Badji Mokhtar University Annaba **2025/2026**
Faculty of Science
Department of Matter Sciences

Series N°2"Chemistry 1"

Exercise 01:
Calculate the wavelengths associated with :
1)- An electron accelerated by a difference in potential of 10^4V.
2)- A ball with mass 2g and speed 300m/s.
3)- conclusion. **Data :**: e = 1,6 .10^{-19} C; m_e = 9,1.10^{-31}Kg; h = 6,62.10^{-34} J.s.

Exercise 02:
Knowing that the speed of the electron of the excited hydrogen atom is 3,64.10^5 m.s^{-1},
- Determine the wavelength of the radiation emitted by this atom when the electron passes to the next lower energy level.

Exercise 03:
1- The emission spectrum of the hydrogen atom is composed of several lines. For each of the first three series, give the wavelengths of the first line and the limiting line. First, establish the formula $1/\lambda\_(i\rightarrow j)$, where $\lambda_(i\rightarrow j)$represents the length of the radiation emitted when the electron passes from the n_i level to the n_j level ($n_i>n_j$). In which spectral region (visible, uv, IR, ...) is each of these series observed?
2- The first line of the Brackett series in the emission spectrum of the hydrogen atom has a wavelength of 4.052μm. Without further data, calculate the wavelength of the three following lines.

Exercise 04:
Excite the electron of the hydrogen atom in the ground state to energies equal to 10.20, 12.08 and 12.74eV.
Determine the electron energies on the different levels.
Precise the associated energy diagram. Which absorption series is involved?
What is the wavelength of each transition? c = 3.10^8 ms^{-1} ; h = 6,62.10^{-34} J.s.

Exercise 05:
If a hydrogen atom in the ground state absorbs a photon of wavelength λ_1 = 972.8 Å. Then emits a photon of wavelength λ_2 = 18790 Å, on which level is the electron after this emission?
Show on an energy diagram the 2 transitions corresponding to these 2 lines. (R_H= 10973740 m^{-1}).

Exercise 06:
Consider the hydrogenoid, $_4Be^{3+}$. The shortest wavelength line in its spectrum is at 57.3Å.
1)- Which transition does it correspond to?
2)- Calculate the corresponding energy. **Data** : c = 3.10^8 ms^{-1} ; 10973740 m^{-1}; h = 6,62.10^{-34} J.s.

Exercise 07:
Let the hydrogenoid ion $^6_3Li^{2+}$.
1) Determine the radius of the first orbit.
2) Determine the speed of the electron in this orbit.
3) Determine the wavelength associated with the electron in this orbit.
4) Determine the shortest wavelength of the emission spectrum of this ion.
Data : e = 1,6 .10^{-19} C; m_e = 9,1.10^{-31}Kg; h = 6,62.10^{-34} J.s ; k = 9.10^9u.MKS.