

Series N° 4

Exercise 1:

- 1- What are the possible subshells when $n = 4$? How many orbitals are contained by each of these subshells?
- 2- What are the possible m values for $l = 4$?
- 3- What are the values of principal quantum number (n) and azimuthal quantum number (l) for $3s$ and $4p_y$ orbitals?
- 4- Given the following sets of quantum numbers (n, l, m, s), identify each principal shell and subshell.

1- $l = 0, 0, \frac{1}{2}$

2- $2, 1, 0, \frac{1}{2}$

3- $3, 2, 0, \frac{1}{2}$

4- $4, 3, 3, \frac{1}{2}$

- 5- Is each set of Quantum numbers allowed? Explain your answers.

1- $n = 2; l = 1; l = 2; s = +\frac{1}{2}$

2- $n = 3, l = 0; l = -1; s = -\frac{1}{2}$

3- $n = 2; l = 2; l = 1; s = +\frac{1}{2}$

4- $n = 3; l = 2; l = 2; s = +\frac{1}{2}$

- 6- What is the maximum number of electrons in a shell?
- 7- What will be the maximum numbers of electrons having same spin, present in an atom for $n + l = 4$?

Exercise 2 :

1- Write the noble gas electron configuration and use an orbital diagram to describe the electron configuration of the valence shell of each of the following atoms:

N ($Z=7$), Si ($Z=14$), Cr ($Z=24$) Fe ($Z=26$), Cu ($Z=29$), Te ($Z=52$), Ag ($Z=47$), Mo ($Z=42$)

2- Locate these atoms in the periodic table and group them, if possible, by family or period.

3- Give the atomic number, electronic configuration of each of the following elements:

a-The noble gas in the same period as germanium (${}_{32}\text{Ge}$)- **b-**The alkaline earth metal in the same period as selenium (${}_{34}\text{Se}$)

c- The halogen in the same period as lithium (${}_{3}\text{Li}$) -**d-** The chalcogen in the same period as cadmium (${}_{48}\text{Cd}$)

4. The elements $Z = 117$ and 120 have not yet been discovered. In which family/group would you place these elements and also give the electronic configuration in each case.

Exercise 3 :

Consider the following chemical elements: ${}_{8}\text{O}$ ${}_{9}\text{F}$ ${}_{16}\text{S}$ ${}_{30}\text{Zn}$ ${}_{34}\text{Se}$

1- Write in a table: the electronic structure in the ground state of its atoms, core electrons, valence electrons specifying their position in the periodic table (period, group)

2 -Are there transition elements and halogens among them? justify.

3- Assign, by justifying, to each of these elements its electronegativity value taken from the values below:

electronegativity: 2,58 3,98 1,65 2,55 3,44

4-Predict the charge on the monatomic ions formed from the following atoms in binary ionic compounds

${}_{9}\text{F}$ ${}_{30}\text{Zn}$ et ${}_{34}\text{Se}$. Justify