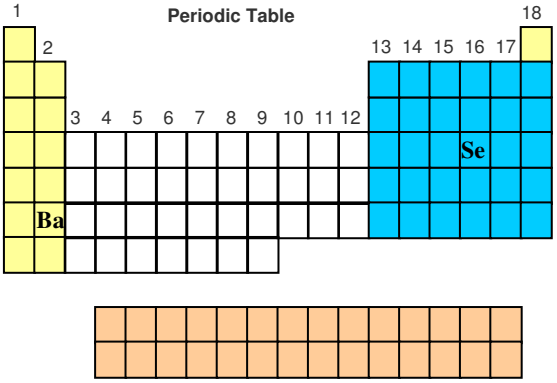
Lewis Dot Diagrams

Chem Worksheet 5-7

Name _____

The outermost electrons in an atom are called the **valence electrons**. These electrons are especially important because they interact with other atoms in chemical bonds. The valence electrons are those electrons in the highest energy level. When the electron configuration is known, the number of valence electrons can be determined by adding up the electrons found in the highest energy *s* and *p* orbitals. The number of valence electrons can also be determined by simply determining the group number on the periodic table. The last digit of the group number indicates the number of valence electrons.



Examples:
Selenium has 6 valence electrons (it's in group 16)
Barium has 2 valence electrons (it's in group 2)

Lewis Diagrams

Se: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^4$
has 6 valence electrons

Ba $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2$
has 2 valence electrons

A system of tracking valence electrons was developed by G. N. Lewis. In this system the element symbol is written to represent an atom and dots are written around the symbol to represent valence electrons. The dots are generally spaced out evenly. Since the largest number of valence electrons for the **representative elements** (those in the *s* or *p* block) is eight, we place a maximum of two dots on each side.

Use your periodic table to answer the following questions.

1. Tin has _____ valence electrons, and chlorine has _____ valence electrons.

2. Three atoms that have eight valence electrons are _____, _____, and _____.

3. Each of the atoms in alkali earth metal family (group 2) has _____ valence electrons.

4. Sodium has _____ valence electrons, and bismuth has _____ valence electrons.

5. The valence electrons are those found in the highest energy ____ and ____ orbitals.

6. How many dots are drawn in the Lewis dot diagram for phosphorus?

7. Iodine has seven valence electrons. Which other elements have seven valence electrons?

8. An element with the electron configuration: [Xe] $6s^2 4f^{14} 5d^{10} 6p^2$ has how many valence electrons?

Write the electron dot (Lewis) diagrams for the following.

9. carbon

10. silicon

11. magnesium

12. neon

13. tellurium

14. aluminum

15. rubidium

16. helium

17. fluorine

18. lithium

19. gallium

20. $1s^2 2s^2 2p^3$

21. $1s^2 2s^2 2p^6 3s^2 3p^6$

22. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$

23. [Rn]$7s^1$

24. [Ar]$4s^2 3d^{10} 4p^4$

25. [Xe]$6s^2 4f^{14} 5d^{10} 6p^5$

26. [Kr]$5s^2 4d^{10} 5p^1$

27. radon

28. calcium

29. radium