Photoelectron Spectroscopy (PES)

- Method used to identify the placement of electrons for a single atom.
- Process to get the Ionization Energy for a particular electron:
  1. Shoot x-rays at a substance that cause electrons to be emitted with a specific energy
  2. Measure the energy of the emitted electrons
  3. Subtract the energy of the emitted electron from the energy of the x-ray photons

![Photoelectron Spectrum](image1)

![Photoelectron Spectrum](image2)

![Photoelectron Spectra](image3)

Calcium  Potassium
Looking at the spectra for Na and K below, which of the following would best explain the difference in *signal intensity* for the 3s electrons?

(A) K has a greater nuclear charge than Na  
(B) K has more electron-electron repulsions than Na  
(C) Na has one valence electron in the 3s sublevel  
(D) Na has less electron shielding than K

Which element could be represented by the complete PES spectrum below?

(A) Li  
(B) B  
(C) N  
(D) Ne

Looking at the spectra for Na and K below, which of the following would best explain the difference in binding energy for the 3s electrons?

(A) K has a greater nuclear charge than Na  
(B) K has more electron-electron repulsions than Na  
(C) Na has one valence electron in the 3s sublevel  
(D) Na has less electron shielding than K