$Y_{1,0} = (1/2)\sqrt{3/\pi}\mathcal{A}_z^{(1)}$
$Y_{1,\pm1} = -(i/2)\sqrt{3/2\pi}\mathcal{A}_y^{(1)} \mp (1/2)\sqrt{3/2\pi}\mathcal{A}_x^{(1)}$
$Y_{2,0} = (3/4)\sqrt{5/\pi}\mathcal{A}_{zz}^{(2)}$
$Y_{2,\pm1} = -(i/2)\sqrt{15/2\pi}\mathcal{A}_{yz}^{(2)} \mp (1/2)\sqrt{15/2\pi}\mathcal{A}_{xz}^{(2)}$
$Y_{2,\pm2} = -(1/4)\sqrt{15/2\pi}\mathcal{A}_{yy}^{(2)} \pm (i/2)\sqrt{15/2\pi}\mathcal{A}_{xy}^{(2)} + (1/4)\sqrt{15/2\pi}\mathcal{A}_{xx}^{(2)}$
$Y_{3,0} = (5/4)\sqrt{7/\pi}\mathcal{A}_{zzz}^{(3)}$
$Y_{3,\pm1} = -(5i/8)\sqrt{21/\pi}\mathcal{A}_{yzz}^{(3)} \mp (5/8)\sqrt{21/\pi}\mathcal{A}_{xzz}^{(3)}$
$Y_{3,\pm2} = -(1/4)\sqrt{105/2\pi}\mathcal{A}_{yyz}^{(3)} \pm (i/2)\sqrt{105/2\pi}\mathcal{A}_{xyz}^{(3)} + (1/4)\sqrt{105/2\pi}\mathcal{A}_{xxz}^{(3)}$
$Y_{3,\pm3} = (i/8)\sqrt{35/\pi}\mathcal{A}_{yyy}^{(3)} \pm (3/8)\sqrt{35/\pi}\mathcal{A}_{xyy}^{(3)} - (3i/8)\sqrt{35/\pi}\mathcal{A}_{xxy}^{(3)} \mp (1/8)\sqrt{35/\pi}\mathcal{A}_{xxx}^{(3)}$
$Y_{4,0} = (105/16)\sqrt{1/\pi}\mathcal{A}_{zzzz}^{(4)}$
$Y_{4,\pm1} = -(21i/8)\sqrt{5/\pi}\mathcal{A}_{yzzz}^{(4)} \mp (21/8)\sqrt{5/\pi}\mathcal{A}_{xzzz}^{(4)}$
$Y_{4,\pm2} = -(21/8)\sqrt{5/2\pi}\mathcal{A}_{yyzz}^{(4)} \pm (21i/4)\sqrt{5/2\pi}\mathcal{A}_{xyzz}^{(4)} + (21/8)\sqrt{5/2\pi}\mathcal{A}_{xxzz}^{(4)}$
$Y_{4,\pm3} = (3i/8)\sqrt{35/\pi}\mathcal{A}_{yyyz}^{(4)} \pm (9/8)\sqrt{35/\pi}\mathcal{A}_{xyyz}^{(4)} - (9i/8)\sqrt{35/\pi}\mathcal{A}_{xxyz}^{(4)} \mp (3/8)\sqrt{35/\pi}\mathcal{A}_{xxxz}^{(4)}$
$Y_{4,\pm4} = (3/16)\sqrt{35/2\pi}\mathcal{A}_{yyyy}^{(4)} \mp (3i/4)\sqrt{35/2\pi}\mathcal{A}_{xyyy}^{(4)} - (9/8)\sqrt{35/2\pi}\mathcal{A}_{xxyy}^{(4)} \pm (3i/4)\sqrt{35/2\pi}\mathcal{A}_{xxxy}^{(4)} + (3/16)\sqrt{35/2\pi}\mathcal{A}_{xxxx}^{(4)}$