7.36 (Potassium atom is excited $\ell = 2$) 4s' electron is excited

$L = \sqrt{\ell(\ell+1)}\,\hbar$

$L = \sqrt{2(2+1)}\,\hbar = \sqrt{6}\,\hbar$

$^2D_{\frac{5}{2},\frac{3}{2}}$

Possible values of J?

$J = \ell + S$

$j_{max} = \ell + s = 2 + \frac{1}{2} = \frac{5}{2}$

$j_{min} = |\ell - s| = 2 - \frac{1}{2} = \frac{3}{2}$

$J_{max} = \sqrt{\frac{5}{2}\left(\frac{5}{2}+1\right)}\,\hbar = \sqrt{\frac{35}{4}}\,\hbar$

$J_{min} = \sqrt{\frac{3}{2}\left(\frac{3}{2}+1\right)}\,\hbar = \sqrt{\frac{15}{4}}\,\hbar$