

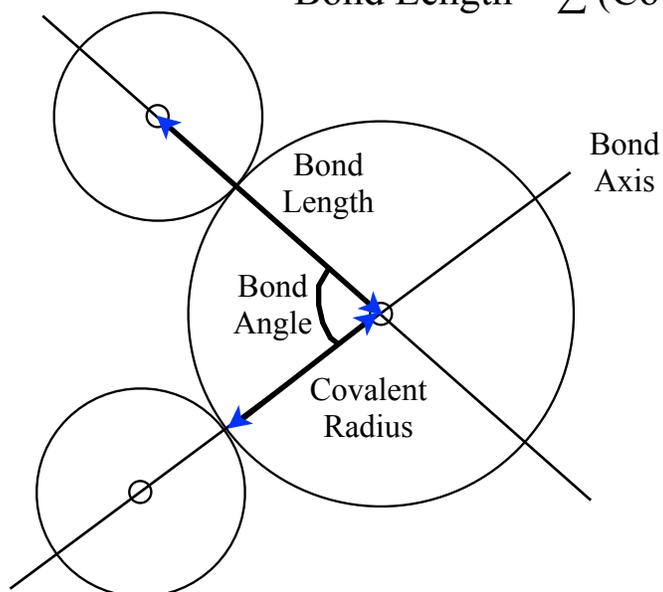
Introduction to Bonding

1

Introduction To Bonding

Bonding Terminology

$$\text{Bond Length} = \sum (\text{Covalent Radii})$$



2

Introduction To Bonding

Foundational Thoughts

- Chemical bonds are attractive forces which hold atoms together to form compounds.
- These attractive forces are created when the valence electron clouds from two atoms interact with each other.
- There are several types of bonds which can form.
- The type of bond which forms depends on the characteristics of the atoms which are interacting.....
 - Metal with a Non-Metal
 - Non-Metal with a Non-Metal
 - Metal with a Metal

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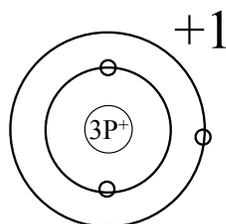
Metal with a Non-Metal

- What are the chemical properties of metals?
- What are the chemical properties of non-metals?
- What do you think will happen when they react together?

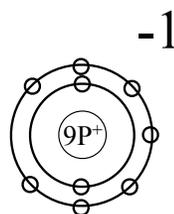
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Metal with a Non-Metal

- Ionic Bonding
 - A strong non-metal steals electrons from a weak metal
 - Ions are formed
 - These ions then attract to form a **salt**
 - A compound which contains ionic bonds



Lithium



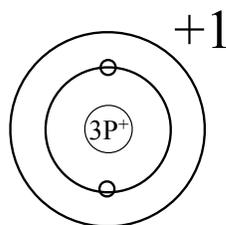
Fluorine

5

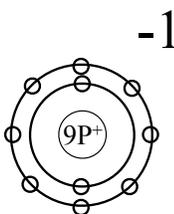
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Lithium



Lithium **Fluoride** Salt

6

Introduction To Bonding

Non-Metal with a Non-Metal

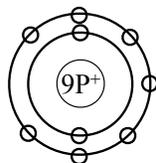
- What are the chemical properties of non-metals?
- What do you think will happen when 2 react together?
- There are two possible results
 - Equal Sharing
 - Unequal Sharing

7

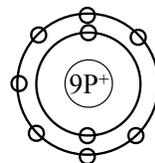
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Non-Metal with a Non-Metal

- Non-Polar Covalent Bonding
 - Two atoms of the same non-metal
 - Equal Sharing
 - Forms **non-polar molecules**



Fluorine



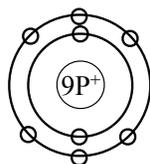
Fluorine

8

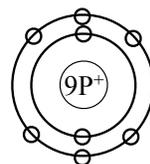
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Fluorine



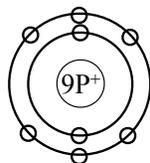
Fluorine

9

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Non-Metal with a Non-Metal

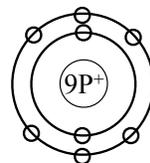
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Fluorine



Non-Polar F₂ Molecule



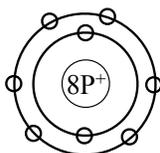
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10

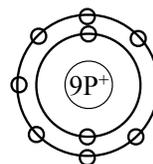
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Non-Metal with a Different Non-Metal

- Polar Covalent Bonding
 - Different non-metals close enough in strength that they share
 - This sharing is unequal - creates dipoles
 - Partial charge on a bond caused by unequal sharing
 - Forms **polar molecules**



Oxygen



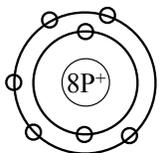
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11

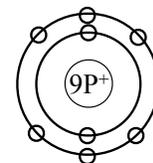
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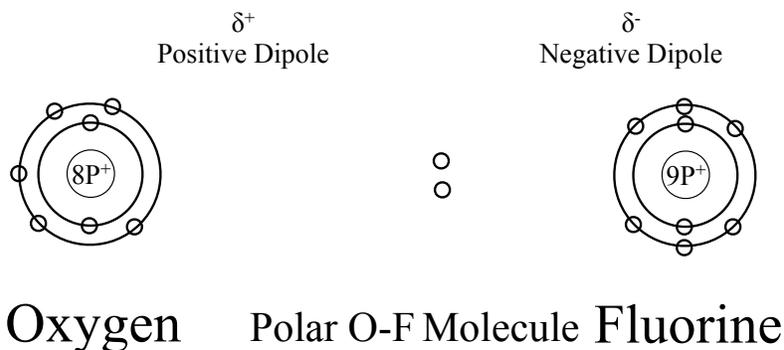
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12

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13

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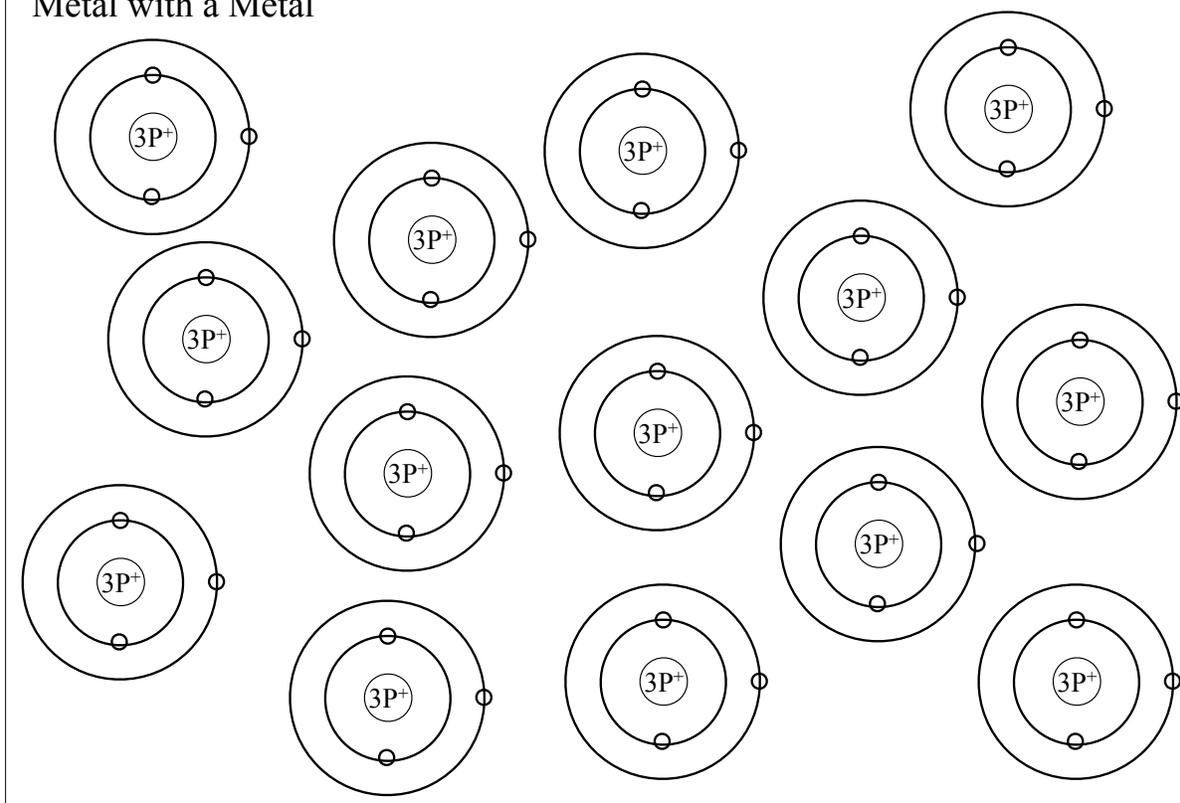
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14

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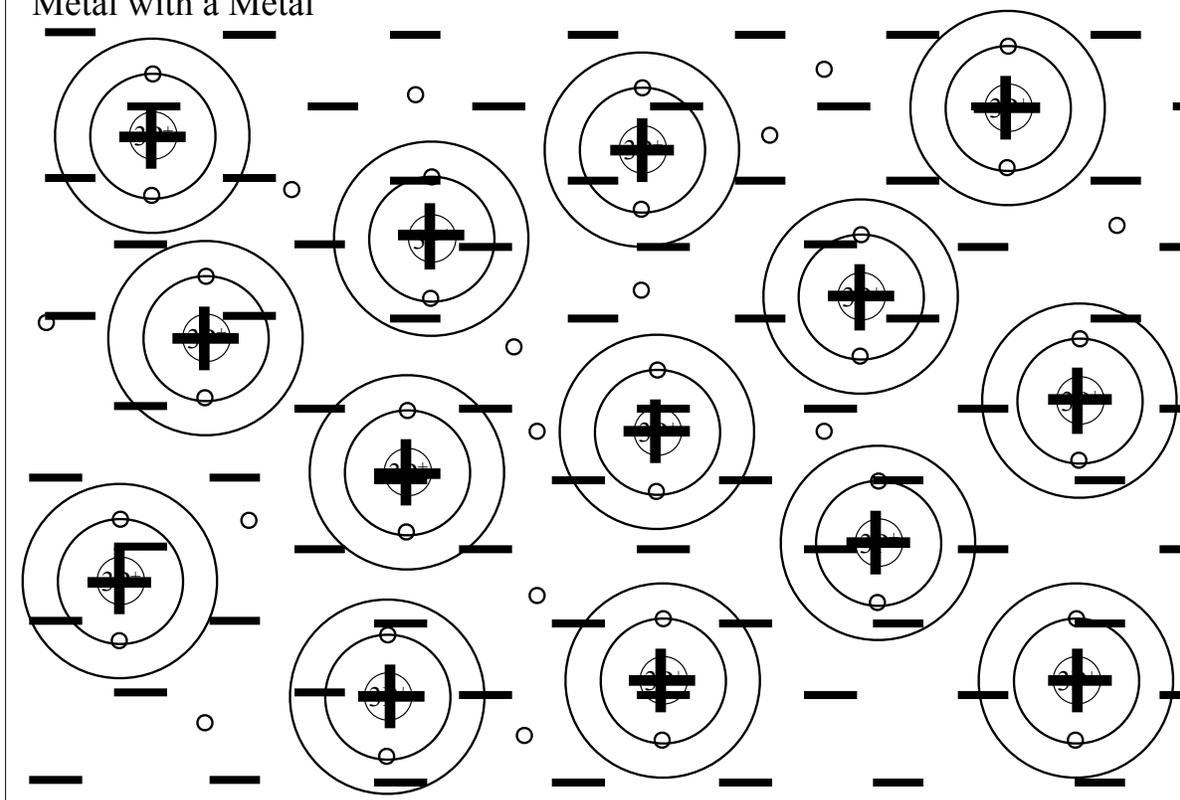
Metal with a Metal



15

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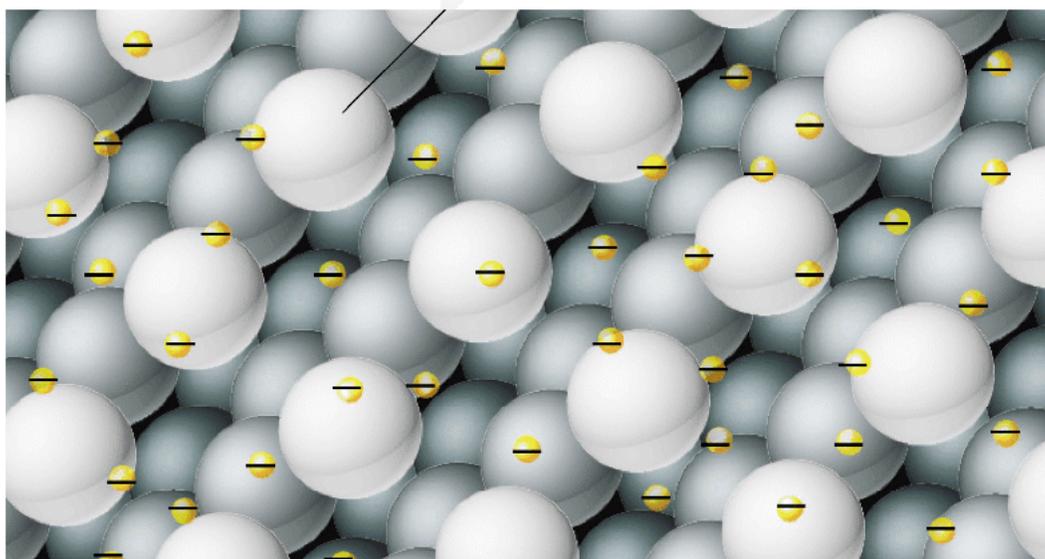
Metal with a Metal



16

Introduction To Bonding

Metal with a Metal



Sea of Electrons

17

Introduction To Bonding

Summary

<u>Type of Bond</u>	<u>Formed By</u>	<u>Mode of Formation</u>	<u>Properties</u>
Ionic (Stealing)	A metal & a non-metal	-Electron transfer, creating ions which attract -Forms Salts NaCl CaI ₂	-ions in all phases -solids insulate -solids have high melting points
Covalent (Sharing)	2 non-metals same - nonpolar different - polar	-Sharing electrons -Forms Molecules CO ₂ H ₂ O sugar, fats, proteins	-no ions -low melting pt -insulate in all phases
Metallic	atoms of metals	Delocalized sea of electrons around weak nuclei	-conduct -ductile -malleable -shiny -high melting pt

18