Nomenclature: K x-ray lines come from atomic transitions to the innermost atomic electron “shell.”

Kα line is \( n \approx 2 \rightarrow n = 1 \)
Kβ line is \( n = 3 \rightarrow n = 1 \)

L x-ray lines are longer wavelength and come from transitions to \( n = 2 \)

Lα line is \( n = 3 \rightarrow n = 2 \)
Lβ line is \( n = 4 \rightarrow n = 2 \)

The Bohr formula is a guide to the wavelengths of these lines:

\[
E_n = \frac{(-13.6 \text{ eV}) Z^2}{n^2}
\]

\[
\frac{hc}{\lambda} = hf = (+ (13.6 \text{ eV}) (Z^2)) \left( \frac{1}{n_1^2} - \frac{1}{n_2^2} \right)
\]

for \( n_2 \rightarrow n_1 \) transition.

So for Kα: \( f = (2.47 \times 10^{15} \text{ } (Z^2)) \) Hz
Kβ: \( f = (2.93 \times 10^{15} \text{ } (Z^2)) \) Hz
Lα: \( f = (0.457 \times 10^{15} \text{ } (Z^2)) \) Hz
Lβ: \( f = (0.417 \times 10^{15} \text{ } (Z^2)) \) Hz

Look at Moseley plot in text. The intercept reflects the number of electrons “inside” the shell involved in the transition.