1. Name the alcohols below. Tell a common usage of them.

- **H₃C—OH**
  - methanol, methyl alcohol, wood alcohol
  - race car fuel, canned heat

- **H₂C—OH**
  - ethanol, ethyl alcohol, grain alcohol
  - gasohol, fuel additive, flambe desserts, antibacterial, solvent

- **H₃C—CH₃**
  - isopropanol, isopropyl alcohol
  - rubbing alcohol, astringent

2. Name the monomer units for the following polymers

- **Teflon**
  - tetrafluoroethylene

- **PVC**
  - vinyl chloride

- **HDPE**
  - ethylene

3. Why are many plastics not biodegradable?

   **Most of them are saturated hydrocarbon polymers. Saturated hydrocarbons are very non reactive.**

4. Why does benzene undergo substitution rather than addition reactions? (What would have to happen in an addition reaction?)

   **Benzene is made of an aromatic ring that has a particular stability due to the alternating double bonds. An addition reaction would involve breaking one of the double bonds in the ring. Disrupting the alternating double bonds gets rid of the stability of the molecule so it is not favored. Substitution reactions do not disrupt the aromatic stability because a hydrogen attached to the ring is replaced with another atom.**

5. Metabolism of alcohol in the body to give undesirable side effects involves what kind of reaction?
6. What is the characteristic functional group of thiols? What is a distinguishing property of thiols?

-\( \text{-SH or the sulfhydryl group} \)

they smell bad

7. Where in our body are thiol groups important in the structure of proteins?

\text{Keratin, the structural protein of hair}

8. What kind of interaction is depicted below?

\[
\begin{align*}
\text{HOOC} & \quad \text{COOH} \\
\text{NH}_2 & \quad \text{NH}_2 \\
\text{CH}-\text{CH}_2-\text{S} & \quad \text{S}-\text{CH}_2-\text{HC} \\
\end{align*}
\]

\text{disulfide bond}

What happens if a reducing agent is applied to the above molecule?

\text{The reducing agent breaks the disulfide bond, forming two thiol groups, puts hydrogen on each S.}
\text{Forms two molecules.}

9. Alcohols and ethers both contain C-O bonds. Why are ethers more likely to be gases at room temperature while alcohols are liquids? (tell which has a higher boiling point and why).

\text{This has to do with different boiling points. Ethers are gases at room temperature because their boiling point is below room temperature. Ethers have lower boiling points than alcohols, since alcohols boil above room temperature.}
\text{The reason for this difference is the difference in hydrogen bonding. Alcohols contain an O-H bond, so they are able to hydrogen bond with other alcohol molecules. Therefore, alcohols are difficult to evaporate, or boil. Ethers, however, are polar, but do not contain a hydrogen capable of forming a hydrogen bond. Therefore, ethers are easier to separate from other ether molecules and evaporate, or boil at low temperatures.}