

Objectives 4 & 5:

4. Explain how ionic compounds are formed, predict their formulas, and draw the ions.
5. Explain how covalent compounds are formed and draw their Lewis Structures.

**Octet rule**

<https://sciencing.com/use-octet-rule-8651379.html>

1. What is the octet rule?

2. Complete the following table

Element	Periodic table group	Number of outer or valence electrons	Number of additional electrons needed to fill outer energy level
Hydrogen			
Carbon			
Nitrogen			
Oxygen			
Chlorine			
Silicon			
Phosphorus			
Sulfur			
Bromine			

3. Why is hydrogen stable with only 2 outer electrons instead of 8 outer electrons?

4. Why does the 8A periodic table group not react with other elements?

**Introduction to ionic compounds**

<http://chemistry.elmhurst.edu/vchembook/143Aioniccpds.html>

5. What is the difference between an atom and an ion?

6. How do positive ions form?

7. Why do metals tend to form positive ions?

8. How do negative ions form?

9. Why do nonmetals tend to form negative ions?

10. What holds the positive and negative ions together in an ionic bond?

**Electron dot diagrams (sometimes called Lewis Structure)**

<http://www.usetute.com.au/lewisstr.html>

11. What is an electron dot diagram?

12. Draw electron dot diagrams for each of the following elements

Sodium                  Calcium                  Aluminum                  Carbon

Nitrogen                  Sulfur                  Fluorine                  Argon

**Dot diagrams for ionic compounds**

<http://www.kentchemistry.com/links/bonding/IonicLewisDots.htm>

14. Write the ions for each of the following compounds

NaCl

MgCl<sub>2</sub>

Al<sub>2</sub>O<sub>3</sub>

15. Complete the following table

Metal element	Number of outer electrons	Charge of metal ion	Nonmetal element	Number of outer electrons	Charge of nonmetal ion	Formula of metal + nonmetal compound	Electron dot diagram of compound
Potassium	1	+1	Fluorine	7	-1	KF	$[K]^{+1} [F:]^{-1}$ **
Calcium			Oxygen				
Sodium			Sulfur				
Magnesium			Chlorine				

## Covalent Bonds

<http://hyperphysics.phy-astr.gsu.edu/hbase/Chemical/bond.html>

16. How is a covalent bond formed?
17. Ionic compounds are formed by a metal and a nonmetal. What types of elements form covalent bonds?

## Diatomic elements

<http://study.com/academy/lesson/what-is-a-diatomic-element-definition-examples.html>

18. Draw Lewis Structures and tell the number of electrons shared by each diatomic element

H<sub>2</sub>

N<sub>2</sub>

O<sub>2</sub>

F<sub>2</sub>

## Lewis Structures for some covalent molecules

<http://www.chemguide.co.uk/atoms/bonding/covalent.html>

19. Draw Lewis Structures for the following compounds

Hydrogen chloride HCl

Methane CH<sub>4</sub>

Ammonia NH<sub>3</sub>

Water H<sub>2</sub>O