CHM 322 – all sections

Organic Chemistry Laboratory I

No lab sections will meet on
  • Wednesday, August 27
  • Thursday, August 28

All lab sections will meet starting
  • Tuesday, September 2
What materials will be needed for organic lab?

These items will be used for both semesters of lab:

- a laboratory notebook with duplicate pages
- laboratory approved safety glasses or goggles (you may already have these from gen chem lab)
- a current edition of the laboratory manual

You can purchase them from the Chemistry Stockroom, Rigge Science room 122, during these times (which also are posted around the department):
Thursday, August 28th  11:00-12:30
                   3:00-  4:00

Tuesday, September 2nd  8:00-12:15
                        2:00-  4:00

Wednesday, September 3rd  8:00-10:00
                        2:00-  4:00
Today’s topics

- Course description and syllabus
- Hand out course survey
- Introduction to organic chemistry
  - What is it
  - Why should you care
Please take the anonymous

*Who Are Ya and Whaddya Know?*

Survey

return it at the beginning of class on Friday, August 29
Read: Chapter 1.1 - 1.4

SkillBuilders: 1.1 - 1.4
Organic Chemistry:
the chemistry of carbon
Organic Chemistry: the chemistry of carbon

- Organisms are major sources and users of carbon
  - Dehydrated people are 39% carbon
Organic Chemistry: the chemistry of carbon

- Organisms are major sources and users of carbon
  - all living things make and use compounds of carbon

\[ \alpha-D\text{-glucose} \quad \text{citric acid} \quad \text{adenine} \]

- product of photosynthesis
- up to 30 mM in lemons
- purine nucleobase

- body’s key source of energy
- central to Krebs cycle
- ATP core
Organic Chemistry: the chemistry of carbon

- Organisms are major sources and users of carbon
  - all living things make and use compounds of carbon
  - CO$_2$ (0.03% of the atmosphere)
Organic Chemistry: the chemistry of carbon

- Organisms are major sources and users of carbon
  - all living things make and use compounds of carbon
  - $\text{CO}_2$ (0.03% of the atmosphere)
  - dead things act as stores of carbon (coal, oil, natural gas)
Organic Chemistry: the chemistry of carbon

- Organisms are major sources and users of carbon
  - all living things make and use compounds of carbon
  - CO$_2$ (0.03% of the atmosphere)
  - dead things act as stores of carbon (coal, oil, natural gas)

- Why do organisms rely on carbon to build molecules for living?
  - structural stability
    - C–C bond: 90 kcal/mol
    - Si–Si bond: 40% weaker
    - C–H bond: 104 kcal/mol
    - Si–H bond: 30% weaker
Organic Chemistry: the chemistry of carbon

- Organisms are major sources and users of carbon
  - all living things make and use compounds of carbon
  - CO$_2$ (0.03% of the atmosphere)
  - dead things act as stores of carbon (coal, oil, natural gas)

- Why do organisms rely on carbon to build molecules for living?
  - structural stability
  - structural versatility
  - 3D order
The chemical diversity of carbon:

- **ethane**
- **ethene** (polymer = Baggies)
- **ethanol** (beer; 3000 B.C.)
- **oxirane** (chemisterilant)
- **diethyl ether** (anesthetic; disc. 16th century)
production of ethanol by fermentation is greater than 5,000 years old: Sumerian cuniform tablets and Egyptian hieroglyphics allude to beer production.

by 1400 BC Egyptians were being advised against getting drunk on beer.
ethene

- discovered by Johann Becker, ~ 1669
- a plant hormone: used by Egyptians to hasten ripening of figs
- monomer for polyethylene (Baggies®)
- most produced organic compound worldwide: >109 x 10^6 metric tons in 2006
oxirane

- Synthesized by Wurtz, 1859
- chemisterilant
- fumigant for foodstuffs
- used industrially to make ethylene glycols
diethyl ether

- synthesized by Cordus, 1540
- Paracelsus noted its analgesic properties
- first inhaled anesthetic
- flammable!
Happy 186th Birthday, Organic Chemistry!

1828: Wöhler synthesizes urea

Freidrich Wöhler (trained as M.D. with specialization in obstetrics; mentored by Gmelin and by Berzelius)

In a letter to Berzelius: “I must tell you that I can prepare urea without requiring the kidney of an animal, either man or dog.”
Fr. A. A. Lambert, S.J. gave a lecture on combustion in the hall on the third floor of the main building of Creighton College.


The *Omaha Herald* noted the event, and indicated that the lecture included experiments.

One month later, on December 14, The College is authorized to build a chemical laboratory.