## Table

**Matrix** representation of the rotation point groups

What is a *group*? A group is a set of objects that form a closed set: if you combine any two of them together, the result is simply a different member of that same group of objects. Rotations in a given point group form closed sets - try it for yourself!

Note: the 3rd matrix in the 1st column (x-diad) is missing a "-" on the 33 element; this is corrected in this slide. Also, in the 2nd from the bottom, last column: the 33 element should be +1, not -1. In some versions of the book, in the last matrix (bottom right corner) the 33 element is incorrectly given as -1; here the +1 is correct.

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The 4 operators enclosed in orange boxes are also the 222 point group, appropriate to orthorhombic symmetry

The dashed boxes in this column make up group 4.

The dashed boxes in this column make up group 32. The dashed box in this column comprises the 3-fold axes only.

0:

0;

0;

1:

0:

-1:

-1:

-1:

-1

0:

-1

-1

-1

-1

-1

-1

-1

-1

-1

-1

-1

-1

-1

-1

-1

-1

-1

-1

-1

-1

Table II. Symmetry operators of rotation groups			
tetragonal branch		hexagonal branch	cubic branch
	0 0 1	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
	0 0 -1	5 a 0 -a5 0 0 0 1	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
	0	$\begin{array}{cccc}5 & -a & 0 \\ a &5 & 0 \\0 & 0 & 1 \\ 3 \end{array}$	
$\begin{array}{cccc} -1 & 0 \\ 0 & -1 \\ 0 & 0 \end{array}$	0 0 1	.5 a 0 -a .5 0 0 0 1	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$
	0 0 1	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$
	0 0 1	.5 -a 0 a .5 0 0 0 1 6	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$
0 1 1 0 0 0	0 0 -1	5 -a 0 -a .5 0 0 0 -1	0 0 -1
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	0 0 -1	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
		5 a 0 a .5 0 0 0 -1	0 0 -1 0 0 -1
a=√3/2 amé, Wenk: Table II		.5 a 0 a5 0 0 0 -1	-1 0 0 1 0 0 -
		$\begin{array}{cccc} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{array}$	-1 0 0 -1 0 0
		.5 -a 0 -a5 0 0 0 -1 622	1 0 0 -1 0 0 - 23
	, i		J