3.1 Quick Check - Atomic Orbitals

Check off each item if you can do the question. Write down a question to ask if you cannot do the question.

Light and Waves

\[ c = \lambda \cdot \nu = 3.0 \times 10^8 \text{ m/s} \]

\[ E = h \cdot \nu = \frac{h \cdot c}{\lambda} \quad h = 6.626 \times 10^{-34} \text{ J} \cdot \text{s} \]

Consider this graphic of a traveling wave of light. The scale is in nm.

- What is the wavelength (\( \lambda \)) of this wave?
- What is the frequency (\( \nu \)) of the wave?
- What is the energy of the wave?

- We can see electromagnetic radiation with wavelengths between 400 nm and 700 nm. Would you be able to see this light?

Atomic Orbitals

Consider the n=4 shell of an atom.
- How many subshells are in this shell?
- How many orbitals are in this shell?
- How many electrons could occupy this shell?

Consider the 4s and 3d orbitals.
- Which orbital has higher energy?
- Which orbital is farther from the nucleus (on average)?

Write the orbitals in order of lowest energy to highest energy:

\[ \text{<}_1 \text{<}_1 \text{<}_1 \text{<}_1 \text{<}_1 \text{<}_1 \text{<}_1 \text{<}_1 \text{<}_1 \]

\[ \text{<}_1 \text{<}_1 \text{<}_1 \text{<}_1 \text{<}_1 \text{<}_1 \text{<}_1 \text{<}_1 \text{<}_1 \]