.61	55 CS	KA2	5	0.405	1,2,3
94.78	76 OS	LY2	2	0.998	1,2,3	96.61	88 RA	LY3	3	0.675	1,2,3
94.91	41 NB	KB3	3	0.666	1,2	96.80	43 TC	KA2	3	0.675	2,3
94.91	41 NB	KB1	3	0.666	1,2,3	96.93	81 TL	LB1	2	1.015	1,2,3
94.91	62 SM	LB1	1	1.998	1,2,3	97.05	88 RA	LA2	2	1.016	1,2,3
95.03	62 SM	LB4	1	2.000	1,2,3	97.18	94 PU	LB1	3	0.678	1
95.03	55 CS	KA1	5	0.400	1,2,3	97.31	60 ND	LB2	1	2.036	1,2,3
95.03	52 TE	KB1	5	0.400	1,2,3	97.44	80 HG	LB7	2	1.019	1,2
95.16	76 OS	LY6	2	1.001	1,2	97.56	51 SB	KB2	5	0.408	1,2,3

TOPAZ CRYSTAL, C# 1.356 ANGSTROMS						97.56 TO 101.09					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
97.56	46 PD	K82	4	0.510	1,2,3	99.51	40 ZR	K82	3	0.690	1,2,3
97.63	57 LA	LY3	1	2.041	1,2,3	99.51	51 SB	K85	5	0.414	1
97.69	82 PB	LB6	2	1.021	1,2,3	99.57	24 CR	K85	1	2.071	1,2
97.69	79 AU	LB9	2	1.021	1,2	99.77	75 RE	LY6	2	1.037	1,2
97.76	92 U	LB9	3	0.681	1,2	99.83	56 BA	LY4	1	2.075	1,2
97.82	77 IR	LY5	2	1.022	1,2	100.03	81 TL	LB4	2	1.039	1,2,3
97.95	88 RA	LY2	3	0.682	1,2,3	100.16	80 HG	LB2	2	1.040	1,2,3
97.95	57 LA	LY2	1	2.046	1,2,3	100.16	79 AU	LB5	2	1.040	1,2
97.95	64 GD	LA1	1	2.046	1,2,3	100.16	35 BR	KA1	2	1.040	1,2,3
98.08	49 IN	KA1	4	0.512	1,2,3	100.16	54 XE	KA1	5	0.416	1,2,3
98.08	58 CE	LY1	1	2.048	1,2,3	100.23	61 PM	LB1	1	2.081	1,2,3
98.14	64 GD	LN	1	2.049	1,2,3	100.43	46 PD	K83	4	0.521	1,2
98.21	76 OS	LY1	2	1.025	1,2,3	100.43	87 FR	LA2	2	1.042	1
98.34	75 RE	LY3	2	1.026	1,2,3	100.43	46 PD	K81	4	0.521	1,2,3
98.53	96 CM	LB2	3	0.685	1	100.49	24 CR	K81	1	2.085	1,2,3
98.60	74 W	LY4	2	1.028	1,2	100.49	88 RA	LY1	3	0.695	1,2,3
98.60	79 AU	LB10	2	1.028	1,2	100.49	24 CR	K83	1	2.085	1,2
98.66	64 GD	LA2	1	2.057	1,2,3	100.49	51 SB	K81	5	0.417	1,2,3
98.86	87 FR	LA1	2	1.030	1,2,3	100.56	67 HO	LL	1	2.086	1,2,3
98.86	98 CF	LY1	4	0.515	1	100.69	40 ZR	K85	3	0.696	1
98.92	92 U	LB10	3	0.687	1,2	100.69	35 BR	KA2	2	1.044	1,2,3
99.12	75 RE	LY2	2	1.032	1,2,3	100.82	33 AS	K82	2	1.045	1,2,3
99.38	49 IN	KA2	4	0.517	1,2,3	100.82	51 SB	K83	5	0.418	1,2
99.38	46 PD	K85	4	0.517	1	100.89	59 PR	LB7	1	2.091	1,2
99.38	80 HG	LB3	2	1.034	1,2,3	101.09	93 NP	LB1	3	0.698	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						101.36 TO 104.75					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
101.36	33 AS	KR5	2	1.049	1,2	103.11	74 W	LY3	2	1.062	1,2,3
101.36	80 HG	LB1	2	1.049	1,2,3	103.11	78 PT	LB10	2	1.062	1,2
101.49	79 AU	LB7	2	1.050	1,2	103.11	91 PA	LB10	3	0.708	1,2
101.49	54 XE	KA2	5	0.420	1,2,3	103.24	60 ND	LB3	1	2.125	1,2,3
101.49	81 TL	LB6	2	1.050	1,2,3	103.31	42 MO	KA1	3	0.709	1,2,3
101.49	59 PR	LB9	1	2.100	1,2	103.51	73 TA	LY4	2	1.065	1,2
101.62	25 MN	KA1	1	2.102	1,2,3	103.51	50 SN	KB2	5	0.426	1,2,3
101.69	95 AM	LB2	3	0.701	1,3	103.51	92 U	LB3	3	0.710	1,2,3
101.69	91 PA	LB9	3	0.701	1,2	103.58	63 EU	LN	1	2.131	1
101.76	60 ND	LB6	1	2.104	1,2,3	103.65	63 EU	LA2	1	2.132	1,2,3
101.89	40 ZR	KB3	3	0.702	1,2	103.79	92 U	LL	2	1.067	2,3
101.89	25 MN	KA2	1	2.106	1,2,3	103.79	56 BA	LY3	1	2.134	1,2,3
101.89	40 ZR	KB1	3	0.702	1,2,3	103.93	74 W	LY2	2	1.068	1,2,3
101.96	59 PR	LB10	1	2.107	1,2	103.93	79 AU	LB3	2	1.068	1,2,3
102.03	78 PT	LB9	2	1.054	1,2	104.06	86 RN	LA2	2	1.069	1
102.16	58 CE	LY5	1	2.110	1,2	104.06	56 BA	LY2	1	2.138	1,2,3
102.43	33 AS	KB1	2	1.057	1,2,3	104.13	42 MO	KA2	3	0.713	1,2,3
102.43	76 OS	LY5	2	1.057	1,2	104.20	79 AU	LB2	2	1.070	1,2,3
102.43	86 RN	LA1	2	1.057	1	104.20	48 CD	KA1	4	0.535	1,2,3
102.56	33 AS	KB3	2	1.058	1,2	104.20	45 RH	KB2	4	0.535	1,2,3
102.70	83 BI	LN	2	1.059	1,2,3	104.34	57 LA	LY1	1	2.142	1,2,3
102.77	59 PR	LB2	1	2.119	1,2,3	104.40	78 PT	LB5	2	1.072	1,2
102.83	97 BK	LY1	4	0.530	1	104.48	80 HG	LB4	2	1.072	1,2,3
102.90	63 EU	LA1	1	2.121	1,2,3	104.75	74 W	LY6	2	1.074	1,2
102.97	75 RE	LY1	2	1.061	1,2,3	104.75	87 FR	LY1	3	0.716	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						104.96 TO 109.15					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
104.96	88 RA	LY5	3	0.717	1,2	107.28	45 RH	KB1	4	0.546	1,2,3
105.17	94 PU	LB2	3	0.718	1	107.28	96 CM	LY1	4	0.546	1
105.31	48 CD	KA2	4	0.539	1,2,3	107.49	39 Y	KB2	3	0.729	1,2,3
105.45	66 DY	LL	1	2.158	1,2,3	107.57	75 RE	LY5	2	1.094	1,2
105.59	80 HG	LB6	2	1.000	1,2,3	107.57	58 CE	LB9	1	2.188	1,2
105.59	50 SN	KB5	5	0.432	1	107.71	90 TH	LB10	3	0.730	1,2
105.59	92 U	LB1	3	0.720	1,2,3	107.71	53 I	KA2	5	0.438	1,2,3
105.87	45 RH	KB5	4	0.541	1	107.71	59 PR	LB6	1	2.190	1,2,3
105.87	78 PT	LB7	2	1.082	1,2	108.00	85 AT	LA2	2	1.097	1
105.94	53 I	KA1	5	0.433	1,2,3	108.00	77 IR	LB10	2	1.097	1,2
106.08	60 ND	LB4	1	2.167	1,2,3	108.07	58 CE	LB10	1	2.195	1,2
106.08	60 ND	LB1	1	2.167	1,2,3	108.14	91 PA	LB3	3	0.732	1,2,3
106.15	79 AU	LB1	2	1.084	1,2,3	108.28	73 TA	LY3	2	1.099	1,2,3
106.22	90 TH	LB9	3	0.723	1,2	108.28	74 W	LY1	2	1.099	1,2,3
106.29	95 AT	LA1	2	1.085	1	108.36	62 SM	LA1	1	2.199	1,2,3
106.57	55 CS	LY4	1	2.174	1,2	108.57	39 Y	KB5	3	0.734	1
106.64	50 SN	KB1	5	0.435	1,2,3	108.72	78 PT	LB2	2	1.102	1,2,3
106.85	92 U	LB5	3	0.726	1,2	108.79	57 LA	LY5	1	2.205	1,2
107.00	58 CE	LB7	1	2.180	1,2	108.86	72 HF	LY4	2	1.103	1,2
107.00	50 SN	KB3	5	0.436	1,2	109.01	93 NP	LB2	3	0.736	1,2,3
107.00	77 IR	LB9	2	1.090	1,2	109.01	78 PT	LB3	2	1.104	1,2,3
107.07	39 Y	KB4	3	0.727	2	109.01	92 U	LB7	3	0.736	1,2
107.14	91 PA	LL	2	1.091	1,2,3	109.08	58 CE	LB2	1	2.209	1,2,3
107.28	45 RH	KB3	4	0.546	1,2	109.15	34 SE	KA1	2	1.105	1,2,3
107.28	82 PB	LN	2	1.092	1,2,3	109.15	62 SM	LA2	1	2.210	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						109.15 TO 112.28					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
109.15	73 TA	LY2	2	1.105	1,2,3	111.45	56 BA	LY1	1	2.241	1,2,3
109.30	77 IR	LB5	2	1.106	1,2	111.67	92 U	LB4	3	0.748	1,2,3
109.45	79 AU	LB4	2	1.107	1,2,3	111.97	95 AM	LY1	4	0.562	1,3
109.67	59 PR	LB3	1	2.217	1,2,3	111.97	44 RU	KB2	4	0.562	1,2,3
109.67	86 RN	LY1	3	0.739	1	112.13	41 NR	KA2	3	0.750	1,2,3
109.74	62 SM	LY	1	2.218	1,2,3	112.28	84 PD	LA2	2	1.126	1,2,3
109.74	34 SE	KA2	2	1.109	1,2,3	112.28	76 OS	LB9	2	1.126	1,2
110.03	79 AU	LB6	2	1.111	1,2,3						
110.11	39 Y	KB3	3	0.741	1,2						
110.11	39 Y	K31	3	0.741	1,2,3						
110.25	49 IN	KB2	5	0.445	1,2,3						
110.33	91 PA	LB1	3	0.742	1,2,3						
110.48	73 TA	LY6	2	1.114	1,2						
110.48	94 PD	LA1	2	1.114	1,2,3						
110.63	77 IR	LB7	2	1.115	1,2						
110.63	70 TH	LL	2	1.115	1,2,3						
110.85	55 CS	LY3	1	2.233	1,2,3						
110.92	65 TB	LL	1	2.234	1,2,3						
110.92	32 GE	KB2	2	1.117	1,2,3						
111.00	91 PA	LB5	3	0.745	1,2						
111.07	47 AG	K41	4	0.559	1,2,3						
111.15	55 CS	LY2	1	2.237	1,2,3						
111.22	32 GE	KB5	2	1.119	1,2						
111.22	41 NB	KA1	3	0.746	1,2,3						
111.37	78 PT	LB1	2	1.120	1,2,3						

TOPAZ CRYSTAL, DH 1.356 ANGSTROMS							112.50 TO 116.65					
ANGLE	ELEM	LINE	N	LAMBDA	REF		ANGLE	ELEM	LINE	N	LAMBDA	REF
112.50	49 IN	KB5	5	0.451	1		114.59	77 IR	LB3	2	1.141	1,2,3
112.50	59 PR	LB4	1	2.255	1,2,3		114.66	61 PM	LA1	1	2.283	1,2,3
112.50	52 TE	KA1	5	0.451	1,2,3		114.66	83 BI	LY4	3	0.761	1,2
112.58	47 AG	KA2	4	0.564	1,2,3		114.74	23 V	KB3	1	2.284	1,2
112.58	81 TL	LN	2	1.128	1,2,3		114.74	23 V	KB1	1	2.284	1,2,3
112.73	32 GF	KB1	2	1.129	1,2,3		114.74	78 PT	LB4	2	1.142	1,2,3
112.73	59 PR	LB1	1	2.258	1,2,3		114.90	71 LU	LY4	2	1.143	1
112.73	32 GE	KB3	2	1.129	1,2		115.06	72 HF	LY2	2	1.144	1,2,3
113.19	74 W	LY5	2	1.132	1,2		115.06	44 RU	KB1	4	0.572	1,2,3
113.27	90 TH	LB3	3	0.755	1,2,3		115.06	78 PT	LB6	2	1.144	1,2,3
113.27	91 PA	LB7	3	0.755	1,2		115.06	83 BI	LA1	2	1.144	1,2,3
113.27	92 U	LB2	3	0.755	1,2,3		115.14	85 AT	LY1	3	0.763	1
113.34	76 OS	LB10	2	1.133	1,2		115.21	24 CR	KA1	1	2.290	1,2,3
113.58	23 V	KB5	1	2.269	1,2		115.21	57 LA	LB10	1	2.290	1,2
113.65	77 IR	LB2	2	1.135	1,2,3		115.37	84 PO	LY6	3	0.764	1,2
113.81	44 RU	KB5	4	0.568	1		115.37	84 PO	LY3	3	0.764	1,2,3
114.04	49 IN	KB1	5	0.455	1,2,3		115.37	44 RU	KB3	4	0.573	1,2
114.04	57 LA	LB7	1	2.275	1,2		115.37	61 PM	LA2	1	2.292	1
114.04	49 IN	KB3	5	0.455	1,2		115.53	24 CR	KA2	1	2.294	1,2,3
114.12	72 HF	LY3	2	1.138	1,2,3		115.61	90 TH	LB5	3	0.765	1,2
114.12	73 TA	LY1	2	1.138	1,2,3		115.61	90 TH	LB1	3	0.765	1,2,3
114.43	76 OS	LB5	2	1.140	1,2		115.85	76 OS	LB7	2	1.149	1,2
114.43	52 TE	KA2	5	0.456	1,2,3		116.25	57 LA	LB2	1	2.303	1,2,3
114.51	58 CE	LB6	1	2.281	1,2,3		116.57	88 RA	LB9	3	0.769	1,2
114.59	57 LA	LB9	1	2.282	1,2		116.65	56 BA	LY5	1	2.308	1,2

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						116.81 TO 122.00					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
116.81	72 HF	LY6	2	1.155	1,2	120.11	51 SB	KA1	5	0.470	1,2,3
116.81	91 PA	LD4	3	0.770	1,2,3	120.28	33 AS	KA1	2	1.176	1,2,3
116.81	83 BI	LA2	2	1.155	1,2,3	120.45	75 RE	LB5	2	1.177	1,2
116.89	58 CE	LB3	1	2.311	1,2,3	120.62	77 IR	LB6	2	1.178	1,2,3
116.97	64 CD	LL	1	2.312	1,2,3	120.62	58 CE	LB1	1	2.356	1,2,3
117.05	38 SR	KB2	3	0.771	1,2,3	120.79	82 PB	LY4	3	0.786	1
117.29	94 PU	LY1	4	0.579	1	120.79	71 LU	LY3	2	1.179	1,2,3
117.29	77 IR	LB1	2	1.158	1,2,3	120.79	40 ZR	KA1	3	0.786	1,2,3
117.78	91 PA	LB2	3	0.774	1,2,3	120.79	72 HF	LY1	2	1.179	1,2,3
117.78	95 TH	LB7	3	0.774	1,2	120.96	33 AS	KA2	2	1.180	1,2,3
118.03	88 RA	LB10	3	0.775	1,2	120.96	43 TC	KB2	4	0.590	1
118.03	48 CD	KB2	5	0.465	1,2,3	120.96	76 OS	LB3	2	1.180	1,2,3
118.03	38 SR	KB5	3	0.775	1	120.96	46 PD	KA2	4	0.590	1,2,3
118.28	80 HG	LN	2	1.164	1,2,3	120.96	43 TC	KB4	4	0.590	1
118.44	75 RE	LB9	2	1.165	1,2	120.96	77 IR	LB4	2	1.180	1,2,3
118.77	98 RA	LL	2	1.167	1,2,3	121.05	84 PO	LY1	3	0.787	1,2,3
119.27	76 OS	LB2	2	1.170	1,2,3	121.31	92 U	LB6	3	0.788	1,2,3
119.27	46 PD	KA1	4	0.585	1,2,3	121.57	89 AC	LB1	3	0.789	1
119.61	75 RE	LB10	2	1.172	1,2	121.57	83 BI	LY3	3	0.789	1,2,3
119.78	73 TA	LY5	2	1.173	1,2	121.83	83 BI	LY6	3	0.790	1,2
119.94	55 CS	LY1	1	2.348	1,2,3	121.83	71 LU	LY2	2	1.185	1,2,3
120.03	38 SR	KB1	3	0.783	1,2,3	121.83	40 ZR	KA2	3	0.790	1,2,3
120.03	38 SR	KB3	3	0.783	1,2	121.83	60 ND	LA1	1	2.370	1,2,3
120.03	58 CE	LB4	1	2.349	1,2,3	121.83	70 YB	LY4	2	1.185	1,2
120.11	82 PB	LA1	2	1.175	1,2,3	122.00	75 RE	LB7	2	1.186	1,2

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						122.00 TO 128.04					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
122.00	82 PB	LA2	2	1.186	1,2,3	125.22	74 W	LB9	2	1.204	1,2
122.26	51 SB	KA2	5	0.475	1,2,3	125.22	43 TC	KB1	4	0.602	1,2,3
122.26	48 CD	KB1	5	0.475	1,2,3	125.31	88 RA	LB3	3	0.803	1,2,3
122.35	91 PA	LY4	4	0.594	1,2	125.31	60 ND	LN	1	2.409	1,2,3
122.35	56 BA	LB9	1	2.376	1,2	125.41	57 LA	LB3	1	2.410	1,2,3
122.35	98 CF	LA1	3	0.792	1	125.59	98 CF	LB1	4	0.603	1
122.62	90 TH	LB4	3	0.793	1,2,3	125.59	98 CF	LA2	3	0.804	1
122.62	57 LA	LB6	1	2.379	1,2,3	125.78	81 TL	LA1	2	1.207	1,2,3
122.70	60 ND	LA2	1	2.380	1,3	125.78	75 RE	LB2	2	1.207	1,2,3
122.70	48 CD	KB3	5	0.476	1,2	125.87	92 U	LN	3	0.805	1,2,3
122.70	92 U	LY6	4	0.595	1,2	125.96	31 GA	KB1	2	1.208	1,2,3
122.88	90 TH	LB2	3	0.794	1,2,3	125.96	31 GA	KB3	2	1.208	1,2
123.32	56 BA	LB10	1	2.387	1,2	126.05	55 CS	LY5	1	2.417	1,2
123.41	93 NP	LY1	4	0.597	1,2,3	126.15	88 RA	LB5	3	0.806	1,2
123.41	83 BT	LY2	3	0.796	1,2,3	126.33	92 U	LY2	4	0.605	1,2,3
123.68	53 I	LY4	1	2.391	1,2	126.71	74 W	LB10	2	1.212	1,2
123.77	31 GA	KB2	2	1.196	1,2,3	126.71	91 PA	LB6	3	0.808	1,2,3
123.77	92 U	LY3	4	0.598	1,2,3	126.90	76 OS	LB6	2	1.213	1,2,3
123.95	76 OS	LB1	2	1.197	1,2,3	127.28	74 W	LB5	2	1.215	1,2
123.95	31 GA	KB5	2	1.197	1,2	127.28	72 HF	LY5	2	1.215	1,2
124.04	63 EU	LL	1	2.395	1,2,3	127.28	97 BK	LA1	3	0.810	1
124.13	71 LU	LY6	2	1.198	1,2	127.76	47 AG	KB2	5	0.487	1,2,3
124.86	56 BA	LB2	1	2.404	1,2,3	127.85	76 OS	LB4	2	1.218	1,2,3
124.86	43 TC	KB3	4	0.601	1,2	127.85	81 TL	LY4	3	0.812	1,2
125.04	79 AU	LN	2	1.203	1,2,3	128.04	81 TL	LA2	2	1.219	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						128.14 TO 132.99					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
128.14	83 BI	LY1	3	0.813	1,2,3	130.71	47 AG	KB5	5	0.493	1
128.24	75 RE	LB3	2	1.220	1,2,3	130.81	97 BK	LA2	3	0.822	1
128.43	89 AC	LB2	3	0.814	1	130.81	37 RB	KB5	3	0.822	1
128.43	88 RA	LB1	3	0.814	1,2,3	131.02	91 PA	LY3	4	0.617	1,2,3
128.63	90 TH	LY4	4	0.611	1,2	131.43	45 RH	KA2	4	0.618	1,2,3
128.63	70 YB	LY3	2	1.222	1,2,3	131.53	59 PR	LA2	1	2.473	1,2,3
128.63	71 LU	LY1	2	1.222	1,2,3	131.74	50 SN	KA2	5	0.495	1,2,3
128.72	82 PB	LY3	3	0.815	1,2,3	132.05	55 CS	LB9	1	2.478	1,2
128.92	53 I	LY3	1	2.447	1,2	132.05	75 RE	LB1	2	1.239	1,2,3
128.92	53 I	LY2	1	2.447	1,2,3	132.26	42 MO	KB4	4	0.620	2
129.02	98 RA	LB7	3	0.816	1,2	132.47	80 HG	LA1	2	1.241	1,2,3
129.02	37 RB	KB2	3	0.816	1,2,3	132.47	56 BA	LB6	1	2.482	1,2,3
129.02	74 W	LB7	2	1.224	1,2	132.47	62 SM	LL	1	2.482	1,2,3
129.12	57 LA	LB4	1	2.449	1,2,3	132.68	97 BK	LB1	4	0.621	1
129.31	82 PB	LY6	3	0.817	1,2	132.68	42 MO	KB2	4	0.621	1,2,3
129.41	91 PA	LY6	4	0.613	1,2	132.68	90 TH	LB6	3	0.828	1,2,3
129.41	45 RH	KA1	4	0.613	1,2,3	132.78	47 AG	KB1	5	0.497	1,2,3
129.71	50 SN	KA1	5	0.491	1,2,3	132.78	55 CS	LB7	1	2.485	1,2
130.01	69 TM	LY4	2	1.229	1	132.89	70 YB	LY6	2	1.243	1,2
130.01	57 LA	LB1	1	2.458	1,2,3	132.89	78 PT	LN	2	1.243	1,2,3
130.01	70 YB	LY2	2	1.229	1,2,3	132.99	39 Y	KA1	3	0.829	1,2,3
130.21	92 U	LY1	4	0.615	1,2,3	132.99	91 PA	LN	3	0.829	1,2,3
130.41	54 XE	LY1	1	2.462	1	132.99	37 RB	KB1	3	0.829	1,2,3
130.51	59 PR	LA1	1	2.463	1,2,3	132.99	37 RB	KB3	3	0.829	1,2
130.51	82 PB	LY2	3	0.821	1,2,3	132.99	96 CM	LA1	3	0.829	1

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						133.31 TO 134.94					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
133.31	74 W	LB2	2	1.245	1,2,3						
133.31	47 AG	KB3	5	0.498	1,2						
133.53	55 CS	LB10	1	2.492	1,2						
133.53	73 TA	LB9	2	1.246	1,2						
133.96	91 PA	LY2	4	0.624	1,2,3						
134.17	22 TI	KB5	1	2.498	1,2						
134.28	39 Y	KA2	3	0.833	1,2,3						
134.61	75 RE	LB6	2	1.251	1,2,3						
134.72	23 V	KA1	1	2.503	1,2,3						
134.94	88 RA	LB2	3	0.835	1,2,3						

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						135.05 TO 142.49					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
135.05	80 HG	LA2	2	1.253	1,2,3	137.55	42 MO	KB1	4	0.632	1,2,3
135.16	23 V	KA2	1	2.507	1,2,3	138.01	81 TL	LY6	3	0.844	1,2
135.27	32 GE	KA1	2	1.254	1,2,3	138.01	42 MO	KB3	4	0.633	1,2
135.27	42 MO	KB5	4	0.627	1	138.49	69 TM	LY3	2	1.268	1,2,3
135.27	73 TA	LB10	2	1.254	1,2	138.49	91 PA	LY1	4	0.634	1,2,3
135.49	73 TA	LB5	2	1.255	1,2	138.49	70 YB	LY1	2	1.268	1,2,3
135.60	52 TE	LY4	1	2.511	1,2	138.97	92 U	LY5	4	0.635	1,2
135.60	55 CS	LB2	1	2.511	1,2,3	139.45	95 AM	LA1	3	0.848	1,3
135.72	59 PR	LN	1	2.512	1,2,3	139.45	90 TH	LY3	4	0.636	1,2,3
135.94	22 TI	KB3	1	2.514	1,2	139.45	81 TL	LY2	3	0.848	1,2,3
135.94	22 TI	KB1	1	2.514	1,2,3	139.94	69 TM	LY2	2	1.274	1,2,3
136.17	32 GE	KA2	2	1.258	1,2,3	140.19	46 PD	KB2	5	0.510	1,2,3
136.17	56 BA	LB3	1	2.516	1,2,3	140.44	79 AU	LA1	2	1.276	1,3
136.28	83 BI	LY5	3	0.839	1,2	140.44	68 ER	LY4	2	1.276	1,2
136.28	80 HG	LY4	3	0.839	1,2	140.82	56 BA	LB4	1	2.555	1,2,3
136.39	75 RE	LB4	2	1.259	1,2,3	140.94	96 CM	LB1	4	0.639	1
136.62	87 FR	LB1	3	0.840	1,2,3	141.45	49 IN	KA1	5	0.512	1,2,3
136.62	71 LU	LY5	2	1.260	1,2	141.58	58 CE	LA1	1	2.561	1,2,3
136.62	92 PB	LY1	3	0.840	1,2,3	141.71	90 TH	LN	3	0.854	1,2,3
136.97	81 TL	LY3	3	0.841	1,2,3	141.97	74 W	LB1	2	1.282	1,2,3
136.97	88 RA	LB4	3	0.841	1,2,3	142.36	56 BA	LB1	1	2.567	1,2,3
136.97	96 CM	LA2	3	0.841	1	142.36	52 TE	LY3	1	2.567	1,2
137.31	74 W	LB3	2	1.263	1,2,3	142.36	52 TE	LY2	1	2.567	1,3
137.55	73 TA	LB7	2	1.264	1,2	142.49	77 IR	LN	2	1.284	1,2,3
137.55	90 TH	LY6	4	0.632	1,2	142.49	73 TA	LB2	2	1.284	1,2,3

TOPAZ CRYSTAL, D# 1.356 ANGSTROMS						142.49 TO 149.90					
ANGLE	ELEM	LINE	N	LAMBDA	REF	ANGLE	ELEM	LINE	N	LAMBDA	REF
142.49	30 ZN	K92	2	1.284	1,2,3	147.55	81 TL	LY1	3	0.868	1,2,3
142.49	90 TH	LY2	4	0.642	1,2,3	147.55	74 W	LB4	2	1.302	1,2,3
142.75	55 CE	LA2	1	2.570	1,2,3	147.55	94 PU	LA1	3	0.868	1
142.75	30 ZN	K85	2	1.285	1,2	147.70	46 PD	KB1	5	0.521	1,2,3
143.02	44 RU	KA1	4	0.643	1,2,3	147.70	46 PD	KB3	5	0.521	1,2
143.29	87 FR	LB2	3	0.858	1,2,3	148.01	80 HG	LY3	3	0.869	1,2,3
143.42	98 CF	LY1	5	0.515	1	148.78	98 CF	LB2	4	0.653	1
143.56	79 AU	LA2	2	1.288	1,2,3	148.78	90 TH	LY1	4	0.653	1,2,3
144.10	74 W	LB6	2	1.290	1,2,3	148.78	70 YB	LY5	2	1.306	1,2
144.10	72 HF	LB9	2	1.290	1,2	148.78	72 HF	LB7	2	1.306	1,2
144.10	69 TM	LY6	2	1.290	1	148.94	36 KR	KB5	3	0.871	1,2
144.10	95 AM	LA2	3	0.860	1,3	148.94	88 RA	LB6	3	0.871	1,2,3
144.38	53 I	LY1	1	2.582	1,2,3	149.10	73 TA	LB3	2	1.307	1,2,3
144.79	49 IN	KA2	5	0.517	1,2,3	149.42	41 NB	KB2	4	0.654	1,2,3
144.79	46 PD	KB5	5	0.517	1	149.90	80 HG	LY6	3	0.873	1,2
145.21	44 RU	KA2	4	0.647	1,2,3						
145.50	30 ZN	KB1	2	1.295	1,2,3						
145.93	55 CS	LB6	1	2.593	1,2,3						
146.36	88 RA	LY4	4	0.649	1,2						
146.36	72 HF	LB10	2	1.298	1,2						
146.36	72 HF	LB5	2	1.298	1,2						
146.66	86 RN	LB1	3	0.866	1						
146.66	36 KR	KB2	3	0.866	1,2,3						
146.66	82 PB	LY5	3	0.866	1,2						
146.66	36 KR	KB4	3	0.866	2						