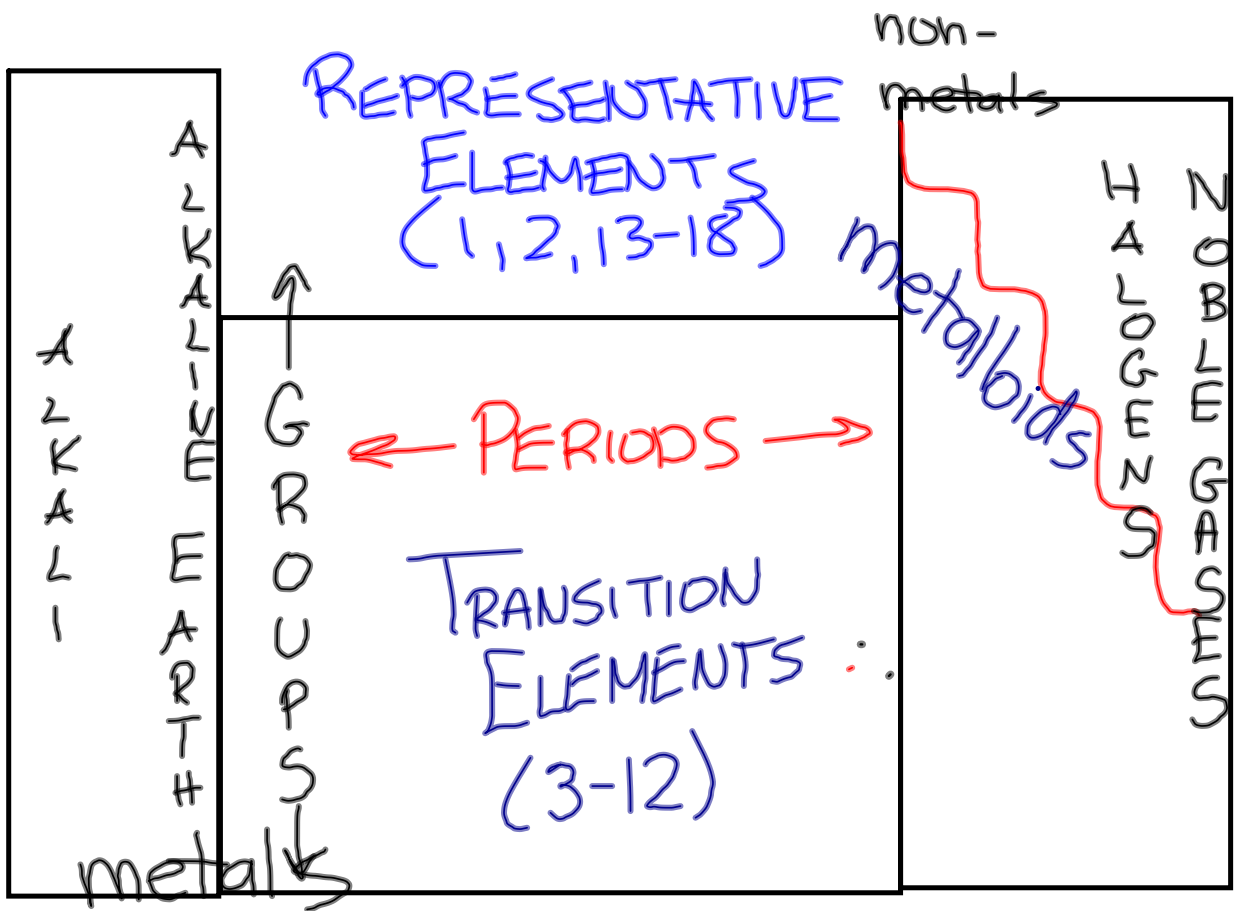


p. 52 #20-27



a) Pb b) O c) Ag

d) Na e) H f) Al



fe

na

iron

CHEMISTRY 112

Matter & Its Diversity

physical changes - are those in which no new substances are formed.

Ex. boiling - $\text{H}_2\text{O}_{(l)} \rightarrow \text{H}_2\text{O}_{(g)}$

chemical changes - are those in which a new substance is formed.

Ex. $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$

↓
chemical reaction

qualitative knowledge - describes changes in matter not involved with a measured quantity. Ex. color

quantitative knowledge - involves a measure of the **amount** of matter or the **amount** of change in a measurable property of matter.

- involves a number (usually)

Ex. mass of magnesium is 1.2 g

empirical knowledge - observable information that can be measured.

Ex. dinosaurs did exist

theoretical knowledge - explains observations in terms of ideas.

Ex. dinosaurs died 65 million years ago due to an asteroid strike.

COMPONENTS OF EXPERIMENTAL DESIGN

Manipulated Variable (independent variable)

- the property that is being changed

Responding Variable (dependent variable)

- the property that changes as a result of the change in the manipulated variable.

Controlled Variable

- a property that is kept constant.

Example: How does sleep affect performance in school?

Elements

Metals - substances that are shiny, bendable and good conductors of electricity and heat.

Ex. gold

Nonmetals - are ^{not} shiny, bendable and are not good conductors.

Solid nonmetals are brittle and lack luster .

Ex. sulfur (S)

Most nonmetals are gases

Ex. oxygen

Metalloids - elements that have properties that are similar to metals and nonmetals.

SUMMARY



⇒ Metals and nonmetals separated by the "staircase line".

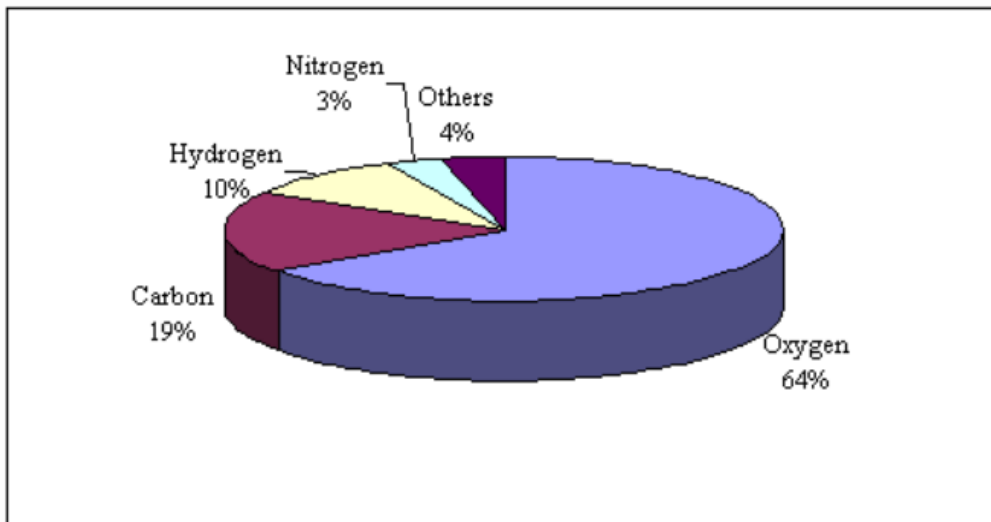
The most common elements in the human body are:

1 - oxygen - 65%

2 - carbon - 18%

3 - hydrogen - 10%

<http://www.freeinfosociety.com/site.php?postnum=658>



Traditional Groups

Alkali Metals - elements found in group 1. They normally are soft, silver-colored metals that react readily with water forming basic solutions.

Alkaline Earth Metals - elements found in group 2. They are light, reactive metals that form oxide coatings.

Halogens - elements in group 17
- are extremely reactive nonmetals.

Noble Gases - elements in group 18
- very unreactive gases.

Representative Elements - are elements in groups 1, 2, 13 to 18. These elements best follow the periodic law and are often used to demonstrate theories.

Transition Elements - elements found in groups 3 to 12 ("D block")
- elements whose electrons enter inner shells as atomic number increases

Periodic Law

PERIODIC LAW - when elements are arranged in order of increasing atomic mass, chemical and physical properties form a pattern that repeats at regular intervals.

The organization of Mendeleev's periodic table was based upon placing elements with similar properties in columns in the table.

The table was successful in being accepted because it allowed the prediction of the properties of elements that had not yet been found.

Family - or **group** of elements

- a vertical column in the periodic table.

- elements having similar chemical properties. Ex. Group 1

Period - a horizontal row of elements.

- elements whose properties change from metallic to nonmetallic as you move from left to right on the periodic table.

Reactivity of metals increases as you go down and left

Reactivity of nonmetal increases as you move up and right

| Period | 1A | | | | | | | | | | | | 3A 4A 5A 6A 7A | | | | | 8A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|----|----|--|-----|-----|-----|-----|-----|-----|----|----|----|----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|
| | H | 2A | | | | | | | | | | | B | C | N | O | F | He | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | H | | | | | | | | | | | | | | | | | | He | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Li | Be | | | | | | | | | | | | | | | | | Ne | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Na | Mg | 3B | 4B | 5B | 6B | 7B | 8B | | 1B | 2B | Al | Si | P | S | Cl | Ar | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | K | Ca | Sc | Ti | V | Cr | Mn | Fe | Co | Ni | Cu | Zn | Ga | Ge | As | Se | Br | Kr | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Rb | Sr | Y | Zr | Nb | Mo | Tc | Ru | Rh | Pd | Ag | Cd | In | Sn | Sb | Te | I | Xe | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Cs | Ba | | Hf | Ta | W | Re | Os | Ir | Pt | Au | Hg | Tl | Pb | Bi | Po | At | Rn | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Fr | Ra | | Unq | Unp | Unh | Uns | Uno | Une | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | <table border="1"> <tr> <td>6</td> <td>La</td> <td>Ce</td> <td>Pr</td> <td>Nd</td> <td>Pm</td> <td>Sm</td> <td>Eu</td> <td>Gd</td> <td>Tb</td> <td>Dy</td> <td>Ho</td> <td>Er</td> <td>Tm</td> <td>Yb</td> <td>Lu</td> </tr> <tr> <td>7</td> <td>Ac</td> <td>Th</td> <td>Pa</td> <td>U</td> <td>Np</td> <td>Pu</td> <td>Am</td> <td>Cm</td> <td>Bk</td> <td>Cf</td> <td>Es</td> <td>Fm</td> <td>Md</td> <td>No</td> <td>Lr</td> </tr> </table> | | | | | | | | | | | | | | | | 6 | La | Ce | Pr | Nd | Pm | Sm | Eu | Gd | Tb | Dy | Ho | Er | Tm | Yb | Lu | 7 | Ac | Th | Pa | U | Np | Pu | Am | Cm | Bk | Cf | Es | Fm | Md | No | Lr |
| 6 | La | Ce | Pr | Nd | Pm | Sm | Eu | Gd | Tb | Dy | Ho | Er | Tm | Yb | Lu | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Ac | Th | Pa | U | Np | Pu | Am | Cm | Bk | Cf | Es | Fm | Md | No | Lr | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Homework

Periodic Table Assignment

| Element Name | Atomic Number | Element Symbol | Group Number | Period Number | SATP State |
|--------------|---------------|----------------|--------------|---------------|------------|
| radium | 88 | Ra | 2 | 7 | S |
| cesium | 55 | Cs | 1 | 6 | S |
| | 19 | | | | |
| antimony | | | | | |
| | | S | | | |
| | | | 9 | 4 | |
| barium | | | | | |
| | 28 | | | | |
| | | U | | | |
| | | | 17 | 2 | |
| | 30 | | | | |