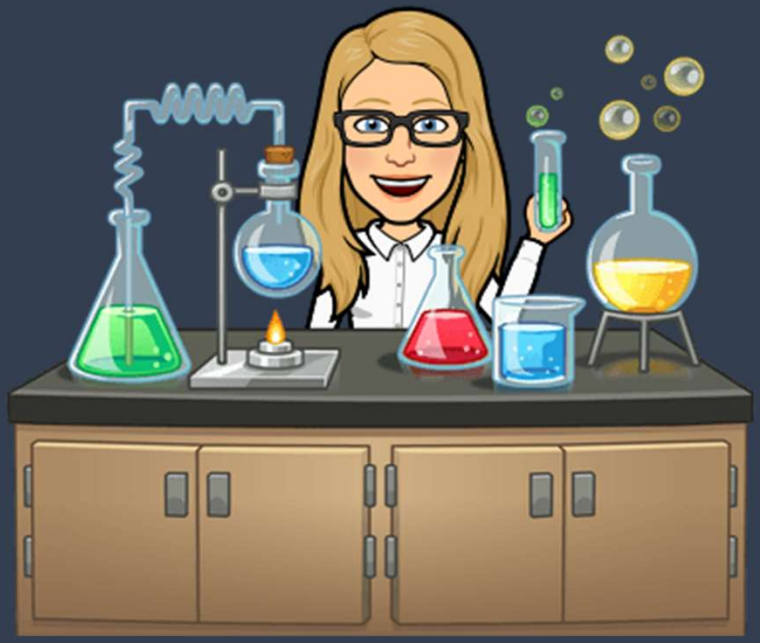
For clicker question voting, go to:
https://pollev.com/lauriestarke263



Dr. Laurie S. Starkey

Cal Poly Pomona

CHM 3150 Organic Chemistry II
9/11/25

Today's Topic: Ch. 13, Step 2
Reactions of Epoxides/Ethers

Daily To-Do	Flipped Lectures

Step 2

Read

- Read Klein
  - 13.10 **Reactions of Epoxides**
  - 13.6 **Reactions of Ethers with HX**
  - 13.11 **Thiols and Sulfides**
- Watch flipped lecture

Ring-opening reactions of epoxides
57 minutes, *pages 13-4 to 13-7*

Watch

- Work through **SkillBuilders 13.4, 13.5**
- **Epoxide ring-opening homework** (submit to Gradescope)

Practice

Step 3

- Read Klein 13.12 **Synthesis Strategies**
- Watch flipped lecture
- Work through **SkillBuilders 13.6, 13.7**
- All Ch. 12 and 13 assignments are meant to prepare you for the exam, so they are due no later than **11 pm on the day of Exam 1**

Ether synthesis strategies
7 minutes, *page 13-8*

For Tuesday

Lecture: Ch. 13 Reactions of Epoxides & Ethers

Reactions of Epoxides & Reaction of Ethers with HX

One Week from Today: Exam 1

CHM 3150 Organic Chemistry II, Dr. Laurie S. Starkey, Fall 2025

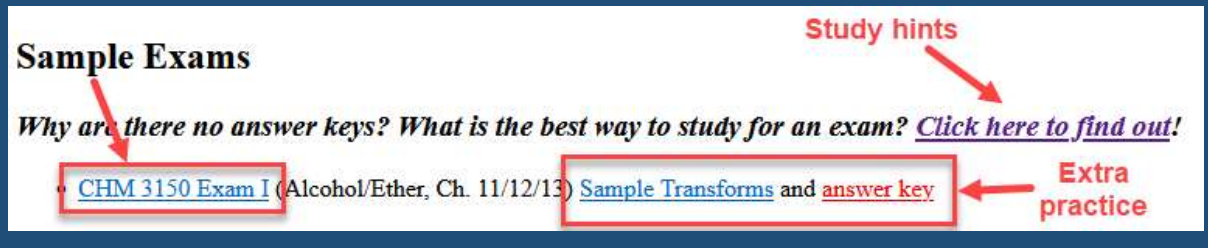
Tentative Schedule (Chapter and Worksheet #)

Week	Mon	Tues	Wed	Thurs	Fri
0	8/18	8/19	8/20	8/21 ~~Review 7-11 #1~~	8/22
1	8/25	8/26 ~~Review 7-11 #2~~	You are here	8/28 ~~Ch. 12 #1~~	8/29
2	9/1 **Holiday**	9/2 ~~Ch. 12 #2~~		9/4 ~~Ch. 12 #3~~	9/5
3	9/8	9/9 ~~Ch. 13 #1~~	9/10	9/11 Ch. 13 #2	9/12
4	9/15	9/16 Ch.13 #3, Review	9/17	9/18 **Exam I**	9/19

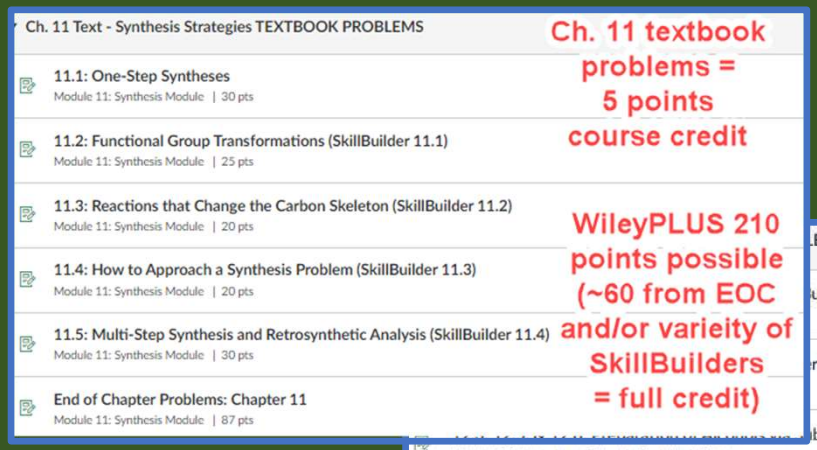
Exam 1
Thursday, 9/18
Chapters 11,12,13

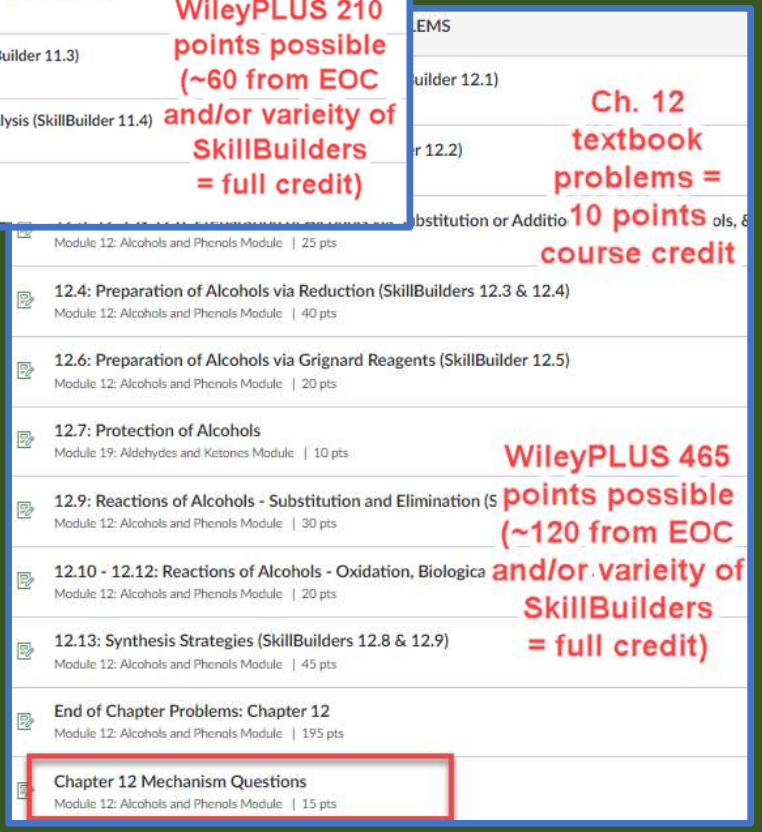
- 60-minute written exam.
- No notes or model kits allowed, but Periodic Table is provided.

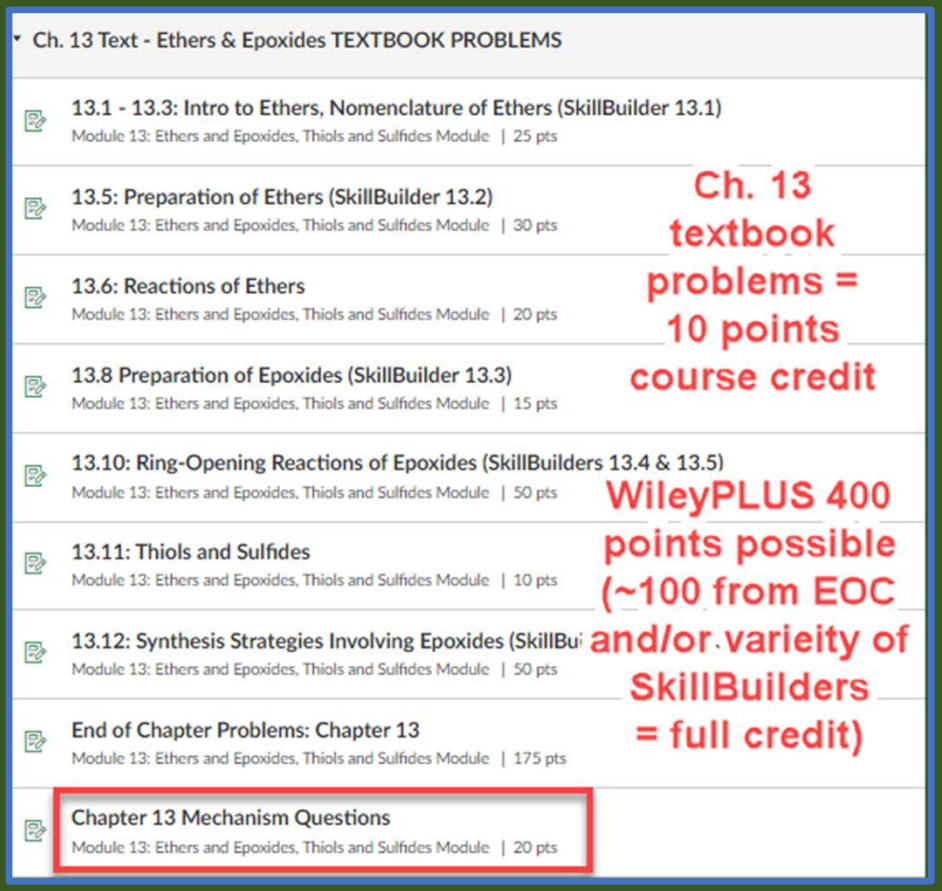
No surprises! See sample exams on Course Homepage (links at very bottom).



Work on a VARIETY of Textbook Problems!



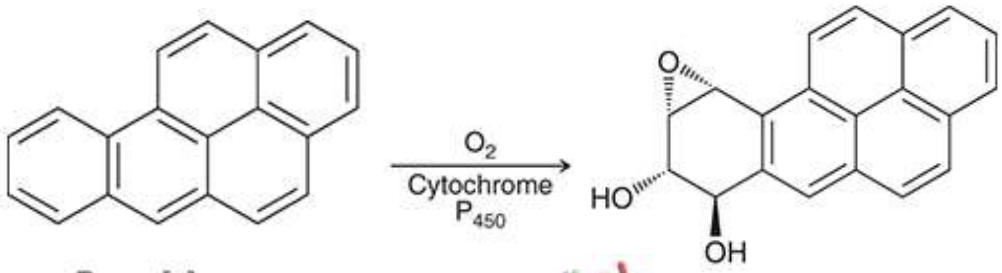




Cigarette Smoke, Charred Food Produces Epoxides that are Carcinogenic "Alkylating Agents"

BioLinks

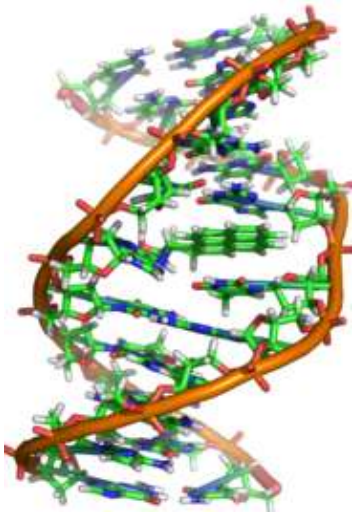
Cigarette Smoke and Carcinogenic Epoxides



Benzo[*a*]pyrene

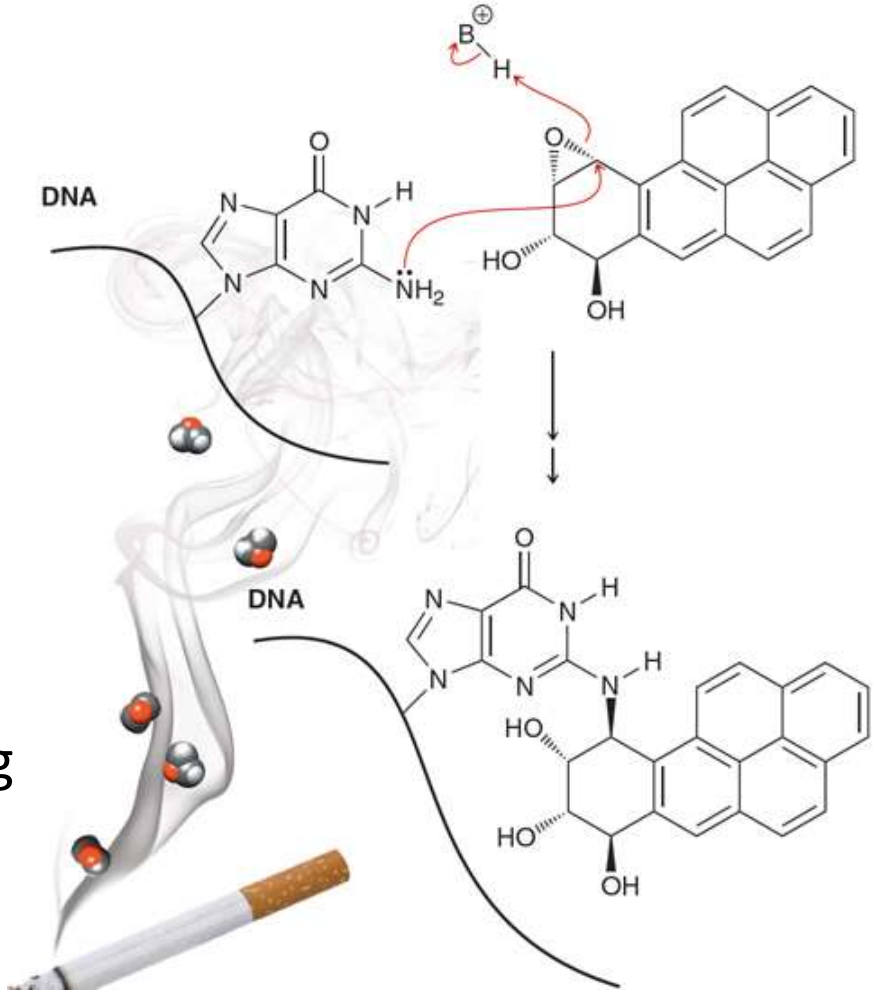
A diol epoxide

Wikipedia

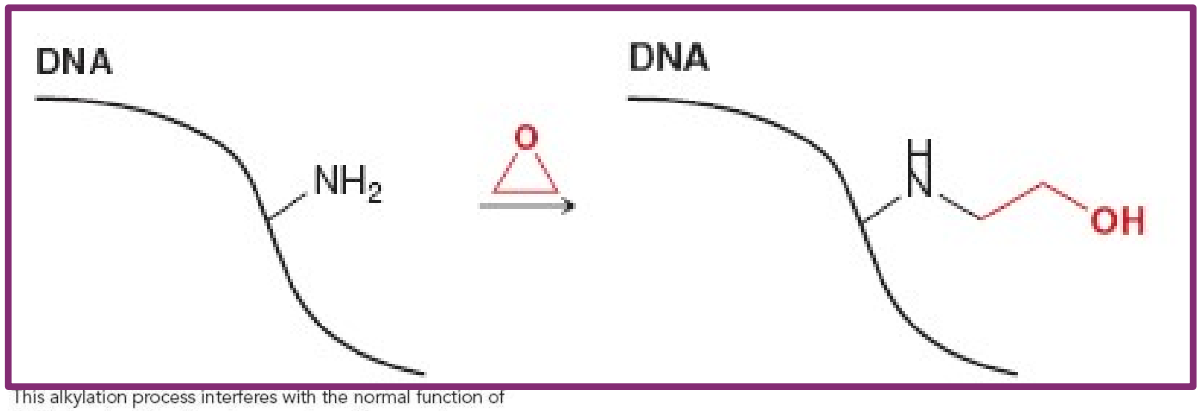


A DNA adduct (at center) of benzo[*a*]pyrene, the major mutagen in tobacco smoke.[26]

Copying alkylated DNA gives rise to mutations, leading to cancer.



WorldLinks | Ethylene Oxide for Sterilizing Medical Equipment



To prevent the spread of infections, medical equipment must be sterilized frequently. It is challenging to keep equipment germ-free if it is made of plastics that cannot withstand autoclave temperatures (120°C), but are too expensive to dispose of after each individual use (such as the duodenoscope shown below). Ethylene oxide can be used as a sterilizing agent for sensitive equipment. The gas easily diffuses through porous materials and effectively kills all forms of microorganisms, even at room temperature. The mechanism of action likely involves a nucleophilic amino group in DNA attacking the ring and causing a ring opening of the epoxide, effectively attaching a carbon chain at alkylating that site.

This alkylation process interferes with the normal function of DNA, thereby killing the microorganisms. The use of pure ethylene oxide presents a hazard, because when the flammable gas mixes with atmospheric oxygen, it becomes susceptible to explosion. This problem is circumvented by using a mixture of ethylene oxide and carbon dioxide, which is no longer explosive. Such mixtures are sold commercially for the sterilization of medical equipment and can also be used to treat agricultural grains. One such mixture, called Carboxide, is comprised of 10% ethylene oxide and 90% CO_2. Carboxide can be exposed to air without the danger of explosion.

Ethylene oxide is an effective sterilizing agent, but it is also toxic, explosive at high concentrations, and requires great care to use effectively. Other methods of sterilization are continuously being explored, but no method is foolproof. In 2015, several patients at the UCLA medical school came down with a "carbapenem resistant" enterobacteria, i.e. an intestinal bacteria resistant to virtually all antibiotics. Two patients died. It was discovered that several duodenoscopes had not been adequately sterilized between patients. In response, UCLA tightened up their nonautoclave sterilization procedure, returning to the use of ethylene oxide.