

Exercises 4

Exercise 4.1

What is the frequency of the photon emitted during the transition of the electron from the $n = 5$ shell to the $n = 4$ shell of a hydrogen atom?

Exercise 4.2

Calculate the wavelength and indicate the color of the second spectral line of the Balmer series ($n_1 = 2$).

Exercise 4.3

Which transition of a hydrogen atom generates red light with a wavelength of 656.3 nm? (The Rydberg constant : $R = 3.290 \cdot 10^{15}$ Hz)

Exercise 4.4

Which subshell has 5 orbitals? How many orbitals does an l subshell have?

Exercise 4.5

Give the 4 quantum numbers of the electron of the hydrogen atom in its ground state.

Exercise 4.6

How many nodal areas does the orbital of an electron defined by the quantum numbers $(n, l, m_l, m_s) = (4, 2, -1, 1/2)$ have in total?

How many nodal surfaces of each type (angular/radial) does it have?

What is the type of this orbital?

Exercise 4.7

How many nodal surfaces does a $5p$ orbital have in total?

And how many nodal surfaces does it have of each type?

Exercise 4.8

Determine the angular momentum of a s orbital and a p orbital.

Exercise 4.9

Give the ground state electron configuration of potassium, argon, arsenic, neon, and barium.

Exercise 4.10

Give all the possible combinations for the 4 quantum numbers of the 8th electron of an atom in its ground state in absence of a magnetic field.

Exercise 4.11

Give all the possible combinations for the 4 quantum numbers of the 19th electron of an atom in its ground state in absence of a magnetic field.

Exercise 4.12

Which elements in the periodic table have an electron configuration of the type $[\text{noble gas}]ns^2$?