

PILOT Learning  
Organic Chemistry I – Townsend  
Problem-Set 1  
Fall 2018

Welcome to PILOT!!

1. A) Draw the Lewis dot structures of dichloromethane ( $\text{CH}_2\text{Cl}_2$ ) and ammonia ( $\text{NH}_3$ ).

B) Indicate the hybridization and bond angles in each carbon and oxygen atoms in both compounds.

C) Indicate any overall dipole moment in each compound.

3. A) Draw the molecular orbital diagram of hydrogen fluoride (HF).

B) How does its bond length differ from that of hydrogen iodide (HI)? What about bond strength? Explain why.

4. What is an acid, anyway? Define acid and base.

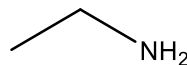
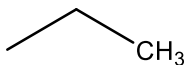
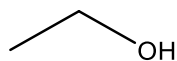
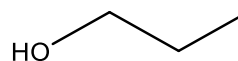
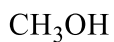
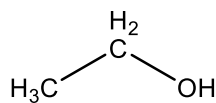
5. Consider the following acid/base reaction.



A) Draw in arrows to indicate the movement of electrons in the reaction.

B) Which part of the reaction represents the HOMO? Which represents the LUMO?  
(\*If there's time, draw a molecular orbital to explain + visualize why!)

5. Order the following groups of molecules from lowest to highest pKa.

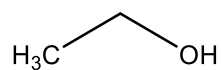
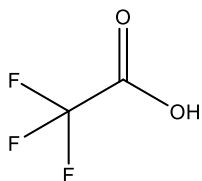
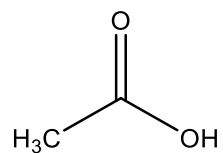
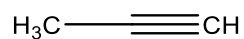
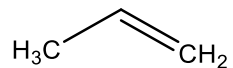
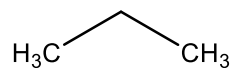


HF

HCl

HI

5 contd.



6. To summarize, what are the four factors that affect acidity?