

Chapter 1+

I. Hierarchy of matter

Atoms

Molecule

II. Life's organization

Organelle

Cell

Tissue

Organ

System

Organism

Population

Community

Ecosystem

Biome

Biosphere

III. How is this accomplished?


Directed transference of energy & rearrangement of matter (thermodynamics)

A. DNA accomplishes this task for organisms, ecosystems for life on the planet

1. DNA → RNA → Protein (1 gene = 1 polypeptide)

B. Ecosystem energy flows chemicals cycle

1. Energy
2. Producers
3. Consumers
4. Decomposers



IV. How do scientists study/know this?

1. Classify → K, P, C, O, F, G, S

a. 3 domains

b. 6 kingdoms

2. Scientific Method

- a. Standard
 - i. Observation
 - ii. Hypothesis
 - iii. Test
 - iv. Theorize
- b. Theories of Biology e.g. mutation
 - variation; Evolution; Cell = basic unit of life;

V. Water - How do we know what it's made of?

*power source *Sulphuric Acid

1. *Hydrolysis Demo* - relate to exothermic recombination & Space Shuttle

2. What is it good for? *tape player *
Cowboy envy tape

1. Polar

2. Hydrogen bonds

3. ΔT moderated (remains liquid over wider range of temperatures)

a. Transfer energy through all H-bonds of the water

b. Evaporation at surface decreases energy (cools)

4. Solid less dense than liquid

a. H-bonds form rigid lattice → more space = less dense; floating ice insulates & protects aquatic organisms

5. Cohesive

a. Allows capillary movement in soil → plants → air (transpiration)

b. Causes soil moisture (unavailable)

c. Surface tension (water striders & high divers)

6. Solvent - excellent for dissolving (divide & conquer) & carry (transpiration) due to polarity
7. Medium for life (cyto-nucleo-plasms; tissue fluids; sap; etc)
 - a. Hydrophilic (water-loving) & hydrophobic (water fearing)
 - b. Presence of water allows for active biochemicals, e.g.- enzyme active sites & phospholipid membranes

VI. $\text{pH} = -\log[\text{H}^+]$ (refers to the concentration of H^+)

1. Acids - H^+ donors
2. Bases - H^+ acceptors
3. Buffers - a solution of a weak acid or base & its salt that serves to stabilize the pH at a specific value
4. Salts - ionic compound composed of ions other than H^+ or OH^-

X. Water, Life's "Nectar of the gods"

A. hydrology cycle (how water cycles)

B. water partitioning - What % is consumable

C. water problems: Non-point and Point organic and inorganic pollutants; availability

1. Nutrient pollutants: N and P

Phosphates have been banned from laundry detergents (not dish soaps) has made a difference in phytoplankton productivity in area lakes (lessened algal blooms) Why do they cause problems?

2. Availability due to location
hydrology and management (scarcity v.
opulence)

D. Drainage Basins - a wholistic approach
to solving water problems