**Biochemistry Notes**

I. **Inorganic Compounds** - compounds that are not produced by

living things.

 A) Do not contain carbon. Relatively simple structure.

 B) 3 important inorganic compounds and substances.

 1. **Water** (**H2O**) –

 a. **Solvent/Polarity** – “universal solvent” -Water is a polar molecule.

 -this allows other chemicals (solutes) to dissolve in water to make solutions and react with each other

 b. Chemicals that do not dissolve or larger particles can form colloids or suspensions.

 c. Allows for movement of compounds in organisms

 d. **High heat capacity** – it can absorb or release large amounts of heat without changing temperature

 e. **Chemical reactivity** – Water can split compounds apart (**hydrolysis**) or be used to hook compounds together (**dehydration synthesis**)

 f. **Cushioning** – Cerebrospinal fluid (brain & spine), amniotic fluid (fetus), synovial fluid (joints)

 2. **Oxygen** (**O2**) - Used by most living things to burn (oxidize) nutrients and get energy.

3. **Carbon dioxide** (**CO2**) - this gas is the source of all

carbon found in living things.

**II. Acids/Bases**

 A. **Acids** – have a sour taste, (ex. Citric acid), attack metals

 1. releases **H+** (hydrogen ions) in a water solution

 2. known as **proton donors**

 B. **Bases** – have a bitter taste, feel slippery

 1. Release **OH-** (**hydroxide** or **hydroxyl** ions) in a solution of water.

 2. Known as **proton acceptors**

 C. Measured on a pH scale, that goes from 0-14.

 1. pH refers to the concentration of H+ ions.

More acidic

Neutral

More basic

2. A pH change by 1, increases or decreases the acidity by 10 times, change by 2, 100 times, etc.

 3. Something with a pH of 14, has a very low concentra- tion of H+ ions of 1 X 10-14 and would be a base.

 D. When an acid is added to a base, a **neutraliztion** **reaction** occurs.

 HCl + NaOH 🡪 HOH + NaCl

 Hydrochloric acid sodium hydroxide water a salt

 E. Weak vs. Strong Acids/Bases

 1. strong acids/bases – ionize completely in water

 2. weak acid/base –don’t ionize completely in water

 F. Diluted vs. Concentrated Acids/Bases

 1. concentrated acids/bases – high acid to H2O ratio

 2. diluted acids/bases – have been “watered down”

 

H+

H+

H+

H+

H+

H+

Cl-

Cl-

Cl-

Cl-

Cl-

Cl-

Cl-

H+

HCO3

HCO3

HCO3

HCO3

H+

CO3-

HCO3

CO3-

HCO3

 dilute strong dilute weak concentrated weak

 G. **Buffers** are chemicals in the body that can absorb or give off H+ and OH- to keep the pH from changing.

NaCO3 + H+ 🡨🡪 NaHCO3

 H. **Salts**

 1. Salts **disassociate** in water to form ions

 2. Form **electrolytes**- ions that conduct electrical currents in solution.

III. **Organic compounds** -compounds produced by living things

A) All contain carbon. Most are complex chains or rings of

carbon.

 B) Many are polymers (many units) chains made of monomers

(single units) hooked together.

C) 4 main types of organic compounds.

 1. **Carbohydrates**- “hydrated carbons” or CHO’s

a. **Monosaccharides** (**simple sugars**) – glucose, fructose,

galactose, ribose, and deoxyribose

b. **Disaccharides (double sugars)** – sucrose (glucose +fructose), lactose (glucose + galactose), and maltose (2 glucoses).

 c. Sugars are used for quick energy

d. **Polysaccharides** (many sugars) not sweet

- Used to store energy – **starch** (plants) or **glycogen**

(animals).

- Used to build cell walls –**cellulose** (**fiber**)

e. To store sugars, cells dehydrate them and hook them together to form chains called starch or glycogen. This process is called **dehydration synthesis**.

+ H2O

O

 O-H

 O-H

O

O-H

O-H

+

O

 O-H

O

O-H

O

🡨🡪

 **glucose glucose starch**

 f. If cell needs energy, it adds water to break off a

glucose in reaction called **hydrolysis**.

g. All CHO’s have 4 calories/gram.

 2. **Lipids** –

a. Most common are:

**fats** (solid) usually from animals and saturated,

**oils** (liquid) usually from plants and unsaturated,

and **waxes**

b. Used for long-term storage of high energy.

 1) Lipids have 9 calories/gram.

c. Protects the outer layers of organisms.

d. Not soluble in water

f. **Phospholipids** – contains a PO4 group that is polar will dissolve in water (**hydrophilic**) and a lipid end that will not (**hydrophobic**)

g. **Steroids** – Most important is **cholesterol**

 - Found in the cell membrane and the brain

- Used by the body to make vitamins, hormones, and bile salts.

3. **Proteins** –polymers that contain nitrogen and are made of units called **amino acids**.

a. Used to form body structures

 **collagen** – found in bones, cartilage, and tendons

 **keratin** – found in hair, nails, and skin.

b. Some are **enzymes** (catalysts) - chemicals that control which reactions take place and how fast they occur.

- They do not take part in reaction

- Names end in -ase

- They are activated to start functioning and are deactivated when they are done.

 c. Proteins have 4 calories/gram.

4. **Nucleic Acids** – **D(eoxyribo-)NA** and **R(ibo-)NA**.

a. Polymers made out of monomers called

**nucleotides**.

Nitrogen base

Sugar

Phosphate group

 b. Functions of DNA

 - It replicates itself before cell division

 - It contains the instructions(code) for building every protein in the body.

 c. Differences between DNA and RNA

 - RNA has 1 strand, DNA has 2.

 - DNA has deoxyribose sugar, RNA has ribose

 - There are 4 nitrogen bases in DNA

 cytosine (C) pairs with (G) guanine, and

 adenine (A) pairs with (T) thymine

 -In RNA, (A) pairs with (U) Uracil