

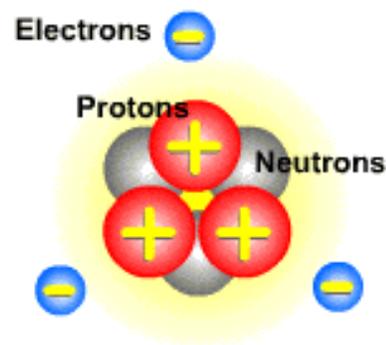
Name _____

HR _____

Chemistry of Living Things Outline

Basics of Chemistry

- The cell is a complex “_____”.
- It is made up of _____
- The _____ processes of the organism takes place inside the organism’s _____.



The Atom

- Living and nonliving things are made up of tiny units called _____.
- The center core is called the _____.
- The nucleus is made up of particles called _____ and _____.
- _____ have a positive charge (+1) and _____ have no electrical charge (0).
- Negatively charged particles, called _____ (-1) revolve around the nucleus at different distances from the nucleus.
- The electrons move in paths called shells or _____.
- Atoms have the _____ number of electrons and protons. Therefore, they are electrically _____ (have no electrical charge).

Elements

- There are about 100 different kinds of _____ known to scientists today.
- A substance made up entirely of one kind of atom is called an _____.
- Ninety-two _____ occur naturally and the others were made up in a _____.
- Elements differ from one another in their _____, _____, and _____ number.
- An element cannot be _____ down into any other substance or matter.
 - Pure silver is an element.
 - It is made up only of silver atoms.
 - When you break down a silver atom, you get electrons, protons, and neutrons.

The Most Common Elements

Modern periodic table

	I A	II A											III A	IV A	V A	VI A	VII A	VIII A									
1	H																	He									
2	Li	Be											B	C	N	O	F	Ne									
3	Na	Mg	III B	IV B	V B	VIB	VII B	VIII B	IB	IIB	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	Ls	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn									
7	Fr	Ra	Ac											Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
														Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

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Element Symbols

- Each element is represented by a _____ made up of one or two letters.

Compounds

- A _____ is formed when _____ or more _____ combine chemically.

Compound Properties

- The _____ (characteristics) of _____ are quite different from the properties of the _____ of which they are composed.
 - Table sugar is made up of the elements carbon, hydrogen, and oxygen.
 - Carbon is a black solid, and hydrogen and oxygen are colorless gases.
 - However, when they combine chemically they form a white granular substance.
- _____ combine to form _____ by a process called _____.
- The formation of a chemical bond involves either the _____ of _____ from one atom to another, or the _____ of _____ between atoms.

Element	Symbol
Carbon	
Hydrogen	
Oxygen	
Nitrogen	
Sulfur	
Phosphorus	
Magnesium	
Iodine	
Iron	
Calcium	
Sodium	
Chlorine	
Potassium	
Zinc	

Molecules

- A _____ of a particular compound is made up of definite numbers and kinds of atoms _____ (joined) together.
- A molecule of _____ contains _____ hydrogen atoms and _____ oxygen atom bonded together.
- _____ atoms of hydrogen bonded together form a molecule of _____.

Ions & Ionic Bonds

- An _____ is an atom that has _____ or _____ an _____.
- Ions are formed during chemical bonding that involves the _____ of electrons.
- When electrons are transferred from one atom to another, _____ atoms become electrically _____.
- The atom that _____ electrons becomes _____ charged.
- The atom that _____ electrons becomes _____ charged.
- The ions with _____ electrical charges are _____ to one another.
- A chemical bond formed when atoms _____ or _____ electrons is called an _____.

Covalent Bonds

- Covalent bonds are formed when _____ produce compounds by _____ electrons.
 - When making hydrogen gas, one molecule of hydrogen gas is formed when two hydrogen atoms join by sharing electrons.

Chemical Formulas

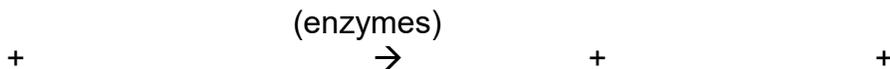
- A _____ formula represents the chemical makeup of a _____.
- It shows the _____ and kinds of atoms present in a compound.
- It is a kind of “shorthand” that scientists use.
 - The chemical formula for sugar is C₆H₁₂O₆.
 - This means that in one molecule of sugar there are six carbon atoms, twelve hydrogen atoms and six oxygen atoms.
 - H₂O (_____)
 - SO₂ (_____)
 - CO₂ (_____)

Structural Formulas

- A formula can also show the kinds, numbers, and _____ of atoms.
- This is called a _____.
- The structural formula of molecular _____ is:

Equations

- Equations are used to describe _____.
- The substances that start the reaction are called the _____.
 - The reactants are placed on the _____ side of the equation.
- The substances formed by the reaction are called the _____.
 - The products are placed on the _____ side of the equation.
- The arrow means “_____” or “_____”.
- Reactions may be represented either by _____ or _____.
 - The **word equation** for _____ respiration is:



- An equation using _____ instead of _____ is called a _____.
 - The **chemical equation** for _____ respiration is:



Organic and Inorganic Compounds

- Living things are made up of _____ and _____ compounds.
- Compounds that do not contain both _____ and _____ are called _____ **inorganic compounds**.
- The principal inorganic compounds found in living things are:
 -
 -
 -
 -
- _____ are compounds that contain both _____ and _____.
- The classes of organic compounds found in living things are:
 -
 -
 -
 -

Carbohydrates

- **Carbohydrates** are the main source of _____ for cell activities.
 -
- Carbohydrates are made up of the elements _____, _____, and _____.
- Generally, there are _____ as many hydrogen atoms as oxygen atoms in carbohydrates (____:____ ratio).
- The simplest carbohydrates are called _____ or simple sugars.
- They are called the “_____” of carbohydrates.
- A common monosaccharide is _____ ($C_6H_{12}O_6$).
 - Glucose is formed during _____.
- When two simple sugars combine, they form a _____ or double sugar.
 - _____ ($C_{12}H_{22}O_{11}$) is an example of a common _____.
Maltose is formed when _____ glucose molecules chemically combine.
- Long chains of _____ (sugar molecules) bonded together form _____.
- Important polysaccharides found in living things are _____ and _____.

Lipids

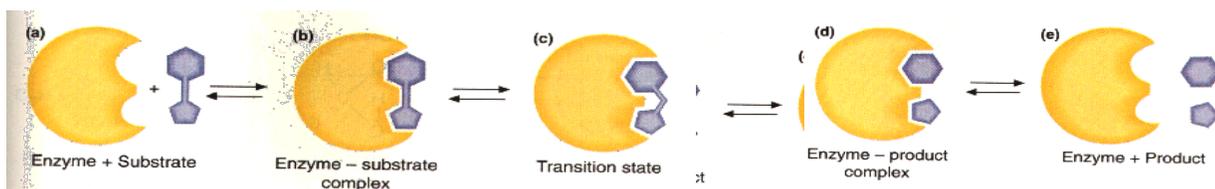
- _____ include fats and oils.
 - _____ are solid at room temperature.
 - _____ are liquids at room temperature.
- In living organisms, lipids form part of the structure of _____.
- Extra food that is not immediately needed as a source of _____ is changed to fat and stored.
- Lipids are a source of _____ in living organisms.
- Lipids, like carbohydrates, contain the elements _____, _____, and _____.
- The building blocks of lipids are _____ and _____.

Proteins

- Proteins form important cell products such as _____, _____, _____, and _____.
- Proteins also play an important role in cell _____ and _____.
- Proteins are made up of _____, _____, _____, and _____.
- Some proteins also contain _____.
- Proteins are composed of simpler units (building blocks) called _____.
- There are _____ amino acids found in living things.
- Amino acids can be _____ together in any sequence and combination.
- Because of this, there are a very large number of different proteins.
- Two amino acids bonded together form a _____.
- Many amino acids bonded together form _____.
- Proteins are made up of long _____ chains.

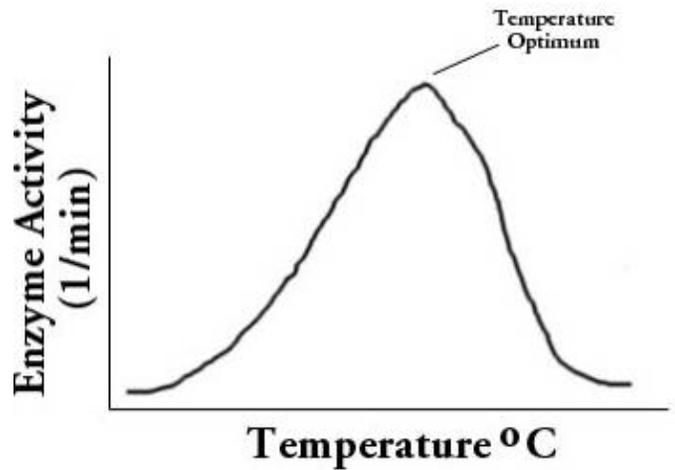
Enzymes

- Each chemical reaction that occurs in a living thing is controlled by an _____.
- Enzymes are large, complex _____ molecules that control the _____ of chemical reactions.
- Enzymes are the _____ catalysts in cellular chemical reactions.
- In chemistry, a _____ is something that _____ up or _____ down a chemical reaction.
- Catalysts are neither permanently _____ nor _____ by the reaction they catalyze.
- In organisms, _____ allow the chemical reactions of _____ to take place more efficiently than they otherwise would at body temperature.
- For example, amino acids are produced from protein digestion. The enzymes needed for this reaction are not changed but must be present for the reaction to occur.
- Some enzymes have a _____ part called a _____.
- Many coenzymes are _____.
- If a vitamin is missing from the human body, a certain _____ cannot function
- If an enzyme doesn't function, one or more _____ reactions cannot occur.
- This is one of the reasons why it is important that you eat a _____ diet every day.
- Without _____ (vitamins) needed by the body, the chemical processes necessary for proper _____ cannot take place.
- The _____ of enzyme action is influenced by several factors:
 -
 - Relative concentrations of
 -
- Each enzyme has an _____ and _____, a _____ or _____ at which it functions most efficiently and its rate of activity (action) is the _____.



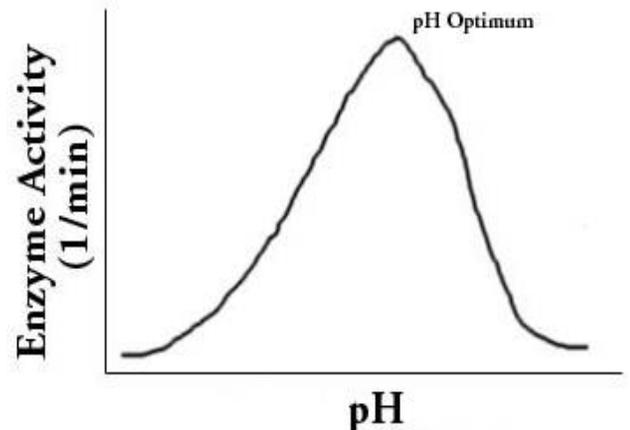
Enzymes and Temperature

- At _____ below the _____, the rate of enzyme activity (action) is _____.
- Enzyme activity _____ with increasing temperature up to the _____ temperature.
- Above the _____ temperature, the rate of enzyme activity _____.



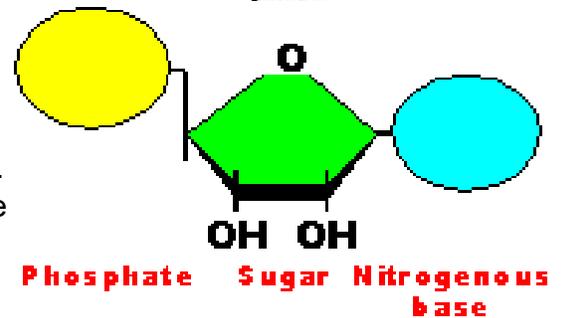
Enzymes and pH

- At _____ levels below the _____, the rate of enzyme activity (action) is _____.
- Enzyme activity _____ with increasing pH up to the _____ pH.
- _____ the optimum pH, the _____ of enzyme activity _____.



Nucleic Acids

- Nucleic acids are very large molecules made up of _____, _____, _____ and _____.
- The simplest unit or building block of nucleic acids is the _____.
- Nucleotides are composed of a _____, a _____, and a _____ group.
- _____ and _____ are two kinds of nucleic acids.
- _____ makes up _____ and is involved in heredity.
- _____ is involved in the making of _____.



The pH Scale

- The pH scale measures whether a solution is _____, _____ or _____.
- The scale runs from _____ to _____.
- A pH of _____ indicates that the solution is _____.
- This means that the solution is neither an _____ nor a _____.
- The _____ the pH number, the _____ the acid solution is.
- A pH above _____ indicates that the solution is _____.
- The _____ the pH, the more strongly _____ is the solution.

