

MPG No. 13.1.44 $4mm$ [Type I, tetragonal] [G tensor]

* Rank 0 tensor. * Rank 1 tensor. * Rank 2 tensor (s). * Rank 2 tensor (a).

$$\begin{bmatrix} 0 & G_{xy} & 0 \\ -G_{xy} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$G_{xy} = Q_{pz}^{(1)}$$

* Rank 3 tensor (s).

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ G_{yzx} & 0 & 0 \\ 0 & -G_{yzx} & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$G_{yzx} = -3Q_{du}^{(1)}$$

* Rank 3 tensor (a).

$$\begin{bmatrix} G_{yzx} & 0 & 0 \\ 0 & G_{yzx} & 0 \\ 0 & 0 & G_{xyz} \end{bmatrix}$$

$$G_{yzx} = -Q_{du}^{(2)} + Q_s^{(1)}$$

$$G_{xyz} = 2Q_{du}^{(2)} + Q_s^{(1)}$$

* Rank 4 tensor (sss).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & G_{xxxy} \\ 0 & 0 & 0 & 0 & 0 & -G_{xxxy} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ G_{xxxy} & -G_{xxxy} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$G_{xxxy} = G_{gaz}^{(1)}$$

* Rank 4 tensor (ssa).

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

$$G_{xxxy} = -2Q_{faz}^{(1)} + 2Q_{pz}^{(1)}$$

$$G_{yzzx} = -4Q_{faz}^{(1)} - Q_{pz}^{(1)}$$

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

$$\begin{bmatrix} 0 & G_{yzzx} & 0 \\ -G_{yzzx} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$G_{yzzx} = -Q_{pz}^{(2)}$$

* Rank 4 tensor (sa).

$$\begin{bmatrix} 0 & 0 & G_{xxxy} \\ 0 & 0 & G_{xxxy} \\ 0 & 0 & G_{zzxy} \\ 0 & G_{yzzx} & 0 \\ G_{yzzx} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$G_{xxxy} = -Q_{faz}^{(2)} + Q_{pz}^{(3)}$$

$$G_{zzxy} = 2Q_{faz}^{(2)} + Q_{pz}^{(3)} + 2Q_{pz}^{(4)}$$

$$G_{yzzx} = -Q_{faz}^{(2)} + Q_{pz}^{(4)}$$

* Rank 4 tensor (as).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & G_{yzzx} & 0 \\ 0 & 0 & 0 & G_{yzzx} & 0 & 0 \\ G_{xyxx} & G_{xyxx} & G_{xyzz} & 0 & 0 & 0 \end{bmatrix}$$

$$G_{yzzx} = -Q_{faz}^{(3)} + Q_{pz}^{(6)}$$

$$G_{xyxx} = -Q_{faz}^{(3)} + Q_{pz}^{(5)}$$

$$G_{xyzz} = 2Q_{faz}^{(3)} + Q_{pz}^{(5)} + 2Q_{pz}^{(6)}$$

* Rank 4 tensor (s).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & G_{xxxy} & 0 & 0 & G_{xxyx} \\ 0 & 0 & 0 & 0 & 0 & -G_{xxyx} & 0 & 0 & -G_{xxxy} \\ 0 & 0 & 0 & 0 & 0 & G_{zzxy} & 0 & 0 & -G_{zzxy} \\ 0 & 0 & 0 & 0 & G_{yzzx} & 0 & 0 & G_{yzxz} & 0 \\ 0 & 0 & 0 & -G_{yzxz} & 0 & 0 & -G_{yzzx} & 0 & 0 \\ G_{xyxx} & -G_{xyxx} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$G_{xxxy} = G_{gaz}^{(1)} - 2Q_{faz}^{(1)} - Q_{faz}^{(2)} + 2Q_{pz}^{(1)} + Q_{pz}^{(3)}$$

$$G_{xxyx} = G_{gaz}^{(1)} - 2Q_{faz}^{(1)} + Q_{faz}^{(2)} + 2Q_{pz}^{(1)} - Q_{pz}^{(3)}$$

$$G_{zzxy} = 2Q_{faz}^{(2)} + Q_{pz}^{(3)} + 2Q_{pz}^{(4)}$$

$$G_{yzzx} = -4Q_{faz}^{(1)} - Q_{faz}^{(2)} - Q_{pz}^{(1)} + Q_{pz}^{(4)}$$

$$G_{yzxz} = -4Q_{faz}^{(1)} + Q_{faz}^{(2)} - Q_{pz}^{(1)} - Q_{pz}^{(4)}$$

$$G_{xyxx} = G_{gaz}^{(1)} + 2Q_{faz}^{(1)} - 2Q_{pz}^{(1)}$$

* Rank 4 tensor (a).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & G_{yzzx} & 0 & 0 & G_{yzxz} & 0 \\ 0 & 0 & 0 & G_{yzxz} & 0 & 0 & G_{yzzx} & 0 & 0 \\ G_{xyxx} & G_{xyxx} & G_{xyzz} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$G_{yzzx} = -Q_{faz}^{(3)} - Q_{pz}^{(2)} + Q_{pz}^{(6)}$$

$$G_{yzxz} = -Q_{faz}^{(3)} + Q_{pz}^{(2)} + Q_{pz}^{(6)}$$

$$G_{xyxx} = -Q_{faz}^{(3)} + Q_{pz}^{(5)}$$

$$G_{xyzz} = 2Q_{faz}^{(3)} + Q_{pz}^{(5)} + 2Q_{pz}^{(6)}$$

* Rank 4 tensor (t).

$$\begin{bmatrix} 0 & G_{xxy} & 0 \\ -G_{xxy} & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ G_{xxy} & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & -G_{xxy} & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$G_{xxy} = G_{gaz}^{(1)}$$