

NAME \_\_\_\_\_ DATE \_\_\_\_\_ CLASS \_\_\_\_\_

TEST DATE: \_\_\_\_\_

# Chapter 10

# Atomic Structure and The Periodic Table

# Vocabulary

# Chapter 10

## Atomic Structure and The Periodic Table

Atomic number \_\_\_\_\_  
Page \_\_\_\_\_

Average atomic mass \_\_\_\_\_  
Page \_\_\_\_\_

Chemical symbol \_\_\_\_\_  
Page \_\_\_\_\_

Dot diagram \_\_\_\_\_  
Page \_\_\_\_\_

Electron cloud \_\_\_\_\_  
Page \_\_\_\_\_

Electrons \_\_\_\_\_  
Page \_\_\_\_\_

Groups \_\_\_\_\_  
Page \_\_\_\_\_

Isotopes \_\_\_\_\_  
Page \_\_\_\_\_

Mass number \_\_\_\_\_  
Page \_\_\_\_\_

Metalloids \_\_\_\_\_  
Page \_\_\_\_\_

Metals \_\_\_\_\_  
Page \_\_\_\_\_

Neutrons \_\_\_\_\_  
Page \_\_\_\_\_

Nonmetals \_\_\_\_\_  
Page \_\_\_\_\_

Nucleus \_\_\_\_\_  
Page \_\_\_\_\_

Periodic table \_\_\_\_\_  
Page \_\_\_\_\_

Periods \_\_\_\_\_  
Page \_\_\_\_\_

Protons \_\_\_\_\_



## CHAPTER 10: Atomic Structure and The Periodic Table

**Aim:** Describe the present model of the atom.

**Chemical symbol:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Some chemical symbols:** Al, Ca, C, Cl, Cu, F, Au, H, He, I, Fe, Mg, and K

**Atoms are the basic building blocks of matter. Atoms are made of three smaller particles.**

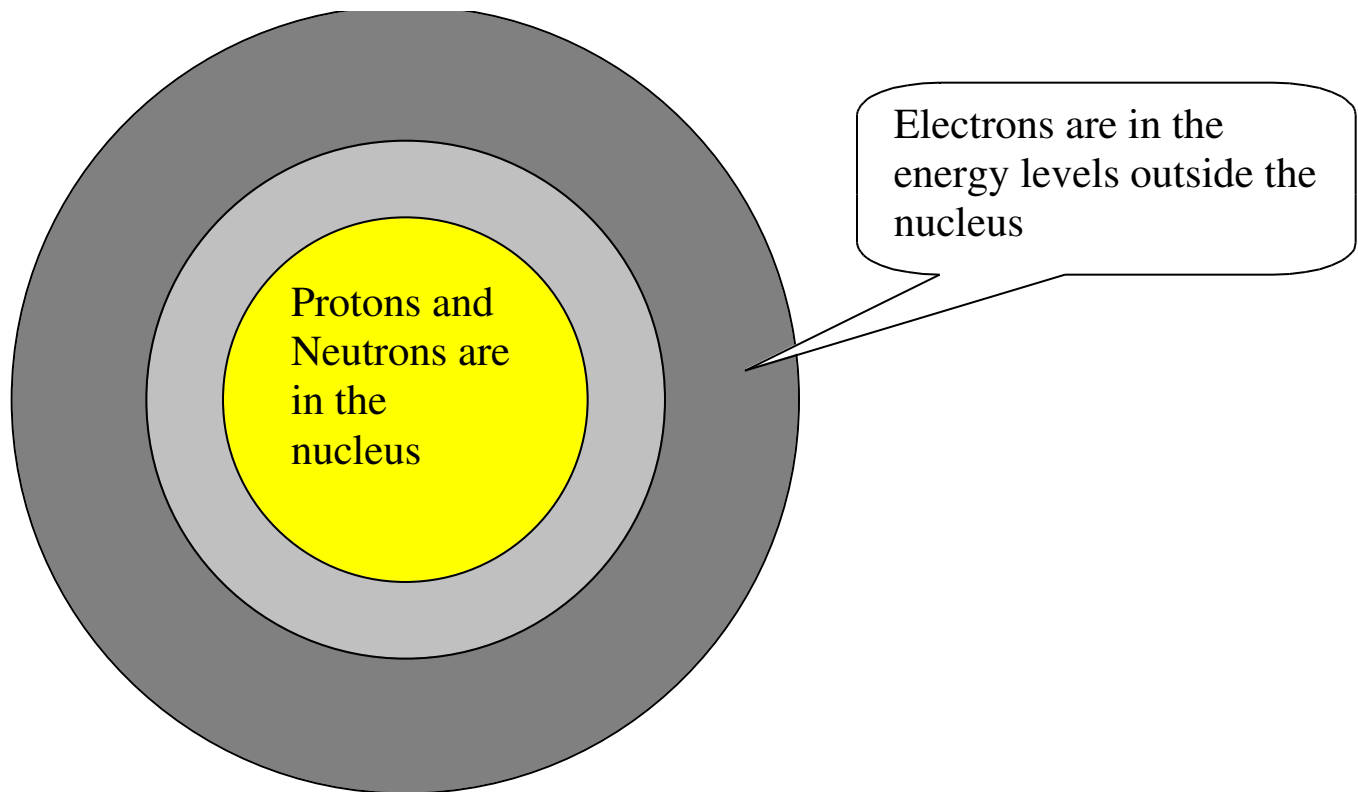
Particles in an Atom				
Particle	Symbol	Location	Charge	Mass (amu)

**Protons and neutrons are made of smaller particles called**

\_\_\_\_\_

**Atomic number** \_\_\_\_\_  
\_\_\_\_\_. The number of **electrons** is **equal** to the number of **protons** in an atom.

**A model** helps us understand something we cannot see. The model of the atom has evolved throughout the years. The **electron cloud model** is the best one so far.



<b>Number of Electrons in energy levels</b>	
<b>Energy Level</b>	<b>Maximum Number of Electrons</b>
<b>1</b>	
<b>2</b>	
<b>3</b>	
<b>4</b>	

**\*The energy levels get very large and overlap each other. Therefore, they sometimes hold fewer than their maximum.**

**Make a model of a Carbon atom:**

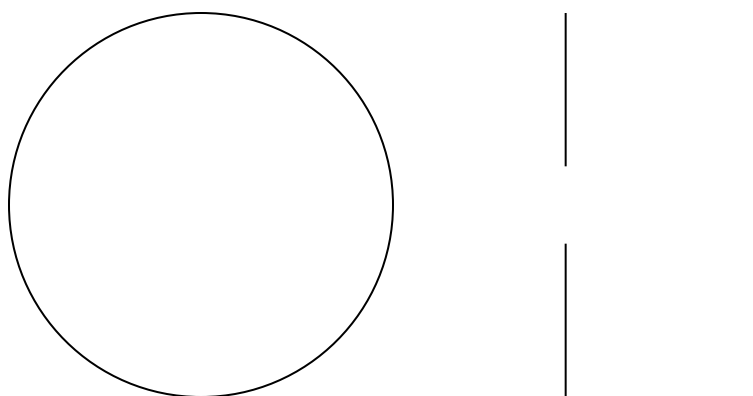
6 ← **Atomic Number:** -----

**C**

Carbon

12.011

2,4



### **Assignment**

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- 1. STUDY GUIDE "Structure of the Atom"**
- 2. REINFORCEMENT "Structure of the Atom"**

# STUDY GUIDE

# Chapter 10

## Structure of the Atom

Text Pages 242-247

Find the words chemical and symbol in the word search below. The following is a list of some chemical symbols: Ag, Au, C, Ca, Cl, Cu, Fe, Ne, O, Pb, and Sn. Find the name of the element for each of these chemical symbols in the word search. Words can be up, down, forward, backward, or on a diagonal.

Look for the word model in the word search. Write the missing words in the blanks in the following paragraph about the model of the atom. Then look for these words in the word search.

The model of the atom includes a positively charged center, or \_\_\_\_\_ which contains two particles, the \_\_\_\_\_ and the \_\_\_\_\_. The number of protons is the \_\_\_\_\_ of an atom. A third particle, the \_\_\_\_\_, is found in a \_\_\_\_\_ outside the nucleus. An \_\_\_\_\_ in the electron cloud is similar to a shelf on a refrigerator. The \_\_\_\_\_ of an electron is so small that it is impossible to describe exactly where it is in an atom.

K	L	W	A	N	E	O	N	I	W	R	U
N	E	U	T	R	O	N	A	Z	O	S	N
A	D	N	W	S	L	R	F	L	A	Y	E
L	O	O	E	D	U	J	T	O	H	M	G
C	M	T	L	R	R	E	R	C	C	B	Y
H	A	O	R	E	G	O	L	A	E	O	X
E	G	R	P	S	M	Y	L	C	H	L	O
M	I	P	B	A	T	C	L	O	U	D	E
I	O	V	S	O	I	D	A	E	L	N	I
C	R	S	Q	U	N	S	I	L	V	E	R
A	T	O	M	I	C	N	U	M	B	E	R
L	P	E	N	I	R	O	L	H	C	S	L

# REINFORCEMENT

# Chapter 10

## Structure of the Atom

Text Pages 242-247

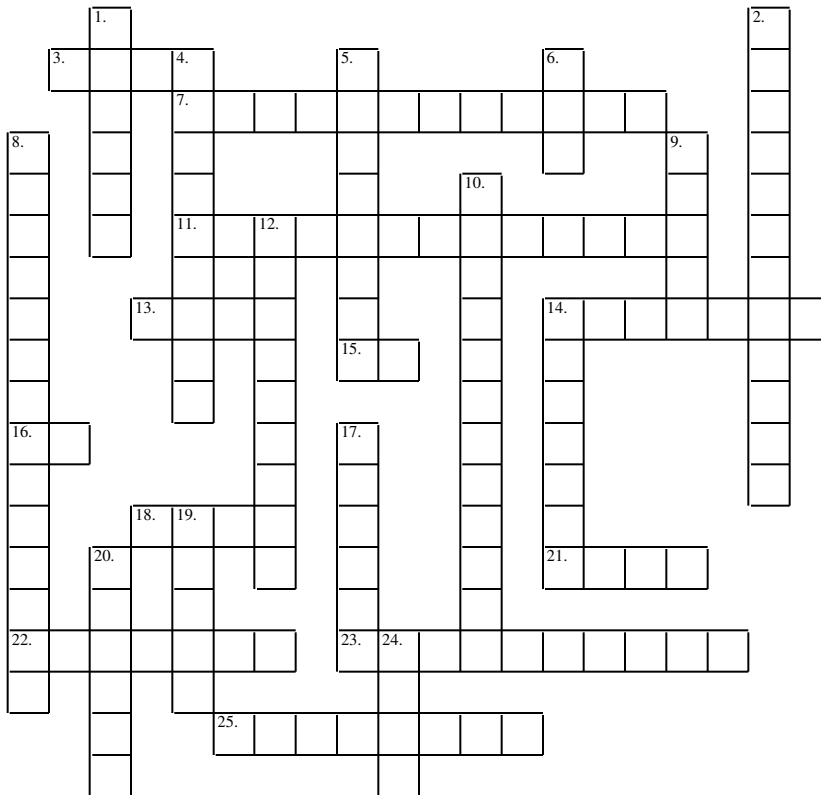
Use the clues to complete the puzzle.

Across

3. Scientist who developed the planetary model of the atom
7. Element 105
11. Region surrounding the nucleus which is occupied by electrons
13. Atomic number of fluorine (spelled out)
14. Center of atom
15. Symbol for sodium
16. Symbol for silver
18. Fe is the symbol.
21. Name of element used in fluorescent signs
22. Atom of an element with a different number of neutrons
23. Sum of protons and neutrons
25. Only element with atoms which do not have neutrons

Down

1. Element often made into electrical wire
2. Number of protons in an atom
4. Name of element whose symbol is Ru
5. Negatively charged particle
6. Mixture of mostly nitrogen and oxygen
8. 1/12 the mass of a carbon-12 atom
9. Helps us understand something that we cannot see directly
10. These are like shelves where electrons can be found.
12. Equal in number to the number of protons
14. A particle with approximately the same mass as a proton
17. Element used in balloons
19. Element name of radioactive gas that can accumulate in houses
20. Positively charged particle in nucleus
24. The building block of matter





**Aim: Compute the atomic mass and mass number of an atom.**

The mass of protons and neutrons is measured in a unit called the **atomic mass unit (amu)**.

1 amu = \_\_\_\_\_.

The mass of a **proton is 1 amu**. The mass of a **neutron is also 1 amu**.

The mass number of an atom is the sum of the number of protons and the number of neutrons in an atom.

6
<b>C</b>
Carbon
12.011
2,4

The mass number of carbon is 12.

$$6p^+ + 6n^0 = 12$$

**Isotopes** \_\_\_\_\_  
 \_\_\_\_\_.

Isotopes of Boron	
Boron-10	Boron-11
Mass number	Mass number
# of protons	# of protons
# of neutrons	# of neutrons

## The **average atomic mass**

-----  
-----.

### Assignment

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1. **STUDY GIUDE "Masses of Atoms"**
2. **REINFORCEMENT "Masses of Atoms"**

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**STUDY GUIDE****Chapter 10****Masses of Atoms****Text Pages 250-254**

Use the terms in the box to complete the following paragraph about atomic mass. Terms may be used more than once.

number	standard	neutron(s)	proton(s)	mass
--------	----------	------------	-----------	------

The electron has very little mass compared to the \_\_\_\_\_ or \_\_\_\_\_ . The mass of the atom depends on the nucleus and how many \_\_\_\_\_ and \_\_\_\_\_ it has. The sum of the protons and neutrons is the mass \_\_\_\_\_ of an atom. The number of neutrons in an atom can be found by subtracting the atomic number from the \_\_\_\_\_ number. The mass of the atom is so small that there is a measure called the atomic \_\_\_\_\_ unit with a symbol of “ $\mu$ .”

Use the terms in the box to complete the following paragraphs about isotopes. Terms may be used more than once.

many	mixtures	protons	neutrons	between	number
element	one	isotopes	six protons	electrons	

The nuclei of all atoms of a given element always have the same number of \_\_\_\_\_ They will also have the same number of \_\_\_\_\_ around the nucleus. Some atoms may have more or fewer \_\_\_\_\_ than will other atoms of the same element. Atoms of the same element with different numbers of neutrons are called \_\_\_\_\_. Hydrogen has three isotopes. A hydrogen atom may contain zero, one, or two \_\_\_\_\_. Every atom of carbon must contain \_\_\_\_\_, but some contain six neutrons and others have eight neutrons. Some elements have only \_\_\_\_\_ natural isotope; however, other elements may have \_\_\_\_\_ isotopes.

One way of showing the difference between isotopes of an element is to put the mass \_\_\_\_\_ after the name of the element. The second way of showing an isotope is to write the mass number and the atomic number with the symbol of the \_\_\_\_\_. In nature, most elements are \_\_\_\_\_ of isotopes. In chlorine gas, there are two isotopes and the average mass of this element is \_\_\_\_\_ the two.

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**REINFORCEMENT****Chapter 10****Masses of Atoms**

Text Pages 250-254

**Isotopes***Answer the following questions on the lines provided.*

1. Define isotopes. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
2. How many isotopes can an element have? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. What is the average atomic mass of an element? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. Compare and contrast the atomic structure of the chlorine-35 and chlorine-37 isotopes.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
5. Suppose that a newly discovered element called centium has three isotopes that occur in nature. These are centium-200, centium-203, and centium-209. Assume that these isotopes occur in equal amounts in nature. What will be the average atomic mass of this element? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## **Aim: Describe the periodic table of elements.**

The periodic table of elements is an arrangement of elements according to repeated changes in properties.

### **Groups or families:** \_\_\_\_\_

\_\_\_\_\_. The number of electrons in the outer energy level determines the group an element belongs to and the properties of the element.

A dot diagram uses the symbol of the element and dots to represent the electrons in the outer energy level.

### **Some dot diagrams**

<b>Lithium</b>	<b>Carbon</b>	<b>Oxygen</b>	<b>Neon</b>
<b>Sodium</b>	<b>Silicon</b>	<b>Sulfur</b>	<b>Argon</b>

**Periods:** Horizontal rows on the periodic table are called **periods**. Elements on the **left side of a period are more metallic**. **Elements on the right side are more nonmetallic**. **Elements next to the stair-step line are metalloids**, and have properties of both metals and nonmetals.

### **Assignment**

- 
- 1. STUDY GUIDE "The Periodic Table"**
  - 2. ENRICHMENT "The Periodic Table"**

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**STUDY GUIDE****Chapter 10****The Periodic Table****Text Pages 255-260**

Use the periodic table in your reference tables as needed to answer the following questions. Place your answers on the lines after the questions.

1. List two types of information that are given in each box of this periodic table.
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
2. In this table, where are the metals located? \_\_\_\_\_
3. Where are the nonmetals located? \_\_\_\_\_
4. What are the elements in groups 3 through 12 called? \_\_\_\_\_
5. What are the elements called that are next to the stair-step-shaped line on the right side of the table? \_\_\_\_\_  
\_\_\_\_\_
6. What do we call the letter or group of letters that represents an element? \_\_\_\_\_
7. How many elements are included in the modern periodic table? \_\_\_\_\_
8. What name is given to the elements in group 18? \_\_\_\_\_
9. What name is given to all vertical columns in this table? \_\_\_\_\_
10. What name is given to each horizontal row in this table? \_\_\_\_\_

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**ENRICHMENT****Chapter 10****The Periodic Table**

Text Pages 255-262

*PREDICTING AN ELEMENT'S GROUP AND PERIOD*

Several scientists, including Newlands, Meyer, and Mendeleev worked on classification systems that grouped elements according to their properties. They found that these properties repeated in a regular or periodic manner. Scientists used this fact to predict properties of undiscovered elements.

Review electron arrangement from your textbook.

In Table 1, write the maximum number of electrons that can fill each energy level on the blanks in the table heading. Write the total number of electrons for each element in the first column labeled Total. For each element, assign the correct number of electrons to each energy level.

Complete Table 2 by using the information from the six elements studied.

**Table 1**

Element	Electrons			
	Total	Level 1	Level 2	Level 3
Argon				
Carbon				
Helium				
Lithium				
Silicon				
Sodium				

**Table 2**

Element	Energy level of outer electrons	Located in period	Number of outer electrons	Located in group
Ar				
C				
He				
Li				
Si				
Na				

1. How is the element's period related to the number of energy levels over which its electrons are spread? \_\_\_\_\_

\_\_\_\_\_

2. How can you predict an element's group and period? \_\_\_\_\_

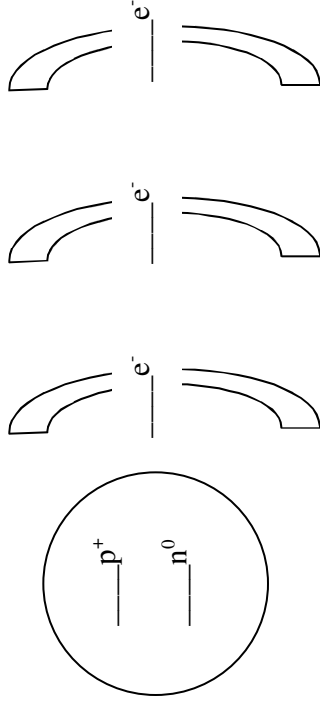
\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

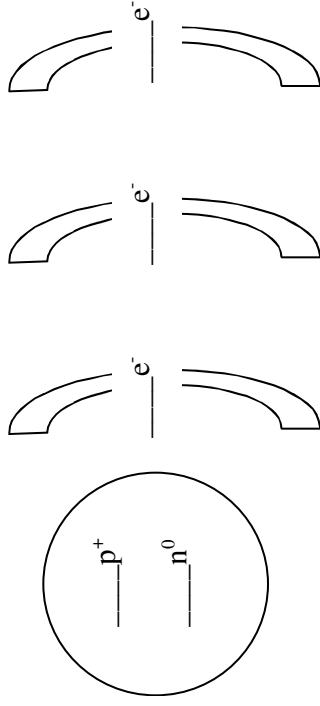
Element Name \_\_\_\_\_  
Number of Protons \_\_\_\_\_  
Number of Neutrons \_\_\_\_\_  
Number of Electrons \_\_\_\_\_

13  
**Al**  
Aluminum  
26.98154



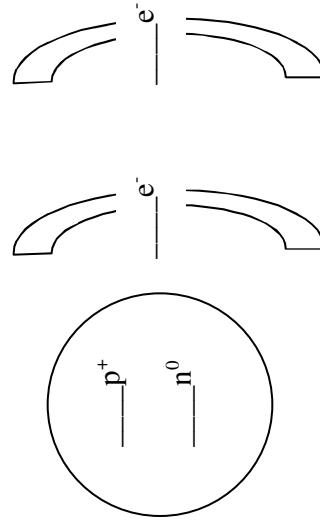
Element Name \_\_\_\_\_  
Number of Protons \_\_\_\_\_  
Number of Neutrons \_\_\_\_\_  
Number of Electrons \_\_\_\_\_

18  
**Ar**  
Argon  
39.948



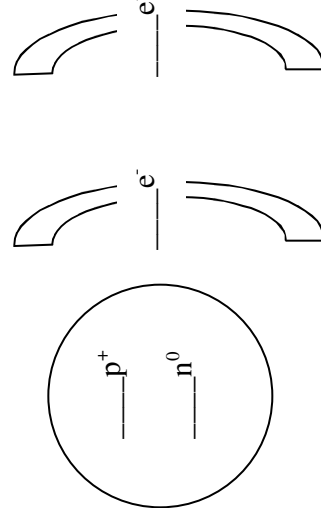
Element Name \_\_\_\_\_  
Number of Protons \_\_\_\_\_  
Number of Neutrons \_\_\_\_\_  
Number of Electrons \_\_\_\_\_

5  
**B**  
Boron  
10.81



Element Name \_\_\_\_\_  
Number of Protons \_\_\_\_\_  
Number of Neutrons \_\_\_\_\_  
Number of Electrons \_\_\_\_\_

4  
**Be**  
Beryllium  
9.01218



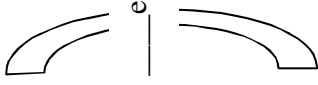
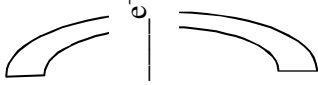
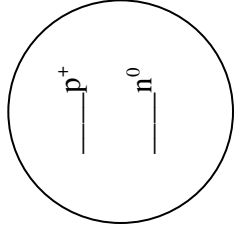


6

**C**

Carbon  
12.011

Element Name \_\_\_\_\_  
Number of Protons \_\_\_\_\_  
Number of Neutrons \_\_\_\_\_  
Number of Electrons \_\_\_\_\_

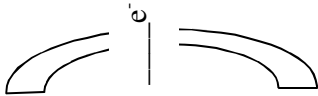
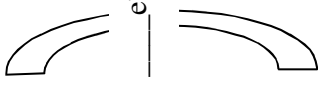
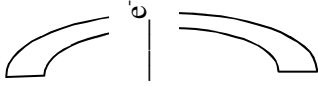
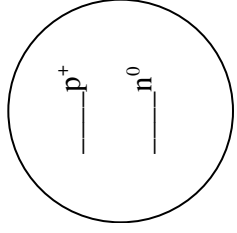


17

**Cl**

Chlorine  
35.453

Element Name \_\_\_\_\_  
Number of Protons \_\_\_\_\_  
Number of Neutrons \_\_\_\_\_  
Number of Electrons \_\_\_\_\_

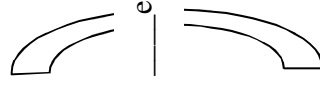
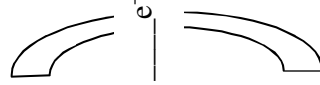
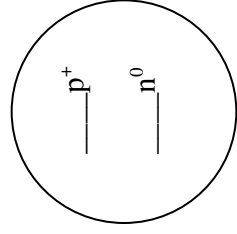


9

**F**

Fluorine  
18.998403

Element Name \_\_\_\_\_  
Number of Protons \_\_\_\_\_  
Number of Neutrons \_\_\_\_\_  
Number of Electrons \_\_\_\_\_

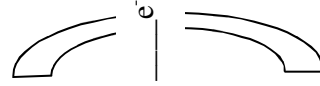
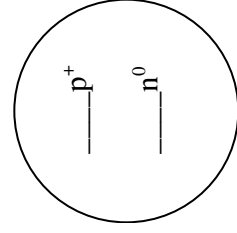


1

**H**

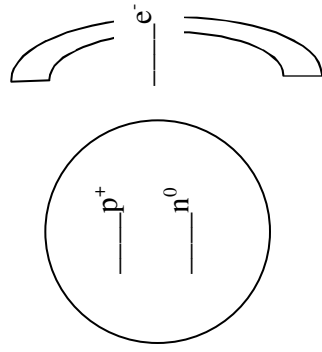
Hydrogen  
1.00794

Element Name \_\_\_\_\_  
Number of Protons \_\_\_\_\_  
Number of Neutrons \_\_\_\_\_  
Number of Electrons \_\_\_\_\_



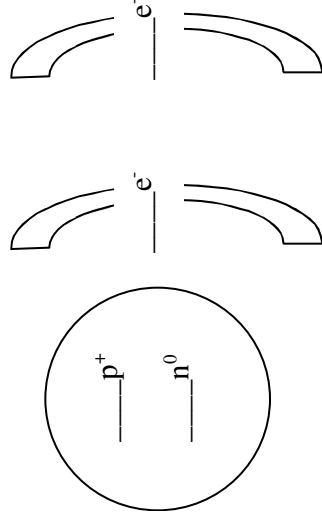
Element Name \_\_\_\_\_  
Number of Protons \_\_\_\_\_  
Number of Neutrons \_\_\_\_\_  
Number of Electrons \_\_\_\_\_

2  
**He**  
Helium  
4.0026



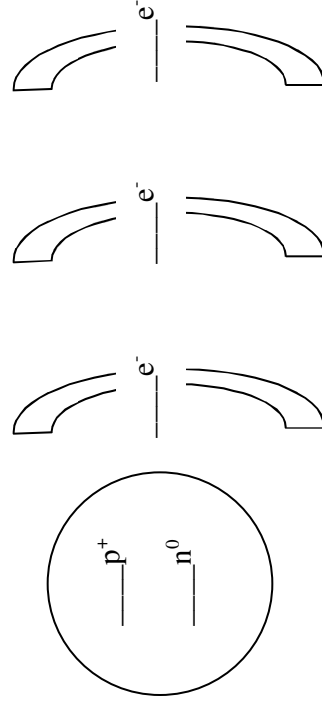
Element Name \_\_\_\_\_  
Number of Protons \_\_\_\_\_  
Number of Neutrons \_\_\_\_\_  
Number of Electrons \_\_\_\_\_

3  
**Li**  
Lithium  
6.941



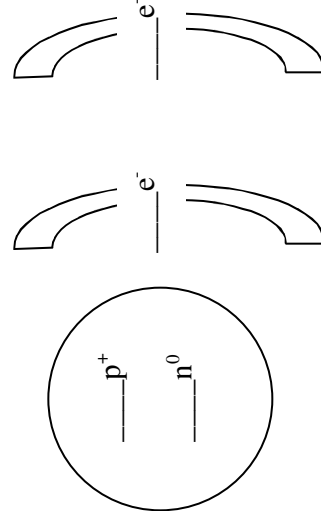
Element Name \_\_\_\_\_  
Number of Protons \_\_\_\_\_  
Number of Neutrons \_\_\_\_\_  
Number of Electrons \_\_\_\_\_

12  
**Mg**  
Magnesium  
24.305



Element Name \_\_\_\_\_  
Number of Protons \_\_\_\_\_  
Number of Neutrons \_\_\_\_\_  
Number of Electrons \_\_\_\_\_

7  
**N**  
Nitrogen  
14.0067



11

**Na**

Sodium

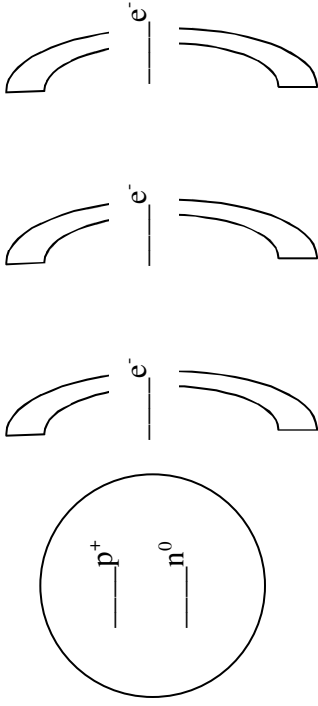
22.98977

Element Name \_\_\_\_\_

Number of Protons \_\_\_\_\_

Number of Neutrons \_\_\_\_\_

Number of Electrons \_\_\_\_\_



10

**Ne**

Neon

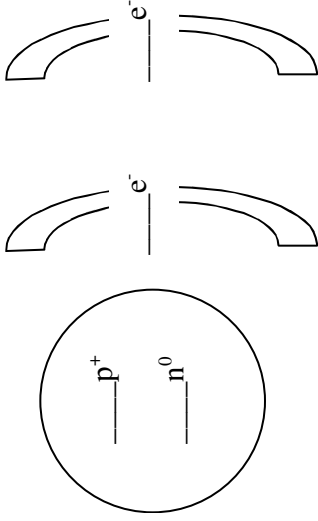
20.179

Element Name \_\_\_\_\_

Number of Protons \_\_\_\_\_

Number of Neutrons \_\_\_\_\_

Number of Electrons \_\_\_\_\_



8

**O**

Oxygen

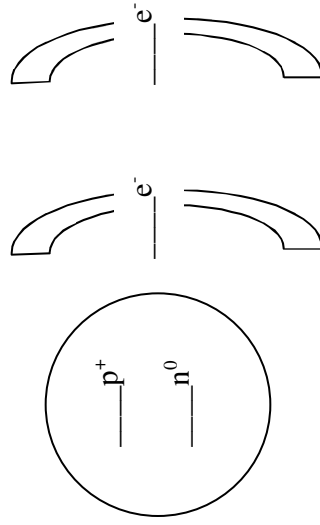
15.9994

Element Name \_\_\_\_\_

Number of Protons \_\_\_\_\_

Number of Neutrons \_\_\_\_\_

Number of Electrons \_\_\_\_\_



15

**P**

Phosphorous

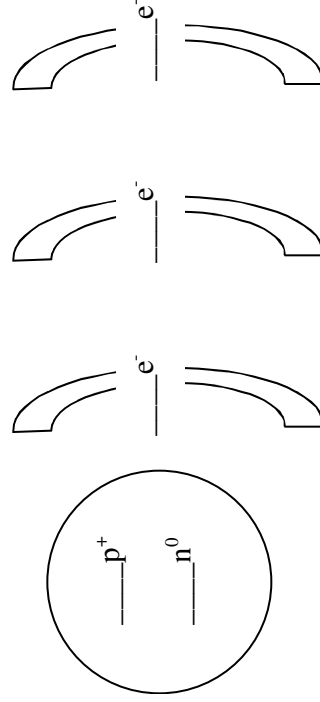
30.97376

Element Name \_\_\_\_\_

Number of Protons \_\_\_\_\_

Number of Neutrons \_\_\_\_\_

Number of Electrons \_\_\_\_\_



16

**S**

Sulfur

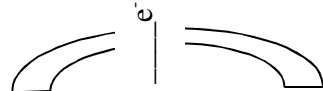
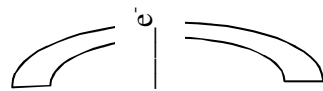
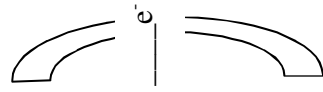
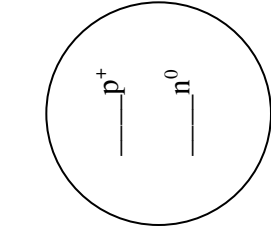
32.06

Element Name \_\_\_\_\_

Number of Protons \_\_\_\_\_

Number of Neutrons \_\_\_\_\_

Number of Electrons \_\_\_\_\_

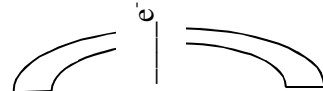
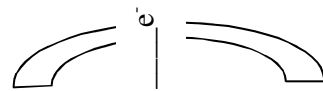
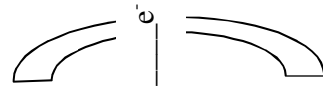
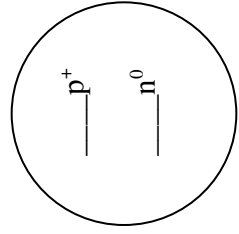


Element Name \_\_\_\_\_

Number of Protons \_\_\_\_\_

Number of Neutrons \_\_\_\_\_

Number of Electrons \_\_\_\_\_



14

**Si**

Silicon

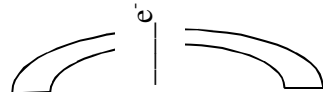
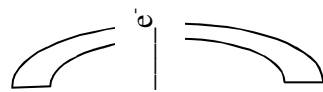
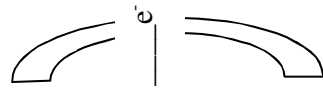
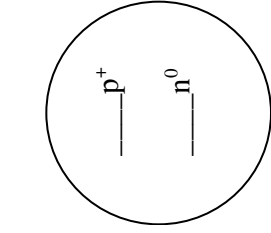
28.0855

Element Name \_\_\_\_\_

Number of Protons \_\_\_\_\_

Number of Neutrons \_\_\_\_\_

Number of Electrons \_\_\_\_\_



Element Name \_\_\_\_\_

Number of Protons \_\_\_\_\_

Number of Neutrons \_\_\_\_\_

Number of Electrons \_\_\_\_\_

