

# Unit 1: Biochemistry

Section 1-1: Elements of Life, Macromolecules, Origin of Macromolecules, Environmental Cycles

Book Reading: Chapter 2, Section 2.1 pages 32-34; Preview Chapter 5 pages page 68-89 (you don't need to read in detail); Supplemental Reading Handout, Chapter 54 pages 1196-1197

## Elements of Life (chapter 2, section 2.1)

### ❖ Essential Elements of Life

- Element- *define*
  
- Four that make up 96% of all living matter:
  - *list*
  - 
  - 
  -
  
- Remaining 4%:
  - *list*
  - 
  - 
  -
  
- Trace Elements- *define*

| Symbol | Element    | Atomic Number (See p. 34) | Percentage of Human Body Weight |
|--------|------------|---------------------------|---------------------------------|
| O      | Oxygen     | 8                         | 65.0                            |
| C      | Carbon     | 6                         | 18.5                            |
| H      | Hydrogen   | 1                         | 9.5                             |
| N      | Nitrogen   | 7                         | 3.3                             |
| Ca     | Calcium    | 20                        | 1.5                             |
| P      | Phosphorus | 15                        | 1.0                             |
| K      | Potassium  | 19                        | 0.4                             |
| S      | Sulfur     | 16                        | 0.3                             |
| Na     | Sodium     | 11                        | 0.2                             |
| Cl     | Chlorine   | 17                        | 0.2                             |
| Mg     | Magnesium  | 12                        | 0.1                             |

Trace elements (less than 0.01%): boron (B), chromium (Cr), cobalt (Co), copper (Cu), fluorine (F), iodine (I), iron (Fe), manganese (Mn), molybdenum (Mo), selenium (Se), silicon (Si), tin (Sn), vanadium (V), and zinc (Zn).

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## Macromolecules of Life (chapter 5)

- ❖ Macromolecule- *define*
  
- ❖ The four Macromolecules include
  - *list*
  - 
  - 
  -

- ❖ Elements within Macromolecules *place a check mark in the box if the element is found in all of that type of macromolecule, write some if it is only found in some of that type*

| <b>Macromolecule</b> | Carbon | Hydrogen | Oxygen | Nitrogen | Phosphorous | Sulfur |
|----------------------|--------|----------|--------|----------|-------------|--------|
| Carbohydrate         |        |          |        |          |             |        |
| Lipid                |        |          |        |          |             |        |
| Protein              |        |          |        |          |             |        |
| Nucleic Acid         |        |          |        |          |             |        |

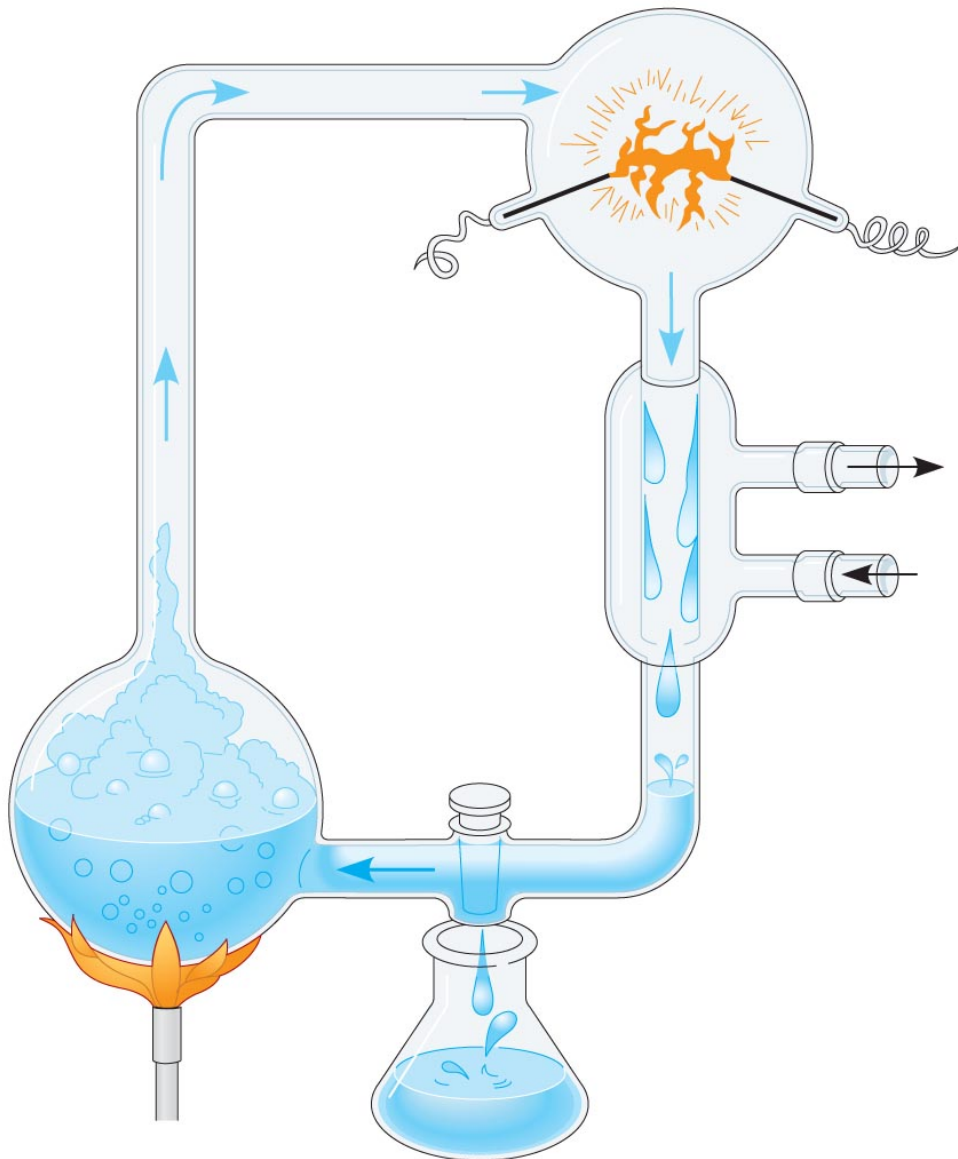
Origin of Organic Macromolecules *(supplemental reading handout)*

- ❖ Atmosphere of Early Earth

- Geological evidence suggests that Earth was formed *when?*
- Life formed about *when?*
- Earth's Early atmosphere is hypothesized to have contained:
  - *List the elements or compounds with their names and chemical symbols*
  - 
  - 
  -
- There was NO *what?*
- The only source of O<sub>2</sub> was *what?*

❖ Miller-Urey Experiment

- Added all the components of earth's early atmosphere
- Added a spark to simulate lightning
- Results: *what?*
- Then added CO<sub>2</sub>, N<sub>2</sub> and SO<sub>2</sub>
- Results: *what?*



## Cycles of Elements and Water in Nature (Chapter 54)

### ❖ The Water Cycle

- Biological Importance: *summarize*
- Available Forms: *what state?*
- Reservoirs: *summarize*
- Key Processes:
  - Evaporation
  - Condensation
  - Precipitation
  - Transpiration



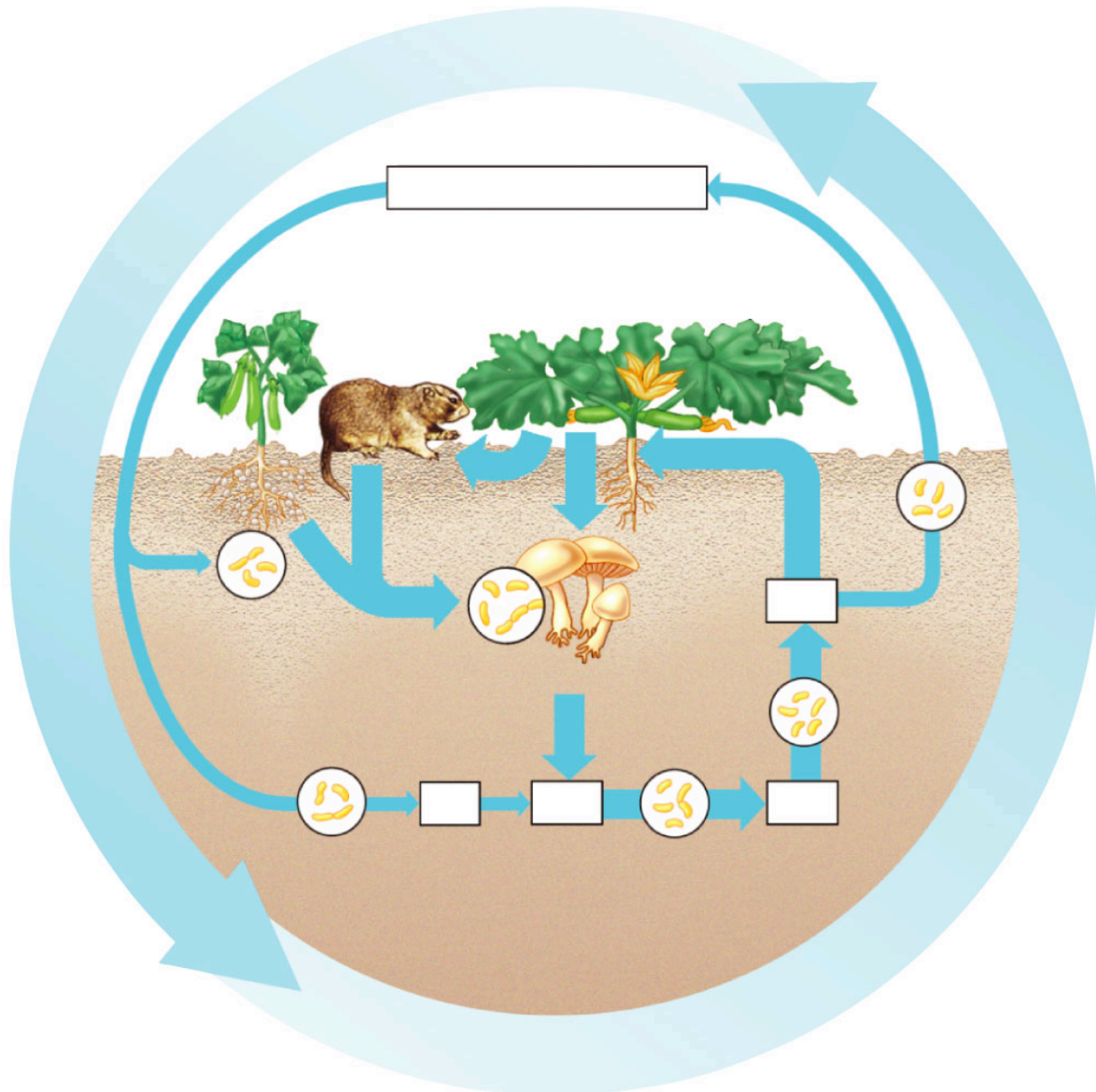
❖ The Carbon Cycle

- Biological Importance: *summarize*
- Available Forms: *what state and/or form and how is it processes?*
- Reservoirs: *summarize*
- Key Processes:
  - Photosynthesis
  - Cellular Respiration
  - Burning of Fossil Fuels



❖ The Nitrogen Cycle

- Biological Importance: *summarize*
- Available Forms: *where does it come from, how is it incorporated into life forms?*
- Reservoirs: *summarize*
- Key Processes:
  - Nitrogen Fixation by bacteria



❖ The Phosphorous Cycle

- Biological Importance: Biological Importance: *summarize*
- Available Forms: *what compound and how is it put into organic life forms*
- Reservoirs: *summarize*
- Key Processes:
  - Weathering
  - Assimilation by plants
  - Decomposition

