

ELEMENT SYMBOLS

Name _____

An element symbol can stand for one atom of the element or one mole of atoms of the element. (One mole = 6.02×10^{23} atoms of an element.)

Write the symbol for the following elements.

- | | |
|-------------------|---------------------|
| 1. oxygen _____ | 11. plutonium _____ |
| 2. hydrogen _____ | 12. americium _____ |
| 3. chlorine _____ | 13. radium _____ |
| 4. mercury _____ | 14. germanium _____ |
| 5. fluorine _____ | 15. zinc _____ |
| 6. barium _____ | 16. arsenic _____ |
| 7. helium _____ | 17. lead _____ |
| 8. uranium _____ | 18. iron _____ |
| 9. radon _____ | 19. calcium _____ |
| 10. sulfur _____ | 20. cobalt _____ |

Write the name of the element that corresponds to each of the following symbols.

- | | |
|--------------|--------------|
| 21. Kr _____ | 31. Cu _____ |
| 22. K _____ | 32. Ag _____ |
| 23. C _____ | 33. P _____ |
| 24. Ne _____ | 34. Mn _____ |
| 25. Si _____ | 35. I _____ |
| 26. Zr _____ | 36. Au _____ |
| 27. Sn _____ | 37. Mg _____ |
| 28. Pt _____ | 38. Ni _____ |
| 29. Na _____ | 39. Br _____ |
| 30. Al _____ | 40. Hg _____ |

ATOMIC STRUCTURE

Name _____

An atom is made up of protons and neutrons (both found in the nucleus) and electrons (in the surrounding electron cloud). The atomic number is equal to the number of protons. The mass number is equal to the number of protons plus neutrons. In a neutral atom, the number of protons equals the number of electrons. The charge on an ion indicates an imbalance between protons and electrons. Too many electrons produces a negative charge, too few, a positive charge.

This structure can be written as part of a chemical symbol.

Example:

$$\begin{array}{c}
 \text{mass} \\
 \text{number} \\
 \downarrow \\
 15\text{N}^{+3} \\
 \uparrow \\
 7 \\
 \text{atomic} \\
 \text{number}
 \end{array}$$

charge

7 protons
8 neutrons (15 - 7)
4 electrons

Complete the following chart.

Element/ Ion	Atomic Number	Atomic Mass	Mass Number	Protons	Neutrons	Electrons
H						
H ⁺						
$^{12}_6\text{C}$						
$^7_3\text{Li}^+$						
$^{35}_{17}\text{Cl}^-$						
$^{39}_{19}\text{K}$						
$^{24}_{12}\text{Mg}^{2+}$						
As ³⁻						
Ag						
Ag ⁺¹						
S ⁻²						
U						

ISOTOPES AND AVERAGE ATOMIC MASS

Name _____

Elements come in a variety of isotopes, meaning they are made up of atoms with the same atomic number but different atomic masses. These atoms differ in the number of neutrons.

The average atomic mass is the weighted average of all the isotopes of an element.

Example: A sample of cesium is 75% ^{133}Cs , 20% ^{132}Cs and 5% ^{134}Cs . What is its average atomic mass?

Answer: $.75 \times 133 = 99.75$

$.20 \times 132 = 26.4$

$.05 \times 134 = \underline{6.7}$

Total = 132.85 amu = average atomic mass

Determine the average atomic mass of the following mixtures of isotopes.

1. 80% ^{127}I , 17% ^{126}I , 3% ^{128}I

2. 50% ^{197}Au , 50% ^{198}Au

3. 15% ^{55}Fe , 85% ^{56}Fe

4. 99% ^1H , 0.8% ^2H , 0.2% ^3H

5. 95% ^{14}N , 3% ^{15}N , 2% ^{16}N

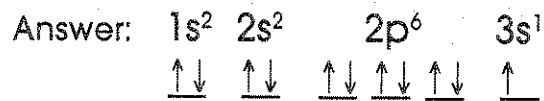
6. 98% ^{12}C , 2% ^{14}C

ELECTRON CONFIGURATION (LEVEL ONE)

Name _____

Electrons are distributed in the electron cloud into principal energy levels (1, 2, 3, ...), sublevels (s, p, d, f), orbitals (s has 1, p has 3, d has 5, f has 7) and spin (two electrons allowed per orbital).

Example: Draw the electron configuration of sodium (atomic #11).



Draw the electron configurations of the following atoms.

1. Cl

2. N

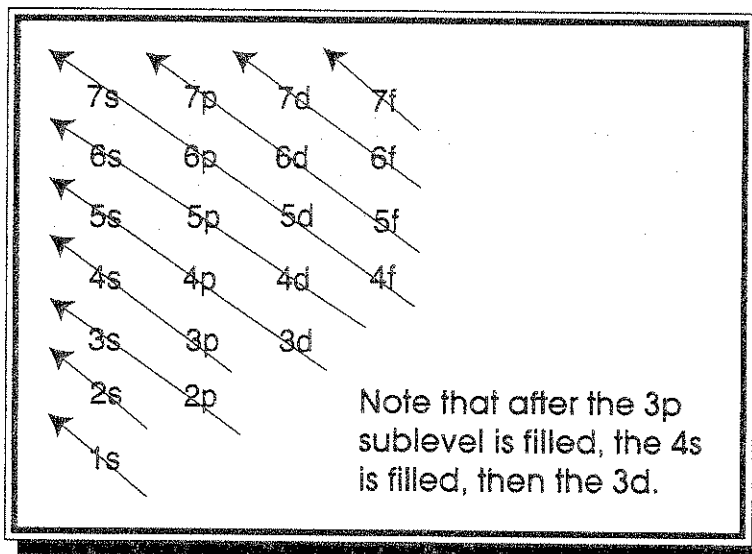
3. Al

4. O

ELECTRON CONFIGURATION (LEVEL TWO)

Name _____

At atomic number greater than 18, the sublevels begin to fill out of order. A good approximation of the order of filling can be determined using the diagonal rule.



Draw the electron configurations of the following atoms.

1. K

2. V

3. Co

4. Zr

VALENCE ELECTRONS

Name _____

The valence electrons are the electrons in the outermost principal energy level. They are always "s" or "s and p" electrons. Since the total number of electrons possible in s and p sublevels is eight, there can be no more than eight valence electrons.

Determine the number of valence electrons in the atoms below.

Example: carbon

Electron configuration is $1s^2$ $2s^2 2p^2$

Carbon has 4 valence electrons.

- | | |
|---------------------|--------------------|
| 1. fluorine _____ | 11. lithium _____ |
| 2. phosphorus _____ | 12. zinc _____ |
| 3. calcium _____ | 13. carbon _____ |
| 4. nitrogen _____ | 14. iodine _____ |
| 5. iron _____ | 15. oxygen _____ |
| 6. argon _____ | 16. barium _____ |
| 7. potassium _____ | 17. aluminum _____ |
| 8. helium _____ | 18. hydrogen _____ |
| 9. magnesium _____ | 19. xenon _____ |
| 10. sulfur _____ | 20. copper _____ |