

7 • How Do Atoms Stick Together?

LECTURE NOTES A

1. The two most important types of bonding are _____ bonds that involve the *transfer* of electrons and _____ bonds that involve the *sharing* of electrons.

2. We will also study metals that involve loosely held _____. This is called _____ bonding.

Ionic Bonding

The Point:

Ionic bonds can be explained with two ideas:

- *Many atoms gain or lose electrons and achieve a stable noble gas electron configuration and a charge.*
- *Oppositely charged ions attract each other. This attraction is the ionic bond. Lewis electron-dot diagrams simplify the way we show the valence electrons in atoms.*

3. The electron configurations of the _____ are stable... so they don't often react.

4. Potassium, K, must _____ (gain/lose) electrons to have a noble gas electron configuration. It will have the same electron structure as the noble gas _____.

5. Chlorine, Cl, must _____ (gain/lose) electrons to have a noble gas electron configuration. It will have the same electron structure as the noble gas _____.

6. In the dungeon video, the instructors (Bob Lewis & Lee Marek) demonstrated a reaction between _____ metal and chlorine gas.

7. Since many elements gain or lose electrons and end up with 8 valence electrons, this arrangement is called an _____. This tendency to have 8 electrons is called the _____.

8. Write four ions that have same stable electron configuration as neon, Ne.

		Ne		
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Do these ions have the same *nucleus* as Ne? ____

9. Which noble gas does not follow the octet rule? ____ Is it stable? _____

10. Negative ions are also called _____. Positive ions are also called _____.

11. K^+ and Cl^- are attracted to each other because they have _____ charges. This attraction is called the ionic bond.

12. Write the Lewis dot diagram for neutral sulfur, S, and the ion it forms.

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13. Write the dot diagram for neutral aluminum, Al, and the ion it forms.

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Covalent Bonding

The covalent bond results from electrons spending time near two nuclei at the same time. Two atoms with large attractions for electrons (nonmetals) overlap their orbitals to allow the electrons to be "shared".

14. The simplest covalent bond occurs in the H_2 molecule. Draw the Lewis symbol for H and H_2 .

H	H_2
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15. Draw the two protons and two electrons when two H atoms come close enough to bond:

16. The energy of two protons and two electrons is _____ (higher/lower) when the negative electrons are close to **both** positive protons than when each electron is close to only one proton.

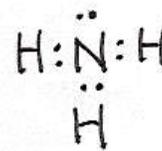
17. Add dots to the symbols for the period 3 elements. Indicate the bonding capacity for each

Na	Mg	Al	Si	P	S	Cl	Ar

(Thinking back to the models used in Unit 1... the hole in each sphere represented a single electron.)

H	C	O	Cl	Br	I	N

18. In the dot diagram for ammonia, NH_3 , eight electrons are drawn...



_____ electrons come from nitrogen

_____ electrons come from hydrogens

Circle the "lone pair" of electrons.

19. Each of the diatomic elements involves a covalent bond.

Draw the Lewis symbol for each one.

Which one does not follow the octet rule? _____

Diatomic Molecule	Lewis Symbol
H_2	H H
N_2	N N
O_2	O O
F_2	F F
Cl_2	Cl Cl
Br_2	Br Br
I_2	I I

20. When one pair of electrons is being shared, the bond is called a _____ bond.

When two pairs of electrons are being shared, the bond is called a _____ bond.

Three pairs are shared in a _____ bond.