

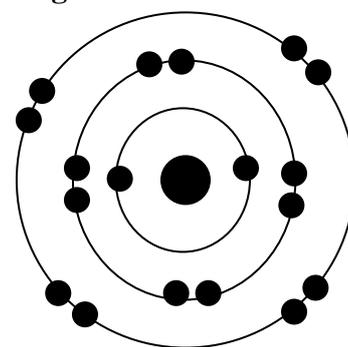
### First Exercise (6.5 pts)

Read the following paragraph then answer the questions below.

Fruits constitute an important source of vitamins and minerals which are absorbed by the blood. For example, potassium element is abundant in orange (170 mg potassium in one orange) and in banana (380 mg potassium in one banana).

1. Potassium ion has (+1) as a charge and it is represented in the adjacent figure.

- Write the electron configuration of potassium ion.
- Write the electron configuration of potassium atom. Explain your answer.
- Determine the atomic number of potassium atom.
- Identify the group and the row to which potassium element belongs.
- Write the equation for the formation of potassium ion.



2. Knowing that potassium element contains 20 neutrons in its nucleus.

- Find its molar mass.
- Calculate the number of moles of potassium in one orange.

### Second Exercise (4.75 pts)

Hydrogen is the lightest element found in nature. It is always found as a combined form like in hydrogen peroxide, hydrogen sulfide....

Hydrogen peroxide or oxygenated water ( $\text{H}_2\text{O}_2$ ) is an oxidant substance used in laboratory and in daily life in decolorizing hair and as disinfectant.

Given:  $\text{H}^\bullet$  ;  $\text{:}\ddot{\text{O}}^\bullet$  ;  $\text{O} (\text{K}^2 \text{L}^6)$

- Determine the valence of H and O.
- Knowing that the atomic mass of oxygen element is 16u. Determine the composition of oxygen element.
- Hydrogen sulfide is a colorless compound having a characteristic bad smell. It is a toxic gas found in some natural gas mines. In the molecule of hydrogen sulfide ( $\text{H}_n\text{S}$ ), sulfur atom is bonded to each hydrogen atom by a single covalent bond
  - Determine n, knowing that sulfur belongs to same group as oxygen.
  - Write the Lewis dot structure of hydrogen sulfide molecule.

### Third Exercise (8.75pts)

Phosphorus, of symbol P, is a very reactive element. It has two isotopes: P-30 and P-31.

In nature, phosphorus does not exist alone, it is always found in compounds like phosphate.

Phosphate is used as a fertilizer for a better plant growth. If it is used in big quantities it causes an excessive development of algae leading to rivers pollution.

Use the section of the periodic table below to answer the questions that follow.

H							
			C			F	
				P		Cl	

1. Define isotopes.
2. a) Determine the atomic number of P-31 and write its Lewis dot symbol.  
b) Deduce the number of electrons of element "X" found just above P in the periodic table.
3. Calculate the nuclear charge of P-30.
4. Justify why phosphate should not be used in big quantities.
5. **Phosphorus can react with Cl to give a molecular compound:  $\text{PCl}_3$ .**
  - a) Write the Lewis dot symbol of Cl and give its name.
  - b) Explain the formation of bonds in  $\text{PCl}_3$ .
  - c) Write the Lewis dot structure of  $\text{PCl}_3$ .
  - d) **Cl exists also in nature as a mixture of two isotopes  $^{35}\text{Cl}$  and  $^{37}\text{Cl}$ . The relative percentage abundance of each of the two isotopes is 75% and 25% respectively.**  
Represent by a histogram the relative % abundance of the two isotopes.

**Good work**