

During the 2009-2010 academic year, there were discussions of how general chemistry and organic chemistry overlapped. We found that many of the first topics covered in organic chemistry were well-covered in general chemistry. Starting with fall 2010, organic professors are going to skip or skim over many of these overlapping topics to allow them to add more biochemistry topics to the end of their organic sequence. To ensure that all students are adequately prepared, we've agreed to cover certain topics and to include organic examples in general chemistry. You'll find the topics (listed below) to be ones already covered heavily in general chemistry. Eric Anslyn and Brent Iverson put together the suggested examples to assist in the inclusion of more organic examples as we discuss these topics.

Topics for Freshman Chemistry to Prepare for Organic Chemistry

- 1) Valence electron counting
 - a. Methane
 - b. Carbon monoxide
 - c. Methyl amine
- 2) Atomic structure and atomic orbitals
- 3) Lewis dot structures with some organic examples
 - a. Methane
 - b. Carbon monoxide
 - c. Methyl amine
 - d. Formic acid
- 4) Electronegativity trends and description
- 5) Polar covalent bonding with some organic examples
 - a. Methanol
 - b. Acetone
 - c. Fluorocarbons
- 6) Formal charge with some organic examples
 - a. Methoxide
 - b. Acetate
 - c. Methyl ammonium
 - d. An amino acid with protonation state of pH 7
- 7) Geometries at atoms (VSEPR) with some organic examples
 - a. Methane, then ethane
 - b. Ethylene
 - c. Acetylene
 - d. Acetone
- 8) Molecular dipoles with some organic examples
 - a. Methane to chloromethane to dichloromethane to chloroform to carbon tet
 - b. Acetone
 - c. Acetic acid
 - d. Methanol
- 9) Atomic hybridization and hybrid orbitals with some organic examples
 - a. Methane, then ethane

- b. Ethylene
 - c. Acetylene
 - d. Acetone
 - e. Methanol
 - f. Acetic acid
 - g. Methyl amine
- 10) Localized bonds, sigma and pi bonding, lone pairs orbitals, with some organic examples
- a. Methane, then ethane
 - b. Ethylene
 - c. Acetylene
 - d. Acetone
 - e. Methanol
 - f. Acetic acid
 - g. Methyl amine
- 11) MOT diagrams for localized bonding with some organic examples
- a. Ethane
 - b. Ethylene
 - c. acetone
- 12) Resonance contributing structures with some organic examples
- a. acetate anion
 - b. nitromethane
- 13) Description of resonance contributing structures using MO's
- a. benzene
- 14) Basic IUPAC nomenclature with some organic examples
- a. alkanes up to decane
- 15) Bond dissociation energies with some organic examples
- a. C-H, C-C, C=C, C-O, C=O
- 16) Combustion with some organic examples
- a. alkanes
- 17) Bronsted acids/bases with some organic examples
- a. Acetic acid
 - b. Methyl ammonium
 - c. Phenol
- 18) pKa and pH **quantitative** lessons for protonation state, with some organic examples in aqueous solution
- a. Protonation state of acetic acid at pHs 2.0, 4.7, and 7
 - b. Protonation state of methylammonium at pHs 7, 10, 13
- 19) Reaction coordinate diagrams of acid/base reactions, and then an SN2 reaction
- a. Hydroxide plus acetic acid
 - b. Methylamine plus acetic acid
 - c. Methylchloride reaction with hydroxide
 - d. Methylchloride reaction with methylamine
- 20) Lewis acids/bases with some organic examples
- a. Methyl carbocation plus chloride

- b. Methyl carbocation plus water
- c. Acetone plus hydroxide
- d. Electrophile/nucleophile definitions