

## CHAPTER 2- BIOCHEMISTRY

- KENNEDY
- BIOLOGY 1AB

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### I. WATER (VERY IMPORTANT TO LIVING ORGANISMS)

- WATER'S UNIQUE PROPERTIES MAKE IT ESSENTIAL FOR ALL LIFE FUNCTIONS
- IT IS POLAR, AND HAS BOTH ADHESIVE AND COHESIVE PROPERTIES
- IT HAS A HIGH SPECIFIC HEAT

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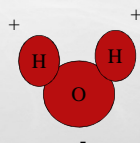
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### A. POLAR COMPOUND-

- WATER HAS BOTH A POSITIVELY CHARGED AND NEGATIVELY CHARGED END



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## B. ADHESION-

- BECAUSE OF THE POLAR NATURE OF WATER, IT HAS THE ABILITY TO STICK TO OTHER THINGS
- WATER IS ATTRACTED TO OTHER CHARGED PARTICLES
- EXAMPLE: CAPILLARY ACTION

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## C. COHESION-

- BECAUSE OF WATERS POLAR NATURE, IT IS ATTRACTED TO ITSELF
- WATER MOLECULES WILL STICK TO EACHOTHER BECAUSE THEY THEMSELVES ARE CHARGED
- EXAMPLE: SURFACE TENSION

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## II. ORGANIC COMPOUNDS

- A. DEFINITION- COMPOUNDS WITH A CARBON BACKBONE, OR CONTAINING CARBON

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## B. EXAMPLES OF ORGANIC COMPOUNDS

- 1. CARBOHYDRATES
  - A. DEFINITION-ORGANIC COMPOUNDS MADE OF CARBON, HYDROGEN, AND OXYGEN
  - MOST CARBOHYDRATES CONTAIN 2 ATOMS OF HYDROGEN FOR EVERY 1 ATOM OF OXYGEN
  - #1 ENERGY SOURCE FOR LIVING ORGANISMS

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## B. EXAMPLES OF CARBOHYDRATES

- 1. MONOSACCHARIDES-MOST SIMPLE FORM OF CARBOHYDRATE
  - CONTAIN 5 OR 6 CARBON ATOMS
  - ARE USUALLY RING SHAPED
  - CONTAIN ONE OXYGEN ATOM IN THE RING

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## A. EXAMPLES

- 1. GLUCOSE
- 2. FRUCTOSE

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## 2. DISACCHARIDE-

- CARBOHYDRATES COMPOSED OF TWO OR MORE MONOSACCHARIDES
- EXAMPLE: GLUCOSE + FRUCTOSE = SUCROSE OR TABLE SUGAR

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## A. EXAMPLES

- 1.LACTOSE
- 2.SUCROSE
- 3.MALTOSE

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## 3. POLYSACCHARIDES-

- FORMED BY THREE OR MORE MONOSACCHARIDES BOUND TOGETHER
- LARGE MACROMOLECULES
- CAN SERVE AS ENERGY SOURCE OR FOR STRUCTURE IN CELLS

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## A. EXAMPLES

- 1.CELLULOSE
- 2.GLYCOGEN
- 3.STARCH

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## 2. LIPIDS

- A. DEFINITION- NON-POLAR ORGANIC MOLECULES MADE OF CARBON, HYDROGEN, AND OXYGEN
- FORM VERY LONG CHAINS
- GOOD FOR LONG TERM ENERGY STORAGE
- DIFFICULT TO BREAK DOWN

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## B. EXAMPLES

- 1. FATTY ACIDS-LONG CHAIN OF CARBON ATOMS WITH A COOH ( CARBOXYL) GROUP AT THE END.
- ATTACHED TO GLYCEROL AND/OR A PHOSPHATE MOLECULE
- EXAMPLE: PHOSPHOLIPID MOLECULE

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## A. HYDROPHILIC-

- THESE ARE CHARGED/POLAR MOLECULES THAT WILL DISSOLVE IN WATER
- EXAMPLE: NA<sub>2</sub>CO<sub>3</sub>

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## B. HYDROPHOBIC-

- NON-POLAR MOLECULES/ THOSE THAT ARE NOT CHARGED AND WILL NOT DISSOLVE IN WATER.
- EXAMPLE: OILS

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## 2. TRIGLYCERIDE-

- FORMED FROM THE COMBINATION OF THREE FATTY ACID MOLECULES BOUND WITH A THREE CARBON MOLECULE OF GLYCEROL
- ACCOUNTS FOR THE MAJORITY OF ALL FAT FOUND IN LIVING ORGANISMS

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### A. OILS-

- A NON-POLAR SOLUTION, ONE MADE OF TRIGLYCERIDES THAT IS LIQUID AT ROOM TEMPERATURE
- CAN BE EITHER SATURATED OR NON-SATURATED, OR A COMBINATION OF THE TWO
- SATURATED CONTAINS ALL THE POSSIBLE HYDROGEN IT CAN HOLD ( THESE ARE USUALLY NOT OILS)
- UNSATURATED FAT IS MISSING SOME HYDROGEN AND IS THEREFOR MORE FLUID
- EXAMPLES: CORN OIL AND PEANUT OIL

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### B. FATS-

- SATURATED TRIGLYCERIDES, NON-POLAR MOLECULES THAT ARE USUALLY SOLID AT ROOM TEMPERATURE
- EXAMPLES: ANY ANIMAL FAT

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### 3. WAX-

- FORM OF TRIGLYCERIDE OR FAT THAT HAS HAD MOST OF THE WATER REMOVED
- USED AS A STORAGE FORM AND FOR STRUCTURE BY BOTH PLANTS AND ANIMALS
- EXAMPLES: BEES WAX, CUTIN

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## 4. STEROID-

- TRIGLYCERIDE BASED MOLECULE USED BY ANIMALS AS A HORMONE
- CAN CAUSE REACTIONS TO OCCUR WITHIN SPECIFIC CELL THAT IT COME IN CONTACT WITH

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## 3. PROTEINS

- A. DEFINITION- LARGE MACROMOLECULES MADE OF CARBON, HYDROGEN, NITROGEN, OXYGEN, AND SULFUR
- THEIR PRIMARY BUILDING BLOCK IS THE AMINO ACID
- THEY FUNCTION AS BUILDING BLOCK WITH IN THE ORGANISM OR EVEN ENZYME AND TRANSPORT MOLECULES
- AVERAGE 200 AMINO ACIDS PER PROTEIN

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## B. AMINO ACID-

- PRIMARY BUILDING BLOCK OF PROTEIN
- 20 DIFFERENT TYPES
- ALMOST ENDLESS COMBINATION OF A.A.S YIELDING A WIDE VARIETY OF PROTEIN MOLECULES

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### C. DIPEPTIDE-

- FORMED BY THE BONDING OF ONLY TWO AMINO ACIDS
- NOT NORMALLY FUNCTIONAL PROTEIN

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### D. POLYPEPTIDE-

- FORMED FROM THREE OR MORE AMINO ACIDS BINDING TOGETHER, MOST COMMON
- EXAMPLE:HEMOGLOBIN

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### E. ENZYMES-

- LARGE POLYPEPTIDE THAT HAS THE ABILITY TO LOWER THE ACTIVATION ENERGY OF REACTIONS, CAUSING THEM TO GO FASTER
- EXAMPLES:MALTASE, LACTASE
- EACH ENZYME HAS AN ACTIVE SITE THAT FITS ONLY ONE SUBSTRATE
- HAND AND GLOVE FIT

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# 1. SUBSTRATE-

- THE MOLECULE THAT THE ENZYME WILL BIND WITH DURING A REACTION.
- WILL ONLY BIND WITH AN ENZYME THAT HAS THE APPROPRIATED ACTIVE SITE

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# 4. NUCLEIC ACIDS-

- A. DEFINITION- MOLECULES COMPOSED OF NUCLEOTIDES THAT ARE RESPONSIBLE FOR CONTROLLING THE ACTIVITIES OF THE CELL
- EXAMPLE: DNA, RNA

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# B. EXAMPLES

- 1. DNA-DEOXYRIBONUCLEIC ACID
- 2. RNA-RIBONUCLEIC ACID

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