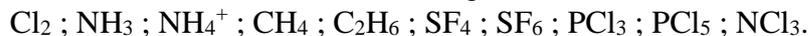


Series 4 "Chemistry 1"

Exercise 01:

I- Using the Lewis model, represent the following elements of the periodic table: ${}_5\text{B}$, ${}_6\text{C}$, ${}_7\text{N}$, ${}_9\text{F}$, ${}_{10}\text{Ne}$.

II-1. Give the Lewis notation for the following molecules and ions:



2. Which of these compounds do not respect the Octet rule?

3. On the basis of the electronic structures of the Sulphur and Phosphorus atoms, explain the formation of the molecules SF_6 and PCl_5 .

4. Predict the different possible valence's of phosphorus. The two chlorides PCl_3 and PCl_5 exist. Explain why only the compound NCl_3 is known, whereas the compound NCl_5 does not exist.

Exercise 02:

1. Consider the following molecules: BF_3 ; CO_2 ; CH_4 ; C_2H_4 and C_2H_2 . Specify the hybridization states of the carbon and boron atoms.

Exercise 03:

Consider the following molecules: C_2H_2 ; N_2H_2 ; H_2O_2 .

Give the hybridization state of the C, N and O atoms in these three molecules, as well as the number and nature of the bonds and the number of free doublets in each of them.

Exercise 04:

Using Gillespie's theory, specify the geometry of the following molecules:



Explain how the bond angles \widehat{HXH} and bond angles $\widehat{XB\bar{X}}$ vary in these molecules.

Exercise 05: (Done in courses)

1. Give the energy diagram of the molecular orbitals (MO) of the homonuclear molecule O_2 .

2. Deduce the electronic structure of the following molecular ions: O^{2-} ; O^{2+} and O_2^{2+} .

3. Compare the number of bonds and the bond length of these ions with those of the O_2 molecule and assign each molecule or molecular ion one of the following bond lengths: 1.49 Å; 1.26 Å; 1.21 Å and 1.12 Å.

4. Classify these chemical species by increasing bond strength.