University of Djilali Bounaama Khemis Miliana Faculty of Sciences of Matter and Computer Science Department of Chemistry

Series of exercises N°1

Chemical Bonding

Exercise Nº1:

1. Write the Lewis structure of the following atoms :

$$_{1}H$$
 $_{5}B$ $_{6}C$ $_{7}N$ $_{8}O$ $_{14}Si$ $_{16}S$ $_{17}Cl$

2. We consider the following molecules :

$$CH_4$$
; SiH_4 ; BH_3 ; C_3H_6 ; C_2H_2 ; C_6H_6 ; ClO_3^-

- *a.* Provide the Lewis structure of these molecules.
- **b.** Using the Valence Shell Electron Pair Repulsion (VSEPR) theory, determine: the hybridization state of the central atom, the type AXmEn, and the geometry of each molecule.

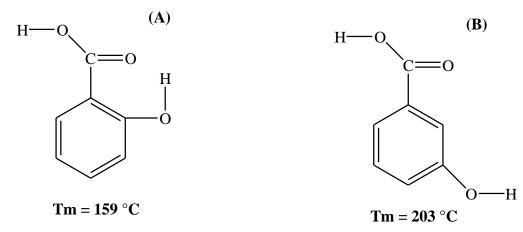
Exercise N•2:

Provide the Lewis structure of the molecules below as well as the geometry predicted by the V.S.E.P.R. method.

NH₄⁺; NH₂⁻; NCO⁻; NO₂⁻; NO₂⁺; NO₃⁻; SO₂; SO₃²⁻

Exercise N•3 :

2-Hydroxybenzoic acid or salicylic acid (A) melts at 159 °C, while 3-Hydroxybenzoic acid (B) melts at 203 °C.



Interpret the observed difference in melting temperature.

Exercise N•4:

Represent schematically the different overlaps of atomic orbitals for the molecules below, specifying the hybridization state of the carbon atom in each case.

 CH_4 ; CH_3 - CH_3 ; CH_2CCH_2 ; H_3CCN ; CH_2O