Key for Take-Home Assigment 02

The data at the bottom of the page was recorded for a metal drawn from the list of elements in the table below. Using this data, determine your metal's binding energy in Joules. Use a ruler to improve your estimation of the binding energy.

Binding energies in the literature typically are reported in electron volts (ev), where 1 eV is equal to $1.6022 \times 10{-19}$ J. Convert your metal's binding energy into its equivalent value in electron volts and then determine your metal's identity. If you cannot narrow it down to a single metal, then identify the possible metals. Your sample id is 88.

metal	binding energy (eV)
lithium	2.35
magnesium	3.68
titanium	4.06
chromium	4.37
nickel	5.01
strontium	2.74
cesium	1.92
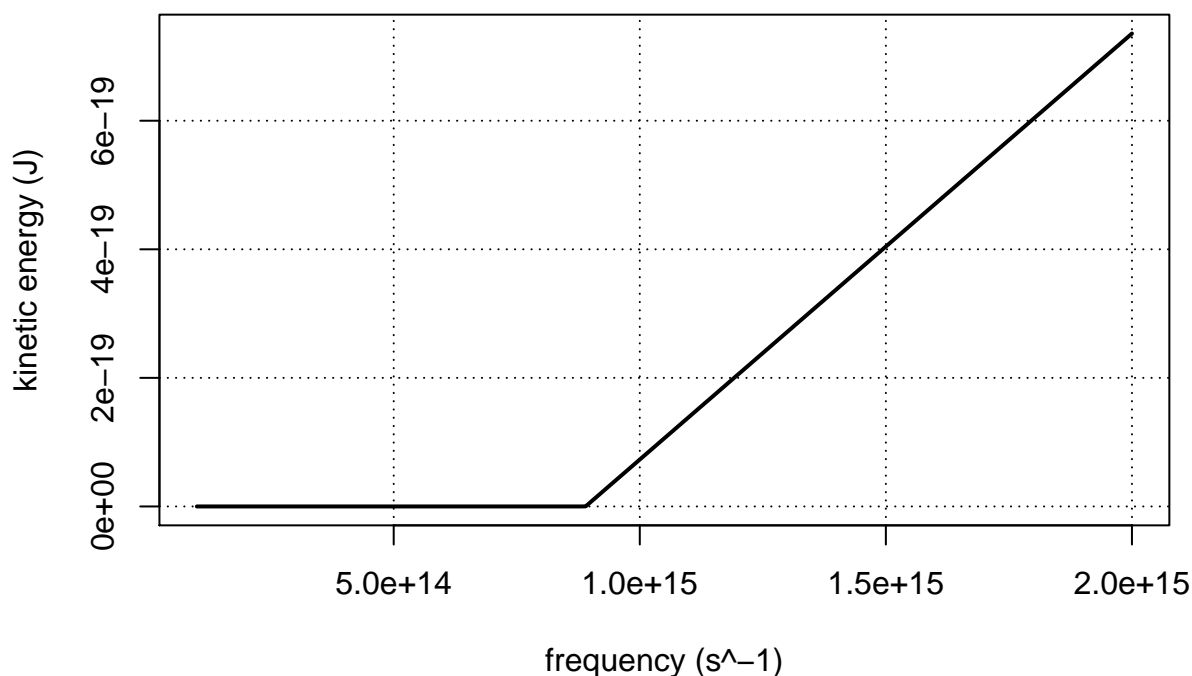
First, we have to estimate the threshold frequency, which is the frequency where the electron's kinetic energy first rises above zero; for this data, the threshold frequency is approximately 9.0×10^{14} s^{-1}. The binding energy, in Joules, is given by the relationship $E = h\nu$, where h is Planck's constant of 6.626×10^{-34} Js; for this data, the binding energy is 6.0×10^{-19} J. Converting to electron volts by multiplying by 1.6022×10^{-19} J/eV gives 3.7 eV. Given this binding energy, the metal is Mg.