

MPG No. 14.3.50 $\bar{4}'2'm$ (-4'2'm setting) [Type III, tetragonal] [T tensor]

* Rank 0 tensor. * Rank 1 tensor.

$$\begin{bmatrix} 0 & 0 & T_z \end{bmatrix}$$

$$T_z = T_{pz}^{(1)}$$

* Rank 2 tensor (s).

$$\begin{bmatrix} 0 & T_{xy} & 0 \\ T_{xy} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$T_{xy} = T_{dxy}^{(1)}$$

* Rank 2 tensor (a). * Rank 3 tensor (s).

$$\begin{bmatrix} 0 & 0 & T_{xxz} \\ 0 & 0 & T_{xxz} \\ 0 & 0 & T_{zzz} \\ 0 & T_{yzy} & 0 \\ T_{yzy} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$T_{xxz} = -T_{faz}^{(1)} + T_{pz}^{(1)}$$

$$T_{zzz} = 2T_{faz}^{(1)} + T_{pz}^{(1)} + 2T_{pz}^{(2)}$$

$$T_{yzy} = -T_{faz}^{(1)} + T_{pz}^{(2)}$$

* Rank 3 tensor (a).

$$\begin{bmatrix} 0 & T_{yzy} & 0 \\ -T_{yzy} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$T_{yzy} = T_{pz}^{(3)}$$

* Rank 4 tensor (sss).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & T_{xxxx} \\ 0 & 0 & 0 & 0 & 0 & T_{xxxx} \\ 0 & 0 & 0 & 0 & 0 & T_{zzxy} \\ 0 & 0 & 0 & 0 & T_{yzzx} & 0 \\ 0 & 0 & 0 & T_{yzzx} & 0 & 0 \\ T_{xxxx} & T_{xxxx} & T_{zzxy} & 0 & 0 & 0 \end{bmatrix}$$

$$T_{xxxx} = T_{dxy}^{(1)} + 2T_{dxy}^{(2)} - T_{gbz}^{(1)}$$

$$T_{zzxy} = T_{dxy}^{(1)} + 2T_{gbz}^{(1)}$$

$$T_{yzzx} = T_{dxy}^{(2)} + 2T_{gbz}^{(1)}$$

* Rank 4 tensor (ssa).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & T_{xxxx} \\ 0 & 0 & 0 & 0 & 0 & T_{xxxx} \\ 0 & 0 & 0 & 0 & 0 & T_{zzxy} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ -T_{xxxx} & -T_{xxxx} & -T_{zzxy} & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{aligned} T_{xxxy} &= 2M_{fbz}^{(1)} + T_{dxy}^{(3)} \\ T_{zzxy} &= -4M_{fbz}^{(1)} + T_{dxy}^{(3)} \end{aligned}$$

* Rank 4 tensor (aas).

$$\begin{bmatrix} 0 & T_{yzzx} & 0 \\ T_{yzzx} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$T_{yzzx} = 2T_{dxy}^{(4)}$$

* Rank 4 tensor (aaa). * Rank 4 tensor (sa).

$$\begin{bmatrix} 0 & 0 & T_{xxxy} \\ 0 & 0 & -T_{xxxy} \\ 0 & 0 & 0 \\ 0 & T_{yzzx} & 0 \\ -T_{yzzx} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$\begin{aligned} T_{xxxy} &= M_{fbz}^{(2)} - 2T_{dxy}^{(5)} \\ T_{yzzx} &= -M_{fbz}^{(2)} - T_{dxy}^{(5)} \end{aligned}$$

* Rank 4 tensor (as).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & T_{yzzx} & 0 \\ 0 & 0 & 0 & -T_{yzzx} & 0 & 0 \\ T_{xyxx} & -T_{xyxx} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{aligned} T_{yzzx} &= M_{fbz}^{(3)} + T_{dxy}^{(6)} \\ T_{xyxx} &= M_{fbz}^{(3)} - 2T_{dxy}^{(6)} \end{aligned}$$

* Rank 4 tensor (s).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & T_{xxxy} & 0 & 0 & T_{xxyx} \\ 0 & 0 & 0 & 0 & 0 & T_{xxyx} & 0 & 0 & T_{xxxy} \\ 0 & 0 & 0 & 0 & 0 & T_{zzxy} & 0 & 0 & T_{zzxy} \\ 0 & 0 & 0 & 0 & T_{yzzx} & 0 & 0 & T_{yzzx} & 0 \\ 0 & 0 & 0 & T_{yzzx} & 0 & 0 & T_{yzzx} & 0 & 0 \\ T_{xyxx} & T_{xyxx} & T_{xyzz} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{aligned} T_{xxxy} &= 2M_{fbz}^{(1)} + M_{fbz}^{(2)} + T_{dxy}^{(1)} + 2T_{dxy}^{(2)} + T_{dxy}^{(3)} - 2T_{dxy}^{(5)} - T_{gbz}^{(1)} \\ T_{xxyx} &= 2M_{fbz}^{(1)} - M_{fbz}^{(2)} + T_{dxy}^{(1)} + 2T_{dxy}^{(2)} + T_{dxy}^{(3)} + 2T_{dxy}^{(5)} - T_{gbz}^{(1)} \\ T_{zzxy} &= -4M_{fbz}^{(1)} + T_{dxy}^{(1)} + T_{dxy}^{(3)} + 2T_{gbz}^{(1)} \\ T_{yzzx} &= -M_{fbz}^{(2)} + T_{dxy}^{(2)} - T_{dxy}^{(5)} + 2T_{gbz}^{(1)} \\ T_{yzxz} &= M_{fbz}^{(2)} + T_{dxy}^{(2)} + T_{dxy}^{(5)} + 2T_{gbz}^{(1)} \\ T_{xyxx} &= -2M_{fbz}^{(1)} + T_{dxy}^{(1)} + 2T_{dxy}^{(2)} - T_{dxy}^{(3)} - T_{gbz}^{(1)} \\ T_{xyzz} &= 4M_{fbz}^{(1)} + T_{dxy}^{(1)} - T_{dxy}^{(3)} + 2T_{gbz}^{(1)} \end{aligned}$$

* Rank 4 tensor (a).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & T_{yzzx} & 0 & 0 & T_{yzzx} & 0 \\ 0 & 0 & 0 & -T_{yzzx} & 0 & 0 & -T_{yzzx} & 0 & 0 \\ T_{xyxx} & -T_{xyxx} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$T_{yzzx} = M_{fbz}^{(3)} + 2T_{dxy}^{(4)} + T_{dxy}^{(6)}$$

$$T_{yzxz} = M_{fbz}^{(3)} - 2T_{dxy}^{(4)} + T_{dxy}^{(6)}$$

$$T_{xyxx} = M_{fbz}^{(3)} - 2T_{dxy}^{(6)}$$

* Rank 4 tensor (t).

$$\begin{bmatrix} 0 & T_{xxx}y & 0 & \\ T_{xxx}y & 0 & 0 & \\ 0 & 0 & 0 & \\ 0 & 0 & 0 & \\ 0 & T_{zzy}x & 0 & \\ T_{xxy}x & 0 & 0 & \\ T_{yzz}x & 0 & 0 & \\ 0 & 0 & 0 & \\ 0 & T_{xyy}y & 0 & \\ 0 & 0 & -\frac{T_{xxx}y}{2} - \frac{T_{xxy}x}{2} + T_{xyy}y + T_{zzy}x & \end{bmatrix}$$

$$T_{xxx}y = T_{dxy}^{(1)} + 2T_{dxy}^{(2)} + T_{dxy}^{(3)} - 2T_{dxy}^{(5)} - T_{gbz}^{(1)}$$

$$T_{zzy}x = T_{dxy}^{(1)} + T_{dxy}^{(3)} + 2T_{gbz}^{(1)}$$

$$T_{xxy}x = T_{dxy}^{(1)} + 2T_{dxy}^{(2)} + T_{dxy}^{(3)} + 2T_{dxy}^{(5)} - T_{gbz}^{(1)}$$

$$T_{yzz}x = T_{dxy}^{(2)} - T_{dxy}^{(5)} + 2T_{gbz}^{(1)}$$

$$T_{xyy}y = T_{dxy}^{(1)} + 2T_{dxy}^{(2)} - T_{dxy}^{(3)} - T_{gbz}^{(1)}$$