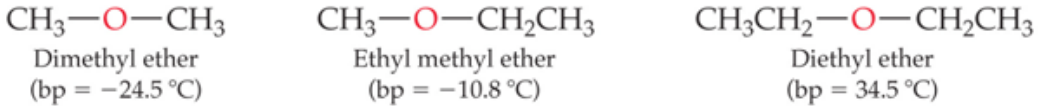
Ethers

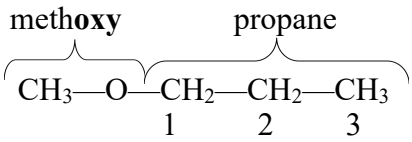
- Contain an ─O─ between two carbon groups.
- That are simple are named by listing the alkyl names in alphabetical order followed by *ether*



Cyclic ethers (heterocyclic compounds) are often given common names. **DO NOT** memorize!

IUPAC Names for Ethers

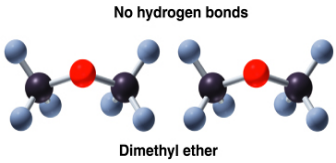
The shorter alkyl group and the oxygen are named as an **alkoxy group** attached to the longer hydrocarbon.

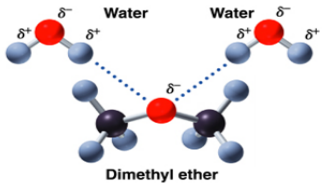


Numbering the longer alkane gives: **1-methoxypropane**

Treat all R-O- groups that you find in a molecule as alkoxy groups or branches (substituents), and follow the previous rules we've covered for all other families.

Properties of Ethers

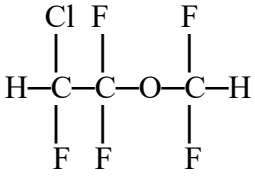




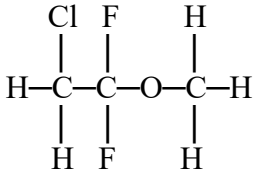
- Slightly polar.
- *Cannot* be H-bond donors.
- Are H-bond acceptors (soluble in water up to 4 C's).
- Simple ethers are highly flammable (many form explosive peroxides).

Anesthetics

- Inhibit pain signals to the brain.
- Such as ethyl ether CH_3─CH_2─O─CH_2─CH_3 were used for over a century, but caused nausea and were flammable.
- Developed by 1960s were nonflammable.



Ethane(enflurane)



Penthrane

Methyl *tert*-butyl ether (**MTBE**)

- Is one of the most produced organic chemicals.
- Is a fuel additive used to improve gasoline combustion.
- Use is questioned since the discovery that MTBE has contaminated water supplies.

Thiols

Thiols or mercaptans, are sulfur analogs of alcohols. (The –SH group is called the mercapto, or sulfhydryl group.)

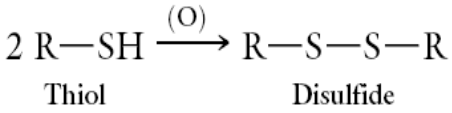
The IUPAC nomenclature system adds the ending –thiol to the name of the alkane, but without dropping the final –e.

- Often have strong odors.
- Are used to detect gas leaks.
- Are found in onions, oysters, garlic and skunk.

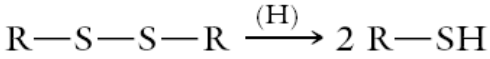
Physical Properties

Thiols have considerably lower boiling points than those of alcohols, even though thiols have higher molecular masses, because thiols do not possess the strong hydrogen bonding of alcohols.

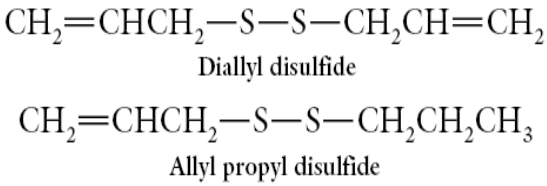
- Thiols (R-SH) react with mild oxidizing agents to yield a **disulfide** (R-S-S-R).



- easily reduced back to thiols



Disulfides are named by naming the R groups attached to the sulfur atoms followed by the word **disulfide.**



Many proteins contain thiol groups and disulfides critical to maintaining their three dimensional shape and their proper functioning.
Lead and mercury salts react with thiol groups, altering the physiological functioning of the proteins involved.
A common source of lead is from flakes of paint manufactured prior to 1980. The use of lead tetraethyl as a gasoline additive also introduces lead into the environment, however its use has been phased out.
Mercury from insecticides and other sources enters the food chain through fish from contaminated rivers, lakes, and streams. Mercury has a physiological effect similar to that of lead.

Reyes