



## Organic Chemistry II - CHMB42 Winter 2015



Welcome to Organic Chemistry part II. CHMB42 provides an introduction to compound determination using various spectroscopic methods. As well you will learn about aromatic substitution, carbonyl chemistry and biologically important compounds such as carbohydrates, and heterocycles.

Lectures: Tuesday 5-6, Wednesday 8-9 a.m., Friday 2-3 in AC223 (the ARC)

### Instructors:

#### **Wanda Restivo**

Lecturing until Reading Week

but lab coordinator for whole term.

SW-639 and SW 162, 416-287-7222

[restivo@utsc.utoronto.ca](mailto:restivo@utsc.utoronto.ca)

office hours: Mon 1-3, Wed 2-3, Thursday 10-11 in SW639

**Dr. Lana Mikhaylichenko** from mid Feb until April

SW 633 , 416-287-7207

[mikhay@utsc.utoronto.ca](mailto:mikhay@utsc.utoronto.ca)

### Email Policy:

Please use a valid "utoronto.ca" account for all CHMB42 correspondence. Emails received from other accounts are frequently filtered out as spam and may not be received. When composing your email, please use professional language. Be sure to include the course code as part of the subject line and sign the email with your first and last name, as well as your student ID. If it is in regards to your lab please include your practical number and the name of your TA. Your email will be answered as soon as possible (likely within 36 hours, unless it is a weekend or holiday).

A note on email content: Please double check the syllabus and course Blackboard page before emailing me with a question. The answers to most student questions can be found there! Questions regarding the lecture material/assigned readings/suggested problems should be posted on the discussion board (see below) rather than emailed. This will ensure that others can benefit from the responses provided and avoids having the same questions asked multiple times. Questions on the lab material should be directed to the lab coordinator or your TA.



Text:

Organic Chemistry (7th Edition) by Paula Yurkanis Bruice, Prentice Hall publishing.

This is the same text you would have used in CHMB41. The text has an accompanying study guide/solutions manual which is not required, but is strongly recommended. The UTSC Bookstore sells a bundled package which includes

the text and study guide/solutions manual. You may also use the 5<sup>th</sup> or 6<sup>th</sup> edition but the chapter numbers and problem numbers may be different. It will be your responsibility to follow along. There will be 7<sup>th</sup> edition texts and solution manuals available in the library on short term loan.

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#### Online Homework:

There will be weekly homework assignments to be completed using the online homework **Sapling Learning**. We have negotiated with them to offer it for free for this term only as a trial. This is VERY generous of them. Please see the pdf in Blackboard with instructions on how to sign up.

<http://saplinglearning.ca> and course is:

[University of Toronto, Scarborough - CHMB42H3 - Spring15 - RESTIVO AND MIKHAYLICHENKO](#)

**Please remember to use your 9 digit student number as your ID for the online homework.**

The problem sets will be released every Friday morning and they are due the following Friday at 11 pm. First one will be due January 23rd. The assignments will be equally weighted and recorded as a percentage. They will cover the material discussed in class. Late assignments will not be graded. The online homework counts for 3% of your final grade and can make a huge difference in helping you understand the course material and ultimately improving your grade.

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#### Discussion Board:

An online discussion board will be maintained through Blackboard. This online space will provide you with a place to post questions related to the course material. You must post as yourself. Feel free to answer each others' questions as well. The forums will be monitored by the instructor and/or a science engagement student to ensure that all questions are answered accurately. In addition, frequently asked questions (with their answers) may be posted here so be sure to check in periodically. Please note: Posts which contain answers/solutions to weekly homework assignments are not permitted and will be promptly removed.

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#### Clickers:

You should have one from last term or from first year. They will be used in class so that you may participate in the questions that will be presented periodically throughout the lectures. They will not be used for credit.

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#### Course Organization:

Lectures- Total of 3 hours per week. The lecture schedule is a rough guide and may be flexible. Incomplete notes will be provided for you on Blackboard. You should print them off and bring them with you to class. You should also bring some blank paper. You will be responsible for all material covered in lecture, even if it is not included in the online notes. Assigned problems will be posted with the lecture material or posted on Blackboard. It may seem like there are so many questions but many of them are quickly answered when going through the reading of the chapter. You will be successful in this course by doing the problems and coming for help when difficulty arises.

#### Online viewing:

For those students who wish to review the lecture after the fact, all CHMB42 lectures will be taped and there will be a link for 'Lecture Cast' from the course Blackboard page. These lectures will be kept for 2 weeks and then removed. They will **NOT** be available for exam review so make sure you keep up during the term and please do not ask for them to be uploaded again...the answer will be no. Forward queries to [webopt@utsc.utoronto.ca](mailto:webopt@utsc.utoronto.ca).

### CHMB42H3 Lecture Schedule (\*Tentative)

Week	Topic	Suggested Reading (Bruice 7 <sup>th</sup> ed.)	Suggested Readings (Bruice 6 <sup>th</sup> ed.)	Suggested Readings (Bruice 5 <sup>th</sup> ed.)
Jan 6-9	Mass Spec/Infrared	14.1-14.6, 14.10-14.17	13	12
Jan 13-16	Infrared/NMR	15.1-15.14,	13 & 14	12 & 13
Jan 20-23	NMR	15.17-15.20	14	13
Jan 27-30	Benzene and Aromaticity/ Reactions of substituted Benzenes	8.7 -8.12, 19.1-19.14	15	14
Feb 3-6	Reactions of substituted Benzenes cont'd/ Carboxylic acid Derivatives	19.15-19.25 16.1-16.8	16 & 17	15 & 16
Feb 10-13	Carboxylic acid Derivatives cont'd	16.9-16.22		
Feb 16-20	READING WEEK			
Feb 24-27	Reactions of Aldehydes and Ketones, More Reactions of Carboxylic Acid Derivatives, Reactions of $\alpha$ , $\beta$ Unsaturated Carbonyl Compounds	17.1-17.6, 17.7-17.12	18	17
Mar 3-6	Reactions of Aldehydes and Ketones cont'd/ Reactions at the $\alpha$ -carbon of Carbonyl Compounds	17.13-17.18, 17.19,18.1-18.3	18,19	17, 18
Mar 10-11	Reactions at the $\alpha$ -carbon of Carbonyl Compounds cont'd	18.4-18.8, 18.9-18.22	19	18
Mar 17-20	More About Amines, Reactions of Heterocyclic Compounds	20.1-20.4 20.5-20.8	21	20
Mar 24-27	The Organic Chemistry of Carbohydrates	21.1-21.5 21.6-21.11	22	21
Mar 31-Apr 6*	The Organic Chemistry of Carbohydrates cont'd/ Exam Review Session	21.12-21.19	22	21

\* Campus is closed on Good Friday April 3 so last lecture will be on Monday April 6<sup>th</sup>.

This is a tentative schedule. Some parts of the lecture, like naming for example, we will leave for you to go over on your own time. We hope to be doing more problems in class. Some of these will be from your text but most will be from other sources.

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#### Tutorials:

The tutorials are scheduled in the same time slot as your laboratory but in alternating weeks. You have been assigned to the tutorials based on our practical number and the room and time schedule is shown below. If you have an even numbered practical you will have your tutorial first.

**Even** numbered practicals will have their tutorials beginning Jan 14, **odd** begin Jan 21

Day	Time	Room	Practical Number
Wednesday	12-1	HW 308	1/3/5, 2/4/6
	12-1	BV264	5/7/9, 8/10/12
Thursday	2-3	HW 214	13/15/17, 14/16/18
	2-3	SW 128	19/21/23, 20/22
Friday	11-12	MW 170	25/27, 26/28

The tutorials will be assigned based on your lab number so you cannot sign into one. Last day for signing into a practical section will be Jan 12. Any change after that date will have to be requested of Wanda Restivo if space allows.

Attendance at the tutorials is compulsory. You will have a total of 5 tutorials. You will have a quiz at the end of the tutorial and they will count towards 2% of your final grade. To be able to write the quiz you must attend the entire tutorial. Your TA will be keeping track of your attendance. You may NOT attend a different tutorial without permission from the instructor. If you miss any you must provide documentation for your absence to Wanda for it to be exempted. You will not be allowed to have more than one exemption. There will be no makeups. Lowest grade will be dropped in your total.

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#### Labs:

The laboratory component of CHMB42 is compulsory. **In order to pass the course, you must also pass the lab component. The lab component is worth 25% of your overall grade.**

#### Lab Manual and notebook:

A lab manual must be purchased from the Bookstore. Please note that we do not print enough manuals for the students in the class in the first week since students are still "shopping" their courses. **Do not wait until the last minute to purchase your manual** as you may be out of luck. If this happens you will purchase the manual and they will be printed on request which may take up to 3 days. If you come to lab saying that you could not purchase a manual then you will not be accommodated and will receive no credit for that lab.

There are five labs and a lab test which is cumulative. It may be both written and practical.

**On your first day to the lab you** will have to bring a copy of your WHMIS training quiz. Instructions on how to access this will be posted on Blackboard. You must have received a 31/38 as a minimum grade. You will not be able allowed into the lab if you do not provide this hard copy of your results to your TA. See the Blackboard course content under labs for more information.

You should continue to use the same notebook that you used for CHMB41. Many of the chemicals will be the same and you can refer back to those pages when writing new msds data. Also the techniques you learned in that course will be handy in case you need to refer back to them. NEW: You may access the internet and the University msds site called ChemWatch on the computers available in SW 164. You may use them any time during the day but you must wear safety glasses as this is still part of the laboratory space. Your msds information must be hand written, by you, in your notebook. Do not print off msds and staple it into your notebook. If you do so you will be asked to leave the lab until your msds is properly written in your notebook.

There will be lab lists posted outside the lab with your name and seat numbers. When you come for your first lab you must have your lab coat and goggles on, have the TA check your notebook and hand in your scored WHMIS sheet you may then proceed to that spot. You will also find Videos on techniques linked from Blackboard. These links are available in your manual.

Lab Schedule:

Odd # labs begin: Jan 14(Even numbered labs will have a tutorial)

Even # labs begin: Jan 21 (Odd numbered labs will have a tutorial)

<u>Day</u>	<u>Time</u>	<u>Room</u>	<u>Practical number</u>
Wednesday	9-1	SW153	1/3/5 , 2/4/6
Wednesday	9-1	SW159	7,9,11 8/10/12
Thursday	1-5	SW153	13/15/17, 14/16/18
Thursday	1-5	SW159	19/21/23, 20/22
Friday	9-1	SW153	25/27/29, 26/28

Lab Rules:

- Be punctual. There will be a quiz (10 minutes) at the beginning of **every** lab, **including the first one.** (The questions at the back of the experiments will not be graded and are for you to try. Similar questions may be used in the quizzes.)
- Be prepared. Msds data in your notebook as well as a flow chart of your experiment, theoretical yield (if applicable) and intro is required. Your TA will be checking your notebook every time before entrance to the lab. **If they feel you are not prepared you will be denied entrance and you will receive a grade of 0 for this lab.**
- Be there. Part of the lab mark is based on your ability to answer, with competence, the questions of the TA's and instructors. This is a performance mark and more information is given in your manual.
- You must wear safety goggles, a lab coat and **have your legs and feet covered.No SHORTS**

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Policy on Missed Tests or labs:

Should you miss the midterm test or lab due to a legitimate reason, you must contact Wanda [restivo@utsc.utoronto.ca](mailto:restivo@utsc.utoronto.ca), or by phone 416-287-7222

immediately and submit appropriate documentation within 48 hours of your absence. If the reason is medical, an official UTSC medical note must be provided. See link below:

[http://www.utsc.utoronto.ca/~registrar/resources/pdf\\_general/UTSCmedicalcertificate.pdf](http://www.utsc.utoronto.ca/~registrar/resources/pdf_general/UTSCmedicalcertificate.pdf)

**The doctor must state that you had moderate to severe symptoms for any makeup consideration.**

I will try to do my best to have you do a makeup lab. For the test there will be a make-up exam within 1-2 weeks of the term test written at the instructors' convenience. If you miss the makeup exam you will receive a grade of 0.

**Please note that students will not be allowed to re-schedule or miss labs on the days of any exams from either this or other courses. This is a Chemistry Discipline Policy.**

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Term Test

There will be one 100 minute term test worth 25% of your final grade sometime after Reading Week. This will be written outside of class time, time TBD. The exact date and time will be provided once the information becomes available from the registrar. It will only cover the material taught before Reading Week by Wanda.

Final Exam:

There will be a final 3-hour, cumulative exam written during the end of semester exam period. The exact date, time and location will be announced as soon as they are available. **Please note that if you miss the Final Exam, you must**

**petition the Registrar's Office to write a deferred exam in the next formal exam period. Check the UTSC Calendar for instructions and deadlines.**

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Method of evaluation:

<u>1 Midterm test</u> - ( ~2 hours) All chapters taught before Reading week inclusive Exam schedule TBA	25%
<u>Tutorials and online homework</u>	2 + 3%
<u>Lab</u> 5 experiments and final lab test- see manual *There will be no makeup for the lab test.	25% must pass to pass course
<u>Final exam</u> during final exam schedule (cumulative)	45% (must either midterm or final to pass course)
Extra credit- information at the end of the syllabus	Up to 1.5%- must have passing mark first

**Note that you must pass the lab and either the midterm or final exam to be eligible to pass this course. The extra credit will not be counted towards achieving a pass in the course.**

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Communication:

All grading in this course will be on the course site on Blackboard.

You should monitor your grades as they go up and you will have 2 weeks from the time they go up to check for errors. Your final term grade will be posted and a final date will be given, after that date- no corrections will be allowed.

Lecture notes, announcements, will be found on **Blackboard**. Discussion groups will only be found on Blackboard. You may access it at:

<https://portal.utoronto.ca/>

You should get used to checking this site frequently for any important announcements.

Academic Policy:

Academic integrity is important to maintain our community which honours the values of honesty, trust, respect, fairness and responsibility and to protect you and the value of the degree towards which you are all working so diligently  
<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>

It is an offence for students to:

- Use someone else's ideas or words in their own work without acknowledging that those ideas/words are not their own with a citation and quotation marks. i.e. to commit plagiarism
- Include false, misleading or concocted citations in their work.
- Obtain unauthorized assistance on any assignment
- Provide unauthorized assistance to another student. This includes showing another student completed work.
- To submit their own work for credit in more than one course without the permission of the instructor
- To falsify or alter any documentation required by the University.- eg: doctor's notes
- To use or possess an unauthorized aid in any test or exam.

There are other offences under the Code, but these are the most common.

Please respect these rules. Offences will be dealt with according to the procedures outlined in the Code of Behaviour on Academic Matters.

## Accessibility:

In this course students with diverse learning styles and needs are welcome. In particular, if you have a disability/health consideration, that may require accommodations, please feel free to approach me and/or the Access/Ability/ Services Office. I will work with you and Access/Ability /Services to ensure you can achieve your learning goals in this course. Enquiries are confidential. The UTSC access/Ability/ Services staff (located in S302), are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations

(416) 287-7560 or [ability@utsc.utoronto.ca](mailto:ability@utsc.utoronto.ca)

## Academic Advising and Career Centre- AC213

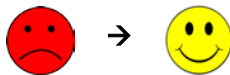
[www.utsc.utoronto.ca/aacc](http://www.utsc.utoronto.ca/aacc)

The wonderful people in this department are there to help you with: exam preparation and writing, writing resumes, choosing courses, creating a timeline for graduation, career research, and so much more. They also will help you find the right people to help you with your academic success.

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## Our hints to your success!!

- Please stay current with the material. The course is highly cumulative. Ideas introduced early on will be used to develop other concepts later. Thus, letting things slide is unwise, as the material begins to accumulate relentlessly. As the semester progresses and other demands on your time increase, playing catch-up will be harder to do. Furthermore, it is possible, indeed likely, that many of the concepts in the course will become clear only after you have had a chance to ponder them for a while. **This period of reflection is critical and hence the need for time.** So try not to learn everything at once. Even a half-hour of regular study each day is likely to be more useful to you than any all-night, caffeine-powered cramathons.
- Write, write, write. The importance of this cannot be overemphasized. Simply listening to the lecture, reading your text, or watching cool graphics flash by the screen is not enough. It is all too easy to lull yourself into thinking that you understand the material. Expressing your ideas clearly in writing (which is what you will have to do in the exams anyway) requires a higher level of mastery. To reach that level you must practice writing. Don't just look at the answers in the text and think you will be able to do it the same way. Write them out and perhaps seeing them on paper will provide clues as to where you might be going wrong. This will also help prevent memorization as you know how to work through the problem logically. Trust us on this. Write, write, write.
- Make the most of the resources available to you.



## Where to get help for this course:

### 1- Instructor's office hours

2- **A peer facilitator program, FSG-** Facilitated Study Group is being run through the Centre for Teaching and Learning. These weekly sessions are open to all students taking this course who want to improve their understanding of course material, improve their study techniques, and improve their grade. Attendance is voluntary. In these sessions you will compare notes, discuss important concepts, develop study strategies, and prepare for exams and assignments on course material. Course material is NOT re-lectured. The FSG's are lead by a trained facilitator, this term it is Amrita Annamunthodo, who has previously taken the course. A survey will be taken during the first week of class to determine the best days and times for most students, and they will begin probably the 2<sup>nd</sup> or 3<sup>rd</sup> week of class.

Any announcements will be announced in class, posted on Blackboard and also at

<http://ctl.utsc.utoronto.ca/home/fsg/>

### 3- Lab Skill Seminars

There will be lab skills seminars throughout the term. These are run by Science Engagement students. They are booked for Tuesday 6-7 in AC223 and Fridays 3-4:00 SW 128. Any changes will be posted on Blackboard

4- **Online Discussion board on Blackboard**- This the best place to ask questions related to the course as the questions will get answered quickly by your peers and the answer will get out to the most people.

5- **\*Extra problems sessions (called Discussion Sessions)** –these are scheduled for a 1-2 hour session each week and your attendance is voluntary. We will be going through extra problems either assigned or not from the text and other sources. Due to scheduling problems it may not be a time that everyone can come, therefore find a friend who can and get their notes and ask them to go over the material. These sessions will not be videotaped. **We have asked for Monday 4-6 TBD.** Our Science Engagement and volunteer students Arpita Patel, Nicole Arguelles and Rurika Okuda will be running them. **These will begin on Jan 12<sup>th</sup>.**

6- Chem Aid Centre- in Portable in front of SY building PO-104 Room 107  
<http://www.uts.utoronto.ca/~chemaid/>

This course has a reputation for being tough which is unfounded. It **IS** a course that requires a lot of **TIME and PRACTICE**. You will be unsuccessful if you do not keep up on the material every day. This course is like building a house. If the foundation is not well built the rest will crumble. You may have to go over your material from CHMB41 over and over. Use your text book to its fullest potential.

As soon as you are having difficulty with a problem, ask for help. We are here to help you understand organic chemistry so don't feel shy. We want you to be successful but it all starts with YOU.

We look forward to meeting you all.

Wanda and Lana

### Class extra activities

#### 1. JEOPARDY QUESTIONS

We are going to introduce Jeopardy games in this course. A student from the Service Learning program is responsible for making these games available to you. Your help in making Jeopardy game questions will be greatly appreciated and rewarded. We assigned an extra bonus mark in addition to your final exam grade for participation in this activity. You will be expected to create at least three accepted questions related to the lecture material. Each accepted question **MUST** be from different chapters. You must submit your question(s) no later than Friday followed by the last lecture for the given chapter. All questions must be submitted in **electronic format with structures written using ChemDraw program**. This program is available for free to all U of T students through library website. The direct link will be posted on the course Blackboard page. You can download it onto three different computers and it is very useful for your upper year chemistry and biology courses. The link for the video of how to download and use this program is also posted. Please state the title of the chapter for these questions and resource (you **MUST** include it even if this book is written in your native language). **All questions must be submitted to Arpita Patel at [arpiita.patel@mail.utoronto.ca](mailto:arpiita.patel@mail.utoronto.ca)**

She will review your questions and will let you know which question has been accepted. The questions must be related to the class material, must be **NOT** from your text book and must be ever be funny, practical, or challenging. You could create multiple choice questions or a short answer questions. You can create your own question or use some extra sources of information. In this case please let us know the original resource. We are looking forward to see your questions. **Your question(s) could appear in your final exam! You must work alone on this project.**



## 2. SONGS OR VIDEOS

We are also looking for the songs or poems related to the course material. The example of such projects will be shown to you in class. **This could be done as a group or an individual project (not more than six students allowed to participate in each group).** Each group member will be rewarded with an extra credit if we approve your project. Songs must be related to the course or lab material. Please contact us the discussion sessions leader in charge Rurika, before you will start working on your project. We will discuss it with you and give you some feedback on your material before you start making actual video. The final video could be uploaded to YouTube. Project must be submitted no later than 6 pm on last day of classes.

All video material must be sent to **Rurika Okuda at [rurika.okuda@mail.utoronto.ca](mailto:rurika.okuda@mail.utoronto.ca)**

Full or partial mark will be assigned for each project depending on the quality of the material and video.

We are also open to any ideas that you may find interesting. Please come and talk to Wanda or Lana in person if you will have any, it could be counted as your extra credit.

## 3. MOLECULE OF THE WEEK PROJECT

You can do this project as a group (**not more than two students** allowed to participate in one group). Each of you will be given one extra mark. In general, please take a close look at the lecture material and pick some structure or structures and then try to see of how much information you can find on this structure. Please be aware that once somebody picks the topic it is not available anymore. There will be no duplication of topics. You need to get Nicole's approval before you will start working on a topic! Presentation must contain interesting and challenging material. You should submit your presentation no later when Friday, March 27<sup>th</sup>. We would recommend submitting it a little bit earlier (at least up to three days before deadline). You will have time to fix your mistakes in this case. You will be expected to make a short (up to 7 min) presentation at the end of the term in order to receive a full mark. It will be done outside the class time and no more than 10-15 people will be your audience. **You should submit your ready presentation to Nicole at [nicole.arguelles@mail.utoronto.ca](mailto:nicole.arguelles@mail.utoronto.ca) and cc it to Lana and Wanda as well.**

In general, your presentation should have information about discovery, physical and chemical properties of that molecule, synthesis, and practical application. Please also try to discuss a mechanism for the reaction there its possible. Please do not forget to include references into your presentation. The best way to do it – list them as foot notes on each slide. Wikipedia will not be considered as a reference, you must look at the original paper and refer to it.

Here are some molecules which we would like to introduce to our class:

1. Aspirin (discovery, commercial method of preparation, practical application)
2. Cinnamaldehyde (natural sources, synthesis, practical application)
3. Vanillin (natural sources, synthesis, practical application)
4. Muscone (natural sources, synthesis, practical application)
5. Carvone (natural sources, synthesis, practical application)
6. Strawberry or raspberry ketones (natural sources, synthesis, practical application)
7.  $\alpha$ -Damescone (natural sources, synthesis, practical application)
8. Z-Jasmone (natural sources, synthesis, practical application)
9. DIBAL-H (structure, importance in synthesis, usage in synthesis of natural compounds such as ciguatoxin, etc.)
10. NADH – natural reducing agent
11.  $\alpha$ -Sinesal – structure, simple chemistry, appearance in nature.
12. Chloral hydrate (natural sources, synthesis, practical application)
13. Ninhydrin (natural sources, synthesis, practical application)
14. 2,4-Dinitrophenylhydrazine and its application in carbonyl compounds (synthesis, chemical reactions)
15. Grignard reagents (discovery, chemical properties, practical application)
16. Nicotine (natural sources, synthesis, practical application)
17. Coumarin (natural sources, synthesis, practical application)
18. D-Ribose (natural sources, synthesis, practical application)
19. Estradiol (natural sources, synthesis, practical application)
20. Anabolic Steroids (classification, synthesis, practical applications)
21. D-Glucose (natural sources, synthesis, practical application)
22. Caffeine (natural sources, synthesis, practical application)

23. Acetaminophen (synthesis, chemical properties, practical application)

24. Procaine (synthesis, chemical properties, practical application)

These are just a few ideas and we will be very happy if you will come out with your own topic.

**Please use this opportunity to improve your mark in the course!**