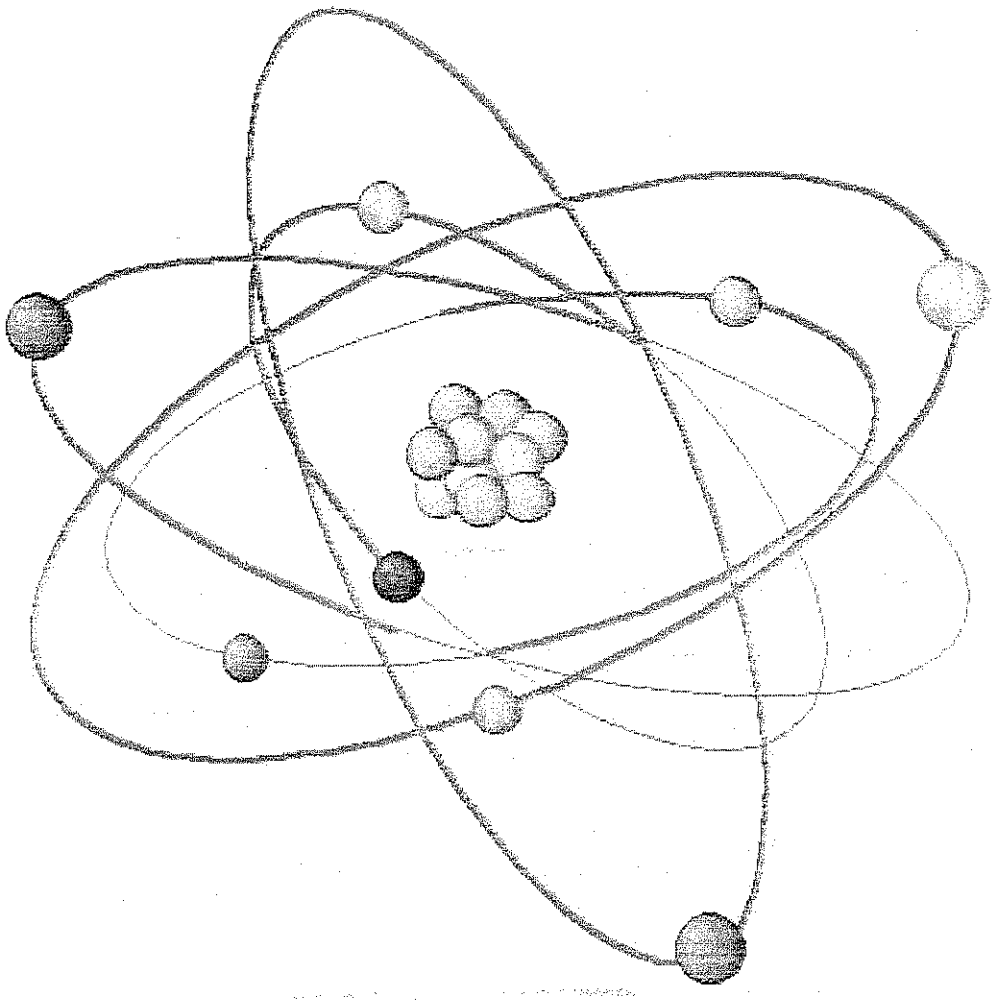
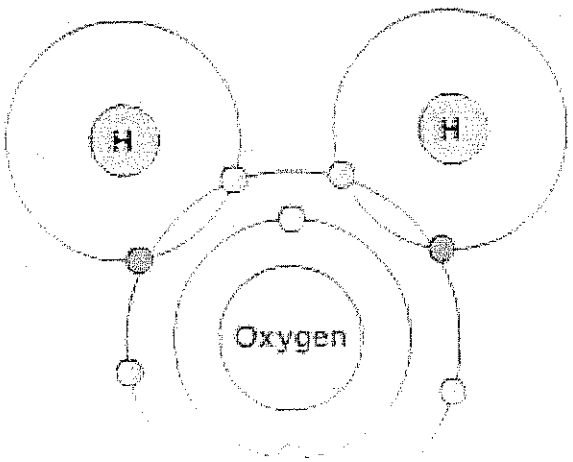


Chemistry Basics

Name_____ Hr_____



Words to Know:

Matter	Atom	Subatomic	Proton	Neutron
Electron	Nucleus	Energy level	Element	Ion
Core electron	Valence electron	Compound	Molecule	Bohr model
Covalent bond	Ionic bond	Lewis Dot Structure	Atomic Mass	
Atomic Number	Periodic Table			

Learning Goals:

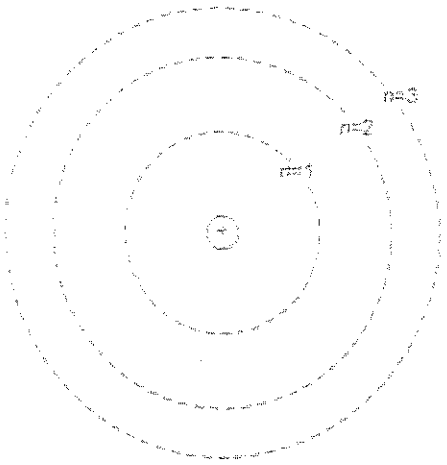
After completing this unit, you should be able to...

- Identify and describe protons, neutrons, and electrons in regards to their location within an atom and their charges
- Understand the role of valence electrons in bonding
- Draw a Bohr model of an atom and identify energy levels and valence electrons
- Use a periodic table to find the atomic number, mass number, and number of neutrons and draw Lewis Dot Structures and Bohr Models
- Differentiate between an ionic bond and covalent bond
- Explain why atoms are neutral, but ions have a charge
- Describe why atoms bond and form molecules

Biology
Introduction to Basic Chemistry

uilding Blocks of Matter:

1. **The ATOM**:
   - _____ is made up of the smallest _____ particle called an _____.
   - Atoms have _____ main parts:
     - _____: **central** region that *contains* **protons and neutrons**
     - _____ or ELECTRON CLOUD: area **outside** the nucleus that contains the **electrons**



   - Made up of _____ kinds of subatomic particles:
     - _____: positive charge
     - _____: neutral (no charge)
     - _____: negative charge

II: **PROPERTIES OF ATOMS**

1. Atoms are electrically _____
   - Number of _____ **equal** number of _____
2. In nature atoms will _____ to other atoms to become stable.
   - _____ are part of why atoms bond together

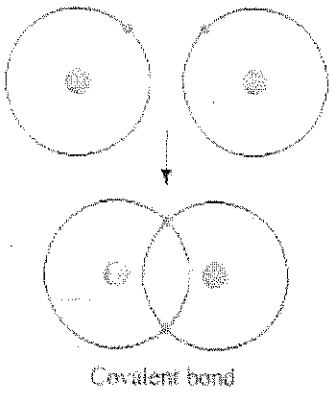
   A. There are **2 types** of electrons:
   - _____ and _____ Electrons:

     ***Valence Electrons: _____ electrons that are involved in bonding

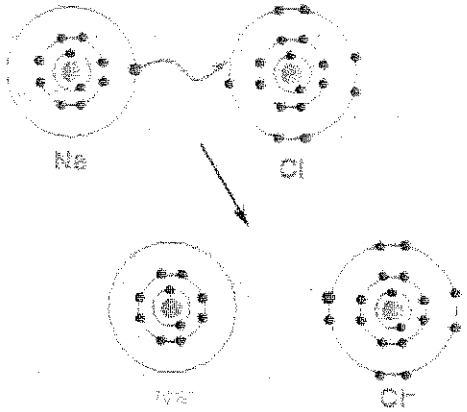
3. **BONDING:** *an attraction within atoms to form a chemical compound*
   - All atoms are electically neutral but are _____ until they form an attraction with another atom.
   - The outermost energy level may _____, _____ or _____ electrons to form a _____ and become stable.

Bonds

Covalent



Ionic



Biology
Introduction to Basic Chemistry
Periodic Table Notes

odic Table:

1. Chart that shows various _____ of elements

2. Arranged into _____ and _____
   a. Rows: **across**
   b. Columns or Families: **down**

3. _____ categories found on the periodic table

   a. **Symbol** – represents a specific **element**
      Ex. H:

   b. **Atomic number** – table organized and **arranged** from **left to right** by increasing atomic number.
      **Elements I.D.
      - **Atomic number =** _____ **=** _____

      Ex. H

      Ex. S

      Ex. K

   c. **Mass number** – most of mass of atom is found in the nucleus.
      - Mass number is usually found under the element symbol
      - Can be found by _____ the _____ and _____
      - **Mass # = protons + neutrons**

        Ex. H

        Ex. Li

        Ex. Al

4. Bohr Models:
   a. model of the atom that shows protons, electrons, neutrons and energy levels

Lewis Dot Structures
   a. model that show the _____ electrons of the atom

Name _____ Class _____ Date _____

SECTION 2-1 REVIEW

COMPOSITION OF MATTER

VOCABULARY REVIEW Define the following terms.

1. atom _____

2. neutron _____

3. compound _____

4. covalent bond _____

5. ion _____

MULTIPLE CHOICE Write the correct letter in the blank.

_____ 1. The atomic number of carbon is 6. Therefore, the number of protons in a carbon atom equals
a. 3. **b.** 6. **c.** 7. **d.** 12.

_____ 2. One of the kinds of particles found in the nucleus of an atom is the
a. proton. **b.** electron. **c.** ion. **d.** boron.

_____ 3. The maximum number of electrons that can be held in an atom's second energy level is
a. 2. **b.** 4. **c.** 6. **d.** 8.

_____ 4. Of the following elements, the one that is most likely to form ionic bonds is
a. hydrogen. **b.** carbon. **c.** sodium. **d.** oxygen.

_____ 5. An example of a compound is
a. water. **b.** hydrogen gas. **c.** oxygen gas. **d.** chloride ion.

Name _____ Class _____ Date _____

SHORT ANSWER Answer the questions in the space provided.

1. What is the difference between mass and weight? _____

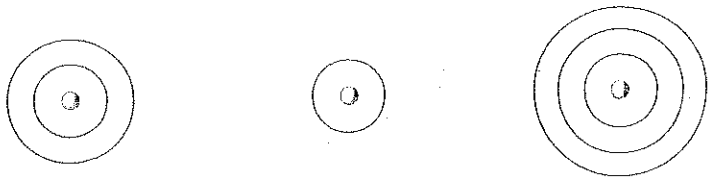
2. Identify the elements and the number of atoms of each element in each of the following compounds:
BO_2 _____ KCl _____
$C_6H_{12}O_6$ _____ NH_3 _____

3. How many pairs of electrons do the two oxygen atoms in an oxygen molecule share with each other? Explain your answer. _____

4. **Critical Thinking** The atomic number of argon is 18. Will argon tend to form bonds with other elements? Explain your answer. _____

STRUCTURES AND FUNCTIONS Label each atom in the spaces provided, and complete the models by drawing the correct number of electrons at each energy level.

The diagrams below represent incomplete models of the atoms helium (atomic number 2), carbon (atomic number 6), and sulfur (atomic number 16). Note: The third energy level can contain up to eight electrons.



a _____ b _____ c _____

PARTS OF AN ATOM

Name _____

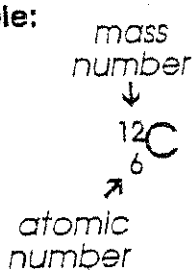
An atom is made up of protons and neutrons which are in the nucleus, and electrons which are in the electron cloud surrounding the atom.

The atomic number equals the number of protons. The electrons in a neutral atom equal the number of protons. The mass number equals the sum of the protons and neutrons.

The charge indicates the number of electrons that have been lost or gained. A positive charge indicates the number of electrons (which are negatively charged) lost. A negative charge indicates the number of electrons gained.

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

Example:



Mass # = protons + neutrons

Why is an atom neutral?

Atomic # = _____ and _____

Complete the following chart.

ment	Symbol	Mass #	Protons	Neutrons	Electrons
Hydrogen					
Boron					
Fluorine					
Aluminum					
Potassium					
Chlorine					
Calcium					
Lithium					
Helium					

_____ Date_____ Period____

Periodic Table Worksheet

Periodic table to find the information asked for below:

1. What is the atomic number of:
   - Calcium____
   - Iron _____
   - Gold_____
   - Uranium_____

2. What is the Atomic mass of:
   - Calcium___
   - Iron_____
   - Uranium_____
   - Copper_____

3. How many protons do the following have?
   - Calcium have____
   - Gold_____
   - Copper_____
   - Iron_____

4. How many electrons do the following have?
   - Gold have_____
   - Iron_____
   - Copper_____
   - Uranium_____

s mercury have more protons and electrons than tin?

ercury a heavier element than tin?

s potassium have more electrons than neon?

s hydrogen have more electrons than Uranium?

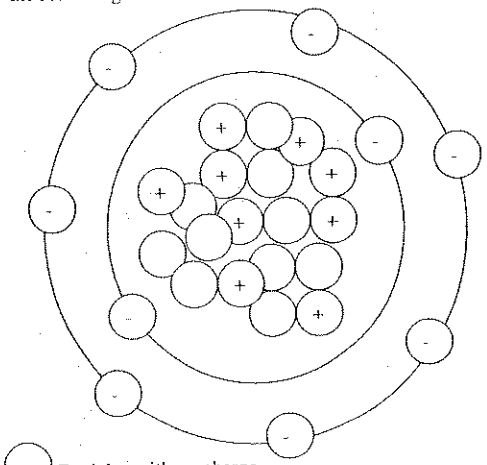
hich has more protons, sulfur or iodine?

hich has more protons, iodine or silver?

the boxes below make Bohr models for each of the elements.

a. Determine how many electrons, protons, and neutrons there are in each atom.
b. Draw a Bohr model of each element using the number of electrons, protons, and neutrons
c. NOTE: The first energy level can only hold up to 2 electrons. The second energy level can hold up to 8 electrons.

12. Study the following model of an atom and answer the following questions:



Key:
- Particles with no charge
- Particles with negative charge
- Particles with positive charge

a. How many electrons does this atom have? _____
b. How many protons? _____
c. How many neutrons? _____
d. What is the atomic number? _____
e. Find the name of this element by referring to the periodic chart. _____

13. Write the symbols or the names for each of these elements:

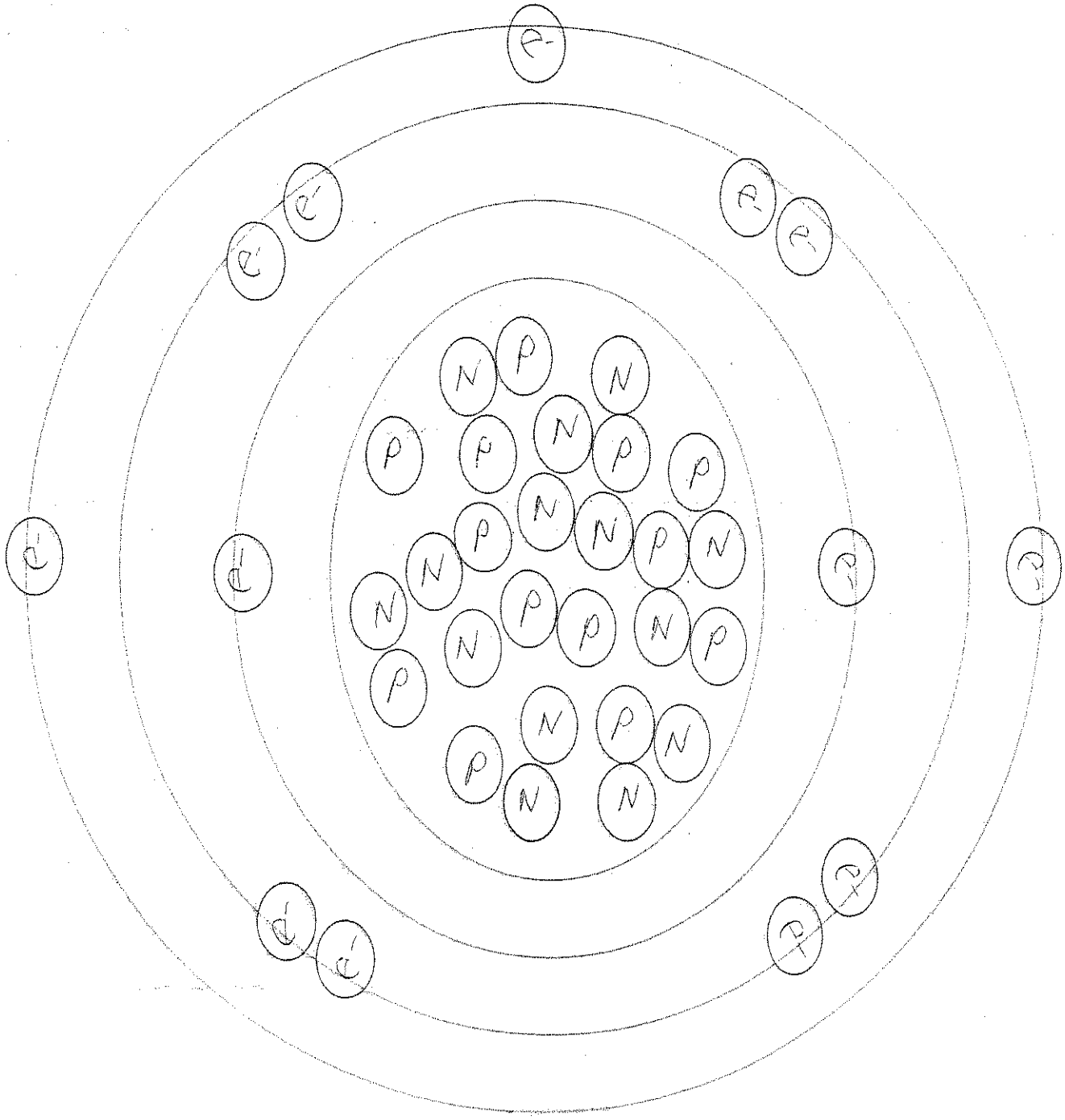
Chlorine _____
Copper _____
Potassium _____
Silver _____
_____ Na
_____ Sn
_____ Zn
Helium _____
Iron _____
_____ P
_____ Ne
Mercury _____

BOHR MODEL OF THE ATOM

Name: Hr:

Color code each part of the atom, and then answer the questions about your color-coded atom.

Parts of the Atom: ☐Nucleus ☐Protons (+) ☐Neutrons (0) ☐Electrons (-)
Energy Levels: ☐Energy Level 1 ☐Energy Level 2 ☐Energy Level 3



Name: _____

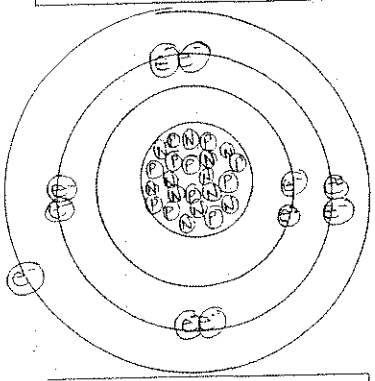
Hour: _____ Date: _____

What Atoms Are These?

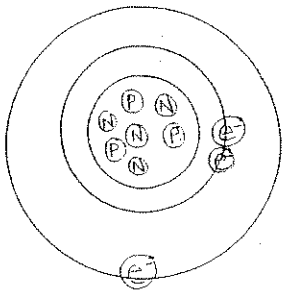
ns: Color-code the Bohr models below.

- ○
- us ○
- ons ○
- us ○
- ergy Level ○
- ergy Level ○
- ergy Level ○

What atom is this?



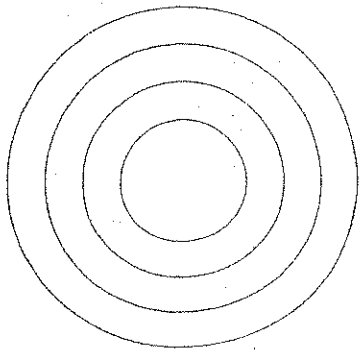
What atom is this?



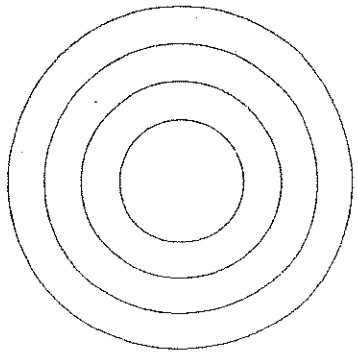
Atoms and Ions
Bohr Models

Name_____ Date_____ Hr._____

Atoms



Element F



Element Ca

LEWIS DOT STRUCTURES:

ELEMENTS OF LIFE: CHNOPS

Name:

CARBON:

The element carbon is perhaps the single most important element to life. Virtually every part of our bodies is made with large amounts of this element. The carbon atom is ideal to build big biological molecules. The carbon atom can be thought of as a basic building block. These building blocks can be attached to each other to form long chains, or they can be attached to other elements.

This can be difficult to imagine at first, but it may help to think about building with Legos. You can think of carbon as a bunch of red legos attached together to form one long chain of legos. Now, you can imagine sticking yellow, blue and green legos across the tops of the red (carbon) legos. These other colors represent other elements like oxygen, nitrogen or hydrogen. As you stick more and more of these yellow, blue and green legos to the red chain, it would start to look like a skeleton of legos with a "spine" of red legos and "bones" of yellow, blue and green legos. This is a lot like the way that big molecules are made in the body. Without carbon, these big molecules could not be built.

Now, virtually every part of your body is made up of these big molecules that are based around chains of carbon atoms. This is the reason we are known as "carbon based life forms". Without carbon, our bodies would just be a big pile of loose atoms with no way to be built into a person.

HYDROGEN:

It would be virtually impossible to understate the importance of this element to human life. First of all, water is a compound of hydrogen and oxygen (H2O). We can survive years, or at least months without getting most of the other elements that we need to survive. We can survive weeks without food, but we would die after only a few days without water. Water is incredibly important in our bodies. In fact, almost _ of our bodies are made of water. It dissolves other life-supporting substances and transports them to fluids in and around our cells. It is also a place in which important reactions take place in our bodies. Chemically, water is a remarkable substance and it's many unique attributes make life possible. Hydrogen is obviously a critical component of water and minute chemical bonds called "hydrogen bonds" are what give water many of its unique attributes.

Also, hydrogen is practically always bound to the carbon that our bodies are constructed of. Without this arrangement, our bodies would be little more than a pile of atoms on the ground. Stomach acid is a compound of hydrogen and chlorine (hydrochloric acid, or HCl). Logically, hydrogen is extremely important in allowing us to digest our food properly and to absorb the many other elements that we need to survive. Finally, many chemical reactions that make life possible involve the hydrogen ion. Without this unique and important element, we simply couldn't exist.

NITROGEN:

Nitrogen is another important element. It plays an important role in digestion of food and growth. As you may know, almost 80% of the air we breathe is made up of nitrogen. But humans cannot use the nitrogen in the air we breathe, that nitrogen is in the wrong form. We have to get nitrogen, in a different form, from the food that we eat. Fortunately, there is plenty of nitrogen in food to nourish our bodies.

Nitrogen is found in large amounts in all kinds of food. Spaghetti, salads, breakfast cereal, hamburgers and even cookies have lots of nitrogen in the form that our bodies need. When your body digests this food and makes it into energy, the first step is to remove nitrogen atoms from the molecules in the food. While your body is busy digesting the rest of this food and making it into energy, these nitrogen atoms are already being used to help you grow. One specific time that this is especially important is during pregnancy. When a woman is pregnant, the nitrogen removed from food during digestion is needed to help the fetus to grow properly. By term, the mother and infant will have accumulated over a pound of nitrogen.

It is also worth noting that in the plant kingdom, nitrogen is one of the 3 main elements that make plant life possible. (Potassium and phosphorus are the other two, and you may hear them referred to collectively as N-P-K whenever talking about key plant nutrients.)

OXYGEN:

It may seem obvious that people need to breathe oxygen to survive, but plants need this element too. Many people think plants "breathe" carbon dioxide and "exhale" oxygen. But in reality, plants also "breathe" oxygen at certain times. Without oxygen, plants could not survive. Without plants, we wouldn't have food to eat.

It is also worth mentioning that water is a compound of hydrogen and oxygen (H_2O) and that water is absolutely necessary for virtually all life as we know it. Water is incredibly important in our bodies. In fact, more than 50% of our bodies are made of water. It dissolves other life-supporting substances and transports them to fluids in and around our cells. It is also a place in which important reactions take place in our bodies. Many people consider water to be the "blood of life".

When you consider the full importance of oxygen, it becomes clear that this versatile element is the single most important substance to life.

PHOSPHORUS:

Phosphorus is one of the most abundant minerals in the human body, second only to calcium. This essential mineral is required for the healthy formation of bones and teeth, and is necessary for our bodies to process many of the foods that we eat. It is also a part of the body's energy storage system, and helps with maintaining healthy blood sugar levels. Phosphorus is also found in substantial amounts in the nervous system. The regular contractions of the heart are dependant upon phosphorus, as are normal cell growth and repair.

Since phosphorus is found in almost all plant and animal food sources, a deficiency of this mineral is rarely seen. However, phosphorus deficiency can and does occur, particularly in people who take certain types of antacids for many years. Since phosphorus is important in maintaining the body's energy system and proper blood sugar levels, it should seem logical that not getting enough of this mineral will affect the energy level in the entire body. Indeed, feeling easily fatigued, weak and having a decreased attention span can be symptoms of mild phosphate deficiency.

It is also worth noting that in the plant kingdom, phosphorus is one of the 3 main elements that make plant life possible. (Potassium and nitrogen are the other two, and you may hear them referred to collectively as N-P-K whenever talking about key plant nutrients.)

The human body must maintain a balance between magnesium phosphorus, and calcium. Excess intake of phosphorus can occur in people with diets high in processed foods, soft drinks, and meats, leading to osteoporosis.

The Recommended Dietary Allowances for phosphorus is 300 milligrams for infants, and between 800 and 1,200 milligrams for adults. It is estimated that Americans ingest on average between 1,500 and 1,600 milligrams of phosphorus per day, almost twice the recommended amount. Foods highest in phosphorus include asparagus, brewers yeast, dairy products, eggs, fish, dried fruit, meats, garlic, legumes, nuts and seeds, and whole grains.

Many antacids, which are widely used for treatment of peptic ulcer disease, gastritis (heart burn) and acid reflux, contain magnesium and aluminum, both of which bind to phosphate, preventing its absorption into the body.

Sulfur:

Sulfur is an important element that is used in small amounts to help construct virtually all parts of the human body. Sulfur helps protect the cells in our bodies from environmental hazards such as air pollution and radiation. Consequently, sulfur slows down the aging process and extends our life span. Also, sulfur helps our liver function properly, helps us digest the food that we eat and then turn that food into energy. Sulfur is also important for helping our blood clot when we cut or bruise ourselves. Additionally, sulfur is an important part of vitamin B1 and insulin. Interestingly, sulfur is also an important part of a substance that keeps your skin supple and elastic. If you don't think that is important, just imagine trying to get a date to the homecoming dance with stiff, loose skin hanging all over your body.

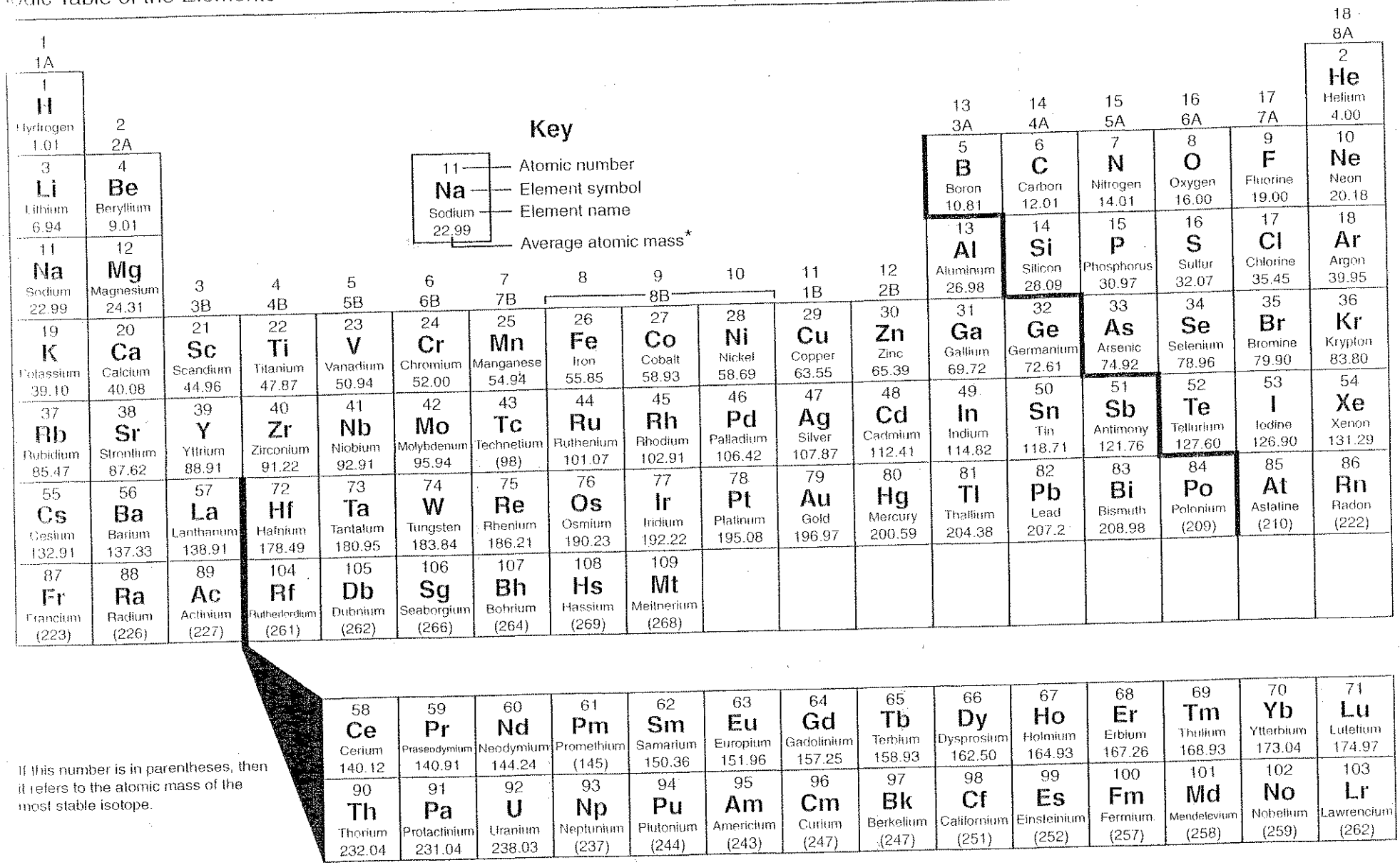
Fortunately, there is plenty of sulfur in the food that we eat and it is easy to get enough of this important element in our daily diets. There is no need to worry about getting too much sulfur in your diet. If you get more than your body needs, you just excrete it in your urine. Foods that have a lot of sulfur include meats, fish, dairy products, eggs and garlic.

Taken from http://www.mii.org/periodic/LifeElement.html

Chemistry Reference Sheet

Periodic Table of the Elements

California Standards Test



If this number is in parentheses, then it refers to the atomic mass of the most stable isotope.