1. Fill in the table:

<table>
<thead>
<tr>
<th>Wavelength</th>
<th>Frequency</th>
<th>Energy of photon</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.37 x 10^{-8} nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>91.9 MHz</td>
<td></td>
<td>4.20 x 10^{-19} J</td>
</tr>
</tbody>
</table>

2. True or False: If yellow light can eject electrons from a certain metal surface, then blue light will eject electrons too.

3. A polished metal surface requires 1.75 x 10^{-19} J to remove electrons via the photoelectric effect. When photons with a wavelength of 237 nm strike the surface, what is the velocity of the ejected electron? KE_{electron} = (1/2)m_ev^2

4. Calculate the wavelength of a beryllium atom traveling at 15% the speed of light.

5. Calculate the wavelength of light associated with the following transitions in a hydrogen atom:
   a. n = 4 \rightarrow n=2
b. removing an e\textsuperscript{-} from the second excited state

6. The ground state ionization energy for the one electron ion X\textsuperscript{m+} is 4.72 \times 10\textsuperscript{4} kJ/mol. Identify m.

7. How many electrons in an atom can have the following designation?
   a. n = 2
   b. 3d
   c. n = 4, l = 1, m_l = 0
   d. 3f_{xyz}
   e. n = 6, l = 2, m_l = -1, m_s = -1/2

8. Write electron configurations and determine the number of unpaired electrons for:
   a. P
   b. Fe
   c. Cr
   d. Cu
   e. Sn\textsuperscript{2+}
   f. Sb\textsuperscript{3-}
   g. Cf
9. Which of the following correspond to an excited state? If so, write the correct ground state configuration. Identify the element in each case.

a. 1s²2s²2p⁵3s¹
b. [Ar]4s¹3d⁵
c. [Kr]5s²4d⁸5p²
d. [Ar]4s²3d¹⁰4p³

10. Put the following in order of:

a. increasing atomic size Si Ca Ge
b. increasing ionization energy C N O
c. increasing ionization energy Al²⁺ Al⁺ Al

d. increasing electron affinity C Si In (energy released)

11. The successive ionization energies for an unknown element are shown below.

IE₁ = 580 kJ/mol
IE₂ = 1815 kJ/mol
IE₃ = 2740 kJ/mol
IE₄ = 11,600 kJ/mol

To which family in the periodic table does the unknown element most likely belong?
**Electron configuration**

 ważnym zasadą Aufbau jest umieszczanie elektronów na przeznaczonym poziomie energetycznym od najniższego po wyższy poziom, z wyjątkiem grup Cr i Cu.

Hund’s Rule ⇒ when filling degenerate orbitals don’t pair up electrons until each orbital has an electron