

1. TENSORIAL ASPECTS OF PHYSICAL PROPERTIES

1.1.4.8.2. Monoclinic system

1.1.4.8.2.1. Group 2

Choosing the twofold axis parallel to  $Ox_3$  and applying the direct inspection method, one finds



There are 13 independent components. If the twofold axis is parallel to  $Ox_2$ , one finds



1.1.4.8.2.2. Group m

One obtains the matrix representing the operator  $m$  by multiplying by  $-1$  the coefficients of the matrix representing a twofold axis. The result of the reduction will then be exactly complementary: the components of the tensor which include an odd number of 3's are now equal to zero. One writes the result as follows:



There are 14 independent components. If the mirror axis is normal to  $Ox_2$ , one finds



1.1.4.8.2.3. Group 2/m

All the components are equal to zero.

1.1.4.8.3. Orthorhombic system

1.1.4.8.3.1. Group 222

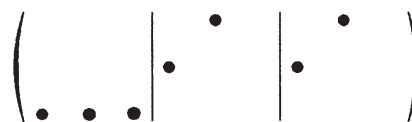
There are three orthonormal twofold axes. The reduction is obtained by combining the results associated with two twofold axes, parallel to  $Ox_3$  and  $Ox_2$ , respectively.



There are 6 independent components.

1.1.4.8.3.2. Group mm2

The reduction is obtained by combining the results associated with a twofold axis parallel to  $Ox_3$  and with a mirror normal to  $Ox_2$ :



There are 7 independent components.

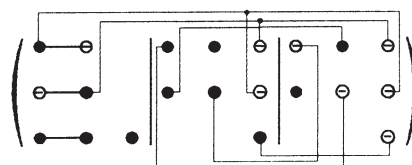
1.1.4.8.3.3. Group mmm

All the components are equal to zero.

1.1.4.8.4. Trigonal system

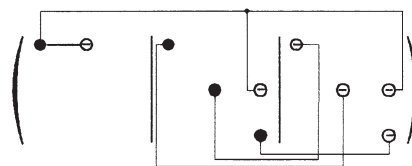
1.1.4.8.4.1. Group 3

The threefold axis is parallel to  $Ox_3$ . The matrix method should be used here. One finds



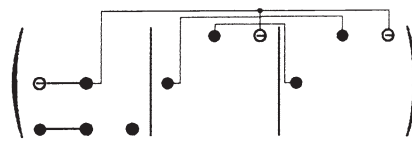
There are 9 independent components.

1.1.4.8.4.2. Group 32 with a twofold axis parallel to  $Ox_1$



There are 4 independent components.

1.1.4.8.4.3. Group 3m with a mirror normal to  $Ox_1$



There are 4 independent components.

1.1.4.8.4.4. Groups  $\bar{3}$  and  $\bar{3}m$

All the components are equal to zero.

1.1.4.8.5. Tetragonal system

1.1.4.8.5.1. Group 4

The method of direct inspection can be applied for a fourfold axis. One finds