

Bonding Test Review

Part I: Complete the following table.

Type of Bond	Type of Elements?	Electron behavior	Properties
Ionic Bond	metal + non	<ul style="list-style-type: none"> Metal <u>lose</u> electron(s) Nonmetal <u>gain</u> electron(s) 	<ul style="list-style-type: none"> Brittle (easy to break) <u>high</u> melting point Electrolytes (charged ions)
Covalent Bond	non + non	Electrons are <u>shared</u> !	<ul style="list-style-type: none"> <u>low</u> melting point Non-electrolytes
Metallic Bond	metal + metal	<u>sea of electrons</u> : electrons float between all of the metal atoms	<ul style="list-style-type: none"> <u>malleable</u> (easy to bend) <u>ductile</u> (form wires) Conductive

Part II: Name the following compounds.

Formula	Type of bond (ionic/covalent)	Name
Al ₂ S ₃	I	aluminum sulfide
AlPO ₄	I	aluminum phosphate
Si ₂ Br ₆	C	<u>disilicon</u> <u>hexabromide</u>
NaBr	I	sodium bromide
C ₃ H ₈	C	<u>tricarbon</u> <u>octahydride</u>
Na ₂ SO ₄	I	sodium sulfate
K ₃ N	I	potassium nitride
CF ₄	C	carbon <u>tetrafluoride</u>
Ca(C ₂ H ₃ O ₂) ₂	I	calcium acetate
N ₂ O ₃	C	<u>dinitrogen</u> <u>trioxide</u>
H ₂ O	C	<u>dihydrogen</u> <u>monoxide</u>
LiBr	I	lithium bromide
SrO	I	strontium oxide

Part III: Name the following compounds.

Formula	Type of bond (ionic/covalent)	Name
HI	C	hydrogen monoiodide
AlCl ₃	I	+3 aluminum chloride -1
K ₂ (CO ₃)	I	+1 potassium carbonate -2
P ₄ O ₁₀	C	tetraphosphorus decoxide
N ₂ O ₃	C	dinitrogen trioxide
Ni₂Se	I	+3 nickel (III) sulfide -2
Mn(ClO₃)₄	I	+4 tin (IV) chlorate -1
IF ₅	C	iodine pentafluoride
(NH ₄) ₂ O	I	+1 ammonium oxide -2
BF ₃	C	boron trifluoride

Part IV: Lewis Dot Structure & VSEPR

- Determine if the compound is ionic or covalent and circle.
- If it is IONIC, then cross out the bottom box because it does NOT apply to ionic bonds
- If it is COVALENT, then complete the bottom box and determine the VSEPR shape
 - Remember: VSEPR shapes only apply to COVALENT bonds

HBr	ionic or covalent	Li ₂ O	ionic or covalent
H-Br:		Li⁺ Li⁺ [O:]⁻²	
# of elements bonded to central atoms: <u>n/a</u>		# of elements bonded to central atoms: _____	
Lone pairs on central atom? <u>Y or N</u>		Lone pairs on central atom? Y or N	
VSEPR shape: <u>linear</u>		VSEPR shape: _____	

LiF	ionic or covalent	CF ₄	ionic or covalent
Li⁺ [F:]		$\begin{array}{c} \text{:F:} \\ \\ \text{:F}-\text{C}-\text{F:} \\ \\ \text{:F:} \end{array}$	
# of elements bonded to central atoms: _____ Lone pairs on central atom? Y or N _____ VSEPR shape: _____		# of elements bonded to central atoms: <u>4</u> Lone pairs on central atom? Y or N <u>N</u> VSEPR shape: <u>tetrahedral</u>	
H ₂ O	ionic or covalent	GaBr₃	ionic or covalent
$\text{H}-\ddot{\text{O}}-\text{H}$		Ga³⁺ [Br:]⁻ [Br:]⁻ [Br:]⁻	
# of elements bonded to central atoms: <u>2</u> Lone pairs on central atom? Y or N <u>Y</u> VSEPR shape: <u>bent</u>		# of elements bonded to central atoms: _____ Lone pairs on central atom? Y or N _____ VSEPR shape: _____	
NH ₃	ionic or covalent	MgF₂	ionic or covalent
$\begin{array}{c} \text{H}-\ddot{\text{N}}-\text{H} \\ \\ \text{H} \end{array}$		Mg²⁺ [F:]⁻ [F:]⁻	
# of elements bonded to central atoms: <u>3</u> Lone pairs on central atom? Y or N <u>Y</u> VSEPR shape: <u>trigonal pyramidal</u>		# of elements bonded to central atoms: _____ Lone pairs on central atom? Y or N _____ VSEPR shape: _____	

Part V: Fill in the blanks for the sentences below.

1. Polyatomic ions are covalent compounds made up of multiple atoms that act as a single unit, which have an overall charge.
2. There are 4 unshared (nonbonding) electrons in a molecule of H_2O . 2 lone pairs
3. There are 4 unshared (nonbonding) electrons in a molecule of OF_2 . 2 lone pairs
4. There are 2 unshared (nonbonding) electrons in a molecule of As_3 . 1 lone pair
5. The VSEPR model of molecular shapes works because all nonmetals have a negative charge and thus repel each other.
6. The charge of an anion is \ominus because it has gained electrons.
(anion or cation?) (+ or - ?)
7. The charge of a cation is \oplus because it has lost electrons.
(anion or cation?) (+ or - ?)
8. The electron-sea model explains why metallic bonds lead to compounds which are malleable (easy to shape) and good conductors of electricity.
9. ionic bonds occur when a metal and a non-metal bond.
10. covalent bonds occur when multiple non-metals bond.
11. metallic bonds occur when one or more metals bond.