PROBLEM SET 2

1. Identify the bonds (a-e) shown in the drawing below and rank them in terms of relative energy. For H-bonding interactions identify functional groups as “donors” or acceptors”. Would this compound be expected to be soluble in water? In benzene?

2. Why are alkenes considered to be “more reactive” than alkanes? Why are alkynes “less reactive” than alkynes?

3. Identify the functional groups present in the drug compound shown below (propranolol). Also, identify the functional groups in the compound below that would facilitate water solubility. Which do not contribute to water solubility.

4. Explain the difference in reactivity between the two alcohols shown below:

CH₃CH₂OH → HCl → NO REACTION
5. Show the products for the following reactions. If more than one product is possible, draw both and identify the major product:

\[
\begin{align*}
\text{O H} & \quad \text{HNO}_3^+ \\
\text{CH}_3 & \quad \text{HCl} \\
\text{CH}_3 & \quad \text{CrO}_3 \\
\text{CH}_3 & \quad \text{HBr} \\
\text{CH}_3 & \quad \text{Na}
\end{align*}
\]

6. Rank the following compounds in terms of relative water solubility (high, intermediate and low):

\[
\begin{align*}
\text{OH} & \quad \text{OH} \\
\text{OH} & \quad \text{OH} \\
\text{OCH}_3 & \quad \text{OCH}_3
\end{align*}
\]