CHM 103

ORGANIC CHEMSTRY I

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COURSE CONTENT

- Introduction. History, classifications 0.5 week
- Carbon: Bonding in organic compounds, structure 0.5 week
- Functional groups 0.5 week
- IUPAC nomenclature 1 week
- Isomerism – Structural & Stereo-isomerism 2 weeks
- Hybridisation – Resonance effects & others 2 weeks
- Alkanes, Alkenes, Alkynes 1.5 weeks
- Alkyl halides, Alkanols 1 week
- Carbonyl compounds: Alkanals and Alkanones. 0.5 week

LECTURE I

- INTRODUCTION/GENERAL INFORMATION
- BACKGROUND
- COURSE CONTENT
- HISTORICAL PERSPECTIVE
- FLASHBACK: SOME BASIC CONCEPTS

COURSE CONTENT

- Introduction. History, classifications 0.5 week
- Carbon: Bonding in organic compounds, structure 0.5 week
- Functional groups 0.5 week
- IUPAC nomenclature 1 week
- Isomerism – Structural & Stereo-isomerism 2 weeks
- Hybridisation – Resonance effects & others 2 weeks
- Identification of organic compounds- Purification 0.5 week
- Alkanes, Alkenes, Alkynes 1.5 weeks
- Alkyl halides, Alkanols 1 week
- Carbonyl compounds: Alkanals and Alkanones. 0.5 week

ORG. CHEM.: A HISTORICAL PERSPECTIVE

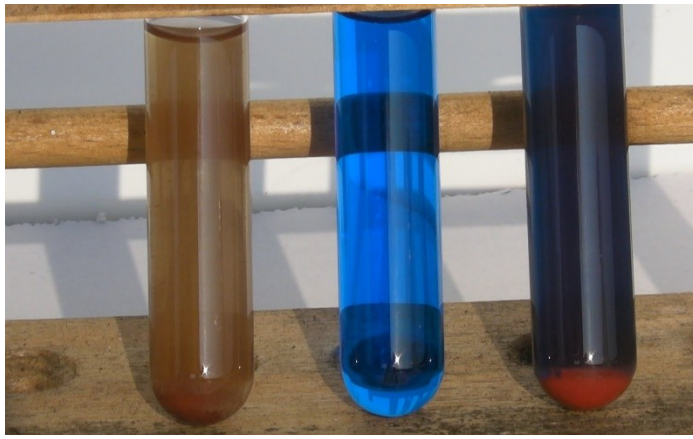
If CHM 101 is **GENERAL** CHEMISTRY, why do we do CHM 103???

Why is Organic Chemistry studied?

A HISTORICAL PERSPECTIVE: Vitality

- Historically, substances that exist in biological systems such as **blood, sweat, urine, cholorophyl, rubber, semen,** etc were thought to be different from ‘test tube compounds’

- They were regarded as possessing a **“Vital Force”**
- This was regarded as the *“Theory of VITALITY”*
  - They could not be synthesised from inorganic components
- But this was not true!!!

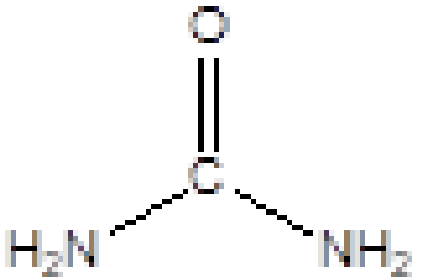


THEORY OF VITALITY DEBUNKED

- This idea was held until the 19th century (i.e. 1800s)

UNTIL THE FOLLOWING HAPPENED

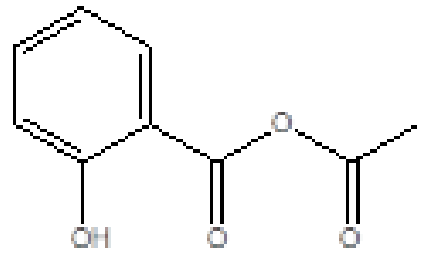
- Synthesis of carbamide (urea) (*Friedrich Wholer1828)*
  - NH_4^+ + ^-OCN ---------> **H_2N-CO-NH_2 (Urea)**
- Making of **soaps** from fats&oils (*Michel Chevereul* 1816)



urea
(Carbamide)

- Synthesis of Perkin's mauve (*Willian Perkins* 1856).

- Manufacture of **aspirin** (acetyl salicylate) (1899)



acetyl salicylate
(Aspirin)

ORGANIC CHEMISTRY: Introduction

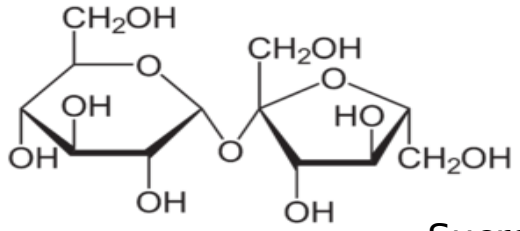
- Today Organic chemistry is better understood
- Org. Chem. is “The chemistry/study of carbon (C) and its compounds”
  - Also called “Chemistry of Life”
  - **Reason:** Lots of compounds found in biological systems are studied
- Every organic compound contains carbon
- Not all compounds containing carbon

ORGANIC CHEMISTRY: Introduction

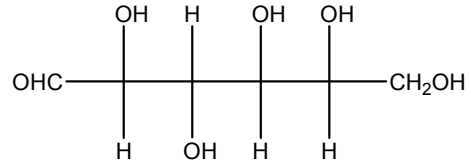
- Organic Chemistry Studies...
  - Hydrocarbons
  - Biomolecules
  - Organometallics
  - Petrochemicals
  - Natural products, etc

BIOMOLECULES

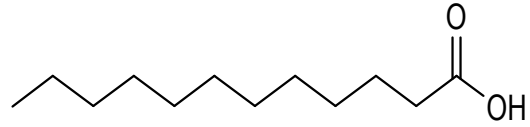
- There are FOUR (4) classes of biomolecules
  - **Carbohydrates** (Glucose, sucrose, starch, chitin)
  - **Proteins**(Enzymes, receptors, antibodies, skin, hair)
  - **Lipids** (Fats, oils, phospholipids,



Sucrose



2,3,4,5,6-pentahydroxyhexanal
(D-Glucose)

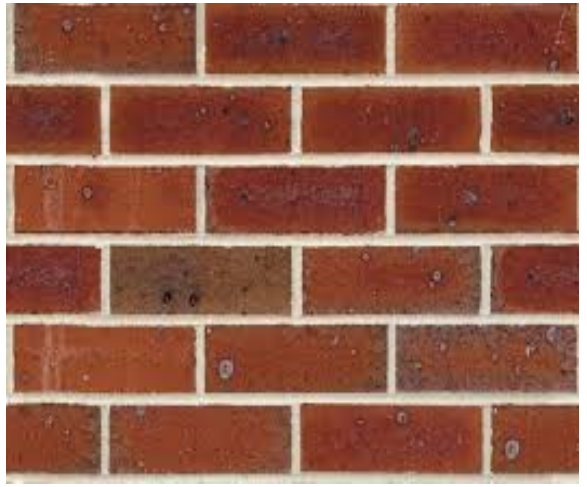


BIOMOLECULES

- They are macromolecules (very large molecules) found in nature and biological systems

Monomer

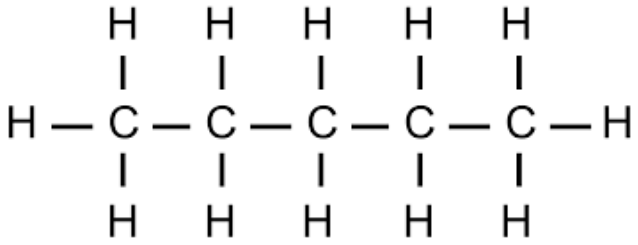
- Sometimes called Biopolymers when made up of monomer units
  - Proteins <==amino acids
  - Cabohydrates (sugars) <== monosacharides
  - Nucleic acids <==single DNA, RNA units



Polymer

WHY IS CARBON SO SPECIAL

- **Catenation:** Ability to form long carbon to carbon chains. C-C-C-C-C-C. Have you ever seen N-N-N-N-N-N- or O-O-O-O-O-O? **NO**
- **Strength of the Carbon to Carbon bond**
  - C-C = 350 KJ/mol, N-N =160 KJ/mol, O-O =



- **Ability to fully utilise its valence el**
  - Valence electrons are outermost electrons
  - E.g. O has 6, but uses 2, N has 5, uses 3, C has 4, uses 4
- **Different Degrees of Unsaturation**: C-C

FLASHBACK

Refresh your memory…

- Element, atom, molecule, ion
- Neutrons, protons, electrons
- Atomic number, mass number
- Bonding
- Functional groups
- etc