

Previously

Valence e⁻ in Yellow

H	1s ¹		
He	1s ²	full	Noble gas
Li	1s ² ,2s ¹		
Be	1s ² ,2s ²		
B	1s ² ,2s ² p ¹		
C	1s ² ,2s ² p ²		
N	1s ² ,2s ² p ³		
O	1s ² ,2s ² p ⁴		
F	1s ² ,2s ² p ⁵		
Ne	1s ² ,2s ² p ⁶	full	Noble gas

1

The Octet Rule

Octet Rule- atoms will lose, gain, or share e⁻ to achieve the e⁻ configuration of the nearest noble gas in the periodic table (8 valence e⁻).

Special Case- He has only two e⁻ (First principle energy level full) and thus H is happy just having two e⁻.

2

Valence e⁻ Are Used to Form Bonds

- 2 types bonds we will talk about
 - Ionic: metal-nonmetal
 - Covalent: nonmetal-nonmetal

3

Ionic Bonds: Transferring e⁻

Ionization Energy- the amount of energy it takes to remove an e⁻ from an atom.

Electronegativity- how strongly an atom pulls on another atoms e⁻.

Ions- atoms that have either lost (cations) or gained (anions) e⁻.

Ionic Compounds- form when a reaction takes place between two atoms with widely different ionization energies (metal and nonmetal).

4

Ionic Bonds are Electrostatic Bonds

+ charge is attracted to - charge
A *crystal lattice* will form to spread out the charge.

Crystal lattice- large, regular shaped structure which forms when ions interact to form an electrically neutral structure.

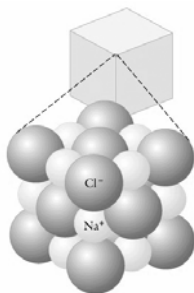


Fig 3.4 Blei and Odian

5

Formulas



Formula unit is used since a crystal of NaCl is too big

Formula unit- the simplest whole-number ratio which will describe an ionic crystal

Use “criss-cross” method to determine formula

6

Oxidation State

Do not forget how to determine oxidation state by looking at the periodic table!

7

Sample Test Questions

1. What is the formula unit for the interaction of Ca^{2+} and Cl^- ?
2. What is the formula unit for the interaction of rubidium and oxygen?

8

Nomenclature of Binary Ionic Compounds

Binary Ionic compounds- exactly two elements

Named: metal nonmetal root + ide

Sodium chloride

9

Sample Test Question

What is the name of the ionic compound, AlCl_3 ?

10

Nomenclature of Ionic Compounds Containing Transition Elements

Common name of transition elements:

$\text{Fe}^{2+}/\text{Fe}^{3+}$ Ferrous Ferric

$\text{Sn}^{2+}/\text{Sn}^{4+}$ Stannous Stannic

Systematic name easier.

$\text{Fe}^{2+}/\text{Fe}^{3+}$ Iron (II) Iron (III)

FeCl_2

iron (II) chloride

SnCl_4

tin (IV) chloride

11

Polyatomic Ions

Polyatomic Ionic compounds- two or more atoms can combine to act as a unit (two or more elements).

Table 3.2 lists ones you will run into often-

LEARN the Ones Listed in Class

TABLE 3.2 Some Important Polyatomic Ions

Ion	Name	Ion	Name
		HCO_3^-	hydrogen carbonate
NO_2^-	nitrite		
		HPO_4^{2-}	hydrogen phosphate
$\text{C}_2\text{H}_3\text{O}_2^-$	acetate	H_2PO_4^-	dihydrogen phosphate
CN^-	cyanide		
HSO_4^-	hydrogen sulfate	HSO_3^-	hydrogen sulfite

12

Polyatomic Ions

Formula unit is determined by criss-cross method, using the polyatomic ion as a unit.

Named: polyatomic cation polyatomic anion

or polyatomic cation anion root + *ide*

or cation polyatomic anion

13

Sample Test Questions

What is the formula unit for the interaction of NH_4^+ and F^- ?

What is the formula unit for the interaction of ammonium and phosphate?

What is the name of NH_4Br ?

What is the name of $\text{Ca}_3(\text{PO}_4)_2$?