

Diagnosis: Aromaticity

January 24, 2020

- Some Nomenclature. But not too much!
- Hückel's rule & the Magic Circle. Annulenes.
- An NMR diagnostic for aromaticity.
- Aromatic, Anti-aromatic, and Non-aromatic compounds.
- Benzenoid & nonbenzenoid aromatic compounds.

110b Teaching Fellows: Felipe Becerril, Christina Beck, Isabelle Cheng, Junha Gu, Nathalie Hong, Shy Lavasani, Allison Liu, Casey Morrison, Jerusalem Nerayo, Eric Tang, Baili Zhong.

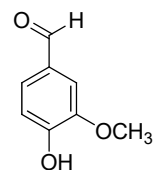
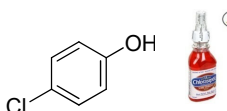
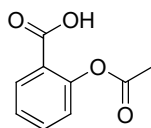
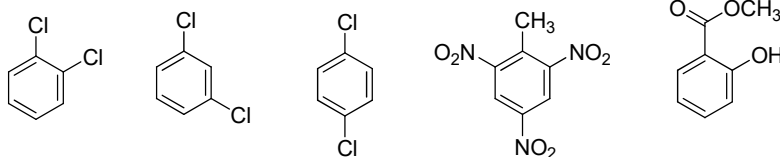
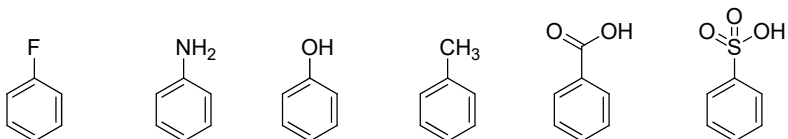
Chemistry Seminar! Prof. Arsalan Mirjafari, Florida Gulf Coast University, "(Dis)solving the World's Problems." Tuesday, January 28, 11:00 AM, Seaver North Auditorium.

O'Leary office hours: T/Th 9:00-10:00 am, SN 208.

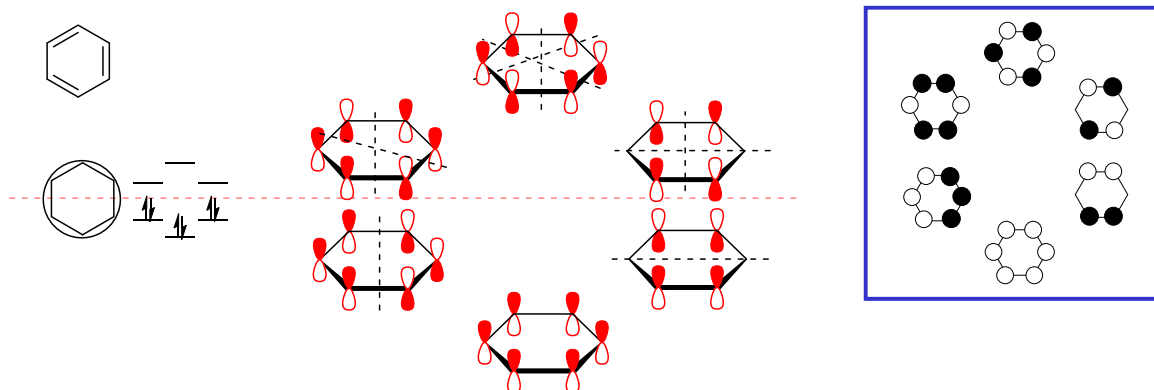
O'Leary's evening review session: Wednesdays 7:00 PM, SN Aud. **Course website:** <http://pages.pomona.edu/~djo04747/110/>

Suggested Problems for Exam 1. 10e/11e/Chapter 14: 18, 24, 26, 27, 28, 31, 33, 35. 10e/Chapter 15: 24, 25, 27, 28, 34abc, 43, 51. 11e/Chapter 15: 22, 23, 25, 26, 32abc, 41, 49.

Nomenclature Examples



Benzene's Molecular Orbitals



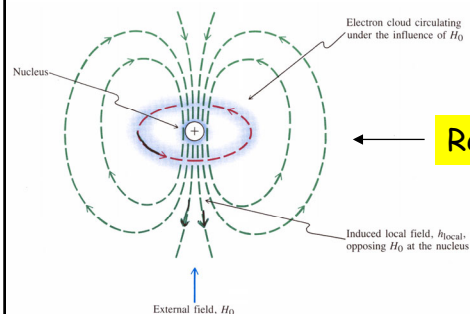
Hückel: cyclic contiguous planar array of $4n + 2 \pi$ electrons ($n = 0, 1, 2, \dots$) confers extra stability to compounds (said to be aromatic).

Aromatic Compound (as defined in Solly's glossary)

A cyclic conjugated unsaturated molecule or ion that is stabilized by π -electron delocalization.

Aromatic compounds are characterized by having large resonance energies, by reacting by substitution rather than addition, and by deshielding of protons exterior to the ring in their ^1H NMR spectra caused by the presence of an induced ring current.

Diamagnetic Ring Currents & Aromaticity



Recall from last semester!

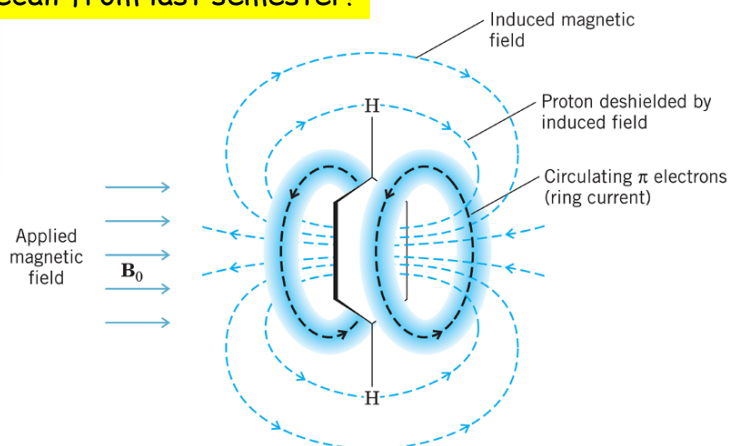
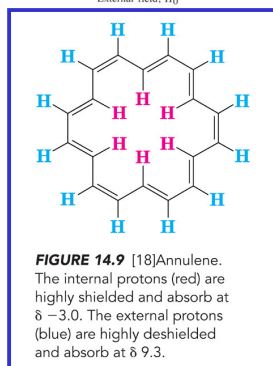
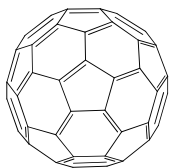


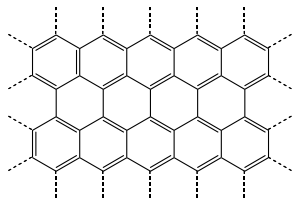
FIGURE 14.8 The induced magnetic field of the π electrons of benzene deshields the benzene protons. Deshielding occurs because at the location of the protons the induced field is in the same direction as the applied field.

Benzenoid/Nonbenzenoid Aromatics

fullerenes



graphite

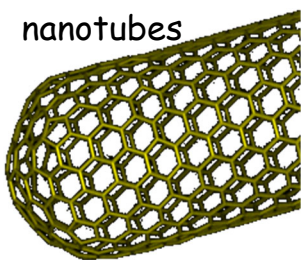


a slightly relevant diversion:
the trunkfish



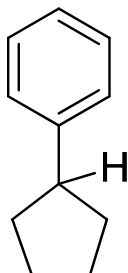
"**Somewhat of a surprise** is that at surface temperatures and pressures, *graphite* is the stable form of carbon. In fact, all diamonds at or near the surface of the Earth are currently undergoing a transformation into graphite. This reaction, fortunately, is **extremely** slow." <http://mineral.galleries.com/minerals/elements/graphite/graphite.htm>

nanotubes

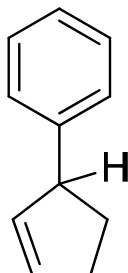


- up to 100 times as strong as steel and almost 2 mm long
 - hemispherical "cap" at each end of the cylinder
 - light, flexible, thermally stable, chemically inert
 - metallic or semi-conducting
- <http://www.pa.msu.edu/cmp/csc/ntproperties/>

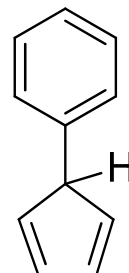
Which of the hydrogen atoms shown below is the most acidic?



A



B



C

Why?

Practice

Classify **A**, **B**, and **C** as either aromatic, antiaromatic, or nonaromatic:

