

MPG No. 33.3.133 $\bar{4}'2'm$ (-4'm2' setting) [Type III, tetragonal] [T tensor]

* Rank 0 tensor. * Rank 1 tensor.

$$[0 \ 0 \ T_z]$$

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

* Rank 2 tensor (s).

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

$$T_{xx} = T_{dv}^{(1)}$$

* 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).

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

$$T_{xxxx} = 2T_{dv}^{(1)} + 4T_{dv}^{(2)} + T_{gv}^{(1)}$$

$$T_{xxzz} = T_{dv}^{(1)} - T_{gv}^{(1)}$$

$$T_{yzyz} = -T_{dv}^{(2)} + T_{gv}^{(1)}$$

* Rank 4 tensor (ssa).

$$\begin{bmatrix} 0 & T_{xxyy} & T_{xxzz} & 0 & 0 & 0 \\ -T_{xxyy} & 0 & -T_{xxzz} & 0 & 0 & 0 \\ -T_{xxzz} & T_{xxzz} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{aligned} T_{xxyy} &= 4M_{f3}^{(1)} - 2T_{dv}^{(3)} \\ T_{xxzz} &= -4M_{f3}^{(1)} - T_{dv}^{(3)} \end{aligned}$$

* Rank 4 tensor (aas).

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

$$T_{yzyz} = 2T_{dv}^{(4)}$$

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

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ T_{yzyz} & 0 & 0 \\ 0 & T_{yzyz} & 0 \\ 0 & 0 & T_{xyxy} \end{bmatrix}$$

$$\begin{aligned} T_{yzyz} &= M_{f3}^{(2)} - T_{dv}^{(5)} \\ T_{xyxy} &= M_{f3}^{(2)} + 2T_{dv}^{(5)} \end{aligned}$$

* Rank 4 tensor (as).

$$\begin{bmatrix} 0 & 0 & 0 & T_{yzyz} & 0 & 0 \\ 0 & 0 & 0 & 0 & T_{yzyz} & 0 \\ 0 & 0 & 0 & 0 & 0 & T_{xyxy} \end{bmatrix}$$

$$\begin{aligned} T_{yzyz} &= M_{f3}^{(3)} - T_{dv}^{(6)} \\ T_{xyxy} &= M_{f3}^{(3)} + 2T_{dv}^{(6)} \end{aligned}$$

* Rank 4 tensor (s).

$$\begin{bmatrix} T_{xxxx} & T_{xxyy} & T_{xxzz} & 0 & 0 & 0 & 0 & 0 & 0 \\ -T_{xxyy} & -T_{xxxx} & -T_{xxzz} & 0 & 0 & 0 & 0 & 0 & 0 \\ T_{zzxx} & -T_{zzxx} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & T_{yzyz} & 0 & 0 & T_{yzyz} & 0 & 0 \\ 0 & 0 & 0 & 0 & -T_{yzyz} & 0 & 0 & -T_{yzyz} & 0 \\ 0 & 0 & 0 & 0 & 0 & T_{xyxy} & 0 & 0 & -T_{xyxy} \end{bmatrix}$$

$$\begin{aligned} T_{xxxx} &= 2T_{dv}^{(1)} + 4T_{dv}^{(2)} + T_{gv}^{(1)} \\ T_{xxyy} &= 4M_{f3}^{(1)} - 2T_{dv}^{(3)} \\ T_{xxzz} &= -4M_{f3}^{(1)} + T_{dv}^{(1)} - T_{dv}^{(3)} - T_{gv}^{(1)} \\ T_{zzxx} &= 4M_{f3}^{(1)} + T_{dv}^{(1)} + T_{dv}^{(3)} - T_{gv}^{(1)} \\ T_{yzyz} &= M_{f3}^{(2)} - T_{dv}^{(2)} - T_{dv}^{(5)} + T_{gv}^{(1)} \\ T_{yzyz} &= -M_{f3}^{(2)} - T_{dv}^{(2)} + T_{dv}^{(5)} + T_{gv}^{(1)} \\ T_{xyxy} &= M_{f3}^{(2)} + 2T_{dv}^{(5)} \end{aligned}$$

* Rank 4 tensor (a).

$$\begin{bmatrix} 0 & 0 & 0 & T_{yzyz} & 0 & 0 & T_{yzyz} & 0 & 0 \\ 0 & 0 & 0 & 0 & T_{yzyz} & 0 & 0 & T_{yzyz} & 0 \\ 0 & 0 & 0 & 0 & 0 & T_{xyxy} & 0 & 0 & T_{xyxy} \end{bmatrix}$$

$$T_{yzyz} = M_{f3}^{(3)} + 2T_{dv}^{(4)} - T_{dv}^{(6)}$$

$$T_{yzyy} = M_{f3}^{(3)} - 2T_{dv}^{(4)} - T_{dv}^{(6)}$$

$$T_{xyxy} = M_{f3}^{(3)} + 2T_{dv}^{(6)}$$

* Rank 4 tensor (t).

$$\begin{bmatrix} T_{xxxx} & 0 & 0 \\ 0 & -T_{xxxx} & 0 \\ 0 & 0 & 0 \\ 0 & 0 & T_{yyzz} \\ T_{zzxx} & 0 & 0 \\ 0 & -T_{yyzz} - T_{zzxx} & 0 \\ 0 & T_{yzyy} & 0 \\ 0 & 0 & T_{zxxx} \\ -T_{yzyy} - T_{zxxx} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$T_{xxxx} = 2T_{dv}^{(1)} + 4T_{dv}^{(2)} + T_{gv}^{(1)}$$

$$T_{yyzz} = -T_{dv}^{(1)} + T_{dv}^{(3)} + T_{gv}^{(1)}$$

$$T_{zzxx} = T_{dv}^{(1)} + T_{dv}^{(3)} - T_{gv}^{(1)}$$

$$T_{yzyy} = -T_{dv}^{(2)} + T_{dv}^{(5)} + T_{gv}^{(1)}$$

$$T_{zxxx} = T_{dv}^{(2)} + T_{dv}^{(5)} - T_{gv}^{(1)}$$