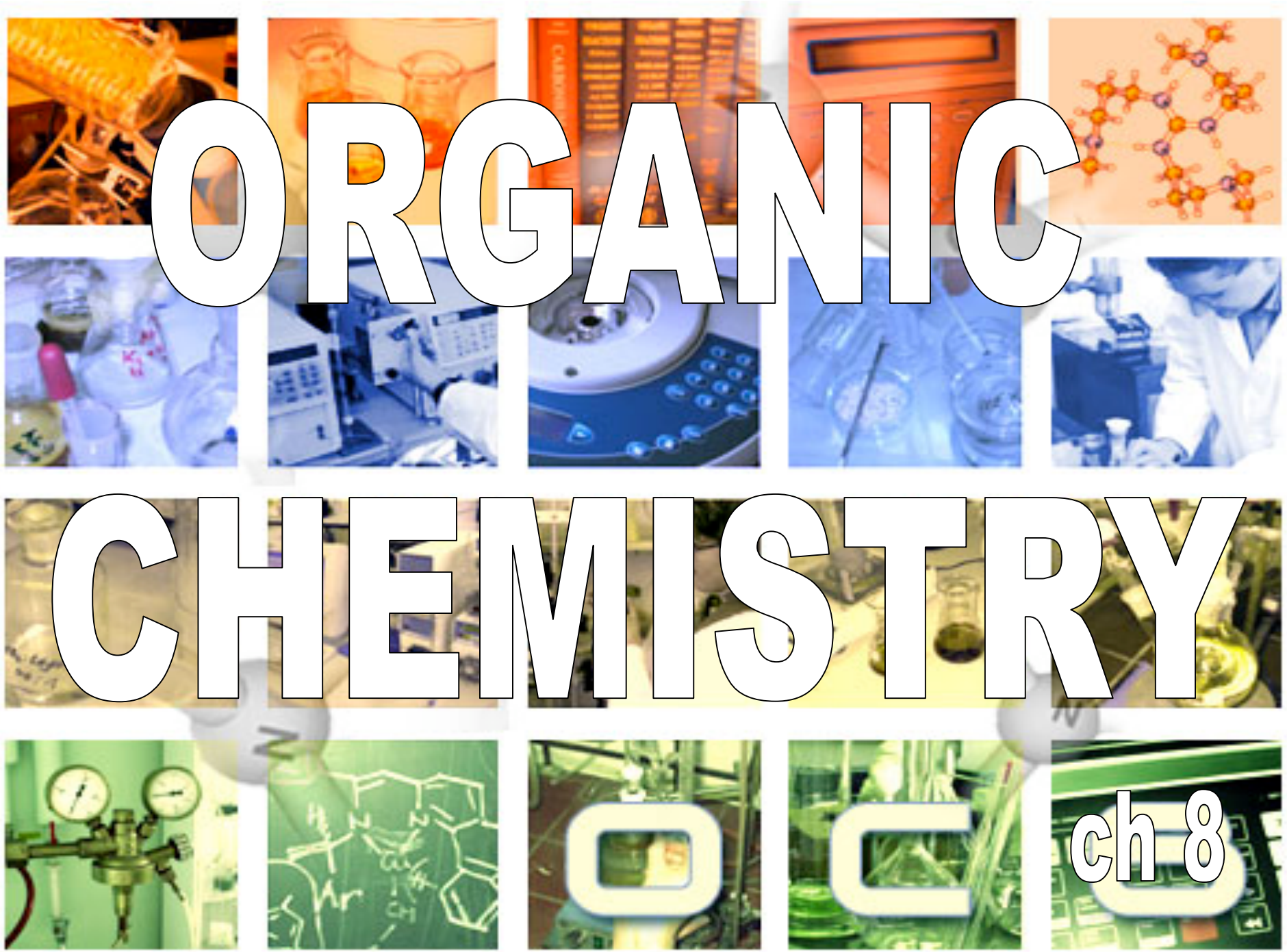
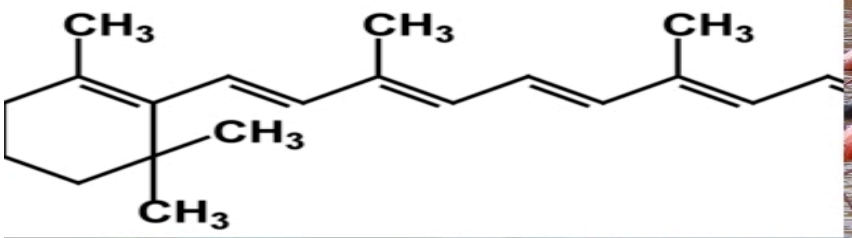
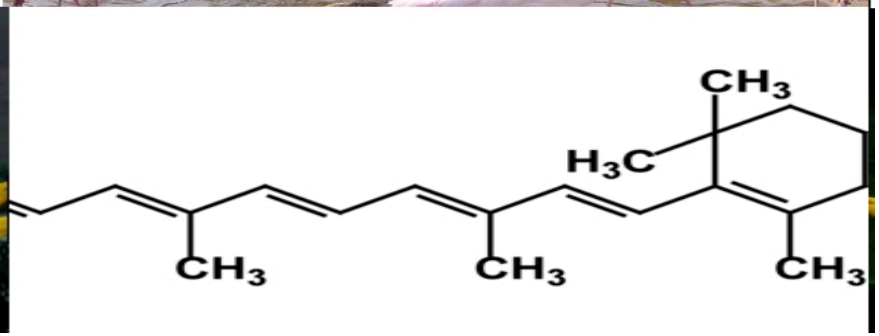

ORGANIC
CHEMISTRY
ch 8

ORGANIC CHEMISTRY

- Study of the element CARBON.
- Study of the Chemistry of Life, and all its chemical reactions.



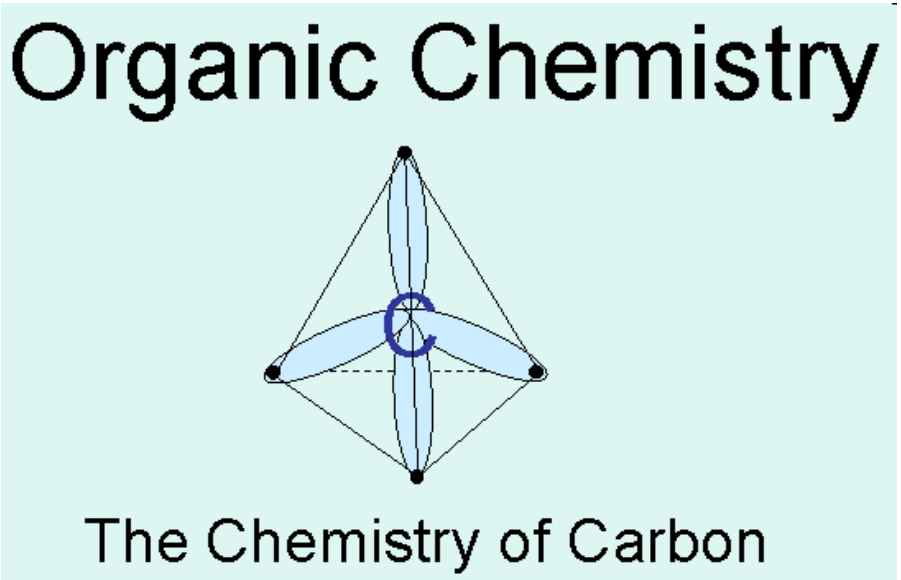


Top 4 Elements for Life

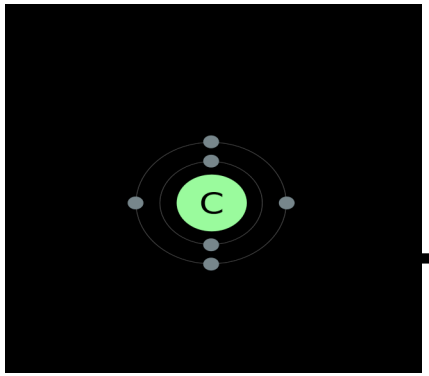
- OXYGEN
- NITROGEN
- HYDROGEN
- CARBON

- Makes up 98% of living matter

CARBON

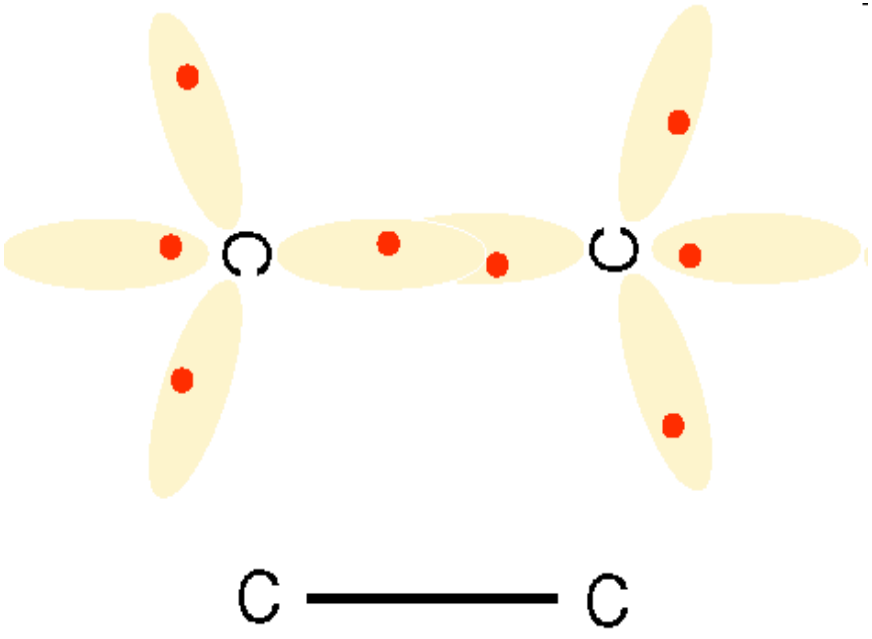


- Carbon compounds make up 90% of all compounds with limitless uses.
- Needed for organic (living) compounds.



CARBON Review

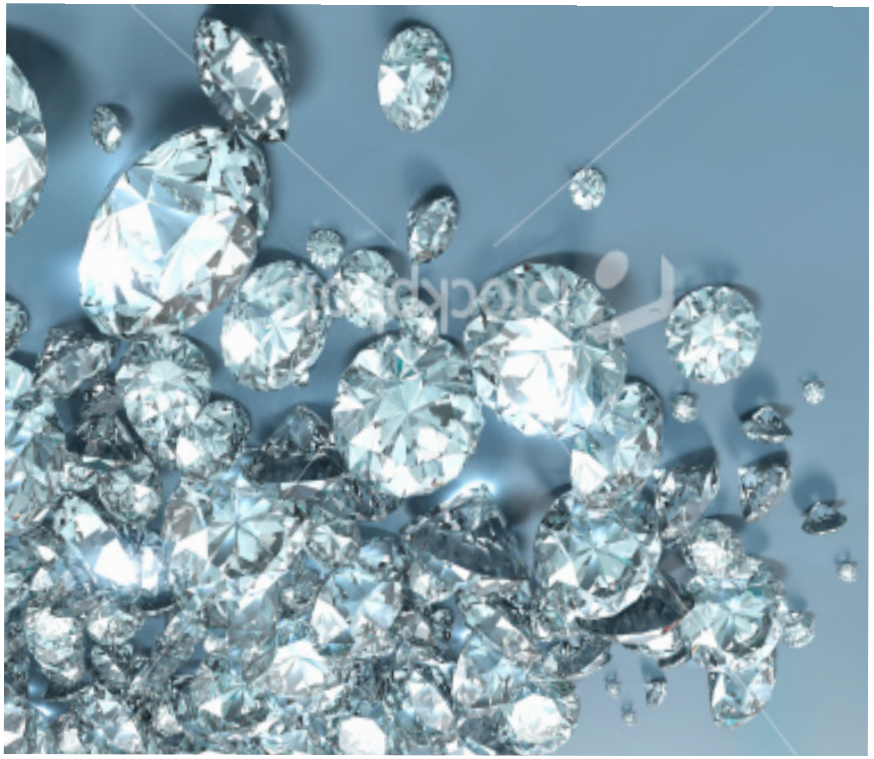
- Non Metal - 3 States of Matter
- Covalent bond- has 4 V.E.
- Can bond with other carbons.
- Have high melting and boiling points.



Carbon con't

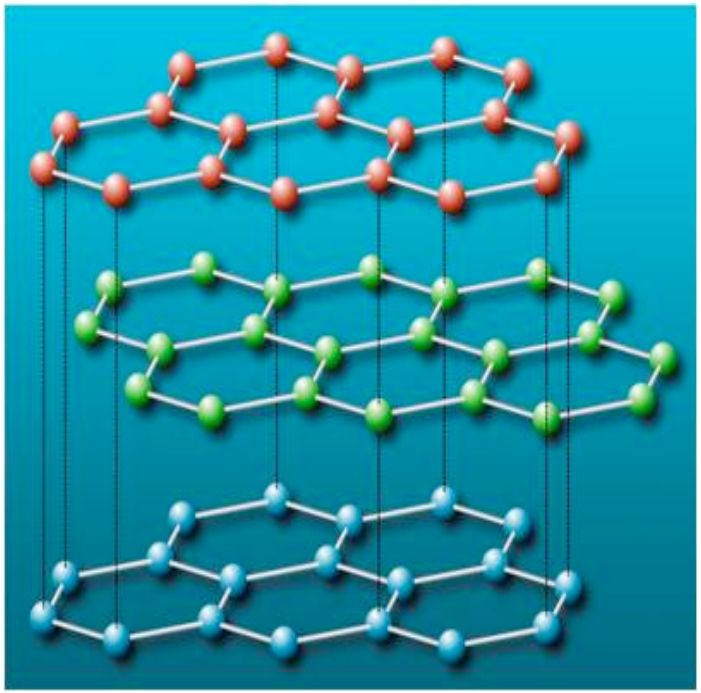
Carbon can come in many natural states and substances.

Diamonds- hard compound with 4 Bonds (strong).



Carbon con't

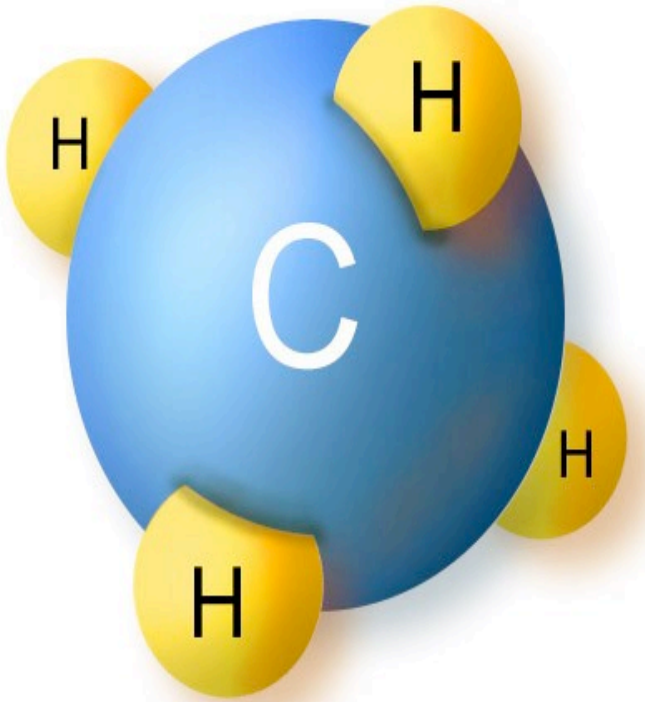
- Graphite- soft compound with 3 bonds.



bonds shown here

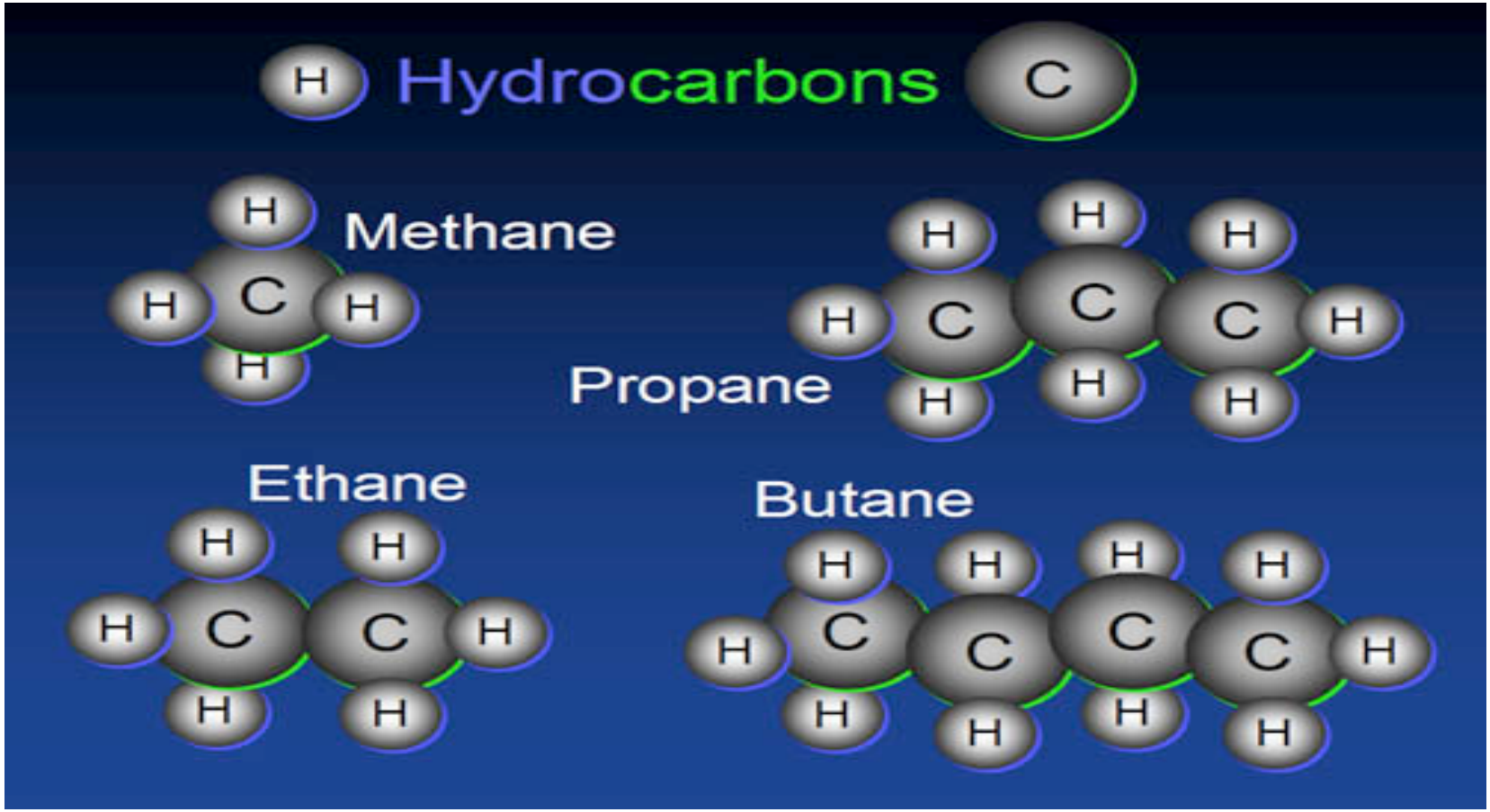
Hydrocarbon

- Compound of just Hydrogen and Carbon atoms.



Hydrocarbon

- Different amounts of atoms and bonds change the compound.



Bonds = Names

- Compound names change the suffix due to type of bonds.
  - -"ane" single bonds
  - -"ene" double bonds
  - -"yne" triple bonds

[Cheat sheet- for "ane" 2x # of carbon + 2 to get # of attached element]

Let's Practice

- Make these structural compounds:

Butane $C_4 H_{10}$

Butene $C_4 H_8$

Butene $C_4 H_6$

Ethane $C_2 H_6$

Ethene $C_2 H_4$

Ethyne $C_2 H_2$

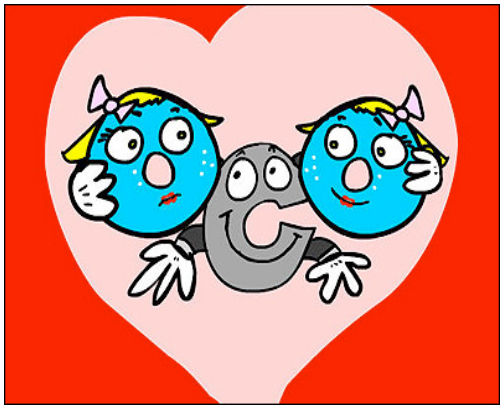
Methane $C H_4$

Methene $C H_2$

Methyne $C H$

Hydrocarbon

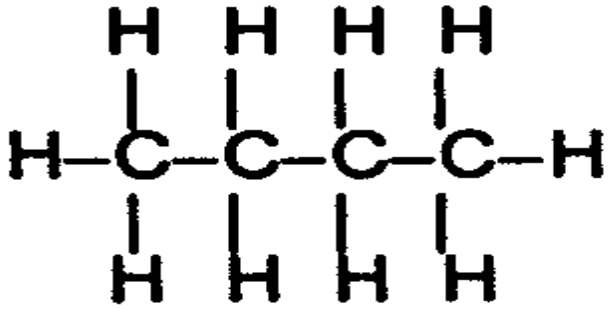
- Can occur in different forms; straight, branched or ring shaped.
- Mix poorly with water and are flammable (release lots of energy & heat)

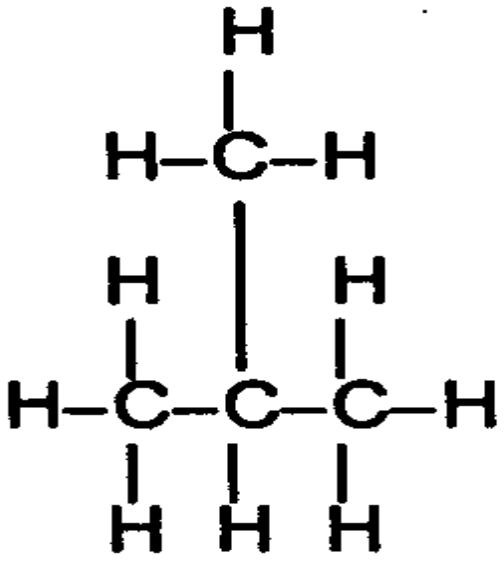


When Carbon atoms combine with other elements, it is no longer a Hydrocarbon. Duh!

ISOMERE

- Compounds with the same chemical formula but a different structure.

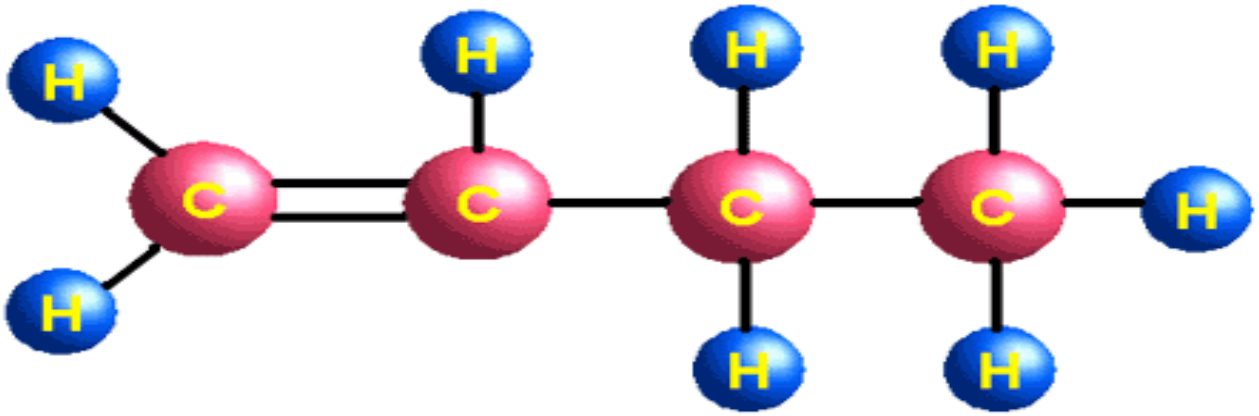




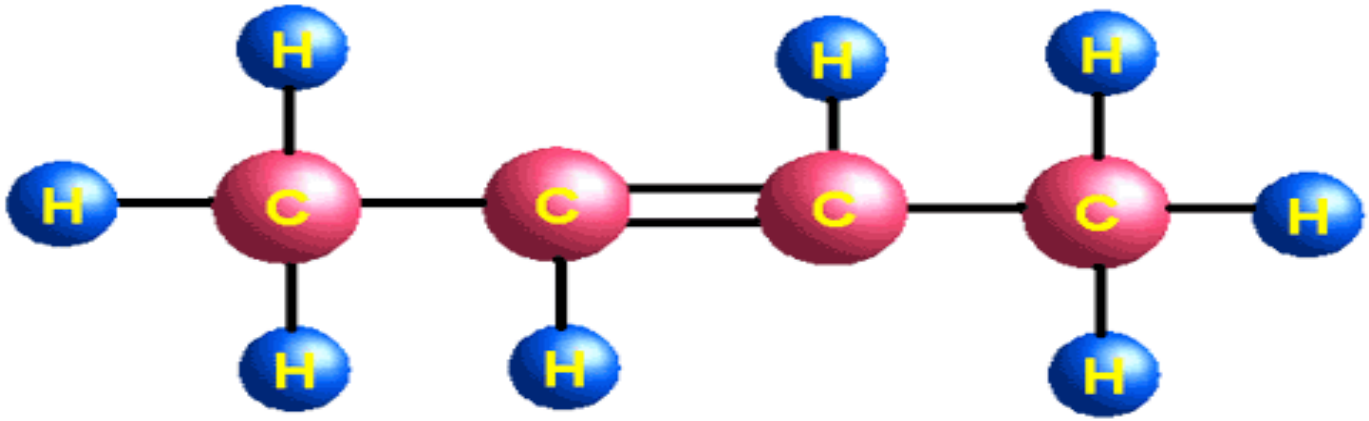
[A different way to put the pieces together]

ISOMERE

Structural Isomer 1



Structural Isomer 2



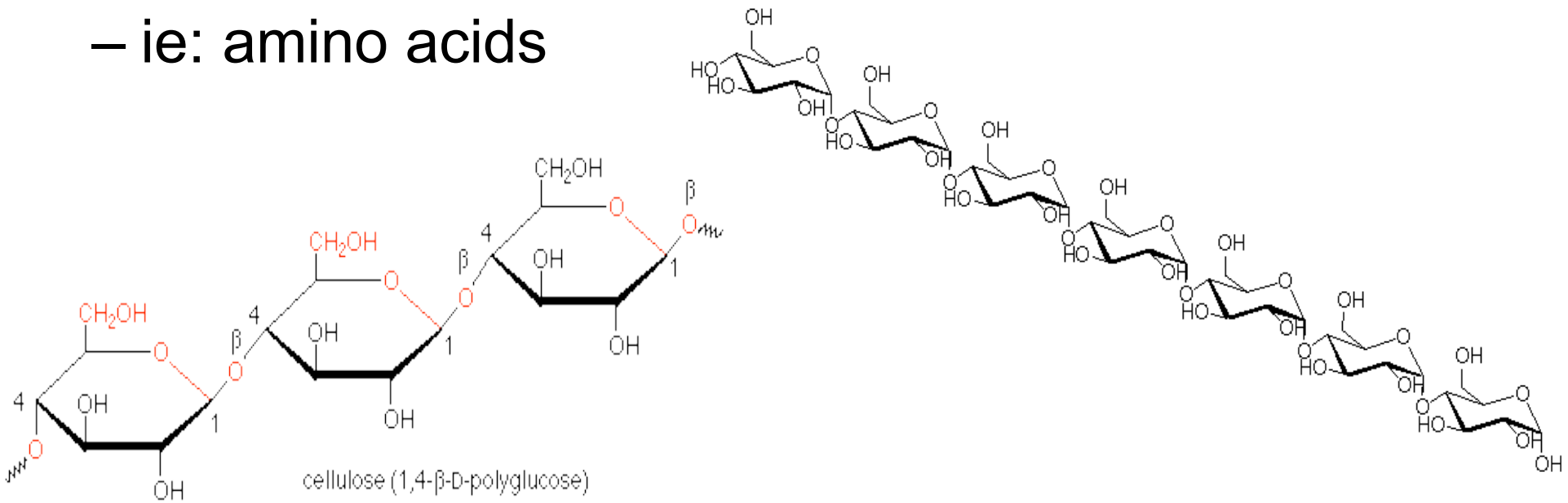
ISOMERE

- How many ways can you alter 6 carbons? [Hexane- C_6H_{14}]
- Show your work.
- Hint: should be able to make the following.
  - 1 row of 6
  - 2 rows of 5
  - 2 rows of 4
  - Why no rows of 2 or 3?

Polymers

- Large molecules, made of smaller molecules together. Repeating patterns.

- Monomers- single, smaller chain of molecules
  - ie: amino acids



Polymers

Are made up of many small, repeating molecular units known as

Monomers

ORGANIC COMPOUNDS

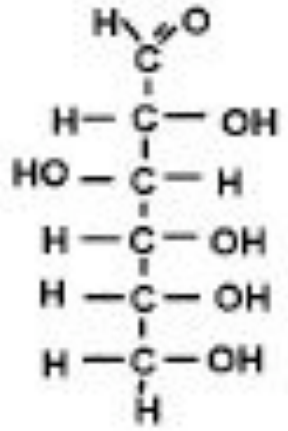
Top 4 for Life

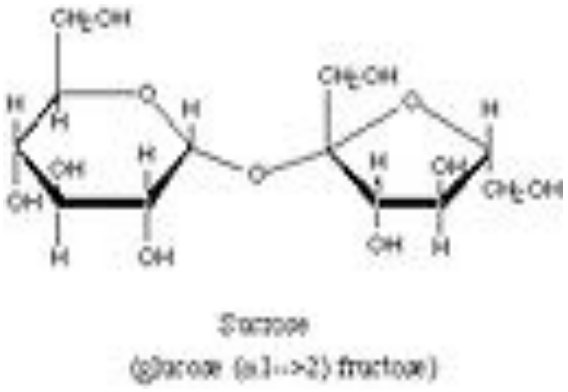
- CARBOHYDRATES
- PROTEINS
- LIPIDS/FATS
- NUCLEIC ACIDS

- INORGANIC: WATER!

Carbohydrates

- Elements: C, H, O (1:2:1 ratio)
- Energy-rich
- 2 classifications:
  - **SIMPLE** sugars:
    - glucose,
    - sucrose,
    - dextrose





Sucrose
(glucose (α1→2) fructose)

Carbohydrates

- **COMPLEX**: long chain of simple sugars

-STARCH: Breaks down & releases energy

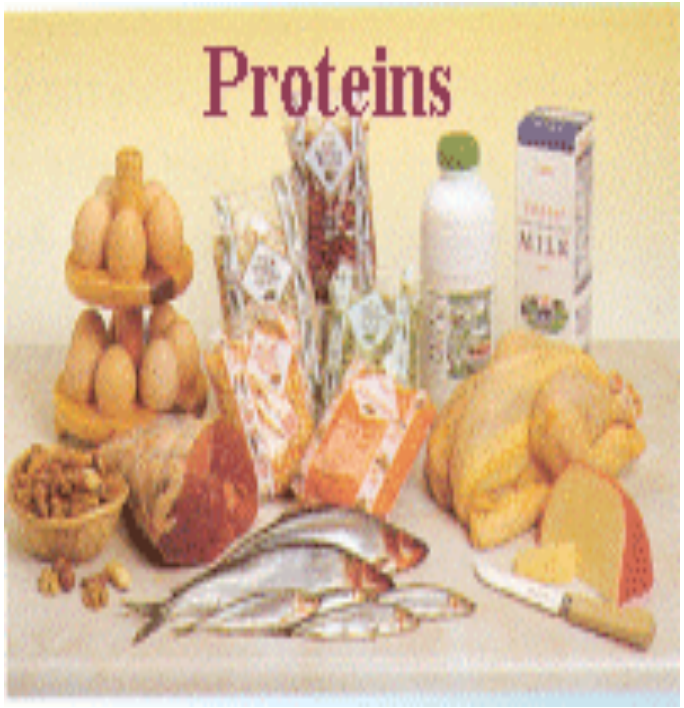
-CELLULOSE: Doesn't break down; fiber.

Complex carbohydrates

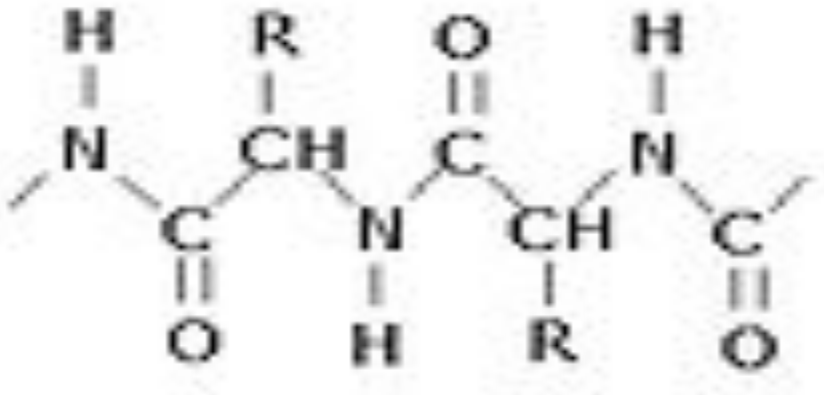
Complex carbohydrates provide vitamins, minerals, and fiber

Foods such as breads, legumes, rice, pasta, and starchy vegetables contain complex carbohydrates

Proteins



- Elements: C, H, O ,N
- Growth (build) & Repair
- 1/2 organic compounds in cells.



Proteins

- AMINO ACIDS-

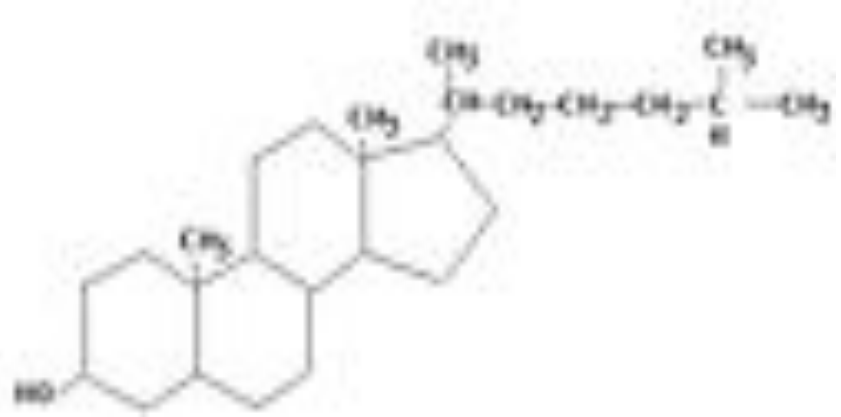
building blocks of proteins.

  - –Complete: animals have 20.
  - –Incomplete: plants have less than 20.

  Sources- meat, eggs, beans.

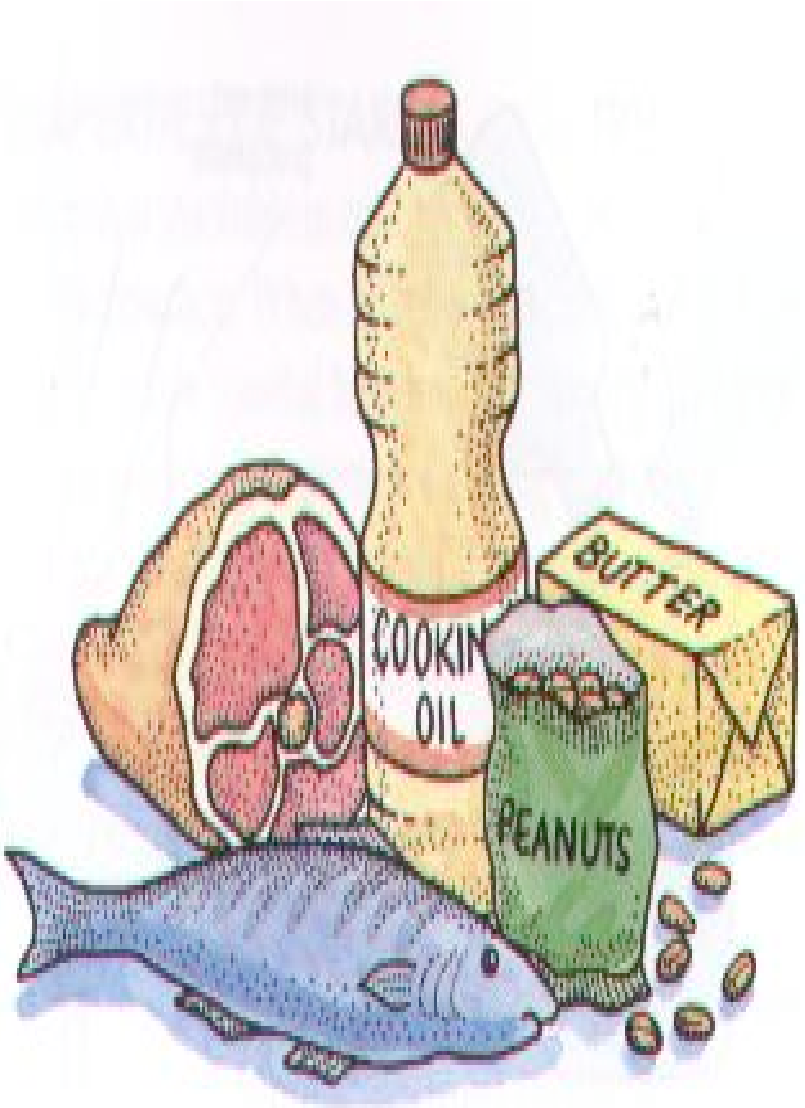
Lipids/Fats

- Elements: C, H, O
- Energy source:
  - –Per gram gives more energy than carb's.
  - –Secondary source.
- Do not dissolve in water.



Lipids/Fats

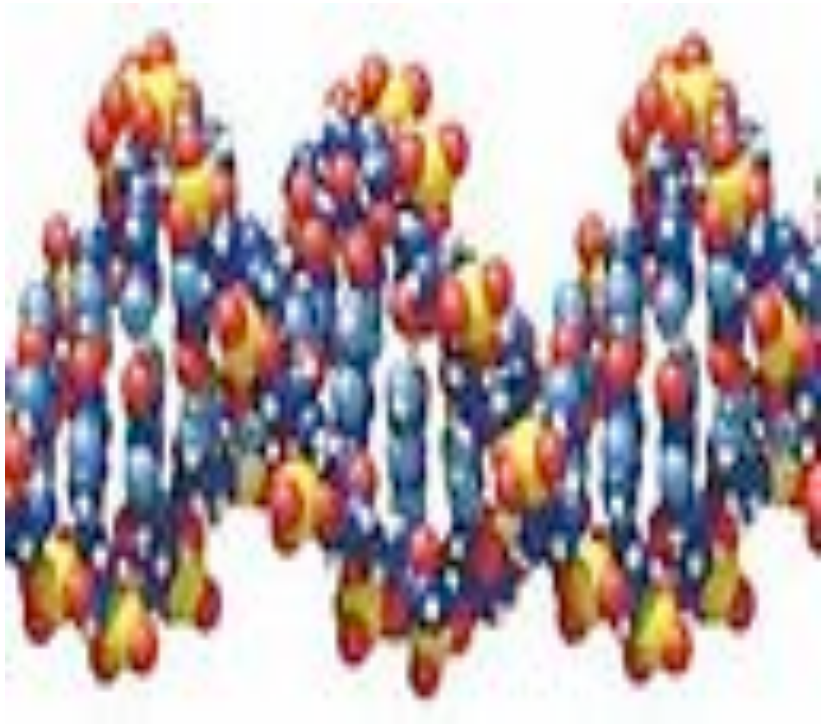
- Fats- solid @ room temp are animal based. Saturated.
- Oils- liquid @ room temp are plant based. Unsaturated.
- Cholesterol- no energy, in animals.
- Sources: butter, peanuts, cheese



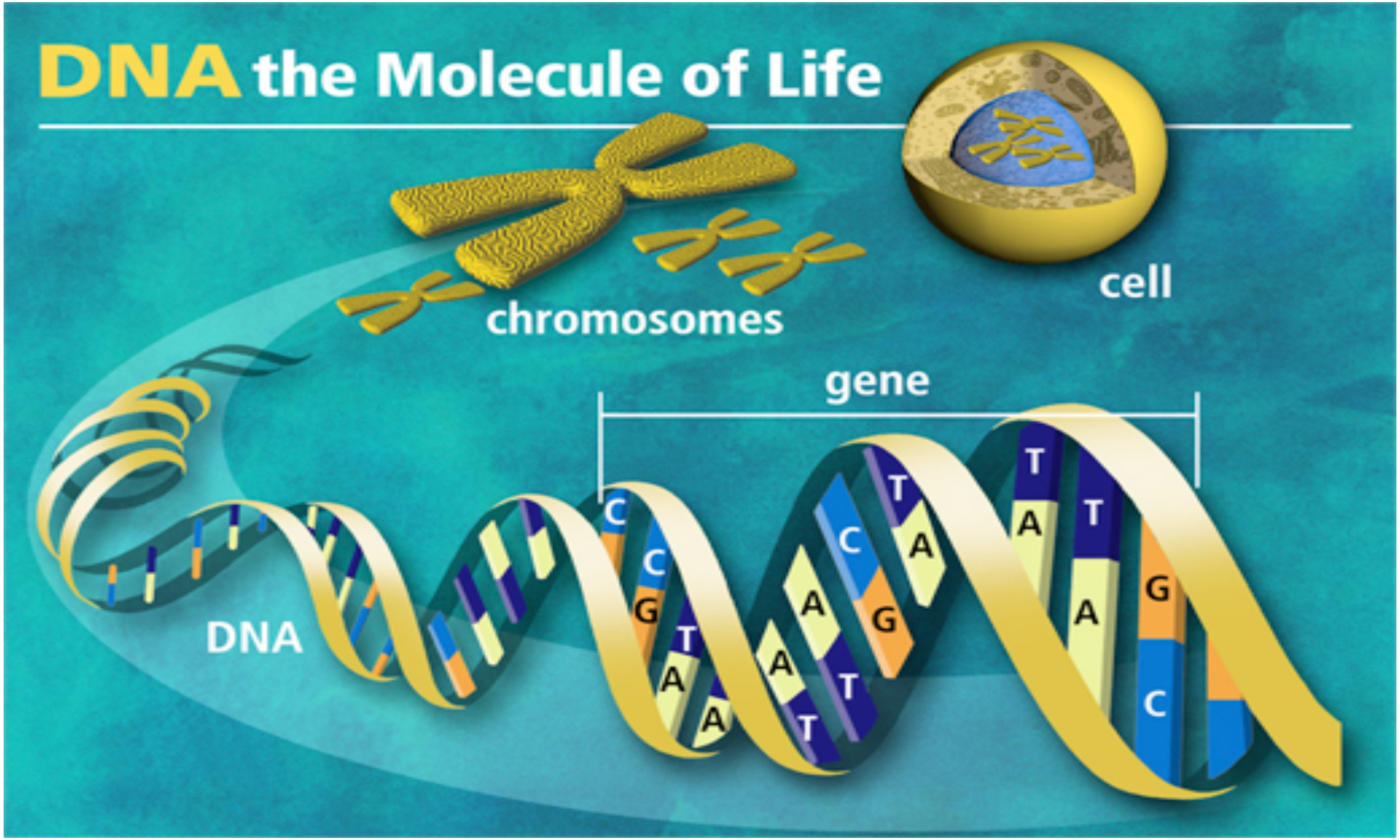
Nucleic Acids

- Elements: C, H, O, N, P
- Hereditary material
  - –Nucleotides are

    The building blocks
    - DNA
    - RNA



Nucleic Acids



INORGANIC

Essential

- WATER- H_2O
  - –needed for all processes.

Carbon footprint

Do your best to keep it light.