<u>**Series Nº 2 Part 2 "Chemistry 1"**</u>

Exercise 01:
 Consider the electron of the hydrogen atom in the second Bohr orbit. Knowing that the velocity is known with a relative uncertainty of 1%.
   - Calculate the uncertainty of this electron's position and compare it with the perimeter of its orbit.
   - Discuss the result obtained.
                Data: m_e= 9,1 10^{-31}kg , h=6,62 10^{-34} J s

Exercise 02:
1. Let an electron have principal quantum number n = 3. What are the possible values for the quantum numbers: ℓ, m and s.
2. How many possible shapes are there for the orbital of an electron with quantum number n = 4? How many possible orientations are there for the orbital of an electron with quantum number ℓ=3?
3. Consider the electronic states corresponding to the following notations: 1s, 3p, 3f, 2d, 5p, 6s, 4d, 5f, 1p. Which of these states cannot exist?
4. Applying KLECHKOVSKY's rule, rank the following orbitals in order of increasing energy: 1s, 2s, 2p, 3s, 3p, 3d, 4s, 4p, 4d, 4f, 5s, 5p.
5. Give the values of the four quantum numbers characterizing each of boron's five electrons in its ground state.

Exercise 03:
An atom is characterized by the following electronic configuration: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^3$
1. How many electrons, how many proton and what is its atomic number?
2. Show the quantum bins of the 4s, 3d, 4p orbitals; are there any unpaired electrons?

Exercise 04:
Consider the following atoms: $_7$N, $_{19}$K, $_{21}$Sc, $_{24}$Cr, $_{25}$Mn, $_{26}$Fe, $_{29}$Cu, $_{30}$Zn, $_{47}$Ag, $_{79}$Au.
1. Give the electronic configurations of the atoms. Present the valence electrons and deduce their number for each atom.
2. Situate these atoms in the periodic table, grouping them if possible by family or period.
3. Cesium (Cs) belongs to the same family as potassium (K) and to the same period as gold (Au). Give its electronic configuration and atomic number.

Exercise 05:
Consider two elements for fourth-period with three unpaired electrons in their external electronic structure.
1. Write the complete electronic structures of each of these elements and determine their atomic numbers.
2. Determine the atomic number and give the electronic configuration of the element located in the same period as iron (Z = 26) and pertaining to the same family as carbon (Z = 6); Justify your answer.

Exercise 06:
Knowing the atomic radii of the elements in the first group and third period of the periodic table.

	Li	Na	K	Rb	Cs		Na	Mg	Al	Si	P	S	Cl
Z	3	11	19	37	55	Z	11	12	13	14	15	16	17
r (Å)	1,50	1,86	2,27	2,43	2,62	r (Å)	1,86	1,60	1,48	1,17	1,00	1,06	0,97

- Specify the direction in which the ionization energy varies as we traverse the group from Li to Cs and the period from Na to Cl.

Exercise07:
Consider the elements $_{29}$Cu, $_{35}$Br, $_{42}$Mo et $_{54}$Xe.
1. Give the electronic structures of these elements and place them on the periodic table.
2. Attribute and explain the values of the energies of first ionization (Ei) and the electronegativity of the following elements: Cu, Br and Mo.

Ei (eV)	7,7	11,8	7,2
Electronegativity	1,9	2,8	1,8

3. An element belongs to the sixth period and to group IV_B. What is its structure? Give its atomic number.