

HW 6 – October 30

**Lewis structures**, also known as Lewis dot diagrams, Lewis dot formulas, Lewis dot structures, electron dot structures, or Lewis electron dot structures (LEDS), are diagrams that show the bonding between atoms of a molecule and the lone (non-shared) pairs of electrons that may exist in the molecule.

Lewis structures show each atom and its position in the structure of the molecule using its chemical symbol. Lines are drawn between atoms that are bonded to one another (pairs of dots can be used instead of lines). Excess electrons that form lone pairs are represented as pairs of dots and are placed next to the atoms. Lewis structures show ONLY outer shell electrons.

For example, the Lewis structures for chlorine molecule is:



Note that chlorine outer shell configuration is ...  $3s^23p^5$

**Structural formulas** will show locations of chemical bonds between the atoms of a molecule. They consist of symbols for the atoms connected by short line that represent chemical bonds (each short line represents 2 electrons):

Cl-Cl, H-H, Cl-Mg-Cl

When detailed information is not needed **chemical formulas** are used. In chemical formulas the number on the right of the element symbol shows how many atoms of this element is present in a molecule.

E.g. for Cl-Cl the chemical formula is  $Cl_2$ , for Cl-Mg-Cl it is  $MgCl_2$

1. Based on the atoms' electron configurations for  ${}_6C$ ,  ${}_1H$  and the octet rule write down Lewis formula for the compound made from these elements that has one carbon atom. Write down its structural formula.
2. Write down symbols (with the charge and its value) for ions of sodium, oxygen, fluorine, magnesium, aluminum, that have the same electron shells as the noble gas neon.
3. Write down electron formulas of the outer shells for  ${}_{13}Al$  and  ${}_{17}Cl$ . One atom of aluminum and three atoms of chlorine make a compound where these atoms have completed outer shells of noble gases. What are these gases? Write down Lewis formula and structural formula for the compound of aluminum and chlorine.

4. Write down Lewis formula for the compound with one atom  ${}_{20}\text{Ca}$  and two atoms of  ${}_{9}\text{F}$ . How many shared and non-shared electrons are in this compound? What is its structural formula?