

Organic Chemistry Laboratory I (CHEM 3105)

Texas Tech University

Spring Session 2020

Laboratory Coordinator/

Instructor of Record Contact

Information and Office Hours

Dr. Douglas H. Pool; Office: CHEM 223A; Prep Lab: CHEM 206

Phone: 806.834.4461; 10:00 am - 10:50 am MWF, or by appointment:

douglas.pool@ttu.edu (I am here a lot but it may be helpful to email in advance to let me know you are coming as I may be out of office prepping for the organic labs!)

Required

- 1) "Organic Chemistry Laboratory Techniques"; TopHat (ISBN: 978-1-77330-778-7, 978-1-77330-243-0). Available online

Books and Materials:

- 2) A laboratory notebook that features duplicate page copies.
- 3) Approved lab coats. These should be rented from the Chemistry Graduate Student Organization (CGSO) in **45** on the first day of lab for \$15 cash, credit/check cards accepted (no checks). Personal lab coats should not be used; **all lab coats must be turned in at the end of the semester**. Disposable lab coats for general chemistry laboratories and light weight lab coats sold for non-chemistry lab courses such as biology are **not approved**.
- 4) Approved safety goggles that fit to the face, safety glasses with side shields are not acceptable. These can be purchased from the CGSO at the same time as lab coat rentals in **45** on the first day of lab for \$5. They will also be available in from the counter near the second floor stockroom near the stairwell. Additionally the bookstores sell goggles.

Prerequisites: You must have passed CHEM 1108 with a grade of C or better. Concurrent enrollment or previous successful completion of CHEM 3305 is required.

Learning Outcome: You will gain experience with fundamental organic techniques, such as distillation, recrystallization, thin layer chromatography (TLC), and develop a working knowledge of infrared (IR) spectroscopy. You will be introduced to laboratory practices of organic chemistry by conducting organic reactions (addition, elimination, substitution, etc) that have been taught in the classroom.

Lab Safety: Minimizing risks in the laboratory is a priority. You are required to view the Safety Lecture provided on Blackboard (blackboard.ttu.edu) and pass the online Safety Quiz before the first lab experiment (see "Course Schedule" on page 10 of this syllabus). Failure to view the Safety Lecture and pass the online Safety Quiz will result in being dropped from the lab.

Strict adherence to the safety rules is expected. Violation of a safety rule that can be corrected on site (e.g. – failure to wear goggles or lab coats, bringing food/drink in the lab) will result in an automatic deduction of at least one Safety Point per rule violated. Typically, noncompliance will result in a warning from the TA and a second offense in one lab period will result in dismissal from the lab for that day. However, TAs have the right to dismiss any student from the lab for violating any safety rule, even one that can be corrected on site and even on the first violation of the rule. Proper dress is also expected; you will be dismissed from lab and receive a zero for the lab report of the missed experiment for not adhering to the dress code.

Lab coats are to be stored in the glassware drawers in the laboratories in the Ziploc bag provided; goggles may not be stored in the lab. Students must remember to bring their goggles to every lab period. Gloves should be worn during all experimentation in lab. Lab coats and gloves should never be worn outside of the laboratory. Remove these items before you step into the hallway.

A portion of your total grade comes from safety points. You will lose points for small infractions that do not result in you being removed from the lab. Be on time! Your TA often will have important safety information to go over at the beginning of class. If you arrive late enough that you miss the pre-lab lecture, you will lose 5 safety points. If you are always on time and follow the safety rules, you should get all of your safety points.

Lab Accidents: In the event of **any** laboratory accident (e.g. – cuts, burns, inhalation of fumes, chemical spills), notify the TA immediately. For a minor cut, bandages are available from Dr. Pool and the first floor stockroom (room 117). For other injuries, the student may be taken to Student Health Services for treatment, or an ambulance will be called if the severity of

the injury warrants. The university does not cover any expenses incurred. An “Incident Report Form” **must** be completed in the presence of the responding personnel.

Lab Preparation: Students must read the complete experiment introduction, discussion (including technique sections included with the experiment on TopHat), and procedure before class. Each experiment assigned on TopHat has questions that must be answered for credit. before your lab section meets. The pre-lab report sections of the lab report must be completed and brought to lab for your TA’s approval before you begin experimentation. Pay close attention to the order of experiments as listed on the course schedule on page 10 of this syllabus.

Assessment:

The following methods will be used to assess the learning outcomes:

1) Experiment Questions on TopHat; 2) Lab Reports; 3) Final Exam.

Each of them will be graded according to a grid described in the Grades paragraph.

1) Experiment questions: Each experiment on TopHat will have a series of questions covering material in the background reading, techniques, the experiment itself, calculations, safety, waste disposal, etc. Completion of these questions is due by the beginning of the regularly scheduled experiment they are covering. Each set of questions for an experiment is worth 10 points and there are twelve experiments for a total of 120 points.

2) Lab Reports: Lab reports must be completed for each experiment. Even though students work in groups to complete experiments, **lab reports must be written by the individual student** and not as a group effort or plagiarized from other sources. Below is an itemized list that describes expectations for the lab reports; an example lab report is given on pages 7-9 of this syllabus. Lab reports will be graded on a 40 point scale for a total of 480 pts over the semester. Lab reports are due at the beginning of the lab period following the lab period in which the experiment was completed. Grades on late reports will incur a 3 point per business day (M-F) deduction unless otherwise excused by Dr. Pool. Lab reports submitted more than one business week after their due date will not be accepted and a zero will be given for the missed assignment.

Lab reports must contain the following sections and are worth the indicated points.

Starred sections (*) are the pre-lab report sections and are due the day of the experiment at the beginning of lab (obtain your TA’s initials on the document to prove that this was completed, -3 points if turned in late)

The final lab reports (that include all of the below sections, including the starred sections) are due at the beginning of the first lab period following the day the experiment was conducted. Lab reports must be typed. Chemical structures and equations as well as diagrams such as TLC plate results can be hand drawn but must be **legible**. Typos for common words or chemical terms not found in word processor dictionaries are not acceptable (-1 pt).

***Heading & Title (1 pt)** – Your name, your lab partner’s name, date, course section, TA’s name, name of the experiment

***Purpose (1 pt)** – The reason for the experiment *in your own words*; 1-2 sentences.

***Reaction & Physical Properties Table (4 pt)** – Draw the reaction (if you’re performing a reaction) and record the physical properties (mp, bp, MW), including units, of the reactants, reagents, and products you will use or make. Reactions can either be neatly hand-drawn or drawn using a program like ChemDraw.

***Safety (4 pts)** – Any safety precautions necessary for the experiment should be outlined here. Examples include proper techniques (e.g. – for using syringes, for handling hot glassware, etc), a listing of chemical hazards, a listing of physical hazards, how to dispose of waste properly, and any other safety issue you see or your TA expects you to address. Make it a habit to reference all necessary chemicals’ safety information before handling them in lab. A good website to reference for this data is www.sigmaaldrich.com. You can search for and select the chemical in question, then click on the “Safety & Documentation” link.

***Procedure (4 pts)** – A detailed explanation of the lab in your own words. You should be able to perform the lab by just following this procedure. This can be written as steps (e.g. – 1. Add 0.15 g of benzophenone to a 3 mL conical vial). Don’t copy from the lab manual. Don’t use personal pronouns (I, me, you, us, etc...)

Data/Observations (4 pts) – Any colors, measurements (weights before and after), reaction times, etc. observed during lab. All graphs tables, and spectra must have a title and be clearly labeled. All IR spectra must have the functional group’s peak labeled. Record any and all observations. Draw pictures if you have to. Duplicate pages of your notebook & IR spectra should be attached to the back of the final lab report.

Calculations & Results (5 pts) – You may or may not have calculations; usually this will be the weight and % yield (see below). Record all weights & measurements to the 2nd decimal place.

Conclusions/Discussion (7 pts) – Discuss the results of the experiment thoroughly and in at least 4 full sentences. This should include a brief description of the lab, its purpose, and state why the lab was or was not successful by citing specific data collected during the experiment.

You must reference your results in this paragraph, the actual weight of your product, the percent yield (if applicable), peaks observed from IR spectra, etc...

One should be able to read just this section and get all the pertinent data from the lab.

Post Lab Questions (10 pts) – Answer **all** assigned post-lab questions

A physical lab report that contains all of the above sections that include the TA initialed pre-lab portion of the report, any spectra or chromatograms, and TA initialed pages from your lab notebook will be submitted to your TA on the day it is due. Additionally electronic portions of your report (Word file for example) will be uploaded to SafeAssign on your Blackboard course page. This only needs to include the portions of your report that you typed and you do not have to digitize or scan the portions of your report that are not typed. Failure to upload the digital file(s) to SafeAssign will result in no grade awarded for the lab report.

Submitting duplicate lab reports or reports that contain duplicate sections is plagiarism. All cases of plagiarism will be submitted to the Office of Student Conduct.

3) Final Exam: The final exam will be given Thursday, April 30, 2020 from 7:00 pm to 9:00 pm in Chemistry 049; it will be worth 160 pts. The final will be based on concepts from laboratory safety, pre-lab quizzes, post-lab questions, general laboratory knowledge, spectra interpretation, and the reactions conducted in lab.

Grades: Assignment grades will be reported on Blackboard. Students should verify their grades every week to ensure their accuracy. Letter grades will be assigned according to the following ranges; no curve will be applied to the grades at the end of the semester. There may be a small adjustment to compensate for differences in TA grading between sections. The following earned number of points will guarantee the corresponding letter grade. Save all your graded assignments until you have received your course grade from the Registrar.

1 Safety Quiz	=	40 pts
Safety Points	=	40 pts
12 Exp Ques (10 pts each)	=	120 pts
12 Reports (40 pts each)	=	480 pts
<u>1 Final Exam (160 pts)</u>	=	<u>160 pts</u>
Total		840 pts

756 – 840 pts : A
630 – 755 pts : B
504 – 629 pts : C
420 – 503 pts : D
0 – 419 pts : F

Absence Policy: Students should submit an “Excused Absence Request Form” (located in Dr. Pool’s office and on Blackboard) and supporting written documentation as described on the “Excused Absence Request Form” within one week of the missed lab. Legitimate excuses for absences include court appearances, required University-sponsored events, sudden illness, funerals, and religious holy days. A note will appear in the “Excused Absences?” column in the Blackboard grade book noting which experiment and/or pre-lab quiz is excused. Additionally an exempt marker will be placed in the column for the experiment lab report being excused. Students will not be assessed for excused absences thus decreasing total assessed points for the course. The percentages used in the table above will be applied to the new total number of points assessed.

Unexcused absences will result in a zero for that lab report and pre-lab quiz. Absences due to weather conditions will not be excused if the university remains open during your scheduled lab period. No more than **two** excused absences will be allowed. No make-up labs will be administered.

Incomplete: The grade of incomplete will be given only if you cannot continue in the course due to circumstances beyond your control and have been earning a passing grade up until that point. You must meet with Dr. Pool to discuss an incomplete.

ADA Statement: Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact Dr. Douglas Pool as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during his office hours. Please note: instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, please contact Student Disability Services in West Hall or call 806-742-2405. (OP 34.22)

Religious Holy Day: Texas law requires institutions of higher education to excuse a student from attending classes or other required activities, including examinations, for the observance of a religious holy day. The student shall also be excused for time necessary to travel. An institution may not penalize the student for the absence and allows for the student to take an exam or complete an assignment from which the student is excused. While no prior notification of the instructor is required, OP 34.19 indicates that a student who intends to observe a religious holy day should make that intention known to the instructor prior to the absence. The student should make up any missed work.

Pregnancy: Any student who is pregnant should be aware that exposure to a number of chemicals is expected. Please discuss this situation with Dr. Pool before you attend any labs.

Academic Dishonesty: Dishonesty on examinations and quizzes or on written assignments, illegal possession of examinations, the use of unauthorized notes during an examination or quiz, obtaining information during an examination from the examination paper or otherwise from another student, assisting others to cheat, alteration of grade records, illegal entry to or unauthorized presence in an office are instances of cheating. Such actions will be subject to penalty ranging from a zero on a lab report, quiz, or exam to a course grade of F.

TEXAS TECH UNIVERSITY
DEPARTMENT OF CHEMISTRY & BIOCHEMISTRY

Undergraduate Teaching Laboratories: Safety Facts and Responsibilities

In order to avoid personal injuries and injuries to fellow students while checking in to, checking out of, and performing experiments in your chemistry laboratory courses, please read the following information. You are expected to read, understand, and follow all the stated safety regulations and any other rule mandated by university faculty or staff throughout the course. Failure to abide by these rules can result in your dismissal from the laboratory and receiving a zero for the experiment.

1. Approved safety goggles (NOT safety glasses) are to be worn continuously while you are in the laboratory. Safety goggles will protect your eyes against impact and splashes. These goggles are available in the book stores and through the American Chemical Society student affiliate group on campus.

If you should get a chemical into your eyes, notify your teaching assistant immediately and wash with flowing water from the eyewash for 15-20 minutes.

2. Students, teaching assistants and other staff members are to be appropriately clothed in the laboratory at all times, including check-in and check-out. Appropriate clothing includes:

- Clothing that protects the individual's body from the neck to the ankles. Sleeveless shirts, tank tops or other clothing items that do not cover the shoulders or abdominal area are not acceptable clothing to be worn in the laboratory. You must wear attire which covers from the neck to the ankles, plus either a lab coat or a lab apron plus sleeves. No skin should be exposed from the waist down.
- Footwear that covers the entire foot. Open-toed and/or open-heeled shoes, including clogs and sandals, etc. are not acceptable footwear to be worn in the teaching laboratory.
- Leggings and tights are not acceptable to be worn in the chemistry laboratory.

3. No unauthorized experiments should be performed.

4. Never use an open flame when working with organic solvents.

5. In case of fire, or accident, notify your teaching assistant at once (note location of the safety shower and eye wash stations before they are needed).

6. Take special care when working with strong acids or strong bases. Contact with these materials can cause severe chemical burns. Always use gloves.

7. Do not touch hot glassware or hot hardware. Think before you act.

8. The Department of Chemistry and Biochemistry will seek medical assistance for you if you are injured in the lab. Transportation to a medical facility will be supplied for you as needed. You are responsible for all costs incurred.

9. Do not taste anything in the laboratory (this applies to food as well as chemicals. Do not use the laboratory as an eating place and do not eat or drink from laboratory glassware).

10. Never bring food or drink into the lab (this includes tobacco products and chewing gum).

11. Exercise great care in noting the odor of vapors and, whenever possible, avoid breathing vapors of any kind.

12. Always use a suction bulb when filling a pipet. Never suction by mouth!
13. Don't force glass tubing into rubber stoppers.
14. Confine long hair securely when in the laboratory.
15. When working with electrical equipment, observe caution in handling loose wires and make sure that all equipment is electrically grounded before touching it.
16. Never work alone in the laboratory.
17. There is no such thing as a "dumb" question. If you have any question, ask your lab instructor/teaching assistant.
18. If you see another student violating these rules, please notify your lab instructor/teaching assistant.
19. The use of cosmetics (including lip balm) is prohibited in the laboratory.
20. Do not use damaged, cracked, chipped, or broken glassware.
21. Waste should be properly segregated and disposed of in accordance with the University, departmental, and laboratory policies.
22. No chemical or equipment may be removed from the laboratory without specified permission and supervision of your lab instructor/teaching assistant.

SPECIAL NOTE DEALING WITH WEARING SAFETY GOGGLES IN THE CHEMISTRY INSTRUCTIONAL LABORATORY

Safety is a very serious issue. Protect your eyes at all times because unforeseen accidents do take place and eyes cannot be replaced! Students and teaching assistants **must continuously wear** approved safety goggles (not safety glasses) while in the chemistry laboratory. This includes the entire time spent in the laboratory during check-in and check-out! Wearing contact lenses in a chemical laboratory can be harmful to your eyes, even with the use of goggles. Contact lenses should be replaced by prescription glasses except in rare cases where this is not possible.

SPECIAL NOTE DEALING WITH CLEANING DUTIES IN THE CHEMISTRY INSTRUCTIONAL LABORATORY

Maintaining a clean / not contaminated work area is extremely important as the organic laboratories are shared by many student sections. Students must always fulfill the assigned cleaning duties before they are allowed to leave the lab at the end of their experiments. The last 10 minutes of the laboratory term should be reserved for this. These duties, as described in the safety lecture include but are not limited to: cleaning and returning the used glassware to the assigned drawer, removing of any trash from the bench top, washing and drying the bench top, placing the hot plate and MelTemp apparatus on the shelf at middle of the bench, returning the stands, clamps and rubber hoses to the designated drawers. Your TA will inform you about any other cleaning duties. After you have completed all these requirements ask your TA to come and check your work area. If everything is properly done, he/she will **sign** your lab notes and **lock** your drawer. Not having the TA signature when turning in the lab report will result in a **20** points penalty.

Example Lab Report

Joe Student
Lab partner - Jane Student
2.29.2031, CHEM 3105-500
TA – Chem X. Pert

Oxidation of Diphenylmethanol to Benzophenone

Purpose

The purpose of this experiment is to oxidize diphenylmethanol, a secondary alcohol, to benzophenone, a ketone. Household bleach is used as the oxidant.

Reaction & Physical Properties Table

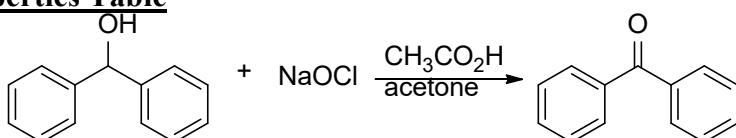


Table 1: Physical Properties Table

Compound	MW (g/mol)	Amount	mmol	mp (°C)	bp (°C)	Density (g/mL)
diphenylmethanol	184.23	200 mg	1.09	65-67	-	-
Sodium hypochlorite (12.5 % aq soln)	-	12 mL	-	-	-	-
acetone	58.08	10 mL	-	-	56	0.79
acetic acid	60.05	0.48 mL	-	-	118	
benzophenone	182.22			47.9		-

Safety

The following is data obtained from the safety and documentation information made available at www.sigmal Aldrich.com. You must cite any source you use in your lab reports. This is just an example of one way to report the safety issues related to an experiment. Make sure you follow your TA's specific instructions and provide a thorough safety section for every experiment.

Diphenylmethanol (irritant)

Risk Statements:

Irritating to eyes, respiratory system and skin

Safety Statements:

In case of contact with eyes, rinse immediately with plenty of water and seek medical advice

Wear suitable protective clothing

Sodium hypochlorite (corrosive and dangerous for the environment)

Risk Statements:

Contact with acids liberates toxic gas

Causes burns

Very Toxic to aquatic organisms

Safety Statements:

In case of contact with eyes, rinse immediately with plenty of water and seek medical advice

Wear suitable protective clothing, gloves and eye/face protection

In case of accident or if you feel unwell, seek medical advice immediately (show label where possible)

Avoid release to the environment. Refer to special instructions safety data sheet

Acetone (flammable and irritant)

Risk Statements:

Highly Flammable

Causes severe burns

Repeated exposure may cause skin dryness or cracking

Vapors may cause drowsiness and dizziness

Safety Statements:

Keep container in a well-ventilated place

Keep away from sources of ignition - No smoking

In case of contact with eyes, rinse immediately with plenty of water and seek medical advice

Acetic Acid (flammable and corrosive)

Risk Statements:

Flammable

Causes severe burns

Safety Statements:

Do not breathe gas/fumes/vapor/spray

In case of contact with eyes, rinse immediately with plenty of water and seek medical advice

In case of accident or if you feel unwell, seek medical advice immediately (show label where possible)

Benzophenone (dangerous for the environment)

Risk Statements:

Irritating to eyes, respiratory system and skin

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment Safety Statements:

In case of contact with eyes, rinse immediately with plenty of water and seek medical advice

Avoid release to the environment. Refer to special instructions safety data sheet

Procedure

1. Make a 3:7 acetone:hexanes solution for the developing solvent for TLC. Put solvent in a beaker and cover with a watch glass or book to let the vapors saturate the developing chamber.
2. Add 0.20 g diphenylmethanol, 10 mL acetone, and 0.48 mL acetic acid to a 50 mL round bottom flask.
3. Obtain a small sample of this solution as a reference for TLC.
4. Add 12 mL of bleach to the solution, put a condenser on the flask, and let stir for 5 min.
5. Remove the condenser and sample the reaction mixture for TLC.
6. Spot the TLC plate with the reference sample and reaction mixture sample, develop the plate, and view under UV light.
7. If the reaction is not complete, add 2.0 mL bleach, let stir for 5 min, and redo the TLC.
8. Once the reaction is complete, pour the reaction mixture into a 126 mL separatory funnel.
9. Rinse the reaction flask with 5 mL hexane and add to the separatory funnel.
10. Separate the two layers and extract the acetone layer with 5 mL hexane.
11. Wash the combined hexane layers with 2 mL 5% NaHCO₃ then 3 mL distilled H₂O.
12. Dry the hexane layer over MgSO₄ then evaporate the hexane in the hood gently under a stream of air.

Data/Observations

Weight of diphenylmethanol: 0.205 g

The hexane layer was mistaken for the acetone layer, so 5 extra mL of hexane was used

The reaction mixture turned clear when the yellow bleach was added to it

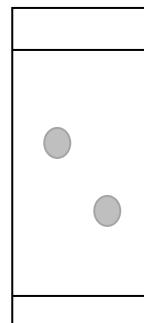
Some product was lost due to the valve not properly fitting the separatory funnel

The beaker weighed 36.70 g empty, 36.83 g with the product (after evaporation of hexane solvent)

The IR of diphenylmethanol showed a broad OH peak at ~3300 cm⁻¹

The IR of benzophenone showed no OH peak, and a peak at ~1660 cm⁻¹ appeared for C=O

The TLC plate was observed under UV light (drawn at right; starting material on right, product on left)



Calculations & Results

Actual amount of product:

$$36.83 \text{ g (beaker with product)} - 36.70 \text{ g (empty beaker)} = 0.13 \text{ g benzophenone (product)}$$

Theoretical amount of product:

$$\frac{0.205 \text{ g starting material}}{184.23 \text{ g s. m.}} \times \frac{1 \text{ mol s. m.}}{1 \text{ mol s. m.}} \times \frac{1 \text{ mol product}}{1 \text{ mol s. m.}} \times \frac{182.22 \text{ g product}}{1 \text{ mol product}} = 0.20 \text{ g benzophenone}$$

Percent yield:

$$\frac{0.13 \text{ g benzophenone}}{0.20 \text{ g benzophenone}} \times 100 \% = 65 \% \text{ yield of benzophenone}$$

Conclusions/Discussion

The oxidation of diphenylmethanol to benzophenone was successful. This reaction is important because it shows how to oxidize a secondary alcohol to a ketone by using an oxidizing agent such as bleach. The importance of thin layer chromatography was enforced by viewing the starting material compared to the reaction mixture. By understanding that different compounds travel at different rates on the TLC plate, it was concluded that the reaction was complete due to the lack of starting material in the reaction mixture sample.

After benzophenone was isolated, it was determined that 0.13 g was produced from this reaction. This seems like a small amount, but because this is a microscale experiment and only 0.205 g of starting material was used, it is a very reasonable yield (60%). Some product was lost in isolation due to spillage and that is why the percent yield is not higher.

The conversion of the alcohol to ketone was confirmed by observation of the IR spectra. The IR spectrum of the product showed the appearance of a C=O peak at approximately 1660 cm^{-1} and disappearance of the OH peak ($\sim 3300 \text{ cm}^{-1}$ for diphenylmethanol).

Post Lab Questions

1. Answer all assigned post-lab questions in this section.

Useful Calculations For Your Benefit

How to calculate percent yield:

First you must calculate the theoretical amount of product if the reaction were to go to 100% completion:

$$\begin{array}{c}
 \text{Convert starting material to moles} \\
 \overbrace{X.XX \text{ g starting material}}^{} \times \frac{1 \text{ mol s. m.}}{\text{MW g s. m.}} \times \underbrace{\frac{X \text{ mol product}}{X \text{ mol s. m.}}}_{\text{Convert to moles of product (usually a 1:1 ratio, look at coefficients in the reaction)}} \times \frac{\text{MW g product}}{1 \text{ mol product}} = \text{theoretical amount of product (g)}
 \end{array}$$

Then you can calculate percent yield:

$$\frac{\text{actual amount of product (g)}}{\text{theoretical amount of product (g)}} \times 100 \% = \text{percent yield of product}$$

NOTE: when using liquids you must use density to convert from grams to milliliters & back:

Density = mass (g)/volume (mL)

$$\frac{X.XX \text{ g Compound X}}{\text{density g Cmpd X}} \times \frac{1 \text{ mL Cmpd X}}{} = X.XX \text{ mL Compound X}$$

Section #	TA	Lab room	Time	Final: Thursday Apr 30, 7:00-9:00pm
300	Mazen Elsaid	221	T 8:00 am – 10:50 am	Chemistry 049
301	Shahid Islam	222	T 8:00 am – 10:50 am	Chemistry 049
302	Mazen Elsaid	222	R 8:00 am – 10:50 am	Chemistry 049
303	Hao Liu	222	F 11:00 am – 1:50 pm	Chemistry 049
304	Hao Liu	222	F 2:00 am – 4:50 pm	Chemistry 049
305	Sai Zhang	222	R 11:00 am – 1:50 pm	Chemistry 049
306	Sai Zhang	222	R 2:00 am – 4:50 pm	Chemistry 049
307	Lucy Kim	222	T 11:00 am – 1:50 pm	Chemistry 049
308	Lucy Kim	222	T 2:00 am – 4:50 pm	Chemistry 049
309	Yao Tang	222	W 11:00 am – 1:50 pm	Chemistry 049
310	Yao Tang	222	W 2:00 am – 4:50 pm	Chemistry 049
312	Shahid Islam	221	T 2:00 am – 4:50 pm	Chemistry 049

CHEM 3105 Course Schedule – Spring Session 2020

Completion Due Jan27th	Safety Lecture (BlackBoard), Online Safety Quiz
Jan 21-24	Lab Check-in, TA Lecture - Introduction to Lab
Jan 28-31	Exp 1: Simple and Fractional Distillation; TopHat Questions – Exp 1
Feb 4-7	Exp 2: Separation of a Mixture of a Carboxylic Acid and a Hydrocarbon; TopHat Questions – Exp 2
Feb 11-14	Exp 3: Recrystallization and Melting Point; TopHat Questions – Exp 3
Feb 18-21	Exp 4: Extraction: 1,3,7-trimethylxanthine; TopHat Questions – Exp 4
Feb 25-28	Exp 5: Thin-Layer Chromatography and Infrared Spectroscopy; TopHat Questions – Exp 5
Mar 3-6	Exp 6: Oxidation of Alcohols; Trends in Infrared Spectroscopy; TopHat Questions – Exp 6
Mar 10-13	Exp 7: Introduction to Gas Chromatography; TopHat Questions – Exp 7
Mar 24-27	Exp 8: Williamson Ether Synthesis; Quiz – TopHat Questions 8
Mar 31-Apr 3	Exp 9: Kinetics of an S _N 1 Reaction; TopHat Questions – Exp 9
Apr 7-10	Exp 10: Dehydrohalogenation of 2-bromoheptane; TopHat Questions – Exp 10
Apr 14-17	Exp 11: Dehydration of Cyclohexanol: E1 Elimination; TopHat Questions – Exp 11
Apr 21-24	Exp 12: Photochemical Isomerization of an Alkene; TopHat Questions – Exp 12 Lab Clean up & Check-out
Thursday Apr 30th	Final Exam, 7:00 pm - 9:00 pm Chemistry 049

https://www.depts.ttu.edu/officialpublications/calendar/19-20_cal_detailed.php

*January 31, 2020 - Last day for student-initiated drop on MyTech without academic penalty (drop does not count against drop limit). All drops are the responsibility of the student.

*April 22, 2020 - Last day for student-initiated drop on MyTech with academic penalty (counts against drop limit). All drops are the responsibility of the student.

If you are enrolled in both CHEM 3305 and CHEM 3105, and you drop from the lecture (CHEM 3305), you must also drop from the lab (CHEM 3105). This should result in a DG (counts against drop limit) for the lecture and a DX (does not count against your drop limit) for the lab course. This may not happen automatically and if it does not you will need to contact the Registrar's office, preferably the same day you dropped your courses.

TTU Resources for Discrimination, Harassment, and Sexual Violence

Texas Tech University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from gender and/or sex discrimination of any kind. Sexual assault, discrimination, harassment, and other [Title IX violations](#) are not tolerated by the University. Report any incidents to the *Office for Student Rights & Resolution*, (806)-742-SAFE (7233) or file a report online at [titleix.ttu.edu/students](#). Faculty and staff members at TTU are committed to connecting you to resources on campus. Some of these available resources are: **TTU Student Counseling Center**, 806-742-3674, <https://www.depts.ttu.edu/scc/> (*Provides confidential support on campus.*) **TTU Student Counseling Center 24-hour Helpline**, 806-742-5555, (*Assists students who are experiencing a mental health or interpersonal violence crisis. If you call the helpline, you will speak with a mental health counselor.*) **Voice of Hope Lubbock Rape Crisis Center**, 806-763-7273, voiceofhopelubbock.org (*24-hour hotline that provides support for survivors of sexual violence.*) **The Risk, Intervention, Safety and Education (RISE) Office**, 806-742-2110, [rise.ttu.edu](#) (*Provides a range of resources and support options focused on prevention education and student wellness.*) **Texas Tech Police Department**, 806-742-3931, <http://www.depts.ttu.edu/ttpd/> (*To report criminal activity that occurs on or near Texas Tech campus.*)