

EXERCISES:

STRUCTURE OF THE ATOM WORKSHEET

5. Fill in the following table.

Element	Symbol	# of protons	# of neutrons	# of electrons
Bromine				
Antimony				
Hydrogen				
Fluorine				
Potassium				

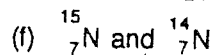
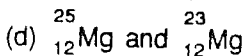
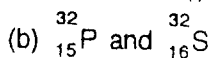
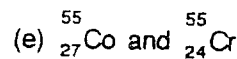
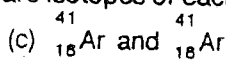
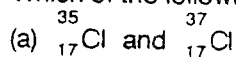
6. Fill in the following table.

Element	Symbol	# of protons	# of neutrons	# of electrons
Neon				
Sodium				
Calcium				
Gold				
Argon				

7. Fill in the missing information in the following table.

Symbol	Number of protons	Number of neutrons	Number of electrons
${}^{37}_{17}\text{Cl}$			
	5	4	
		117	79
${}^{34}_{15}\text{P}$			
		123	80
${}^{103}_{50}\text{Sn}$			
	9	15	
		17	12

8. Which of the following pairs are isotopes of each other?



Definition: An ION is an atom possessing a charge as a result of gaining or losing electrons.

EXERCISES:

9. What is the charge on an electron? _____ On a proton? _____ On a neutron? _____
10. Fill in the following table.

Atom	# of protons	# of neutrons	# of electrons	# of EXTRA electrons	Total charge from neutrons	Total charge from protons	New Total charge from electrons	Total charge on atom
$^{35}_{17}\text{Cl}$				1				
$^{32}_{16}\text{S}$				2				
$^{80}_{35}\text{Br}$				1				
$^{75}_{33}\text{As}$				3				
$^{79}_{34}\text{Se}$				2				

11. Fill in the following table.

Atom	# of protons	# of electrons	What is done to the atom?	# of protons	New # of electrons	Charge on ion
Na			Remove 1 electron			
Al			Remove 3 electrons			
O			Add 2 electrons			
H			Remove 1 electron			
As			Add 3 electrons			
Sr			Remove 2 electrons			
Br			Add 1 electron			
Cr			Remove 6 electrons			
P			Add 3 electrons			
Fe			Remove 3 electrons			

5. Boron exists in the form of two stable isotopes, boron-10 and boron-11, which occur in an abundance of 19.6 percent and 80.4 percent respectively. ~~Using the periodic table, calculate the average mass of boron.~~

6. Precise atomic masses of each isotope of magnesium are given below along with the percent abundance of each isotope:

magnesium-24	23.98504	78.70%
magnesium-25	24.98584	10.13%
magnesium-26	25.98259	11.17%

Calculate the atomic mass of magnesium.

6. Copy the incomplete table below.

PERIODIC TABLE WORKSHEET

Name _____

1. Where are the most active metals located? _____
2. Where are the most active nonmetals located? _____
3. As you go from left to right across a period, the atomic size (decreases / increases). Why? _____
4. As you travel down a group, the atomic size (decreases / increases). Why? _____
5. A negative ion is (larger / smaller) than its parent atom.
6. A positive ion is (larger / smaller) than its parent atom.
7. As you go from left to right across a period, the first ionization energy generally (decreases / increases). Why? _____
8. As you go down a group, the first ionization energy generally (decreases / increases) Why? _____
11. Elements of Group 1 are called _____
12. Elements of Group 2 are called _____
13. Elements of Group 3-12 are called _____
14. As you go from left to right across the periodic table, the elements go from (metals / nonmetals) to (metals / nonmetals).
15. Group 17 elements are called _____
16. The most active element in Group 17 is _____
17. Group 18 elements are called _____
19. Elements within a group have a similar number of _____
20. Elements across a series have the same number of _____
22. As you go down a group, the elements generally become (more / less) metallic.
23. The majority of elements in the periodic table are (metals / nonmetals).
24. Elements in the periodic table are arranged according to their _____
25. An element with both metallic and nonmetallic properties is called a _____

Name _____

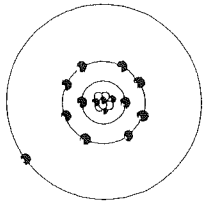
Date _____

Class _____

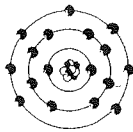
5-3 Apply

Two Trendy Elements

You can compare the sizes and chemical reactivity of two atoms by looking at their location on the periodic table. The two diagrams at the right show the relative sizes of a sodium atom and a chlorine atom. Use your knowledge of periodic trends to answer the following questions.



Sodium Atom



Chlorine Atom

1. Both sodium and chlorine are in the same period on the periodic table. Explain the difference in their sizes.

2. Predict the charge that an ion of each element would have. Explain your answer.

3. Compare the amount of ionization energy required to remove the first electron from each of these atoms.

4. Compare the electron affinities of these atoms.

5. Draw the ion for each atom. Be sure to represent accurately their sizes relative to the original atoms.

6. Explain the ions you have drawn. How do these two elements compare in size now?

Name _____

Date _____

Class _____

5-3 Practice Problems

1. Chlorine, selenium, and bromine are located near each other on the periodic table. Which of these elements is (a) the smallest atom? (b) the atom with the highest ionization energy?

2. Phosphorus, sulfur, and selenium are located near each other on the periodic table. Which of these elements is (a) the largest atom? (b) the atom with the highest ionization energy?

7. Which of the following is the largest: a chlorine atom, a chlorine ion with a charge of 1-, or a bromine atom?

3. Scandium, yttrium, and lanthanum are located near each other in the periodic table. Which of these elements is (a) the largest atom? (b) the atom with the smallest ionization energy?

8. Which of the following is the smallest: a lithium atom, a lithium ion with a charge of 1+, or a sodium atom?

4. (a) Which of the following atoms is smallest: vanadium, chromium, or tungsten? (b) Which of these atoms has the highest ionization energy?

9. Which of the following is the largest: a tellurium ion with a charge of 2-, an iodine ion with charge of 1-, or a xenon atom?

5. (a) Which of the following atoms is smallest: nitrogen, phosphorus, or arsenic? (b) Which of these atoms has the smallest ionization energy?

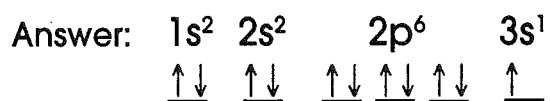
10. Aluminum, silicon, and phosphorus are located near each other in the periodic table. Which of these elements is (a) the largest atom? (b) the atom with the highest ionization energy?

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

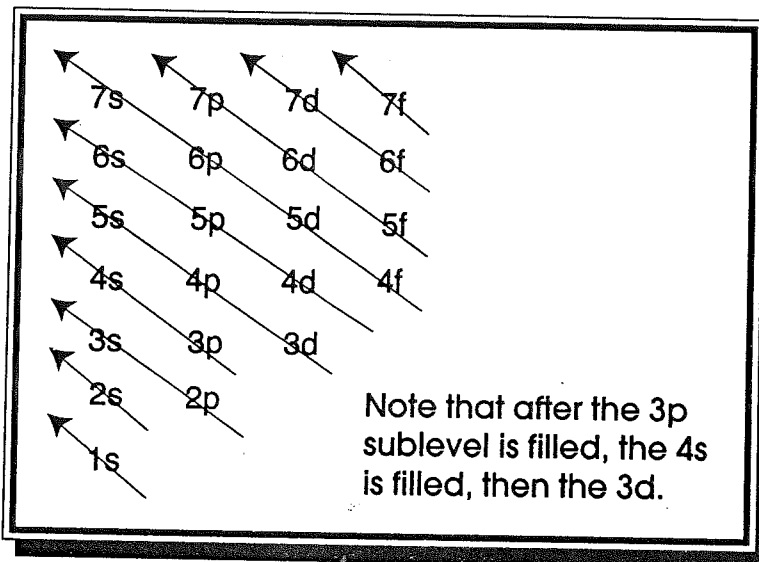
3. Al

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.

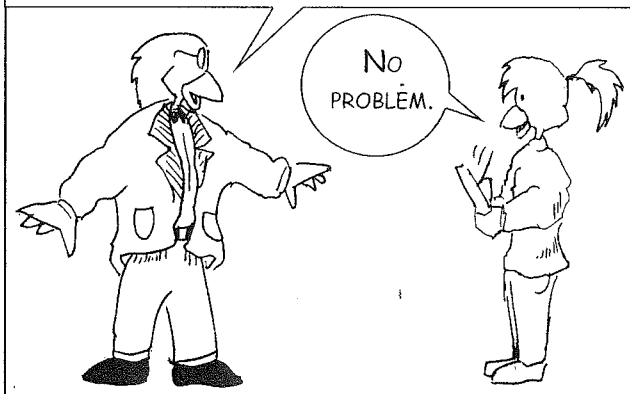
Example: carbon

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 _____ |

IDENTIFY AND COMPLETE EACH ATOM. MAKE SURE YOU PUT THE CORRECT NUMBER OF ELECTRONS IN EACH ORBITAL. USE YOUR PERIODIC TABLE!



REFERENCE BOX

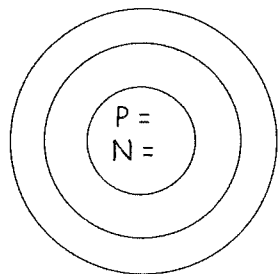
Neutrons = Atomic Mass - Atomic Number

Protons = Atomic Number

Electrons = # Protons (for neutral atoms)

The inner orbital holds a maximum of two electrons and gets filled first.

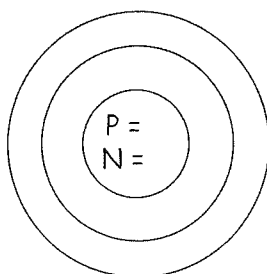
The second orbital holds a maximum of eight electrons and gets filled after inner orbital.



1. Atomic Number: 3

Atomic Mass: 7

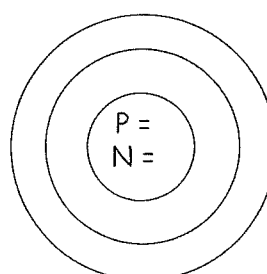
Name: _____



2. Atomic Number: 4

Atomic Mass: 9

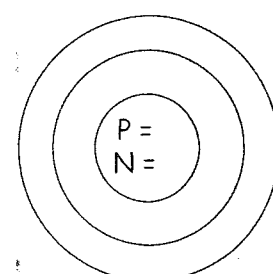
Name: _____



3. Atomic Number: 5

Atomic Mass: 11

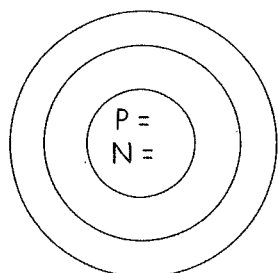
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4. Atomic Number: 6

Atomic Mass: 12

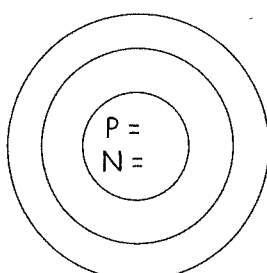
Name: _____



5. Atomic Number: 7

Atomic Mass: 14

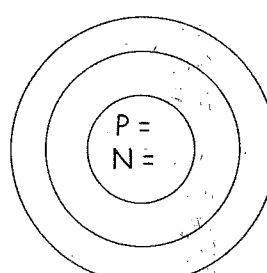
Name: _____



6. Atomic Number: 8

Atomic Mass: 16

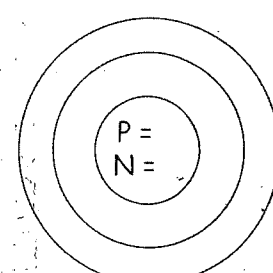
Name: _____



7. Atomic Number: 9

Atomic Mass: 19

Name: _____



8. Atomic Number: 10

Atomic Mass: 20

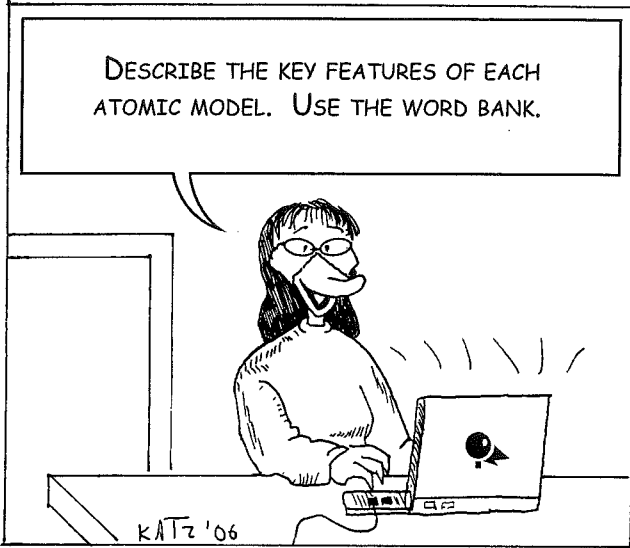
Name: _____

9. Which two atoms could GAIN 1-2 electrons in order to complete their outer shell?

10. Which two atoms could LOSE 1-2 electrons in order to have a complete outer shell?

11. Draw a Lewis Dot diagram for # 1-8

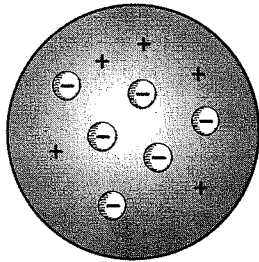
DESCRIBE THE KEY FEATURES OF EACH ATOMIC MODEL. USE THE WORD BANK.



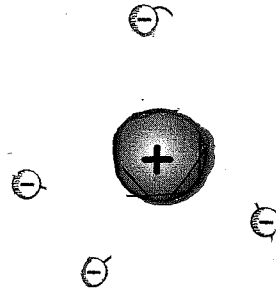
WORD BANK

NUCLEUS	POSITIVE	CIRCULAR
PROTONS	NEGATIVE	PATHS
NEUTRONS	CHARGE	DIFFUSE
ELECTRONS	PROBABILITY	ORBITALS
	SPACE	

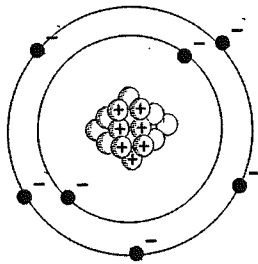
PLUM PUDDING MODEL



RUTHERFORD'S MODEL



BOHR MODEL



ELECTRON CLOUD MODEL

