Consider the Na atom. Although the ground state of Na atom has one and only one corresponding electron configuration, other electron configurations are certainly possible for Na atom; they correspond to higher-lying excited electronic states. The table below gives some of the possible electron configurations, term symbols, and energies (in cm−1) of various states of Na atom. Include J in all term symbols asked for below.

(Ne) 3s 2 S1/2 0.000

(Ne) 3p 2P1/2 16956.183

2P3/2 16973.379

(Ne) 4s 2S1/2 25739.86

(Ne) 3d 2D5/2 29172.855

2D3/2 29172.904

1. What term symbol(s) arise from the [Ne] 3p configuration?
2. What term symbols arise from the [Ne] 3d configuration?
3. Using the atomic spectroscopy selection rules, list all possible transitions from state(s) arising from the [Ne] 3p configuration upwards to the state(s) arising from the [Ne] 3d configuration. Using the table, give the energy (in cm-1) and wavelength of absorbed light (in nm) for each transition.

From this example you can see that tables such as the one above allow one to predict/explain atomic spectra.