Principles of Organic Chemistry: A Compendium of Video Lectures

Syeda Sadia Khatoon and Atta-ur-Rahman*
Foreword

The “Video Book” entitled “Principles of Organic Chemistry: A Compendium of Video Lectures” prepared by Atta-ur-Rahman and Syeda Sadia Khatoon is a very worthwhile addition to the already existing video and other documentation/lectures available. However these are often of variable quality and not organized systematically to cover most of the requirements of undergraduate courses in one place. The present work represents a welcome effort to provide quality lectures in Organic Chemistry delivered by faculty members of renowned institutions such as MIT, Yale, University of California and other leading universities. What is particularly useful about this effort is that the materials have been carefully screened by the authors to ensure quality, and then organized to cover a broad range of topics including basic concepts, synthesis, spectroscopy and macromolecules. The novel arrangement of the materials in the format of a standard book, with chapters and sections containing the video links within them, should make it particularly attractive to users.

This Compendium of some 300 lectures should be a useful source of learning for organic chemistry students. It also represents a very valuable effort in line with the evolution of teaching and knowledge transfer methodologies.

Jean-Marie Lehn

(Nobel Laureate)
PREFACE

The single biggest problem to providing quality education, particularly in the developing world, is the non-availability of high quality faculty. This can now be partly addressed through access to the excellent lecture materials that are available on the net. Unfortunately they are scattered and there is need to screen and organise them in a proper form that will be useful to students. This may partly help to level the playing field between the West and the developing world as far as quality of education is concerned.

The "Video Book" that we have just prepared has contents arranged in the form of a normal text book except that it has no text! It contains just links to some 300 lectures by good scientists! These are systematically arranged according to headings and sub-headings in a standard organic chemistry text book format. To my knowledge it is the first "Video Book" (VB) of its kind and I hope that it will start a new trend.

"Video Books” of this type will allow students to have free access to excellent lectures delivered by world authorities in their respective fields from leading universities. This could lead to a major transformation in the manner that “teaching” is carried out in a typical class room, with both students and teachers having studied the materials in advance. This should result in a paradigm shift with the class rooms becoming more as places for discussion between teachers and students for clarification of concepts rather than just for lecture delivery.

The Commonwealth of Learning (Vancouver, Canada) has kindly agreed to publicise the “book” internationally for which we are grateful. We shall be obliged if you could pass this “Video Book” on to the departments of chemistry and biochemistry so that it reaches the widest possible viewership. It is free. We hope that this novel approach to education contributes substantially in raising standards.

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c)  

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a) https://www.khanacademy.org/science/organic-chemistry/conjugation-diels-alder-mo-
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b) https://www.khanacademy.org/science/organic-chemistry/conjugation-diels-alder-mo-
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a) http://ocw.uci.edu/lectures/chemistry_202_lecture_09_organic_reaction_mechanisms_ii_pericyclic_reaction.html

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25.7. Sigmatropic Rearrangements  
a) http://ocw.uci.edu/lectures/chemistry_202_lecture_14_organic_reaction_mechanisms_ii_sigmatropic_rearrangements.html
b) http://ocw.uci.edu/lectures/chemistry_202_lecture_15_organic_reaction_mechanisms_ii_sigmatropic_rearrangements_part_2.html

26.  

Chapter 26: Chemical Structure and Reactivity

26.1. $S_N$1, $S_N$2, Allylic Organometallic and Conjugated Double Bond Reactions

26.2. Pericyclic Reactions and Diels Alder Reactions

https://www.youtube.com/watch?v=qVBh9TL2ONo&list=PL-XXv-cvA_iAqa_0qj7SIoY3KJHcgRgrb&index=4

26.3. Electrocyclic Reactions, Benzene and Aromaticity

https://www.youtube.com/watch?v=qVBh9TL2ONo&index=4&list=PL-XXv-cvA_iAqa_0qj7SIoY3KJHcgRgrb

26.4. Electrophonic attack on Derivatives of Benzene

https://www.youtube.com/watch?v=GCqOG4FjKD4&index=5&list=PL-XXv-cvA_iAqa_0qj7SIoY3KJHcgRgrb

26.5. Electrophilic Aromatic Substitution, Halogenation, Nitraration and Sulfonation

https://www.youtube.com/watch?v=zXgTlirzjz8&index=6&list=PL-XXv-cvA_iAqa_0qj7SIoY3KJHcgRgrb

26.6. Strategies in Electrophilic Aromatic Substitution

https://www.youtube.com/watch?v=y_7Cfq8MWAY&list=PL-XXv-cvA_iAqa_0qj7SIoY3KJHcgRgrb&index=7

26.7. Synthesis, Oxidation, Ozonolysis of Alkenes, Hydration of Alkynes, Friedel-Crafts Acylation and Alcohols

https://www.youtube.com/watch?v=lekbh6HCFwU&list=PL-XXv-cvA_iAqa_0qj7SIoY3KJHcgRgrb&index=8

26.8. Acetal Formation, Acetal Pro-Drugs, Amine Addition and Intermolecular Reactions

https://www.youtube.com/watch?v=TO339Z7JBxM&list=PL-XXv-cvA_iAqa_0qj7SIoY3KJHcgRgrb&index=9

26.9. Resonance Stabilized yields are Trans-Selective, Baeyer Villiger Oxidation

https://www.youtube.com/watch?v=tnUdDDPOLmA&list=PL-XXv-cvA_iAqa_0qj7SIoY3KJHcgRgrb&index=10
26.10. Enamines, Aldol formation, α, β Unsaturated Aldehyde and Ketones, Wittig Reactions

https://www.youtube.com/watch?v=hnPQ3hD-New&index=11&list=PL-XXv-cvA_iAqa_0qj7SIoY3KJHcgRgrb

26.11. Hydrogen Cyanide Conjugate Addition, Robinson Annulation and Carboxylic Acids

https://www.youtube.com/watch?v=2f_yfWTK7o&list=PL-XXv-cvA_iAqa_0qj7SIoY3KJHcgRgrb&index=12


https://www.youtube.com/watch?v=nPR2p_I816U&index=13&list=PL-XXv-cvA_iAqa_0qj7SIoY3KJHcgRgrb

26.13. Reactions of Carboxylic acids, Carboxylic Acid Derivatives. Acyl Halides Reactions

https://www.youtube.com/watch?v=hXk-RJruVU&index=14&list=PL-XXv-cvA_iAqa_0qj7SIoY3KJHcgRgrb


https://www.youtube.com/watch?v=Zz3ftdq7vmQ&list=PL-XXv-cvA_iAqa_0qj7SIoY3KJHcgRgrb&index=15

26.15. Amides, Alkanesnitriles, Amines and their Derivatives

https://www.youtube.com/watch?v=UKILPthCjKg&index=16

26.16. Amines and their Derivatives, Synthesis

https://www.youtube.com/watch?v=82K9_64NL88&list=PL-XXv-cvA_iAqa_0qj7SIoY3KJHcgRgrb&index=17

26.17. Reactions of Amines, Benzylic Resonance, Benzylic Oxidation Reduction

https://www.youtube.com/watch?v=juLq538gjac&list=PL-XXv-cvA_iAqa_0qj7SIoY3KJHcgRgrb&index=18

26.18. Kolbe Schimitt Reaction, etc
26.19. Clasien Rearrangement, Cope Rearrangement, Arenamines, the Calsien Condensation

https://www.youtube.com/watch?v=dNrXZQXvcx0&index=20&list=PL-XXv-cvA_iAqa_0qj7SI0y3KJHcgRgrb

26.20. Formation and Decarboxylation of 3Ketoacids, α Hydroxycarbonlys, Aldehyde Ketone Synthesis and Carbohydrates

https://www.youtube.com/watch?v=pzbGtNaWy5U&index=21&list=PL-XXv-cvA_iAqa_0qj7SI0y3KJHcgRgrb

26.21. Carbohydrates - Cyclic Hemiacetal Formation by Glucose, Reactions of Sugars

https://www.youtube.com/watch?v=IOoVnP7S3B8&index=22&list=PL-XXv-cvA_iAqa_0qj7SI0y3KJHcgRgrb


https://www.youtube.com/watch?v=rVtkgmUuR1A&list=PL-XXv-cvA_iAqa_0qj7SI0y3KJHcgRgrb&index=23

26.23. Pyridine, Reaction of Pyridine, Synthesis of Amino Acids

https://www.youtube.com/watch?v=AkBQjPR_Yc&list=PL-XXv-cvA_iAqa_0qj7SI0y3KJHcgRgrb&index=24


https://www.youtube.com/watch?v=i54Z9HzuF-8&index=25&list=PL-XXv-cvA_iAqa_0qj7SI0y3KJHcgRgrb

27.

Chapter 27: Click chemistry

27.1. Nobel conference: K. Barry Sharpless “Click Chemistry: Illusions in Chemistry”
27.2. Barry Sharpless: Click Chemistry: Recent Advances Used in Biomedicine

https://www.youtube.com/watch?v=aOpJMmmG80k

28.

Chapter 28: Organometallics

28.1. Alkali Organometallics

a) http://ocw.uci.edu/lectures/chem_201_lec_14_pt_2_organic_reaction_mechanisms_i_anions_pt_2_alkali_organometallics.html

b) http://ocw.uci.edu/lectures/chem_201_lec_14_pt_3_organic_reaction_mechanisms_i_alkali_organometallics_part_2.html

28.2. Alkali Organometallics (Pt. 3) & Addition of E+ to C=C


29.

Chapter 29: Addition of Organometallic Reagents to Carbonyls

a) http://ocw.uci.edu/lectures/chem_51c_organic_chemistry_lec_05_addition_of_organo metallic_reagents_to_carbonyls.html

b) http://ocw.uci.edu/lectures/chem_51c_organic_chemistry_lec_06_alphabeta_unsaturated_carbonyl_compounds.html
30.

Chapter 30: Transition Metals and Redox Reactions

30.1. Balancing Redox Equations

30.2. Electrochemical Cells

30.3. Chemical and Biological Redox Reactions

30.4. Transition Metals

30.5. Crystal Field Theory


31.1. Arndt-Eistert Reaction
https://www.youtube.com/watch?v=xYDIXqekgMk&list=PL85C9357345F6AA35
31.2.  Baeyer-Villiger Oxidation Reaction and Mechanism
https://www.youtube.com/watch?v=Lp7BJHL2Bpk&list=PL85C9357345F6AA35&index=2

31.3.  Baylis-Hillman Reaction
https://www.youtube.com/watch?v=G3bbjxxFF-8&list=PL85C9357345F6AA35&index=4

31.4.  Beckmann rearrangement
https://www.youtube.com/watch?v=gCd4G72q6Lo&list=PL85C9357345F6AA35&index=5

31.5.  Curtius reaction
https://www.youtube.com/watch?v=eMucWgEiRRI&index=11&list=PL85C9357345F6AA35

31.6.  Darzen's condensation
https://www.youtube.com/watch?v=a_GldtZGbDg&list=PL85C9357345F6AA35&index=12

31.7.  Favorskii Rearrangement
https://www.youtube.com/watch?v=P8hfRdmPfYw&index=15&list=PL85C9357345F6AA35

31.8.  The Fischer Indole synthesis
https://www.youtube.com/watch?v=N1QVC9v22-0&list=PL85C9357345F6AA35&index=16

31.9.  Friedel-Crafts Acylation Reaction
https://www.youtube.com/watch?v=mxN45iBCGWs&index=18&list=PL85C9357345F6AA35

31.10. Friedel Crafts Alkylation
https://www.youtube.com/watch?v=2Sk_LafcNDk&index=21&list=PL85C9357345F6AA35

31.11. Gabriel Synthesis
https://www.youtube.com/watch?v=O1ghSY-0a4A&list=PL85C9357345F6AA35&index=22

31.12. Grignard Reaction
https://www.youtube.com/watch?v=a8251H3_774&list=PL85C9357345F6AA35&index=24
31.13. Heck Reaction
https://www.youtube.com/watch?v=Nz15ccKevdg&list=PL85C9357345F6AA35&index=25

https://www.youtube.com/watch?v=Jy9qnm7e_8g&index=26&list=PL85C9357345F6AA35

31.15. Hofmann Elimination
https://www.youtube.com/watch?v=IDLzk3uw5L4&index=27&list=PL85C9357345F6AA35

31.16. Mannich Reaction
https://www.youtube.com/watch?v=S8QX8GogZVY&index=28&list=PL85C9357345F6AA35

31.17. Michael Reaction
https://www.youtube.com/watch?v=N3pcFxWfYNg&list=PL85C9357345F6AA35&index=29

31.18. Mitsunobu Reaction
https://www.youtube.com/watch?v=UBhNrrlo-AM&list=PL85C9357345F6AA35&index=30

31.19. Oppenauer Oxidation
https://www.youtube.com/watch?v=wj24oo_SbUA&index=31&list=PL85C9357345F6AA35

31.20. Riemer-Tiemann Reaction
https://www.youtube.com/watch?v=giwibzFc2b4&index=32&list=PL85C9357345F6AA35

31.21. Robinson ring Annulations
https://www.youtube.com/watch?v=wOJlu0_Gw6o&index=33&list=PL85C9357345F6AA35

31.22. Stork Enamine Reaction
https://www.youtube.com/watch?v=16bLYyMZm-8&list=PL85C9357345F6AA35&index=34

31.23. Suzuki Reaction
https://www.youtube.com/watch?v=7CpwtOGjDPs&index=35&list=PL85C9357345F6AA35
31.24. Swern Oxidation
https://www.youtube.com/watch?v=k3093efdwP4&index=36&list=PL85C9357345F6AA35

31.25. Ugi Reactions
https://www.youtube.com/watch?v=t7DWcsq73XE&index=37&list=PL85C9357345F6AA35

31.26. Vilsmeier-Haack Reaction
https://www.youtube.com/watch?v=2T2soAxu79c&index=38&list=PL85C9357345F6AA35

31.27. Williamson Ether Synthesis
https://www.youtube.com/watch?v=SRWjxHRL7o&index=39&list=PL85C9357345F6AA35
https://www.youtube.com/watch?v=X9ypryY7hrQ&index=40&list=PL85C9357345F6AA35

31.28. Wolff-Kishner Reduction
https://www.youtube.com/watch?v=2M1cRy8HOno&index=44&list=PL85C9357345F6AA35

31.29. Wolff Rearrangement
https://www.youtube.com/watch?v=8fWW-TSt2RU&list=PL85C9357345F6AA35&index=45

32.

Chapter 32: Spectroscopy: Introduction

32.1. Spectroscopy in the Frequency and Time Domains

32.2. Linear and Nonlinear Spectroscopy

32.3. Magnetism and Spectrochemical Theory
Chapter 33: UV/Vis Spectroscopy

33.1. Introduction UV/Vis Spectroscopy


33.2. UV/Vis Spectroscopy: Absorption in the Visible Region


33.3. UV/Vis Spectroscopy: Conjugation and Color


Chapter 34: Infrared Spectroscopy

34.1. Infrared Spectroscopy: Introduction, Theory, Instrumentation, and Sample Preparation


34.2. IR: Bond As Springs


34.3. IR: Signal Characteristics – Wave number
34.4. IR Spectra for Hydrocarbons


34.5. IR: Signal Characteristics - Intensity


34.6. IR: Signal Characteristics – Shape


34.7. IR: Symmetric and Asymmetric Stretching


34.8. IR Signals for Carbonyl Compounds


34.9. IR spectra Practice


34.10. C,H,O-Containing Functional Groups


34.11. Effect of Ring Size Conjugation Electron-Withdrawing Groups

Chapter 35: NMR Spectroscopy

35.1. **Introduction NMR**
   [http://www.chem.ox.ac.uk/vrchemistry/webcast/odell.htm](http://www.chem.ox.ac.uk/vrchemistry/webcast/odell.htm)

35.2. **Organic Spectroscopy: Introduction to NMR Spectroscopy: Concepts and Theory,**

35.3. **Organic Spectroscopy: Chemical Shift. \(^1^H\) NMR Chemical Shifts**

35.4. **Nuclear Magnetic Resonance Spectroscopy**

35.5. **Proton Nuclear Magnetic Resonance (HNM R)**

35.6. **Spin-Spin Coupling**

35.7. **Carbon-13 Nuclear Magnetic Resonance (CNMR)**

35.8. **\(^{13}\)C NMR Chemical Shifts. Chemical Equivalence and Spin-Spin Coupling**
35.9. Magnetic Equivalence, Spin Systems, and Pople Notation

35.10. Coupling Analysis in First-Order and Near-First-Order Systems

35.11. Spin-Spin Coupling in Stereochemistry and Structure Determination.

35.12. Organic Spectroscopy: Coupling Involving Other Nuclei
http://ocw.uci.edu/lectures/chem_203_lecture_15_organic_spectroscopy_coupling_involving_other_nuclei.html

35.13. The Importance of $^{13}$C Chemical Shifts in Structure and Stereochemistry Determination
http://ocw.uci.edu/lectures/chem_203_lecture_16_organic_spectroscopy_the_importance_of_13c_chemical_shifts_in_structure_and_stereochemistry_determination.html

35.14. Introduction to 2D NMR Spectroscopy

35.15. Dynamic Effects in NMR Spectroscopy

35.16. The Nuclear Overhauser Effect in Stereochemistry and Structure Determination
35.17. Understanding Complex Pulse Sequences

35.18. Using HMBC to Help Solve Structures: Putting the Pieces Together

35.19. Aspects of COSY, HMQC, HMBC, and Related Experiments

35.20. Using TOCSY to Elucidate Spin Systems. ROESY

35.21. Using Organic Spectroscopy to Solve Complex Structure

35.22. Organic Spectroscopy: Inadequate. Some Thoughts on Homework Set 9


35.24. Using HMQC-TOCSY or HSQC-TOCSY to Deal with Overlap
http://ocw.uci.edu/lectures/chem_203_lecture_27_organic_spectroscopy_using_hmqctocsy_or_hsqctocsy_to_deal_with_overlap.html

35.25. Some Other Useful NMR Techniques
36.

Chapter 36: Mass Spectroscopy

36.1. Introduction
http://www.chem.ox.ac.uk/vrchemistry/webcast/oldham.htm


36.3. Isotopic Masses, Isotopic Abundances, and High-Resolution Mass Spectrometry
http://ocw.uci.edu/lectures/chem_203_lecture_05_organic_spectroscopy_isotopic_masses_isotopic_abundances_and_highresolution_mass_spectrometry.html

36.4. Fragmentation in EIMS: Alkanes, Alkenes, Heteroatom Compounds, Carbonyl Compounds
http://ocw.uci.edu/lectures/chem_203_lecture_06_organic_spectroscopy_fragmentation_in_eims_alkanes_alkenes_heteroatom_compounds_carbonyl_compounds.html

37.

Chapter 37: Chemistry of Natural Products

37.1. Oxidation Reactions of Sugars

37.2. Polysaccharides
http://ocw.uci.edu/lectures/chem_51c_organic_chemistry_lec_27_polysaccharides.htm !
38.

Chapter 38: Green Chemistry

38.1. Green Chemistry

http://ocw.uci.edu/lectures/chemistry_51b_organic_chemistry_lec_17.html

39.

Chapter 39: Chemical Biology

39.1. What is Chemical Biology

http://ocw.uci.edu/lectures/chem_128_lec_01_intro_to_chemical_biology_introductionwhat_is_chemical_biology.html

39.2. Common Tools in Chemical Biology

http://ocw.uci.edu/lectures/chem_128_lec_02_intro_to_chemical_biology_common_tools_in_chemical_biology.html

39.3. Reactivity and Arrow Pushing

http://ocw.uci.edu/lectures/chem_128_lec_03_intro_to_chemical_biology_reactivity_and_arrow_pushing.html

39.4. Combinatorial Chemistry and Biology

http://ocw.uci.edu/lectures/chem_128_lec_04_intro_to_chemical_biology_combinatorial_chemistry_and_biology.html

39.5. Non Covalent Interaction, DNA

http://ocw.uci.edu/lectures/chem_128_lec_05_intro_to_chemical_biology_noncovalent_interactions_dna.html
39.6. DNA Reactivity with Small Molecules
http://ocw.uci.edu/lectures/chem_128_lec_06_intro_to_chemical_biology_dna_reactivity_with_small_molecules.html

39.7. DNA, RNA and Cancer
http://ocw.uci.edu/lectures/chem_128_lec_07_intro_to_chemical_biology_dna_rna_and_cancer.html

39.8. Introduction to Chemical Biology: RNA
http://ocw.uci.edu/lectures/chem_128_lec_08_intro_to_chemical_biology_rna.html
http://ocw.uci.edu/lectures/chem_128_lec_09_intro_to_chemical_biology_rna_part_2.html

39.9. Protein and Amino Acids Conformations
http://ocw.uci.edu/lectures/chem_128_lec_10_intro_to_chemical_biology_proteins_and_amino_acid_conformations.html
http://ocw.uci.edu/lectures/chem_128_lec_11_intro_to_chemical_biology_proteins_and_amino_acid_conformations_part_2.html

39.10. Protein Functions
http://ocw.uci.edu/lectures/chem_128_lec_12_intro_to_chemical_biology_protein_functions.html

39.11. Protein Functions and Enzymes

39.12. Glycobiology
http://ocw.uci.edu/lectures/chem_128_lec_14_intro_to_chemical_biology_glycobiology.html

39.13. Glycobiology and Polyketides
http://ocw.uci.edu/lectures/chem_128_lec_15_intro_to_chemical_biology_glycobiology_polyketides.html
39.14. Terpenes and cell Singaling

http://ocw.uci.edu/lectures/chem_128_lec_16_intro_to_chemical_biology_glycobiology__polyketides_part_2.html

http://ocw.uci.edu/lectures/chem_128_lec_17_intro_to_chemical_biology_terpenes_and_cell_signaling_part_1.html

http://ocw.uci.edu/lectures/chem_128_lec_18_intro_to_chemical_biology_terpenes_and_cell_signaling_part_2.html

40.

Chapter 40: Polymers

40.1. Polymers: Sorting and Identification of Post
https://www.youtube.com/watch?v=qn_FXw24JAQ&list=PL-XXvcvA_iCoOrAmAIHGw05ZqamH7tiA&index=2

40.2. Polymers: Toy design contest
https://www.youtube.com/watch?v=8YDdOceCaBw&index=4&list=PL-XXvcvA_iCoOrAmAIHGw05ZqamH7tiA

40.3. Polymers: Toy design and Power Point Projects
https://www.youtube.com/watch?v=Op_ma1DW85c&index=5&list=PL-XXvcvA_iCoOrAmAIHGw05ZqamH7tiA

40.4. Polymers: Poster Presentation Projects
https://www.youtube.com/watch?v=3026DmrPqyg&index=6&list=PL-XXvcvA_iCoOrAmAIHGw05ZqamH7tiA

40.5. Polymers: Depolymerization Reactions and acids
https://www.youtube.com/watch?v=0k7oZoRDxRk&list=PL-XXvcvA_iCoOrAmAIHGw05ZqamH7tiA&index=8
40.6. **Polymers: Depolymerization Reactions and Base**

https://www.youtube.com/watch?v=M3jpKG28kZo&index=9&list=PL-XXvcvA_iCoOrAmAIHGWO5ZqamH7tiA

40.7. **Polymers: Depolymerization Reactions and Base**

https://www.youtube.com/watch?v=M3jpKG28kZo&index=9&list=PL-XXvcvA_iCoOrAmAIHGWO5ZqamH7tiA

41.

**Chapter 41: Chromatography**

41.1. **Column Chromatography**


b. https://www.youtube.com/watch?v=clx8lfAgtXo Part 1

c. https://www.youtube.com/watch?v=mwEiq2pGKU8 Part 2

41.2. **Thin-Layer Chromatography (TLC)**


c. https://www.youtube.com/watch?v=qdmKGskCyh8

41.3. **Ion-Exchange Chromatography**

a. https://www.youtube.com/watch?v=jOOf_zHw2Hd4

b. https://www.youtube.com/watch?v=kxD5X0fyZWk
41.4. **HPLC**

a. [https://www.youtube.com/watch?v=kz_egMtdnL4&list=PLh7qJALewvA6-bSqb6DeslSTyr4g7I2P](https://www.youtube.com/watch?v=kz_egMtdnL4&list=PLh7qJALewvA6-bSqb6DeslSTyr4g7I2P)

b. [https://www.youtube.com/watch?v=Y7-CuEGfnyI&list=PLh7qJALewvA6-bSqb6DeslSTyr4g7I2P&index=2](https://www.youtube.com/watch?v=Y7-CuEGfnyI&list=PLh7qJALewvA6-bSqb6DeslSTyr4g7I2P&index=2)

41.5. **Gas chromatography**

[https://www.youtube.com/watch?v=5eUDvggBCMA&index=42&list=PLf9x1YPYxyakBtpulzcOCYZc-Uqb1Atf](https://www.youtube.com/watch?v=5eUDvggBCMA&index=42&list=PLf9x1YPYxyakBtpulzcOCYZc-Uqb1Atf)

42. **Chapter 42: Laboratory Techniques**


42.3. [https://www.youtube.com/watch?v=EUn2skAAjHk](https://www.youtube.com/watch?v=EUn2skAAjHk)


42.5.
Chapter 43: Organic Chemistry Problems

43.1. Organic Synthesis Strategies

a)  https://www.youtube.com/watch?v=3kLBAC2k1k
b)  https://www.youtube.com/watch?v=xMyToMB1uY8
c)  https://www.youtube.com/watch?v=4XR1-TmViNo
d)  https://www.youtube.com/watch?v=KQJ-VjAZyVY
e)  https://www.youtube.com/watch?v=jM8HxK1fn8
f)  https://www.youtube.com/watch?v=QkWLv9wYmpE
g)  https://www.youtube.com/watch?v=m35A8uzwETk
h)  https://www.youtube.com/watch?v=O0sQ8t47bY
i)  https://www.youtube.com/watch?v=SKjBqEEFVI8
j)  https://www.youtube.com/watch?v=OOeUvopss2w
k)  https://www.youtube.com/watch?v=O-LfUahJrYw
l) https://www.youtube.com/watch?v=wLtMBh4o7Ll
m) https://www.youtube.com/watch?v=iiTMikzM3nU
n) https://www.youtube.com/watch?v=rtNWON6RRxY
o) https://www.youtube.com/watch?v=B8biOoxqwaQ