7-8

In this problem we use this relation

$$\left|l \pm \frac{1}{2}, m\right\rangle = \pm\sqrt{\frac{l \pm m + \frac{1}{2}}{2l+1}}\left|l, \frac{1}{2}; m - \frac{1}{2}, \frac{1}{2}\right\rangle + \sqrt{\frac{l \mp m + \frac{1}{2}}{2l+1}}\left|l, \frac{1}{2}; m + \frac{1}{2}, \frac{-1}{2}\right\rangle$$

$$\left|2 + \frac{1}{2}, m\right\rangle = \sqrt{\frac{m + \frac{5}{2}}{5}}\left|2, \frac{1}{2}; m - \frac{1}{2}, \frac{1}{2}\right\rangle + \sqrt{\frac{-m + \frac{5}{2}}{5}}\left|2, \frac{1}{2}; m + \frac{1}{2}, \frac{-1}{2}\right\rangle$$

$$\left|\frac{5}{2}, \frac{5}{2}\right\rangle = \left|2, \frac{1}{2}; 2, \frac{1}{2}\right\rangle$$

$$\left|\frac{5}{2}, \frac{3}{2}\right\rangle = \sqrt{\frac{8}{10}}\left|2, \frac{1}{2}; 1, \frac{1}{2}\right\rangle + \sqrt{\frac{2}{10}}\left|2, \frac{1}{2}; 2, \frac{-1}{2}\right\rangle$$

$$\left|\frac{5}{2}, \frac{1}{2}\right\rangle = \sqrt{\frac{6}{10}}\left|2, \frac{1}{2}; 0, \frac{1}{2}\right\rangle + \sqrt{\frac{4}{10}}\left|2, \frac{1}{2}; 1, \frac{-1}{2}\right\rangle$$

$$\left|\frac{5}{2}, \frac{-1}{2}\right\rangle = \sqrt{\frac{4}{10}}\left|2, \frac{1}{2}; -1, \frac{1}{2}\right\rangle + \sqrt{\frac{6}{10}}\left|2, \frac{1}{2}; 0, \frac{-1}{2}\right\rangle$$

$$\left|\frac{5}{2}, \frac{-3}{2}\right\rangle = \sqrt{\frac{2}{10}}\left|2, \frac{1}{2}; -2, \frac{1}{2}\right\rangle + \sqrt{\frac{8}{10}}\left|2, \frac{1}{2}; -1, \frac{-1}{2}\right\rangle$$

$$\left|\frac{5}{2}, \frac{-5}{2}\right\rangle = \left|2, \frac{1}{2}; -2, \frac{-1}{2}\right\rangle$$

$$\left|2 - \frac{1}{2}, m\right\rangle = -\sqrt{\frac{-m + \frac{5}{2}}{5}}\left|2, \frac{1}{2}; m - \frac{1}{2}, \frac{1}{2}\right\rangle + \sqrt{\frac{m + \frac{5}{2}}{5}}\left|2, \frac{1}{2}; m + \frac{1}{2}, \frac{-1}{2}\right\rangle$$

$$\left|\frac{3}{2}, \frac{3}{2}\right\rangle = -\sqrt{\frac{2}{10}}\left|2, \frac{1}{2}; 1, \frac{1}{2}\right\rangle + \sqrt{\frac{8}{10}}\left|2, \frac{1}{2}; 2, \frac{-1}{2}\right\rangle$$

$$\left|\frac{3}{2}, \frac{1}{2}\right\rangle = -\sqrt{\frac{4}{10}}\left|2, \frac{1}{2}; 0, \frac{1}{2}\right\rangle + \sqrt{\frac{6}{10}}\left|2, \frac{1}{2}; 1, \frac{-1}{2}\right\rangle$$

$$\left|\frac{3}{2}, \frac{-1}{2}\right\rangle = -\sqrt{\frac{6}{10}}\left|2, \frac{1}{2}; -1, \frac{1}{2}\right\rangle + \sqrt{\frac{4}{10}}\left|2, \frac{1}{2}; 0, \frac{-1}{2}\right\rangle$$

$$\left|\frac{3}{2}, \frac{-3}{2}\right\rangle = -\sqrt{\frac{8}{10}}\left|2, \frac{1}{2}; -2, \frac{1}{2}\right\rangle + \sqrt{\frac{2}{10}}\left|2, \frac{1}{2}; -1, \frac{-1}{2}\right\rangle$$

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