

Name: Key  
Atoms, Periodic Table, and Bonding Study guide

Period: \_\_\_\_\_

Test: Wednesday 12/18/19

In addition to this study guide, make sure you also:

- Read your TEXTBOOK (chapter 3 of the Chemical Building Blocks Book and Chapter 1 pages 12-25 of the Chemical Interactions Book)
- Review notes, homework, labs, and quizzes from your science binder (Pages 6-29)

1. Complete the table below on the charges, mass, and location of the 3 subatomic particles.

Subatomic particle	Location	Charge	Mass
Protons	Nucleus	+	1 atomic mass unit
Neutrons	Nucleus	0	1 atomic mass unit
Electrons	Electron Cloud	-	0 (Negligible)

2. What is the difference between an element and atom?

An atom is the smallest particle of an element. An element is the simplest pure substance that cannot be broken down into other substances. Elements are made

3. Why are atoms neutral?

They have equal numbers of positive protons & negative electrons. of all the same type of atoms.

4. a) What is the atomic number?

The number of protons in the nucleus

- b) Where can I find the atomic number for an element?

The number above the elements symbol on the Periodic Table

5. What is the atomic mass?

The average mass of the atom which equals the mass of the protons and neutrons.

6. How can you determine the number of neutrons in an atom?

Atomic mass - Atomic number

7. How can you determine the number of electrons in a neutral atom?

# of electrons = # of protons

8. Fill-in the following information about the organization of the Periodic table.

a. The atomic number increases by 1 as you move from left to right.

b. Each column on the Periodic Table is a Group.

c. Each horizontal row is a Period.

9. Why do elements in the same group have similar chemical properties?

They all have the same number of valence electrons.

10. What are 3 properties of metals?

(1) Shiny (2) Solid at room temp (except Mercury) (3) Ductile  
(4) Conductors (5) Malleable

11. Where are metals located on the Periodic table?

Left side of Periodic Table

12. What are 3 properties of nonmetals?

(1) Dull (2) Brittle (3) Poor Conductors

13. Where are nonmetals located on the Periodic table?

Right side of Periodic Table

14. What are 2 properties of Metalloids?

(1) Semiconductors (2) Some shiny / Some Dull

15. Where are the Metalloids on the Periodic Table?

Both sides of the ZigZag line.



16. How many electrons can be held in the first energy level? 2 The second? 8

17. Complete the following table:

Name of the Family	Group Number	Number of Valence Electrons	Gain or lose Electrons	Charge as an Ion
Alkali Metals	<u>1</u>	<u>1</u>	<u>Lose</u>	<u>+1</u>
Alkaline Earth Metals	<u>2</u>	<u>2</u>	<u>Lose</u>	<u>+2</u>
Boron Family	<u>13</u>	<u>3</u>	<u>Lose</u>	<u>+3</u>
Carbon Family	<u>14</u>	<u>4</u>	<u>—</u>	<u>—</u>
Nitrogen Family	<u>15</u>	<u>5</u>	<u>Gain</u>	<u>-1</u>
Oxygen Family	<u>16</u>	<u>6</u>	<u>Gain</u>	<u>-2</u>
Halogen	<u>17</u>	<u>7</u>	<u>Gain</u>	<u>-3</u>
Noble Gas	<u>18</u>	<u>8</u>	<u>Stable</u>	<u>—</u>

18. What determines whether or not an atom will form chemical bonds?

How many valence electrons the element has. The goal is to have a complete outer shell of 8 (except Hydrogen + Helium with 2).

19. What are valence electrons? How many are there in Lithium, Chlorine, and Oxygen?

Outer most electrons

↓      ↓      ↓  
1      7      6

20. What is an ion?

An atom with an electric charge because it lost or gained an electron.

21. Compare and contrast ionic and covalent bonds

Ionic + Covalent bonds both hold atoms together due to an attraction for valence electrons. They both want a full shell. Ionic bonds transfer/gain electrons; have high melting points, + conduct electricity; occur between a metal + nonmetal.

22. a) Atoms that gain electrons will have a negative charge.

b) Atoms that lose electrons will have a positive charge.

Covalent share electrons; have low melting point, poor conductors, + occur between a nonmetal + nonmetal.

23. The formula for Aluminum fluoride is  $AlF_3$ . Explain what this formula means.

1 Atom of Aluminum bonded to 3 atoms of Fluorine.

24. What is a double and triple bond?

Double bond is when 2 pairs of electrons are shared ex/  $O_2$  : $\ddot{O}::\ddot{O}$ :

Triple bond is when 3 pairs of electrons are shared ex/  $N_2$  : $\ddot{N}:::\ddot{N}$ :

25. What are polar and nonpolar bonds?

Polar bonds are covalent bonds that share electrons unequally.

Nonpolar bonds share electrons equally

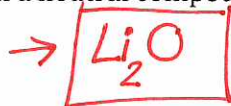
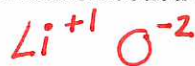
26. Draw the electron-dot diagram for



27. How can you determine the number of covalent bonds that an atom can form?

# of covalent bonds = # of valence electrons needed

28. What is the formula for Lithium oxide? (Use the periodic table to find the charges and then determine the ratio of atoms needed to result in a neutral compound).



*\*Make sure you review the answer key for the drawing of Ionic and Covalent bonds on the class website under answer keys.*