

A large, horizontally-oriented red oval with a slight gradient and a drop shadow, serving as a background for the course title.

PHA284

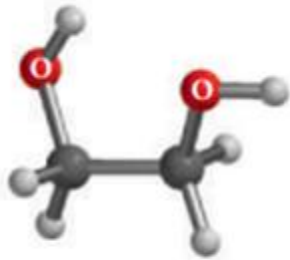
Organic Chemistry II

Ankara University
Faculty of Pharmacy
Department of Pharmaceutical Chemistry

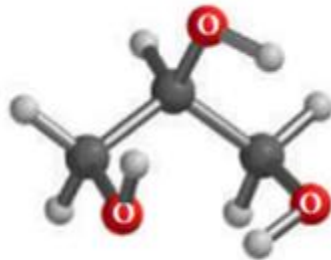
POLYOLS

POLYOLS

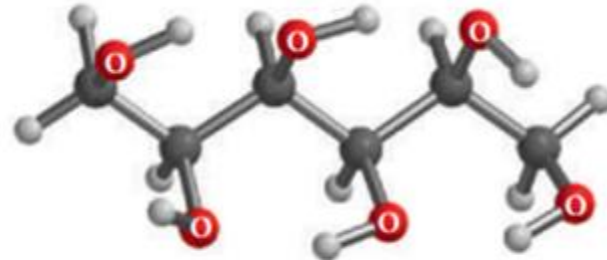
Compounds with more than one hydroxyl groups are called polyols.



ethylene glycol

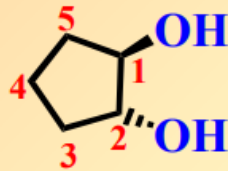


glycerol (glycerine)

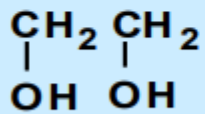


sorbitol

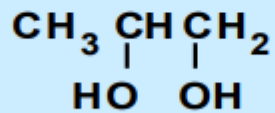
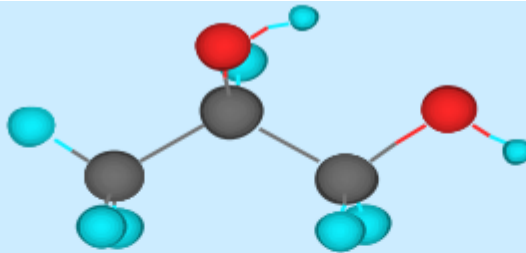
Nomenclature



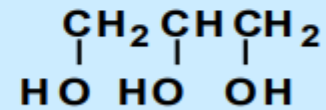
trans-cyclopentane-1,2-diol



1,2-Eth anediol
(Ethylene glycol)



1,2-Propanediol
(Propylene glycol)



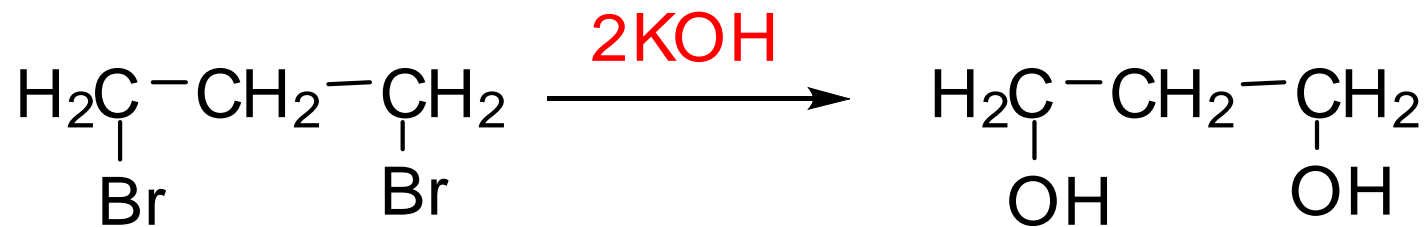
1,2,3-Propanetriol
(Glycerol, Glycerin)

Physical properties

- Increased viscosity
- Increased boiling points
- Increased solubility in polar solvents
- sweet taste

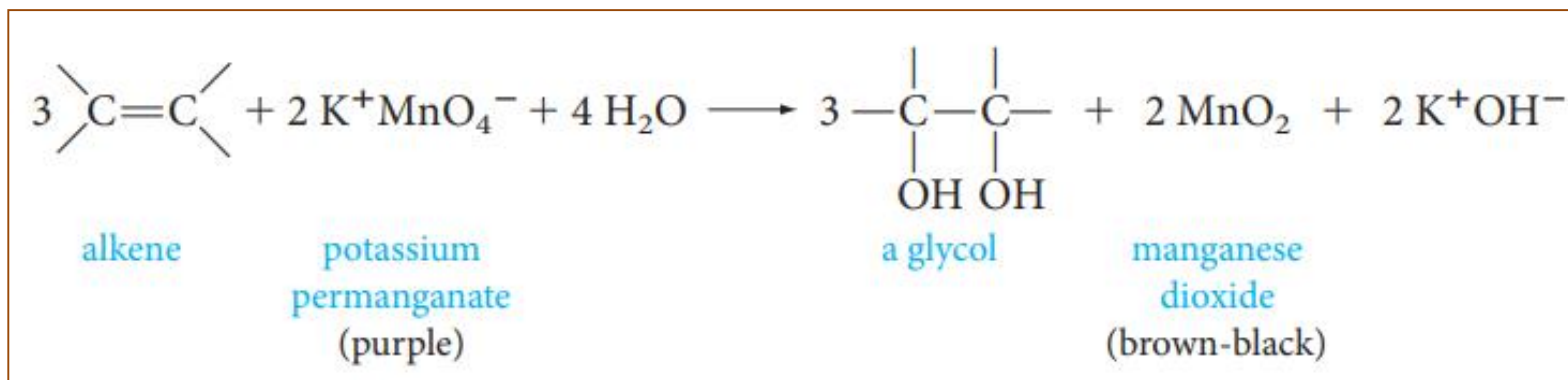
Preparation of Diols

1) Nucleophilic Substitution Reactions



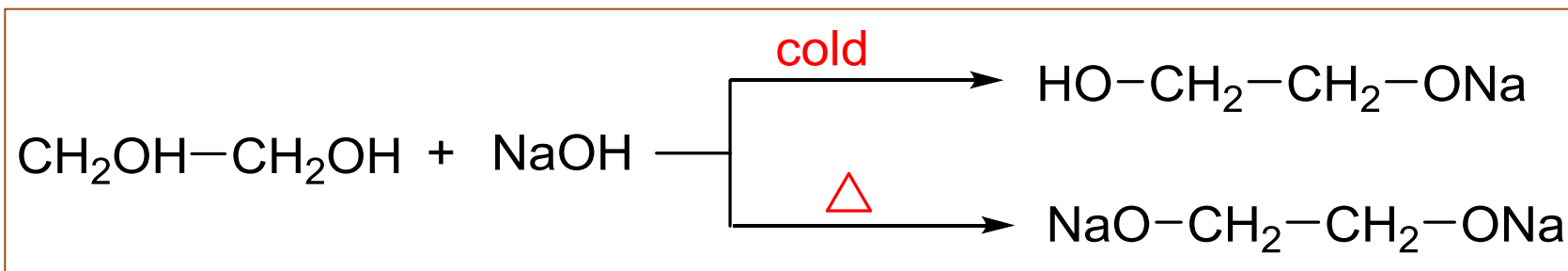
Preparation of Diols

2) α -Glycol synthesis



Chemical Properties

Reaction with alkali hydroxides (KOH, NaOH)



Ethers and Epoxides

Ethers and Epoxides

Ethers are compounds that have two organic groups connected to a single oxygen atom.

Epoxides are cyclic, three-membered ring ethers.

The general formula for an ether is R-O-R'



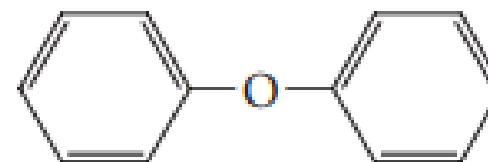
Nomenclature



ethyl methyl ether



diethyl ether (the prefix *di-* is sometimes omitted)



diphenyl ether

Physical Properties of Ethers

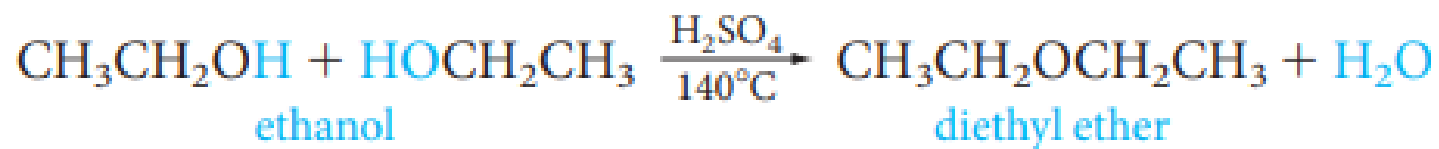
*Ethers are colorless compounds with characteristic, relatively pleasant odors.

*Ethers are less dense than water

*They have lower boiling points (bp's) than alcohols with an equal number of carbon atoms.

Preparation of Ethers

- Dehydration of alcohol



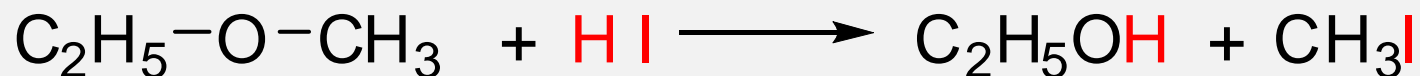
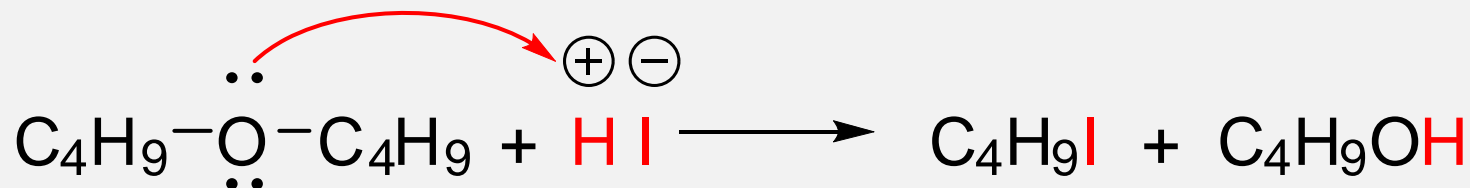
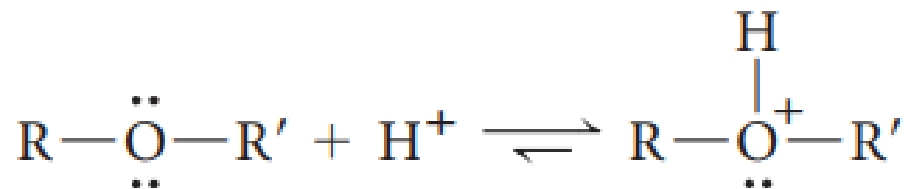
Preparation of Ethers

Williamson ether synthesis



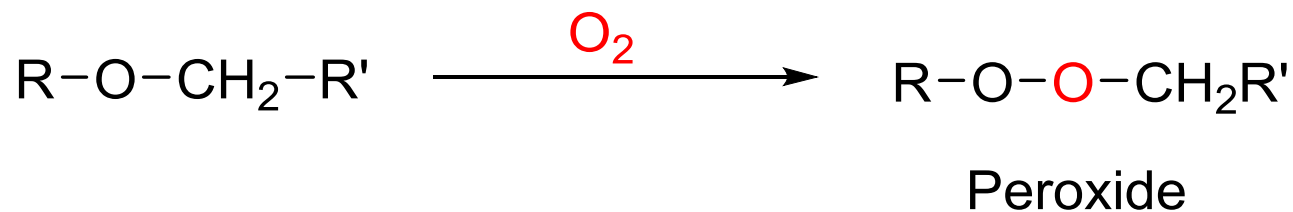
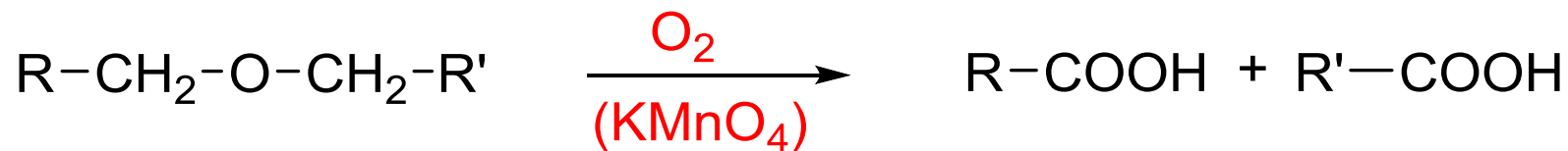
Reaction of Ethers

Cleavage of Ethers



Reaction of Ethers

Oxidation;



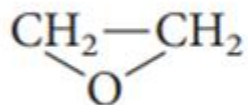
Physical properties

- Lower boiling points compared to corresponding alcohols.
- Very slightly soluble in water
- Usually immiscible with water
- Inflammable (small embers)

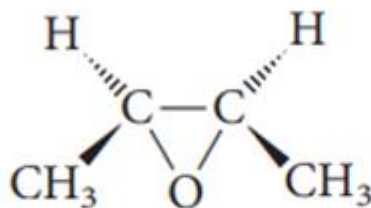
Epoxides

Epoxides (or oxiranes)

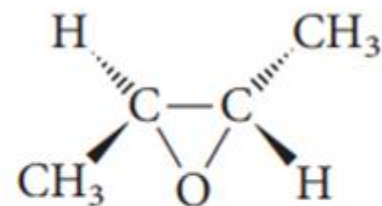
- Epoxides (or oxiranes) are cyclic ethers with a three-membered ring containing one oxygen atom.



ethylene oxide

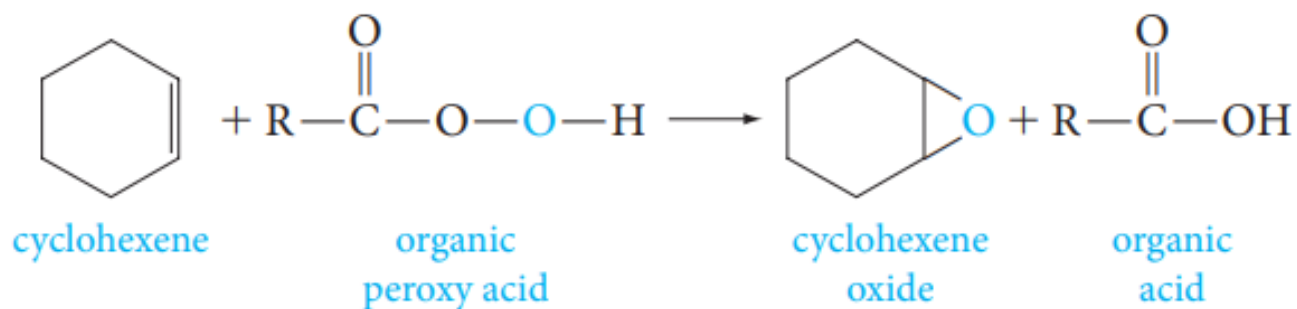
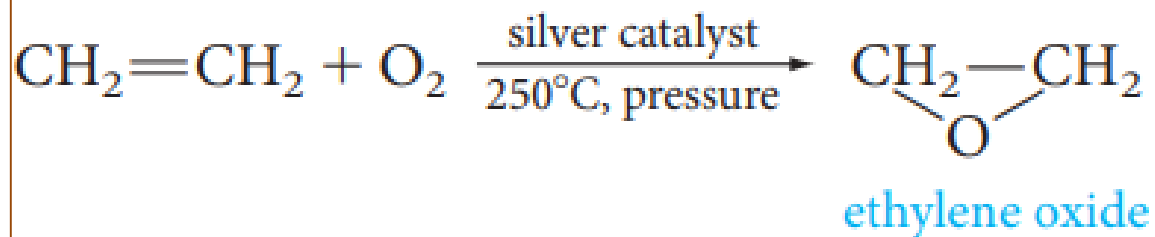


cis-2-butene oxide

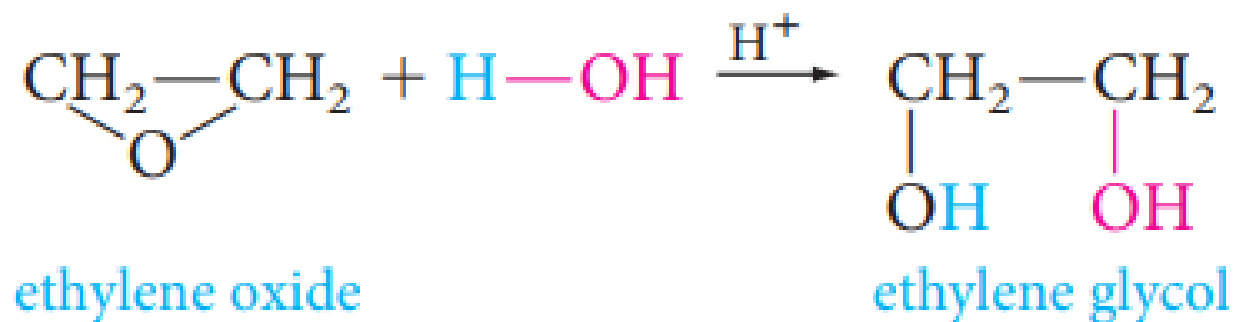


trans-2-butene oxide

Preparation of Epoxides



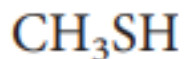
Reaction of Epoxides



THIOLS

THIOLS

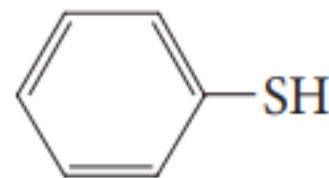
The -SH group, called the sulfhydryl group, is the functional group of thiols. Thiols are named as follows:



methanethiol
(methyl mercaptan)



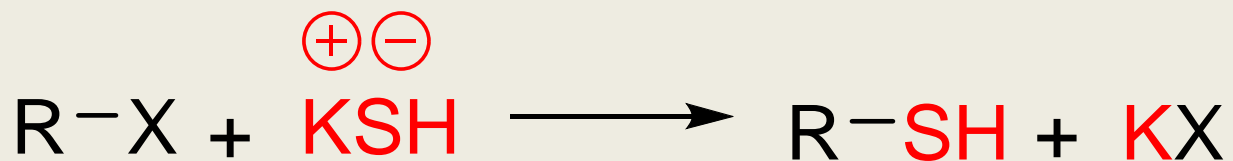
1-butanethiol
(*n*-butyl mercaptan)



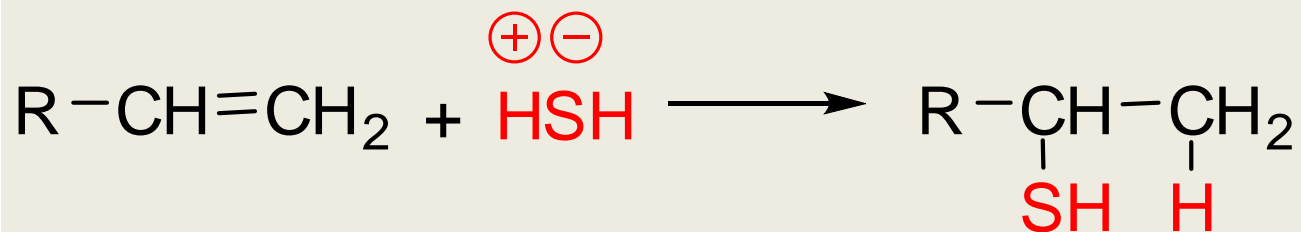
thiophenol
(phenyl mercaptan)

Preparation of Thiols

1) Nucleophilic Substitution Reaction

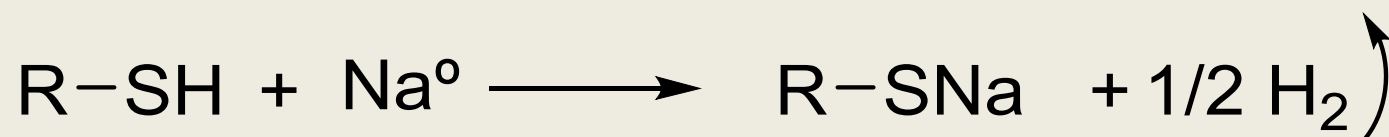


1) H₂S addition to alkenes;

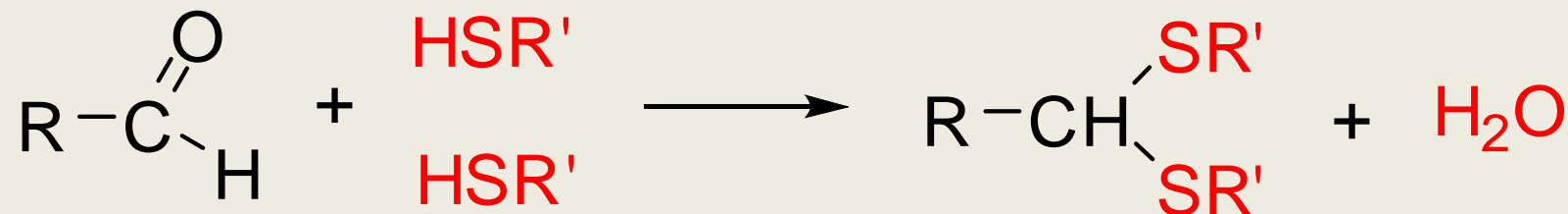


Chemical Reactions

1) Reaction with sodium:

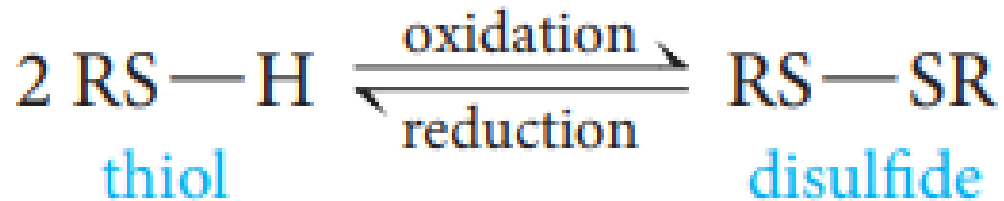
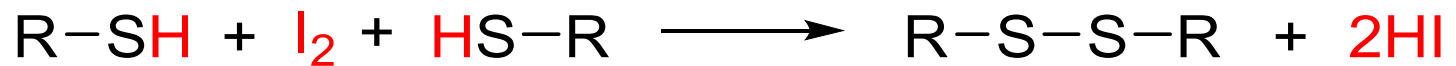


2) Reaction with aldehydes and ketones:



Chemical Properties

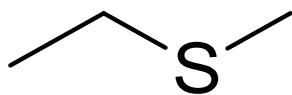
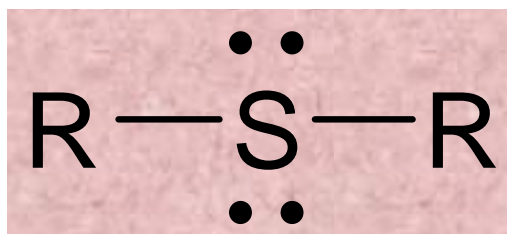
3) Oxidation:



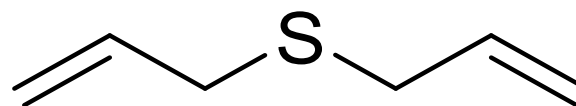
THIOETHERS

THIOETHERS

Thioethers (also called sulfides) are the sulfur analogs of ethers.

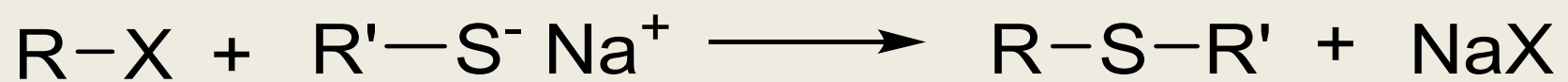


ethyl(methyl)sulfane



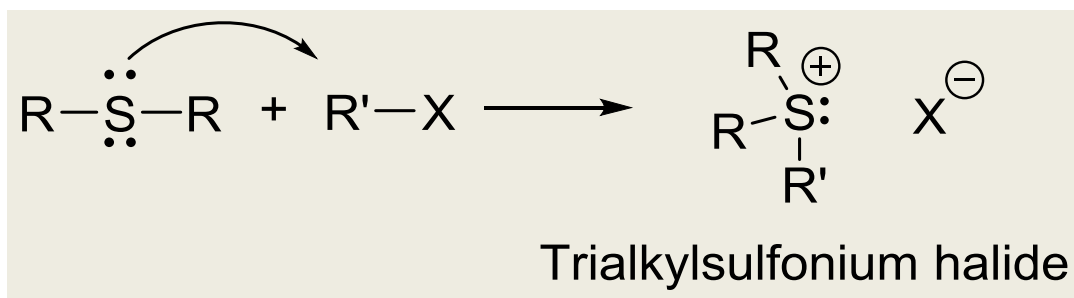
Diallyl sulfide

Preparation of Thioethers

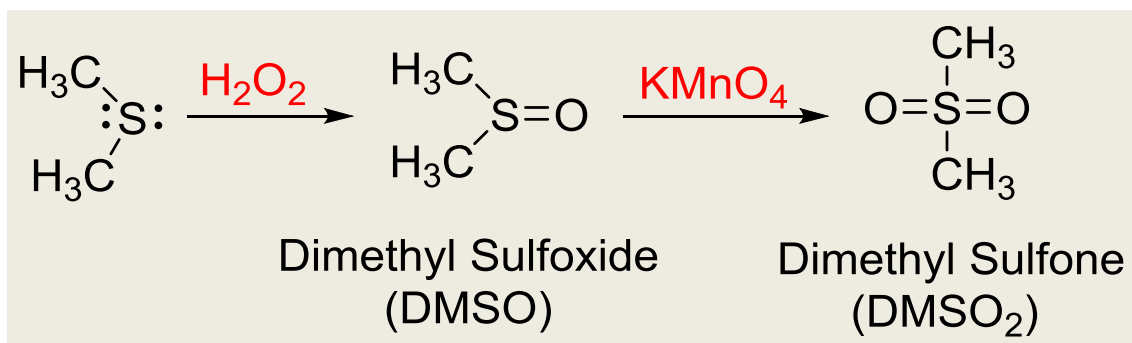


Chemical Properties

1) Reaction with alkyl halides;



2) Oxidation;



References

- ***Organic Chemistry 11e***, T.W. Graham Solomons, Craig B. Fryhle, Scott A. Snyder, John Wiley & Sons, Inc., 2014, ISBN 978-1-118-13357-6 (cloth) Binder-ready version ISBN 978-1-118-14739-9
- ***Organic Chemistry: A Short Course, 13th Ed.***, D.J. Hart, C.M. Hadad, L.E. Craine, H. Hart, Brooks/Cole, Cengage Learning, 2012, ISBN-13: 978-1-111-42556-2
- ***Organic Chemistry, 6th Ed.***, L. G. Wade, Pearson Education, Inc., 2006, ISBN 0-13-147871-0
- ***Organic Chemistry, 2nd Ed.***, Jonathan Clayden, Nick Greeves, and Stuart Warren,, Oxford University Press, 2012, ISBN: 9780199270293
- ***Organic Chemistry***, Mukherjee, S.M., et al., New Age International Ltd, 2008. ProQuest Ebook Central, <http://ebookcentral.proquest.com/lib/ankara/detail.action?docID=3017383>.