Name: Key
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Chemistry 11
An INTRO to CHEMICAL BONDING

Valence Electrons (REVISITED):
Valence electrons are the REACTING electrons. Recall that the NOBLE GASES have a full 8 valence electrons and are considered NON REACTIVE!

Example 1: Identify the number of valence electrons for the following atoms:

Atom	# valence e's	Atom	# valence e's
F $1s^2 2s^2 2p^5$	7	Pb $[Xe]\,6s^2 4f^{14} 5d^{10} 6p^2$	4
Ne $1s^2 2s^2 2p^6$	Ø	Pb^{2+} $[Xe]\,6s^2 4f^{14} 5d^{10}$	2
Na $1s^2 2s^2 2p^6 3s^1$	1	S^- $[Ne]\,3s^2 3p^5$	7
Na^+ $1s^2 2s^2 2p^6$	Ø	S^{2-} $[Ne]\,3s^2 3p^6$	Ø

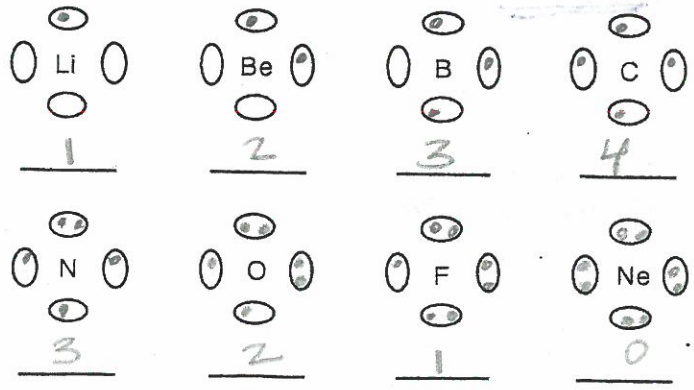
THE MODIFIED VALENCE ORBITALS OF AN ATOM

We learned previously that isolated atoms have their electrons placed in s, p , d and f orbitals. HOWEVER, when an atom is involved in a CHEMICAL BOND some of the atom's orbitals are MODIFIED to allow electrons to be shared between adjacent atoms. For purposes of Chemistry 11 all we need to know is that there are a total of FOUR orbitals into which electrons can be placed (we will IGONORE THE TRANSITION METALS WHEN DEALING WITH CHEMICAL BONDING IN CHEMISTRY 11)

THEREFORE, three rules dictate how valence electrons are placed into these FOUR modified orbitals:

1. EACH ORBITAL HOLDS UP TO "2" electrons.
2. B/c electrons REPEL place into separate orbitals first
3. When all ORBITALS HAVE 1e', begin pairing.

Example 2. Using the rules above, place the required number of valence electrons for each atom into the diagrams below. Show each electron as a DOT.



Experimental evidence suggests that "paired-up" electrons do NOT react; only UNPAIRED electrons normally take part in bonding and chemical reactions. On the space below each atom in the above example, write the number of unpaired electrons possessed by each atom.

VALENCE = the number of electrons that are NORMALLY available for bonding
→ the number of unpaired electrons in the atom

Combining Capacity→ another way of looking at the number of unpaired electons

Example 3. Fill in the number of unpaired electrons for the following atoms:

Atom	**H**	**He**						
Unpaired e	1	~~0~~						
Atom	**Li**	**Be**	**B**	**C**	**N**	**O**	**F**	**Ne**
Unpaired e	1	2	3	4	3	2	1	~~0~~
Atom	**Na**	**Mg**	**Al**	**Si**	**P**	**S**	**Cl**	**Ar**
Unpaired e	1	2	3	4	3	2	1	~~0~~

TYPES OF CHEMICAL BONDING:
Recall the PERIODIC TRENDS:
1. Going DOWN a family the atomic radius INCREASES
2. Going ACROSS a period the atomic radius DECREASES

} Due to electrostatic force!

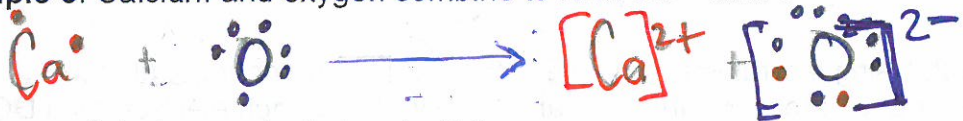
IONIC BONDING when an electron from one atom is transferred to another atom.

A LEWIS STRUCTURE, also known as an electon dot diagram, is a diagram showing how the VALENCE ELECTRONS are distributed in an atom, ion or molecule;

Example 4. Lithium combines with Fluorine to form Li^+ and F^-.

The electrostatic attraction between + and the – holds the ions together.

Example 5. Calcium and oxygen combine to form Ca^{2+} and O^{2-}



How to predict when an ionic bond will form:
1. elements combining are on opposites sides of the P.T.
2. when a METAL + NON-METAL combine

Read pgs 66 – 70 in CHEMISTRY 11
Do Section Review Questions 1+ 2 pg 74