

- (6 pts) (a) List the elements in the periodic table which you would expect to have a spectral structure similar to Be. (b) List the elements that you would expect to form chemical compounds similar to the ones formed by Be.
- (6 pts) (a) How many electrons can occupy the L shell of an atom? (b) How many electrons can occupy the $2p$ subshell of an atom?
- (6 pts) Without looking at table 7.4 in the text, write down the electron configuration for the ground state of (a) argon ($Z=18$) and (b) gallium ($Z=31$). Feel free to check your answers in the table at the back of your book after you are pretty sure you know what you are doing and feel that you have done it correctly.
- (6 pts) (a) Atomic physicists (like me) often like to work with the alkali metals. They have only one electron in an unclosed shell, and it is in an s shell. This results in low melting points (making it easy to make atomic vapors) and in a simple hydrogen-like spectra. What are the 7 alkali metals (including hydrogen — hey, it's a metal too at high enough pressures). (b) My current work is with alkaline earth elements like calcium, which have all closed shells, with the last shell being an s shell. What are all of the alkaline earth metals in the periodic table?
- (6 pts) If you look at the periodic table in your book, you will see that “transition metals” come in two rows of 10 columns. Where does the number 10 come from?

Extra problems I recommend you work (not to be turned in)

- Look at figure 7.10 in the text. Explain in “hand waving” terms why He has a greater ionization energy than H or Li. Then explain why it has a higher ionization energy than Ne or Ar. From these arguments, you can see why He has the highest ionization energy.
- Figure 7.10 cuts off at atomic number 86. If we extended the plot out to 109 (the last element listed on your periodic table), which element on the plot would have the lowest ionization energy?
- Look at figure 7.11. Explain why Cs has a larger radius than Ba and Xe. Explain why it has a larger radius than Rb.
- The “Lanthanides” and “Actinides” are in rows of 15 columns. Where does the number 15 come from. (Hint, 15 is 14 plus one, and there is a “missing” element after Ba and Ra).