

Tutorial Series N°4

Exercise 1

Which statements are correct?

- a. The periodic classification of elements has 18 columns.
- b. The periodic table has 3 blocks.
- c. The elements in the 1st column of the classification make up the halogen family.
- d. A column groups together elements with the same external electronic structure.
- e. The ionisation energy increases in a line from right to left.
- f. Each element has as many ionisation energies as it has valence electrons.
- g. Inert gases can only accept one electron in their valence shell.
- h. Electron affinity increases as you move up a column.
- i. Inert gases are highly electronegative.
- j. Alkaline earths easily capture electrons during chemical reactions.

Exercise 2

Given an element X with atomic number $Z = 14$.

- 1- Give the electronic configuration of the corresponding atom in its ground state.
- 2- Deduce the period and group of the classification to which X belongs.

Exercise 3

1- We consider the following atoms and ions:

^{17}Cl , ^{19}K , ^{20}Ca , ^{26}Fe , ^{28}Ni , ^{42}Mo , ^{22}Ti , ^{25}Mn , ^{35}Br , ^{47}Ag , ^{30}Zn , ^{11}Na , ^{12}Mg , and ^{29}Cu .

- a. Give the electronic configuration of the atoms and ions.
 - b. Locate these elements in the periodic table (indicate the period and the group).
 - c. Identify the block of each atom.
 - d. To which family do these atoms belong?
- 2- Provide the stable ions that can be formed by elements : ^{16}S , ^{17}Cl , ^{30}Zn , ^{11}Na , ^{12}Mg and ^{29}Cu .
- 3- An element belongs to the same period as Rb and to the same group as Mn. Determine its atomic number. $Z(\text{Rb})=37$

Exercise 4

Deduce the atomic number and electronic configuration of the following elements, knowing their place in the classification of the periodic table:

- Oxygen: 2nd period, 16th column (VI_A). What is the most likely ion from this element?
- Chlorine: 3rd period, 17th column (VII_A). To which chemical family does it belong?
- Manganese: 4th period, 7th column (VII_B). To which block does it belong?
- Cesium: 6th period, 1st column (I_A). Which chemical family and block does it belong to?

Exercise 5

The last electronic layer of an atom is the M layer. It contains 3 electrons.

- a. Give the Position of the element in the periodic table.
- b. Give its atomic number and identify it.
- c. What monoatomic ion is likely to form from this atom?
- d. Name two chemical elements belonging to the same family.

Exercise 6

Consider the following elements: ^{56}Ba , ^{40}Zr , ^{38}Sr , ^{31}Ga , ^{28}Ni , and ^{24}Cr .

1- For each element, provide its period, group, and subgroup.

2- Assign to each element the value of its atomic radius from the following options:

r (Å): 1.21, 1.25, 2.15, 1.60, and 2.17. Justify your choice.

3- Rank these elements in increasing order of electronegativity.

Exercise 7

Let be the series of the following elements:

Series 1 : ^{19}K , ^{11}Na , ^{12}Mg , ^{16}S , ^{17}Cl , ^{18}Ar

Series 2 : ^{18}Ar , ^{34}Se , ^{20}Ca , ^{10}Ne , ^{36}Kr , ^{31}Ga

Series 3 : ^{12}Mg , ^{14}Si , ^{18}Ar , ^{16}S , ^{38}Sr , ^{20}Ca

Series 4 : ^{55}Cs , ^8O , ^{19}K , ^{12}Mg , ^5B , ^6C

1- Place the elements on the periodic table.

2- In series 1, predict which elements form anions or cations.

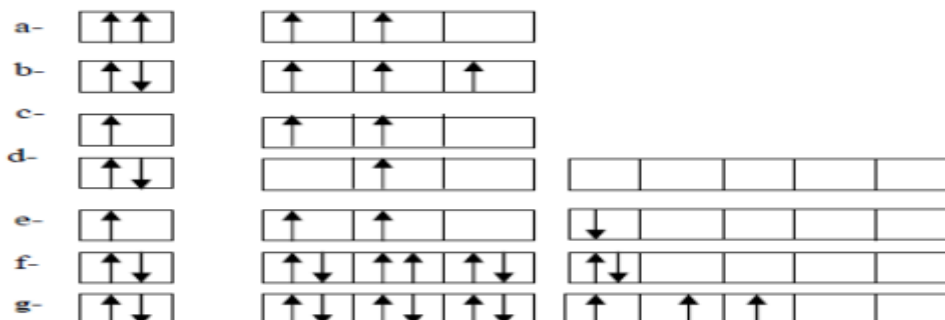
3- In series 2, classify the elements in order of increasing radius.

4- In series 3, classify the elements in order of increasing ionisation energy.

5- In series 4, classify the elements in order of increasing electronegativity.

Exercise 8

Which of the following electronic structures do not comply with the filling rules? Please explain.



Exercises for student

Exercise 1

The electronic structure of an atom is: K (2) L (6)

a. Position the element in the periodic table.

b. Give its atomic number and identify it.

c. How many electrons does the atom have? What monoatomic ion is this atom likely to produce? Justify your answer.

Exercise 2

Let be the following elements : ^{16}S , ^{17}Cl , ^{19}K , ^{24}Cr , ^{34}Se .

1- Give their electronic configuration and show the quantum bins in the valence layer (outer layer). Specify the number of single electrons.

2- Deduce the position of these elements in the periodic table (period, group or column, block).

3- Assign the value of the atomic radius and electronegativity to each of these elements.

Deduce the most electropositive element and the most electronegative element.

Data: Atomic radius (Å) : 2,20 ; 1,40 ; 1,15 ; 1,00 ; 0,79 .

Electronegativity according to Pauling (χ) : 3,16 ; 2,58 ; 0,82 ; 1,16 ; 2,48