ELEMENT SYMBOLS

Name _____

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

Write the symbol for the following elements.

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

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

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

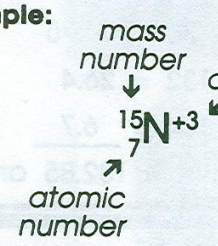
ATOMIC STRUCTURE

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:



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^+						
$^{12}_{6}C$						
$^{7}_{3}Li^+$						
$^{35}_{17}Cl^-$						
$^{39}_{19}K$						
$^{24}_{12}Mg^{2+}$						
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 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 x 133 = 99.75
.20 x 132 = 26.4
.05 x 134 = 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% ^{1}H, 0.8% ^{2}H, 0.2% ^{3}H _____
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).

Answer: $1s^2$ $2s^2$ $2p^6$ $3s^1$

Draw the electron configurations of the following atoms.

1. Cl

2. N

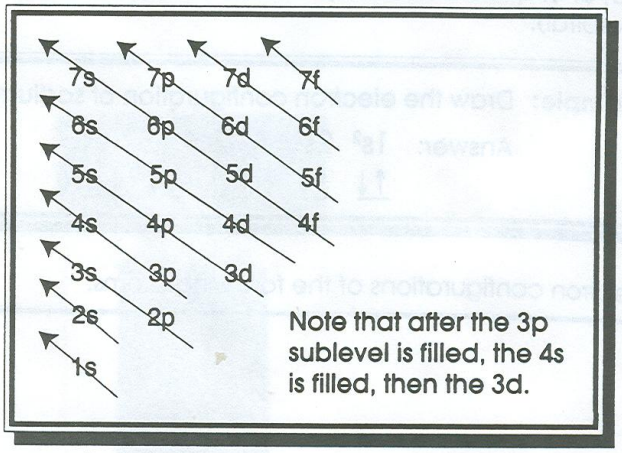
3 Al

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 $1s^2$ $\boxed{2s^2\ 2p^2}$.

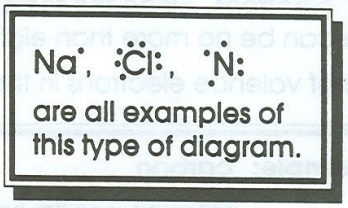
Carbon has 4 valence electrons.

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

LEWIS DOT DIAGRAMS

Name _____

Lewis diagrams are a way to indicate the number of valence electrons around an atc

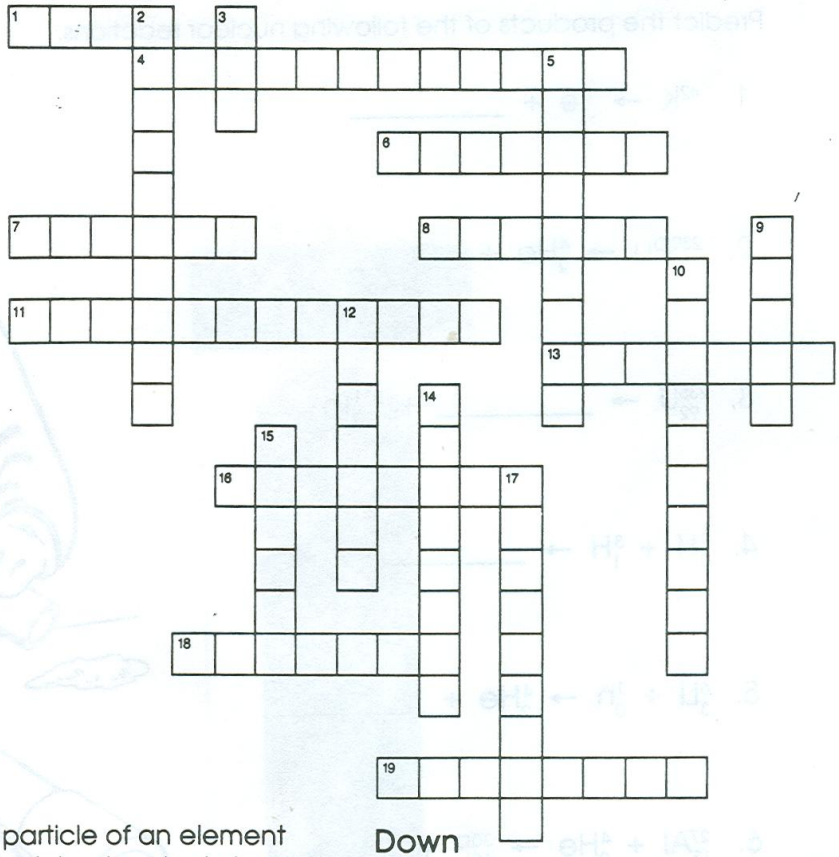


Draw Lewis dot diagrams of the following atoms.

1. calcium
2. potassium
3. argon
4. aluminum
5. bromine
6. carbon
7. helium
8. oxygen
9. phosphorus
10. hydrogen

ATOMIC STRUCTURE CROSSWORD

Name _____



Across

1. The smallest particle of an element that can enter into chemical change
4. The number of protons in the nucleus of an atom
6. Cannot be decomposed into simpler substances by ordinary chemical means
7. State in which all electrons are at their lowest possible energy level
8. The positively charged particle found in the nucleus
11. Standard for the atomic mass unit
13. Most of the mass of an atom is here.
16. Mass number minus atomic number
18. Electrons in the outermost principal energy level
19. Protons and neutrons are these.

Down

2. Sum of the protons and neutrons in the nucleus of an atom
3. Charged atom or group of atoms
5. Equal to the number of protons in a neutral atom
9. The volume of an atom is determined by the size of its electron _____ .
10. Different forms of the same element
12. State in which electrons have absorbed energy and "jumped" to a higher energy level
14. Atoms with the same atomic number but different atomic masses
15. The nucleus and all electrons in an atom except the valence electrons
17. s, p, d, f