Week 2

Families of Carbon Compounds / Acids and Bases

2.1 Families of Carbon Compounds

10/7:

- Hydrocarbons:
  - Alkanes (C_nH_{2n+2}) and cycloalkanes C_nH_{2n}.
  - Alkenes (C_nH_{2n}).
  - Alkynes (C_nH_{2n-2}).
- Aromatic:
  - Contains a benzene ring.
  - All bonds $\sim 140\,\text{Å}$.
  - All carbons sp^2.
  - Planar.
  - π electrons above and below the ring.
  - Special stabilization.
- Covers drawing dipoles.
- Polar and nonpolar molecules:
  - Dipole = distance × change between charges.
  - $\mu = r \times Q$
  - $1\,\text{D} = 3.336 \times 10^{-30}\,\text{C m}$.
  - Analyzes molecules by drawing a Lewis structure, drawing a dipole along each bond, and drawing and labeling a net dipole, if applicable.
  - Goes through a number of examples.
  - Acetonitrile is a strong polar solvent.
- **Functional group**: A common arrangement that determines shape, bonding physical and reactivity of organic compounds.
- Families of carbon compounds:
  - Hydrocarbons: Aliphatic, aromatic.
  - Methyl, ethyl, propyl, R = alkyl groups.

- Phenyl: Ph- or ϕ-.
- Benzyl: Ph$-CH_2$-, $C_6H_5CH_2$-, Bn-
- Compounds with R$-$Z where Z is a heteroatom.
  - If Z is a halogen X, then the halogroup makes it an alkyl halide or haloalkane.
- Alkenyl halide: X$-=$.
- Aryl halide: Ph$-$X.
- Alcohols or phenols: R$-$OH.
- Ether: R$-$O$-$R$'$.
- Amines: NH_2R, NHRR$'$, NRR$'$R$''$.
- Thiols or mercathols: R$-$SH.
- Carbonyl group: R$-$CO$-$R$'$.
- Aldehyde: R$-$COH.
- Ketone: R$-$CO$-$R$'$.
- Carboxylic acid derivatives:
  - Acid: R$-$COOH.
  - Ester: R$-$COOR$'$.
  - Acid chloride: R$-$COCl.
  - Acid halide: R$-$COX.
  - Amide: R$-$CONH_2.
  - Acid anhydride: R$-$COOCO$-$R$'$.
- Nitrile: R$-$C$\equiv$N.
- Acrylonitrile: $=-$C$\equiv$N.