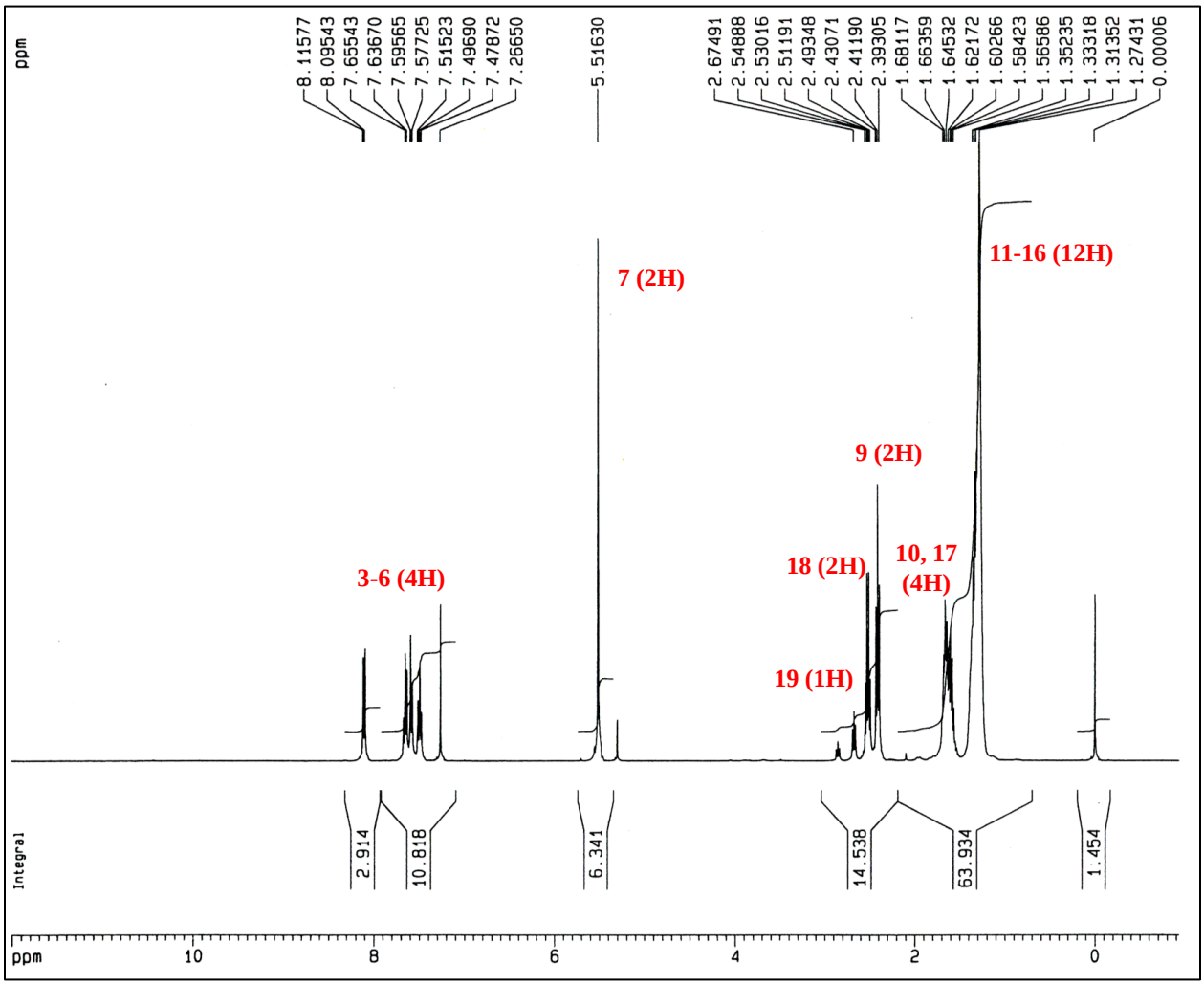
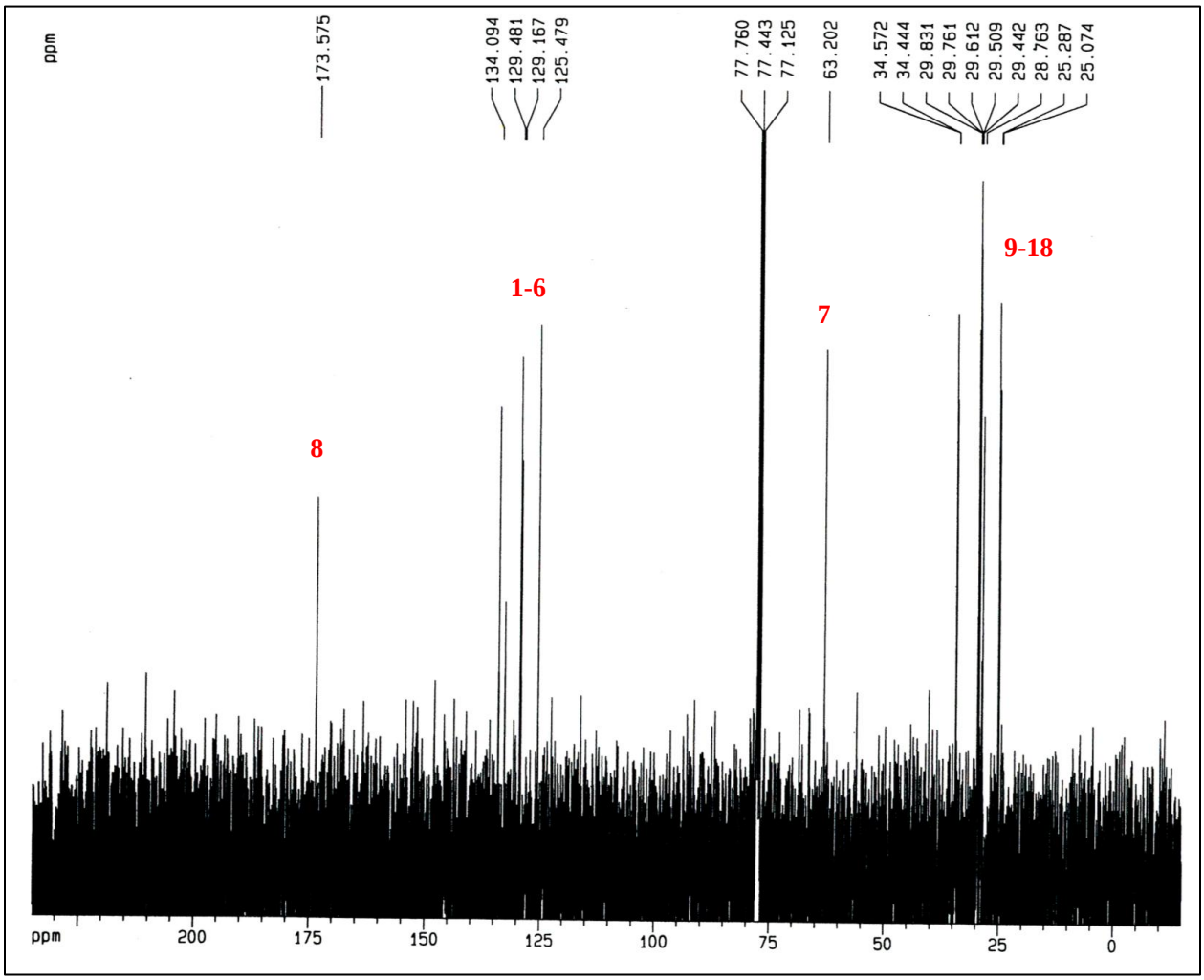
APPENDIX A:

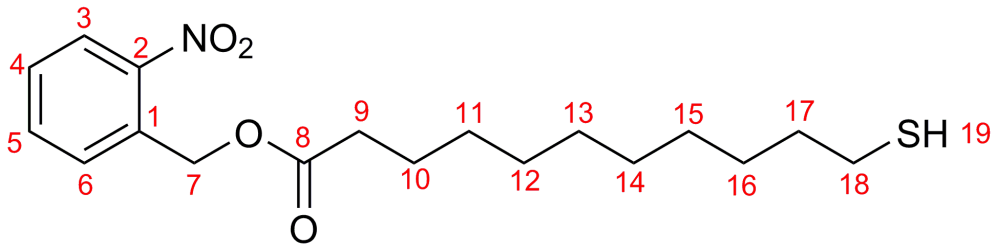
NMR AND MS DATA

A.1: ^{1}H NMR of 2-nitrobenzyl-11-mercaptoundecanoate (photolabile compound), *Chapter 4, Section 4.1*.

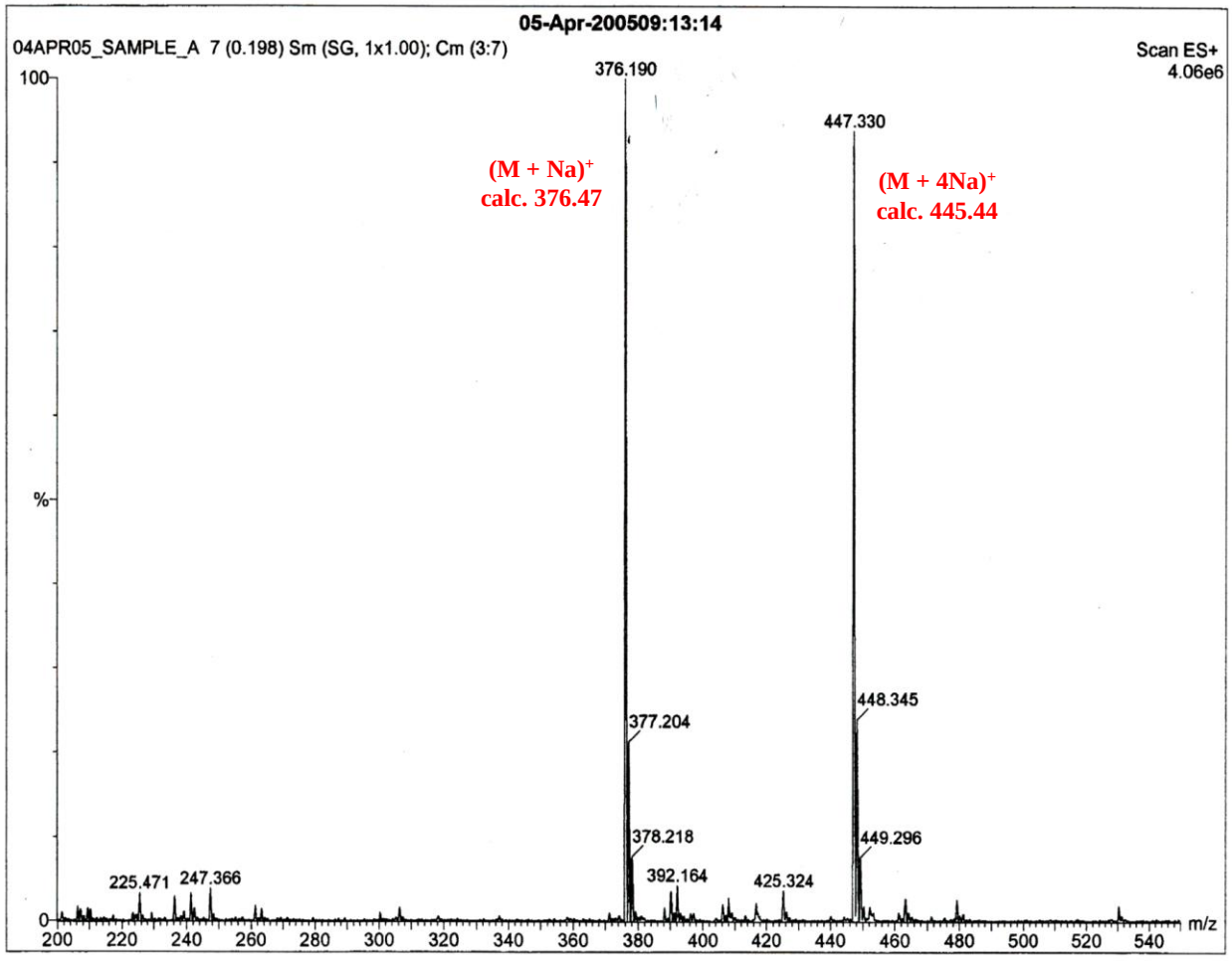


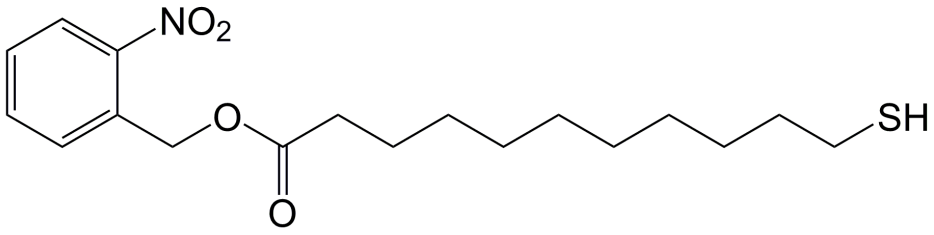
A.2: ^{13}C NMR of 2-nitrobenzyl-11-mercaptoundecanoate (photolabile compound), *Chapter 4, Section 4.1*.



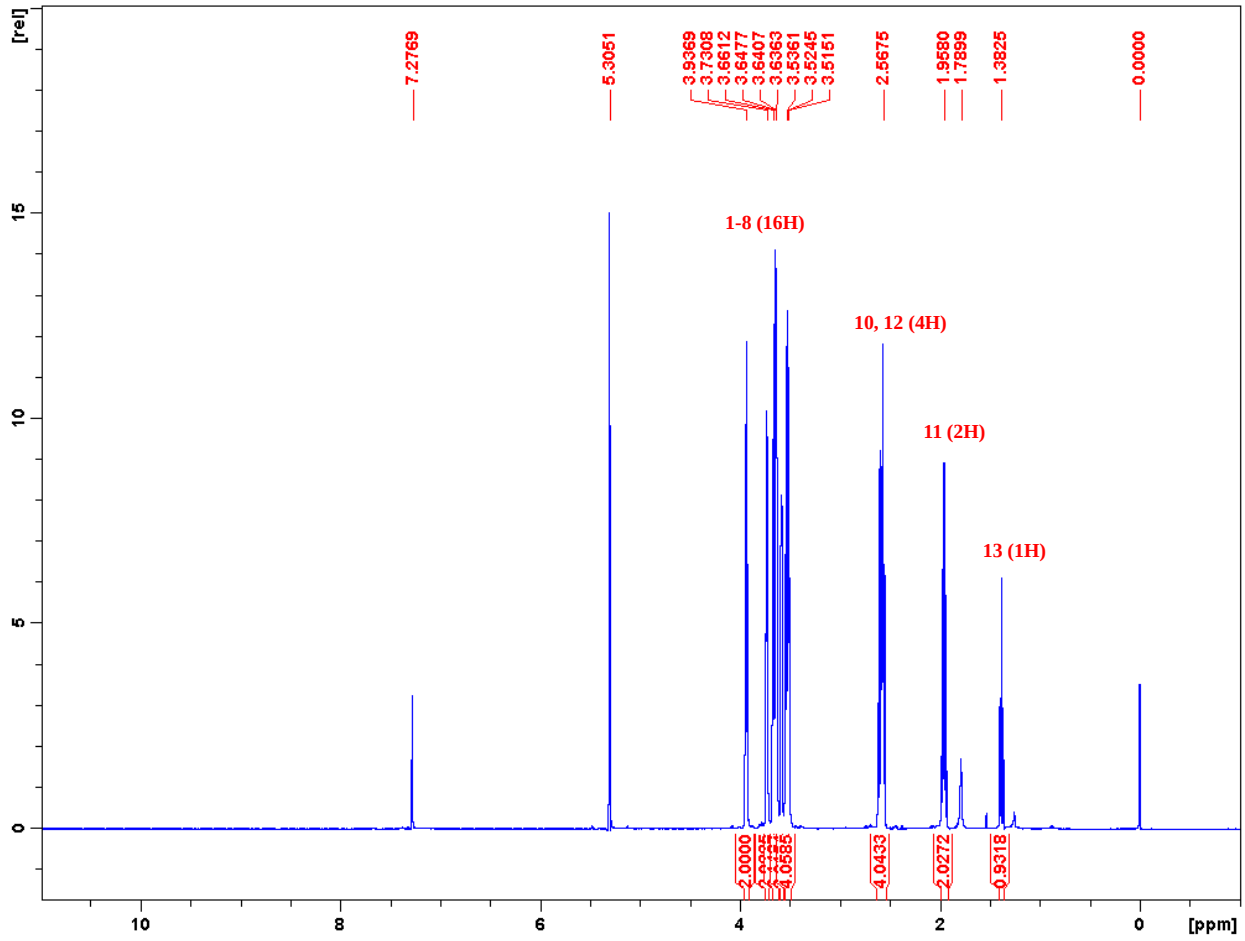


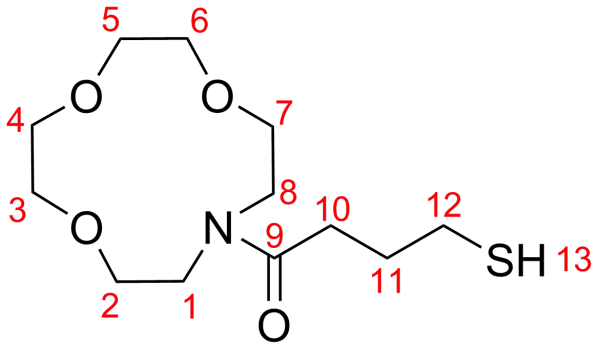
A.3: MS (ESI) of 2-nitrobenzyl-11-mercaptoundecanoate (photolabile compound), *Chapter 4, Section 4.1*.



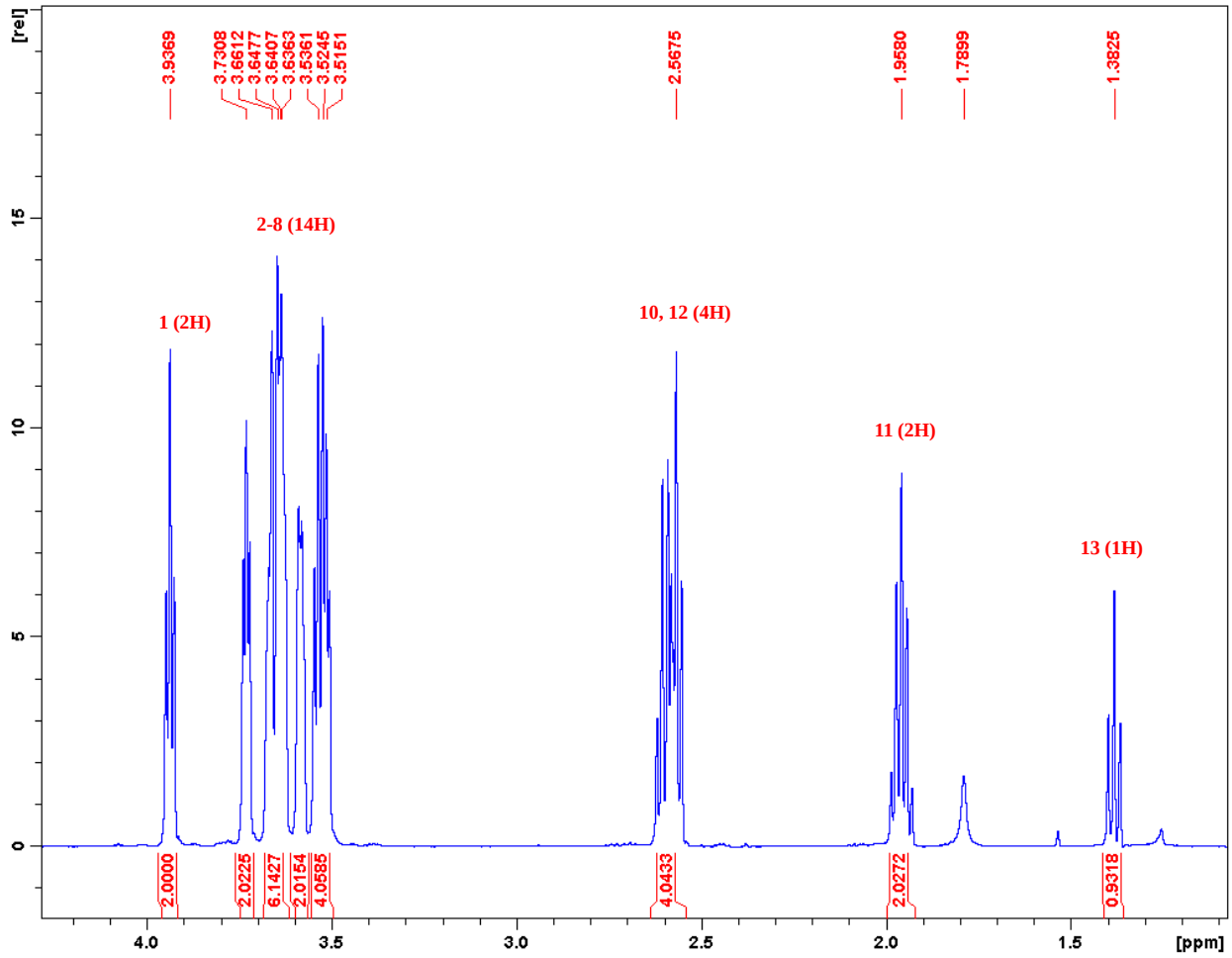


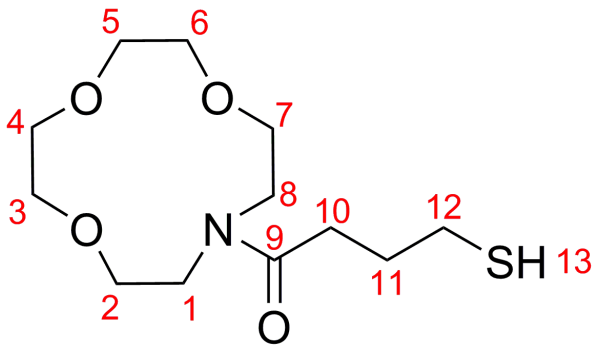
A.4: [1]H NMR of 4-mercapto-1-(1,4,7-trioxa-10-azacyclododecan-10-yl)butan-1-one, *Chapter 6, Section 6.7*.



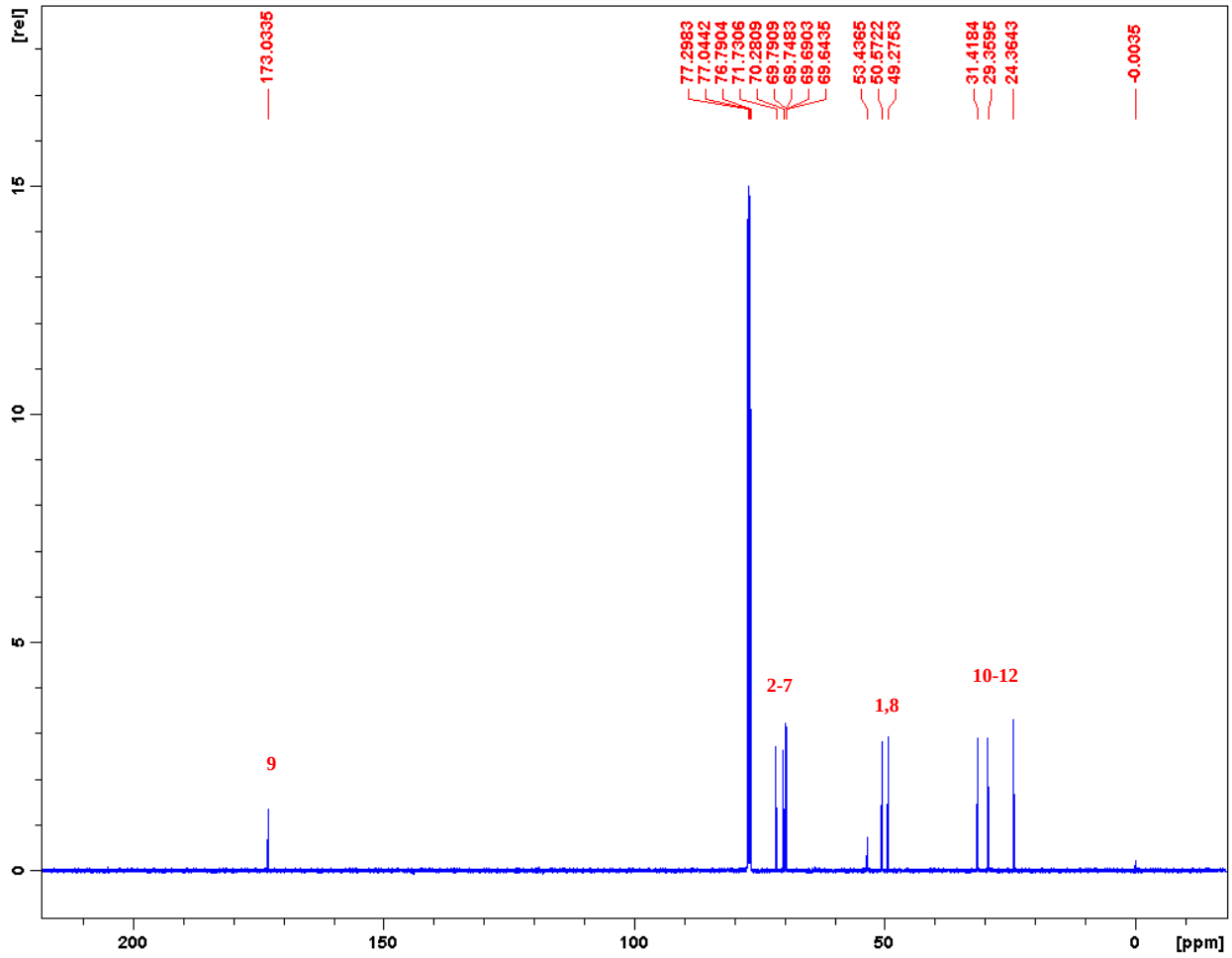


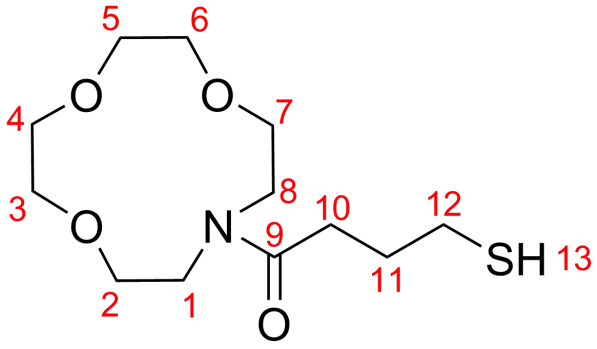
A.5: Expanded ^{1}H NMR of 4-mercapto-1-(1,4,7-trioxa-10-azacyclododecan-10-yl)butan-1-one, *Chapter 6, Section 6.7.*



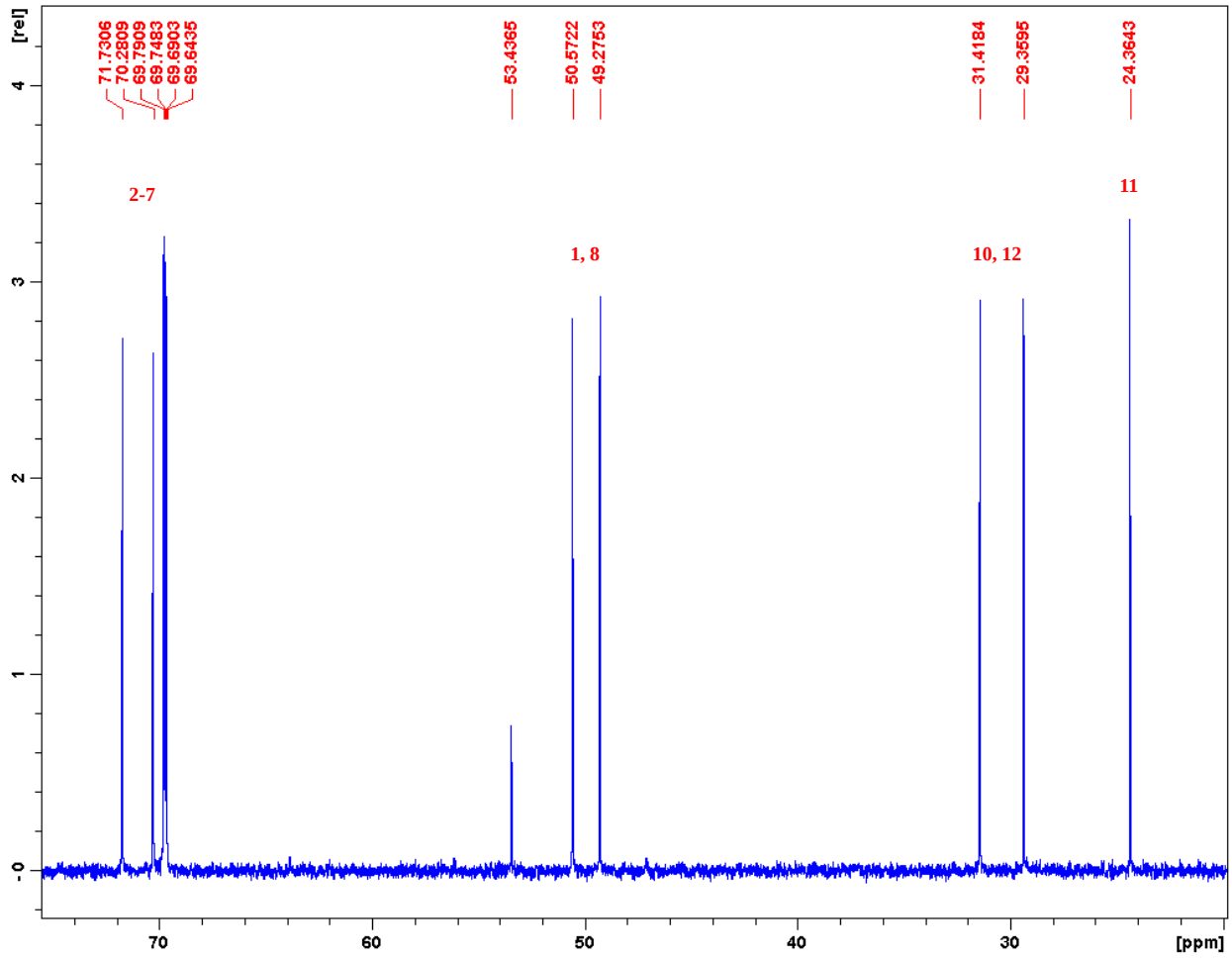


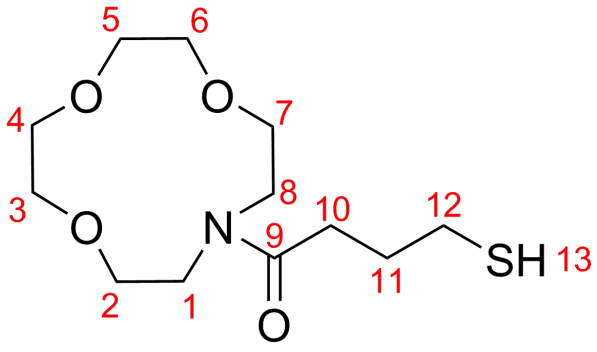
A.6: ^{13}C NMR of 4-mercapto-1-(1,4,7-trioxa-10-azacyclododecan-10-yl)butan-1-one, *Chapter 6, Section 6.7.*



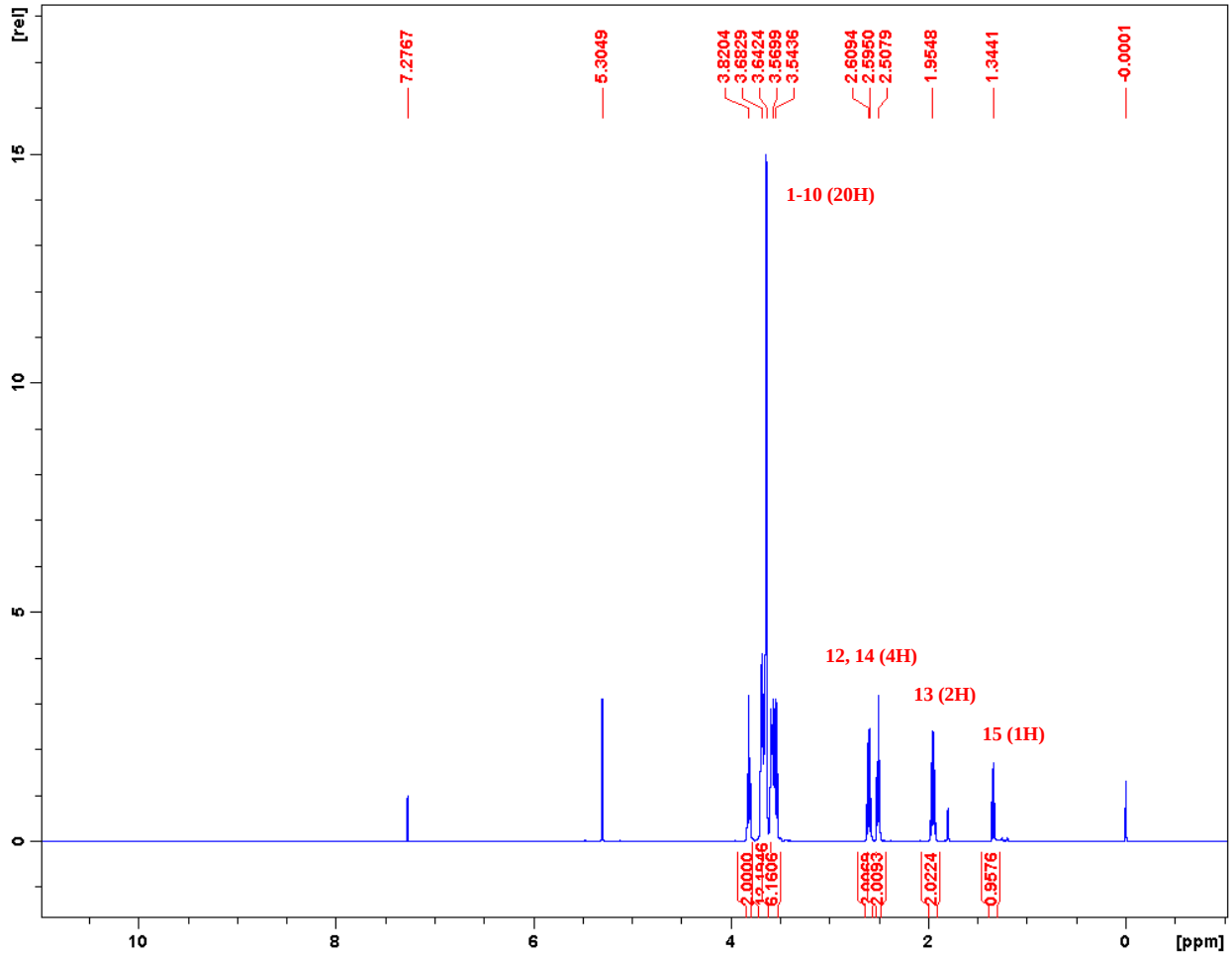


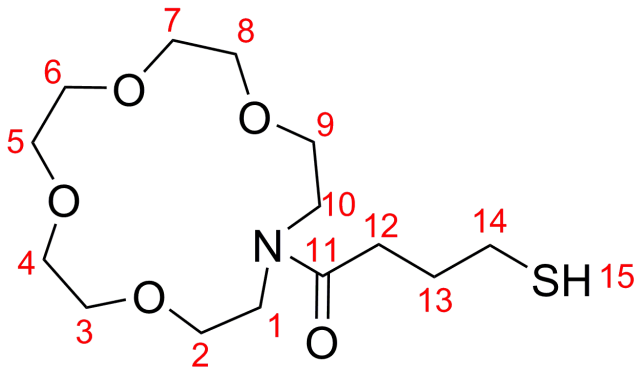
A.7: Expanded ^{13}C NMR of 4-mercapto-1-(1,4,7-trioxa-10-azacyclododecan-10-yl)butan-1-one, *Chapter 6, Section 6.7.*



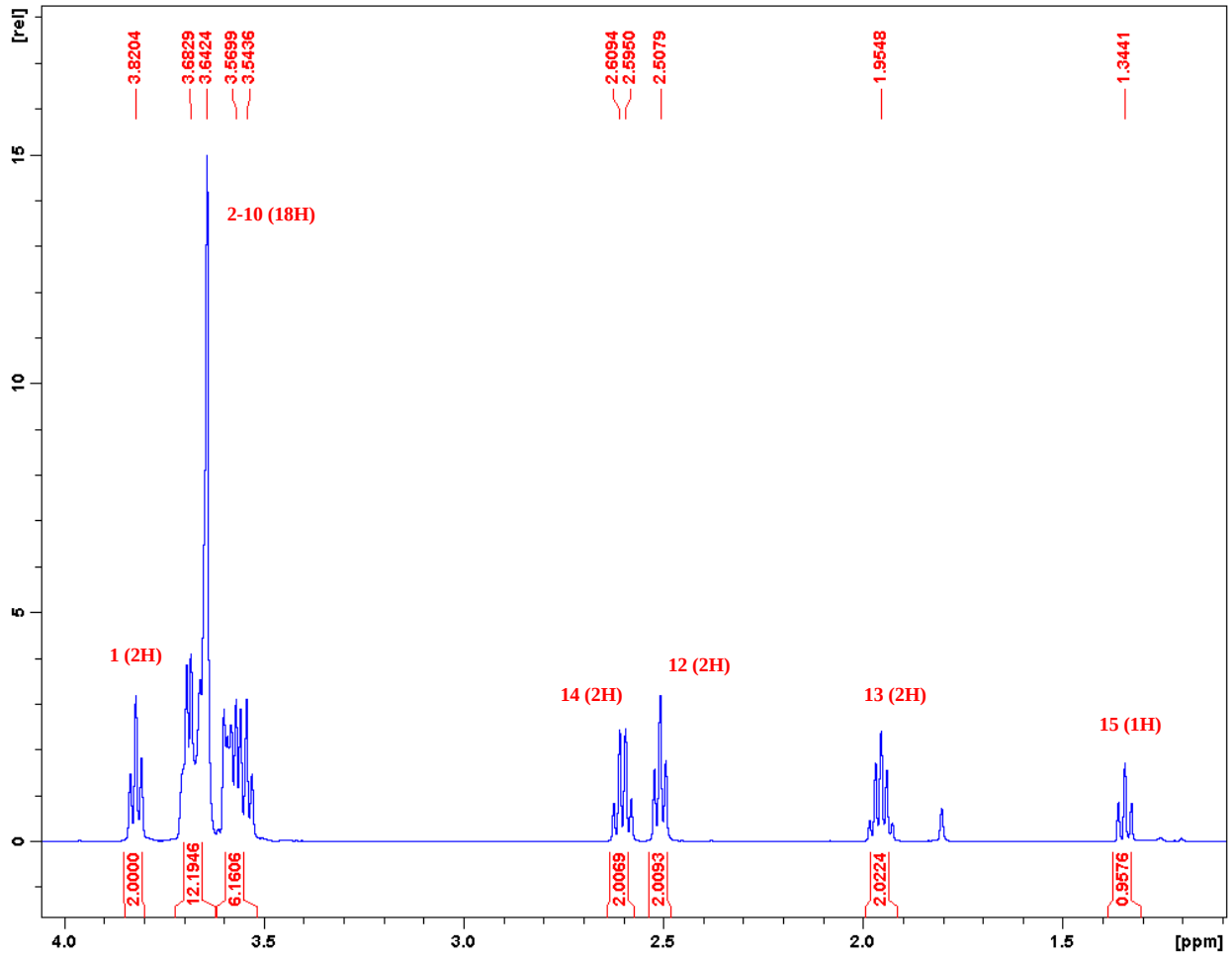


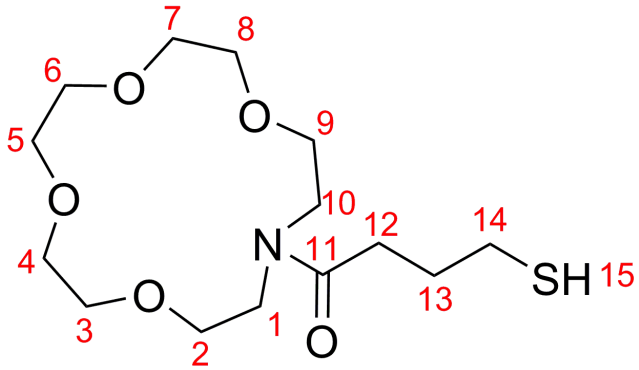
A.8: ^{1}H NMR of 4-mercapto-1-(1,4,7,10-tetraoxa-13-azacyclopentadecan-13-yl)butan-1-one, *Chapter 6, Section 6.7.*



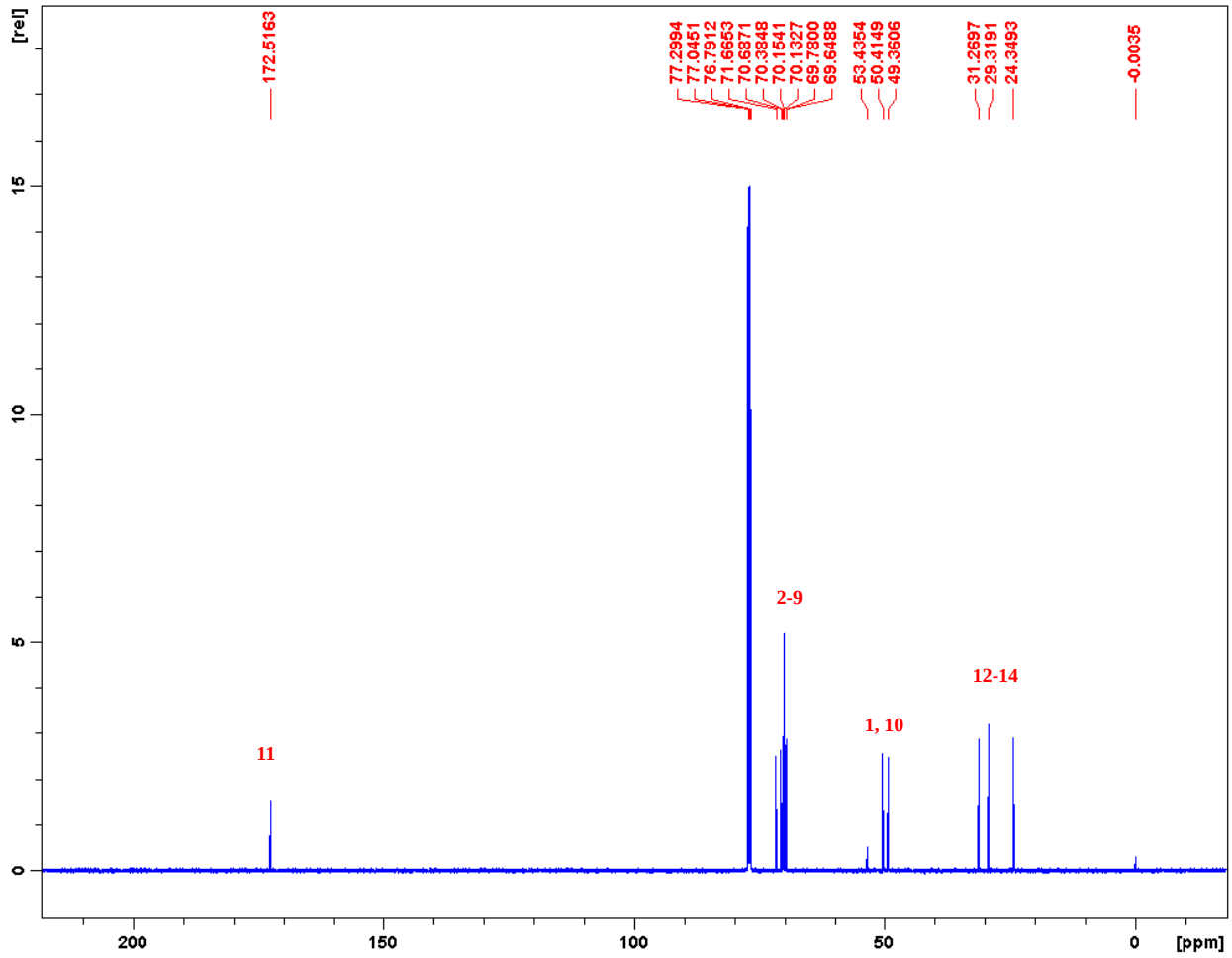


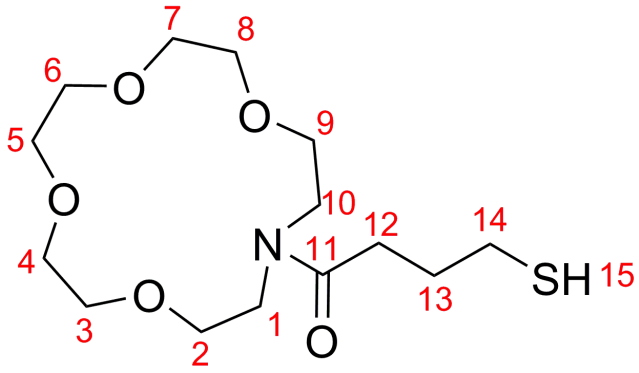
A.9: Expanded ^{1}H NMR of 4-mercapto-1-(1,4,7,10-tetraoxa-13-azacyclopentadecan-13-yl)butan-1-one, *Chapter 6, Section 6.7*.



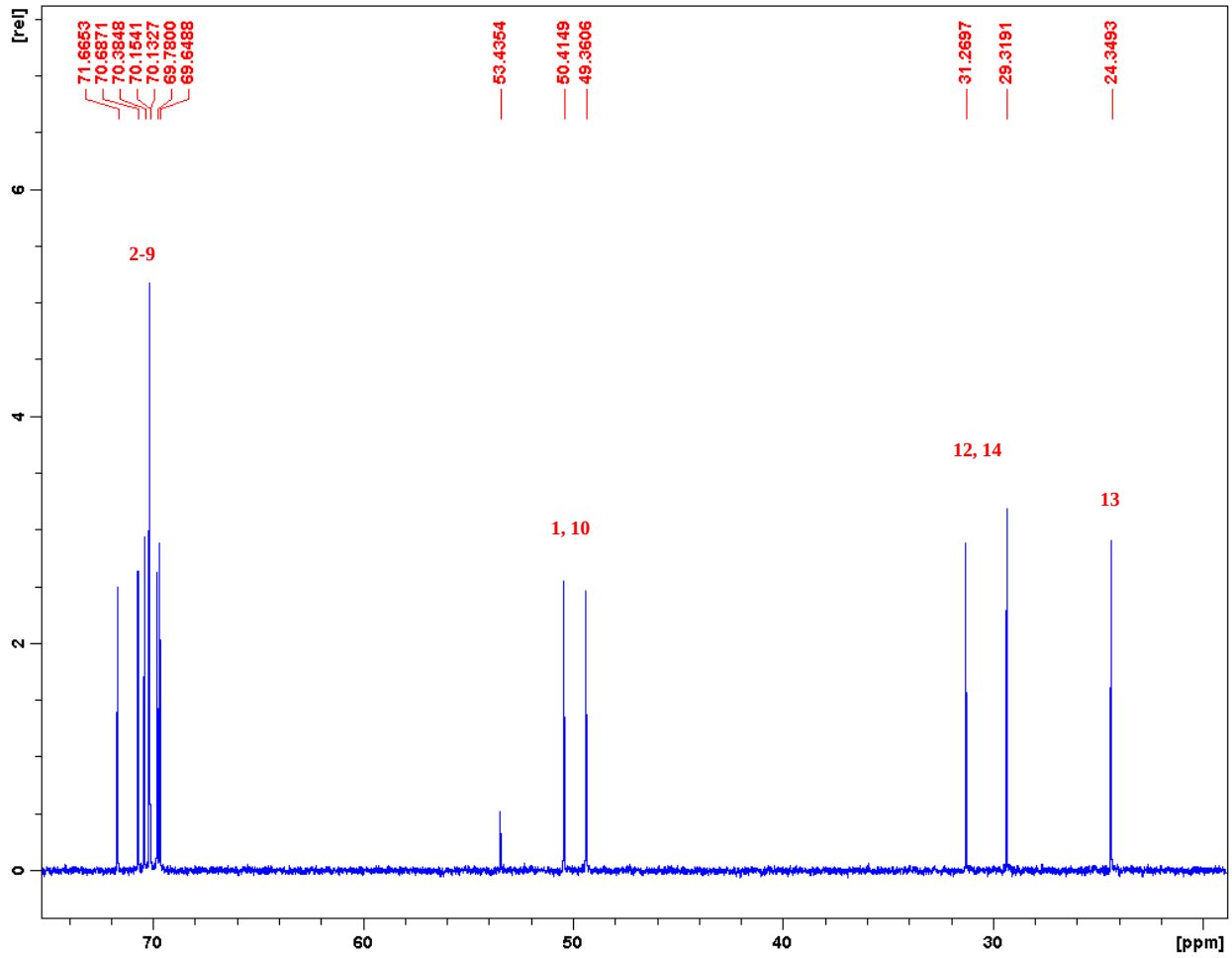


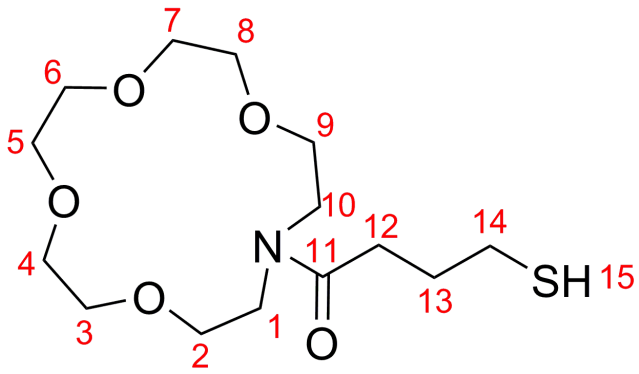
A.10: ^{13}C NMR of 4-mercapto-1-(1,4,7,10-tetraoxa-13-azacyclopentadecan-13-yl)butan-1-one, *Chapter 6, Section 6.7.*



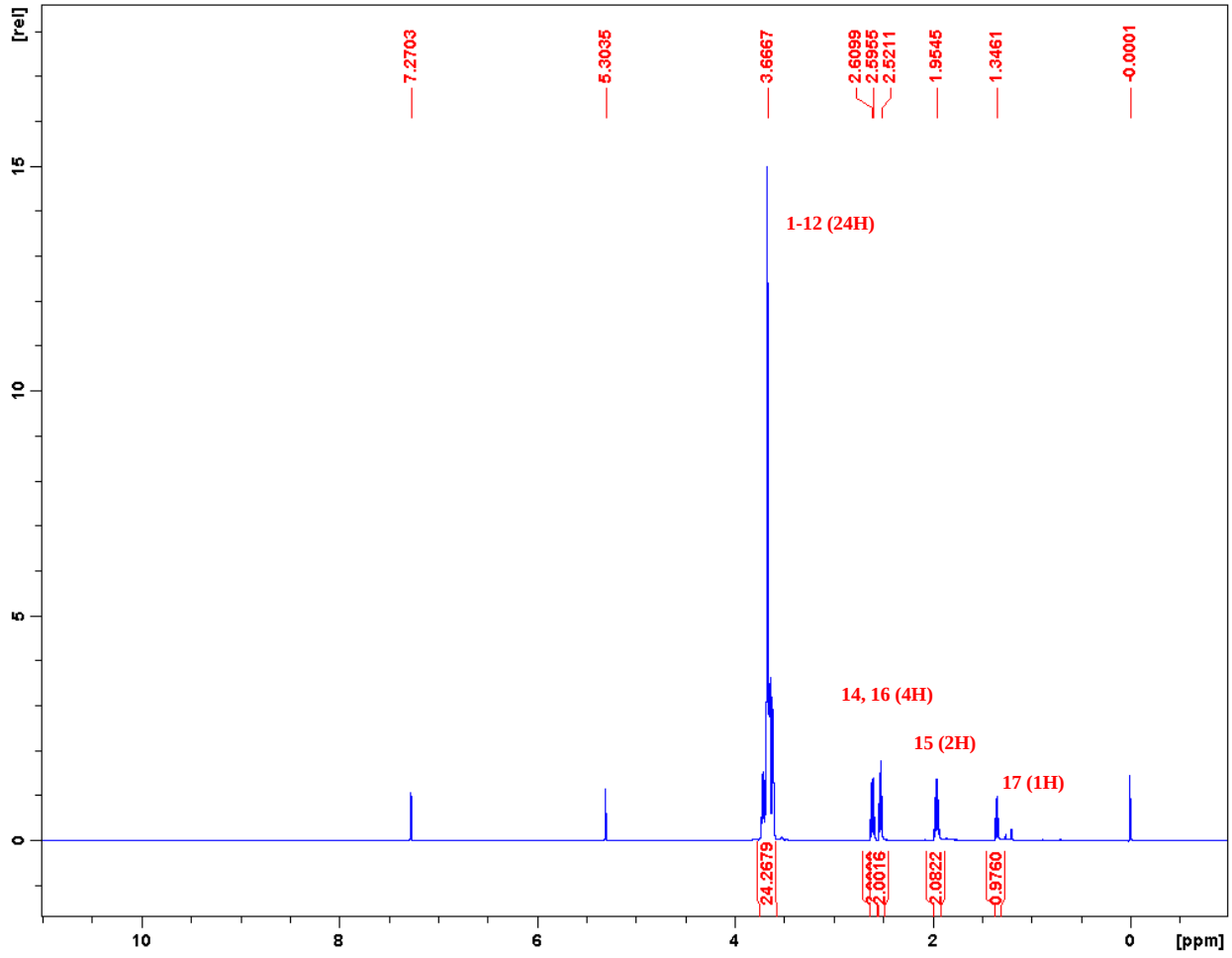


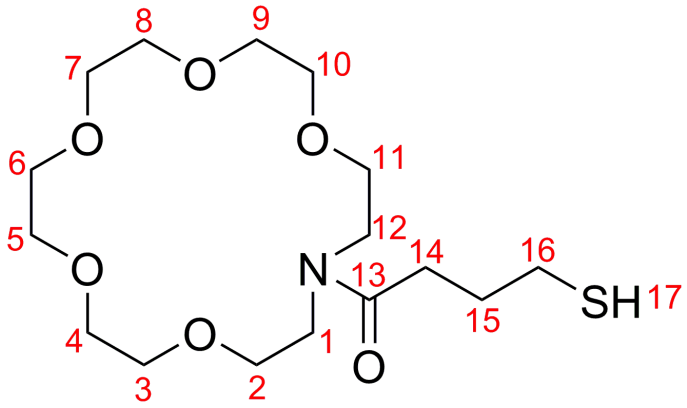
A.11: Expanded ^{13}C NMR of 4-mercapto-1-(1,4,7,10-tetraoxa-13-azacyclopentadecan-13-yl)butan-1-one, *Chapter 6, Section 6.7*.



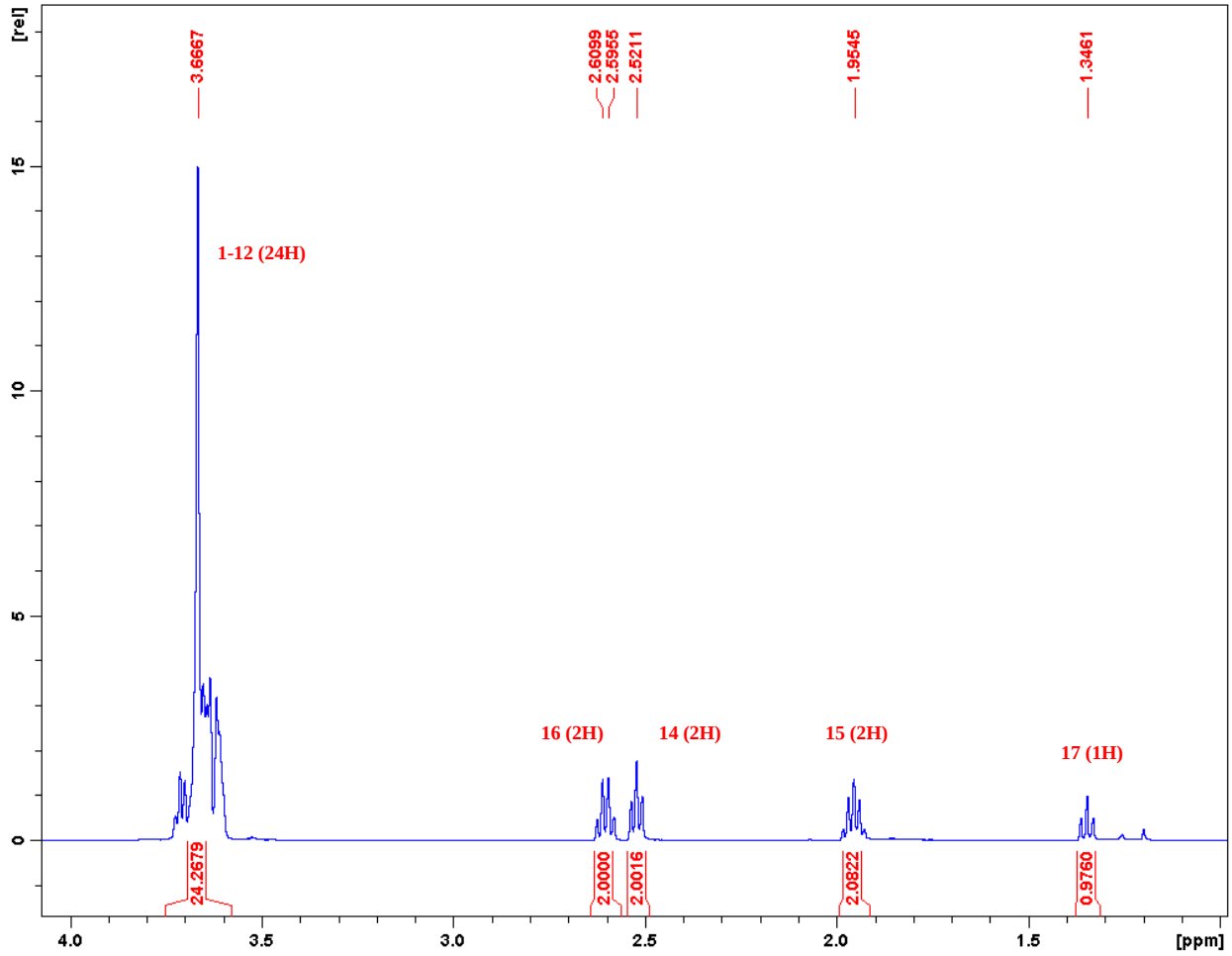


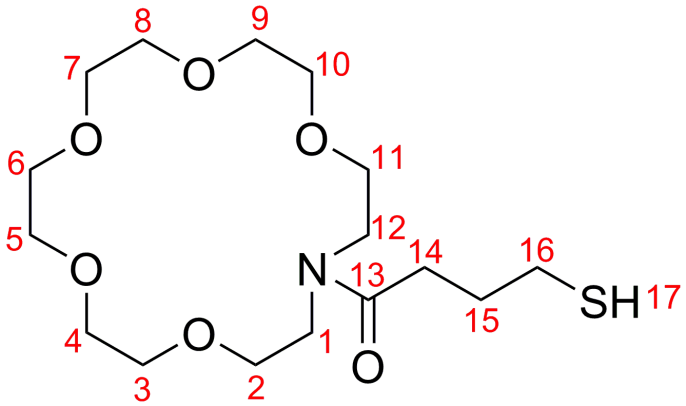
A.12: ^{1}H NMR of 4-mercapto-1-(1,4,7,10,13-pentaoxa-16-azacyclooctadecan-16-yl)butan-1-one, *Chapter 6, Section 6.7.*



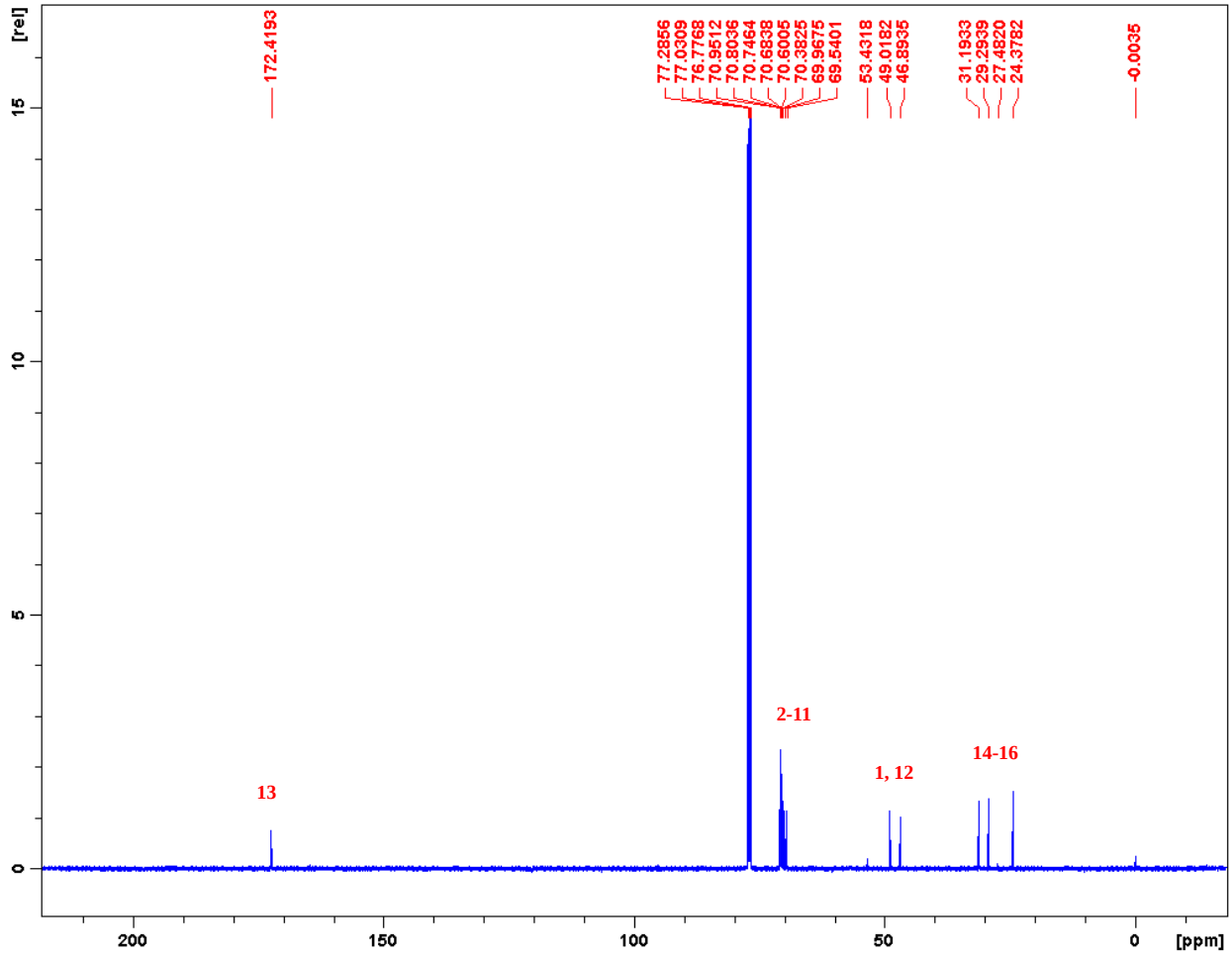


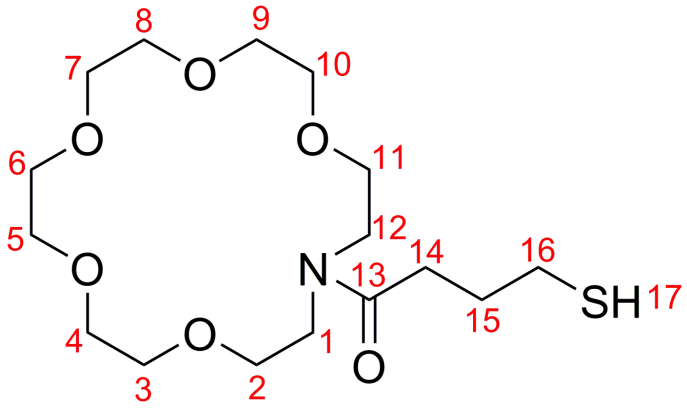
A.13: Expanded ^{1}H NMR of 4-mercapto-1-(1,4,7,10,13-pentaoxa-16-azacyclooctadecan-16-yl)butan-1-one, *Chapter 6, Section 6.7*.



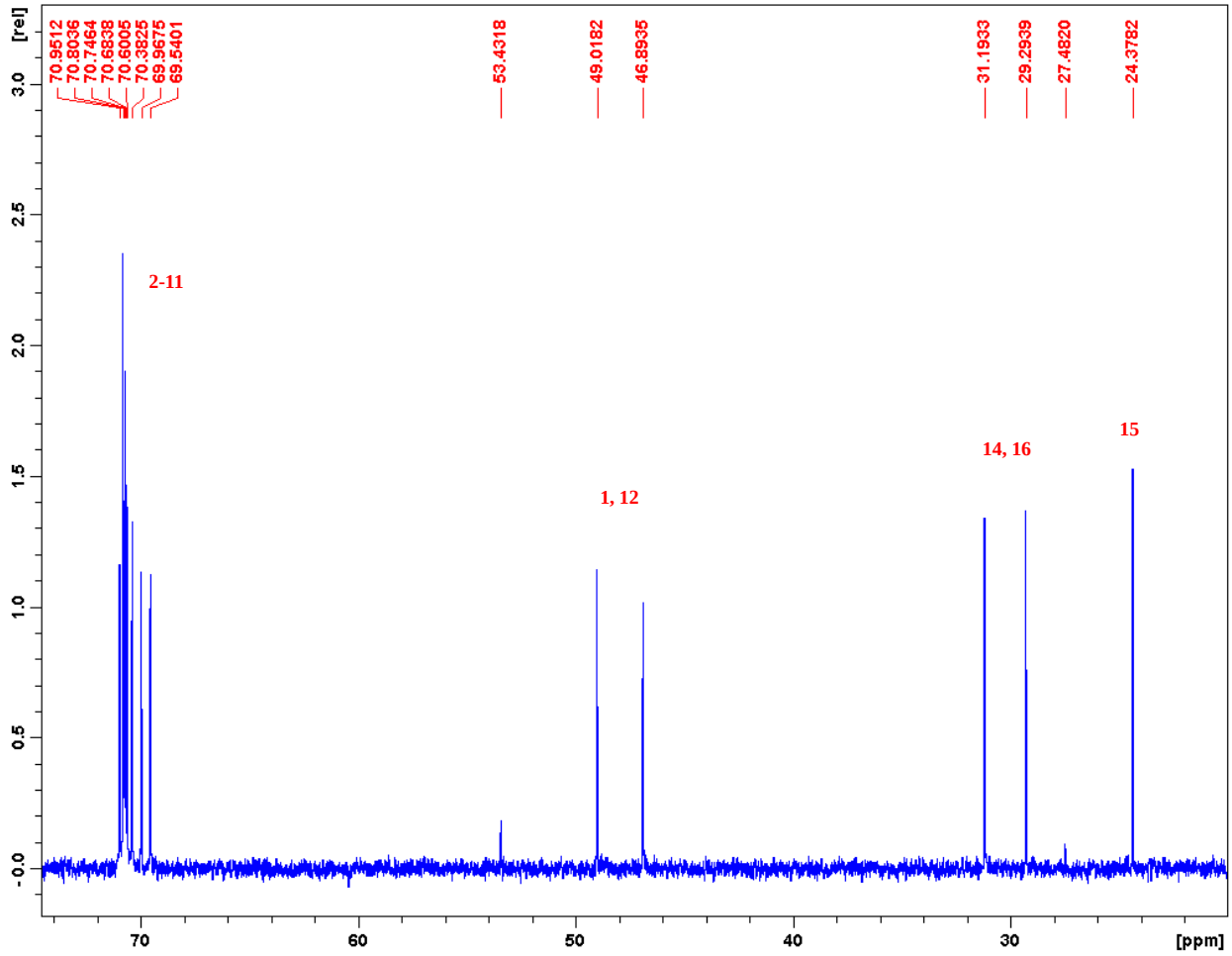


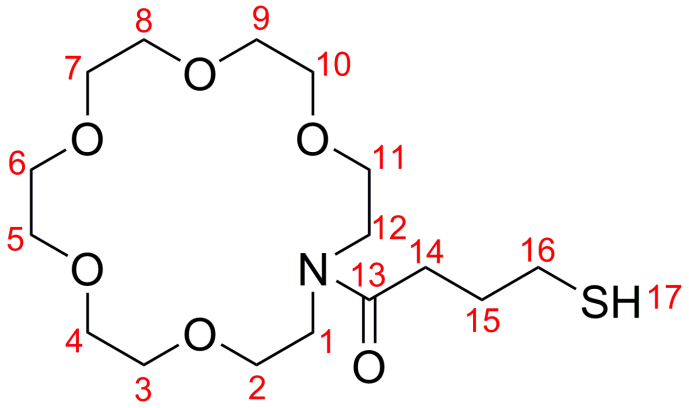
A.14: ^{13}C NMR of 4-mercapto-1-(1,4,7,10,13-pentaoxa-16-azacyclooctadecan-16-yl)butan-1-one, *Chapter 6, Section 6.7.*



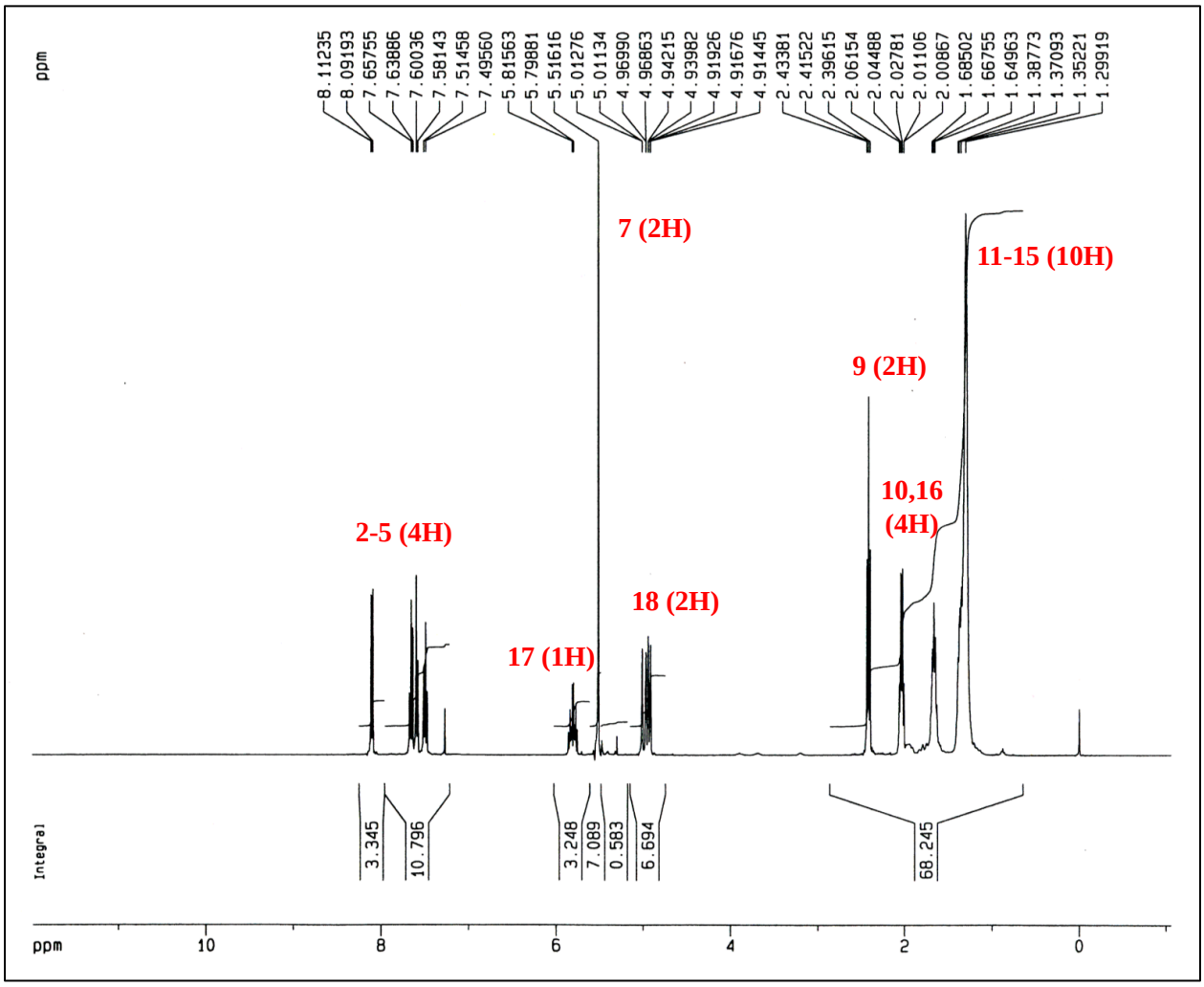


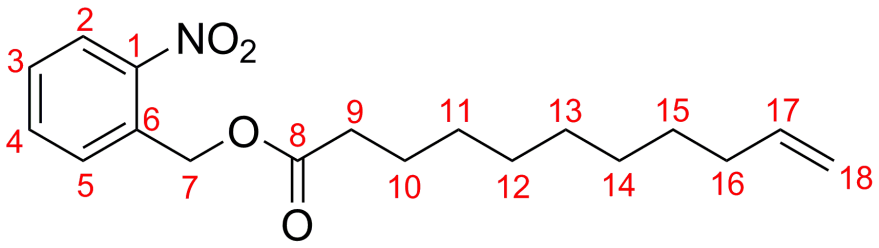
A.15: Expanded ^{13}C NMR of 4-mercapto-1-(1,4,7,10,13-pentaoxa-16-azacyclooctadecan-16-yl)butan-1-one, *Chapter 6, Section 6.7*.



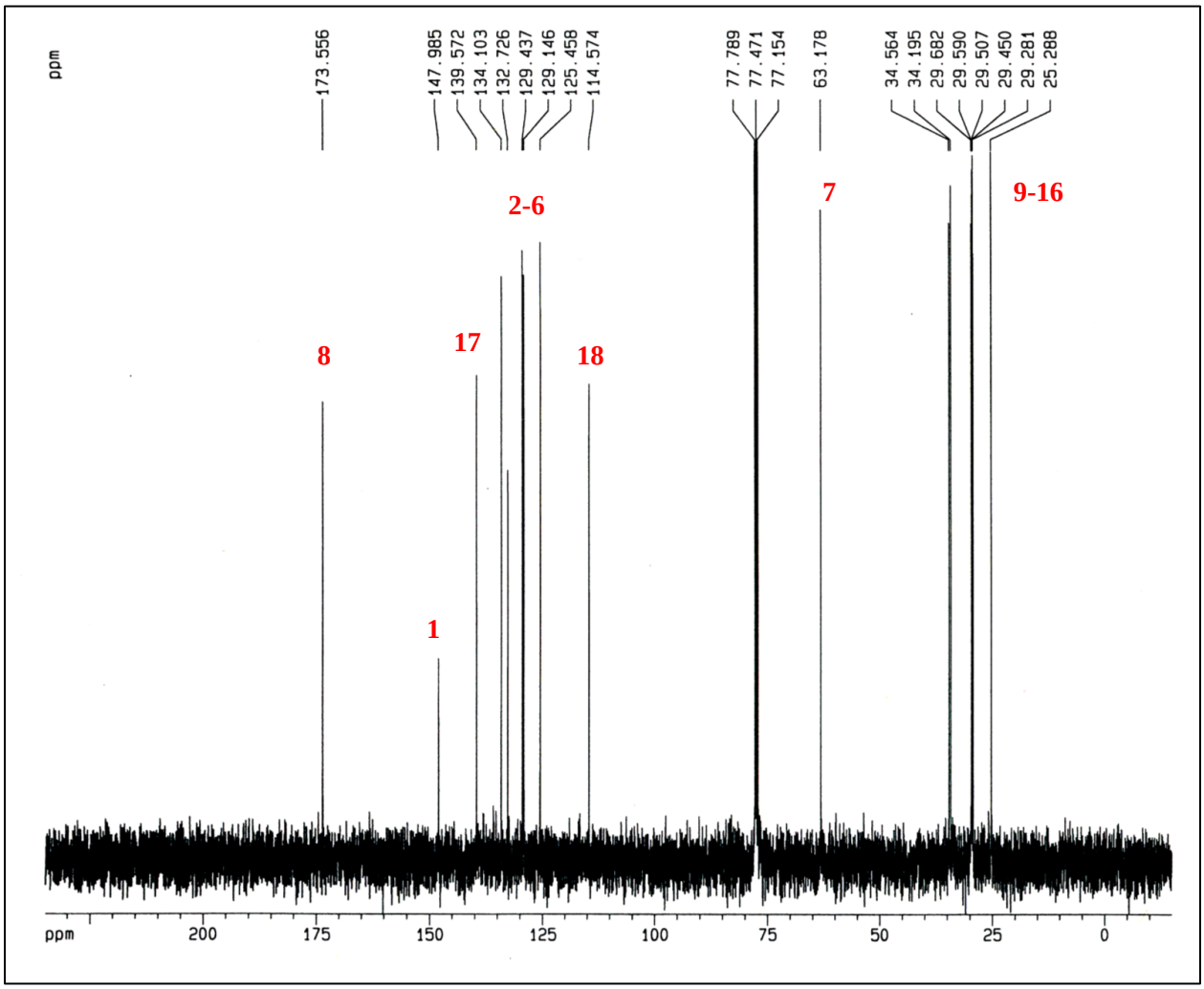


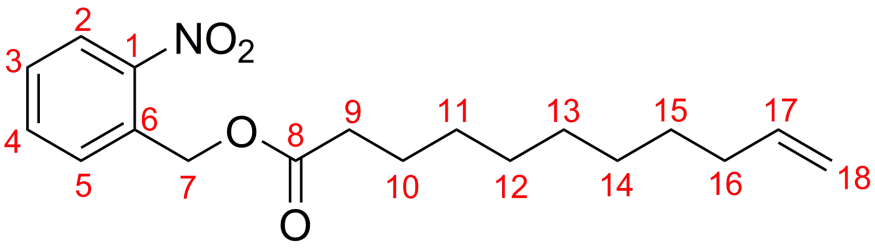
A.16: ^{1}H NMR of 2-nitrobenzyl-undec-10-enoate, *Chapter 4, Section 4.12*.



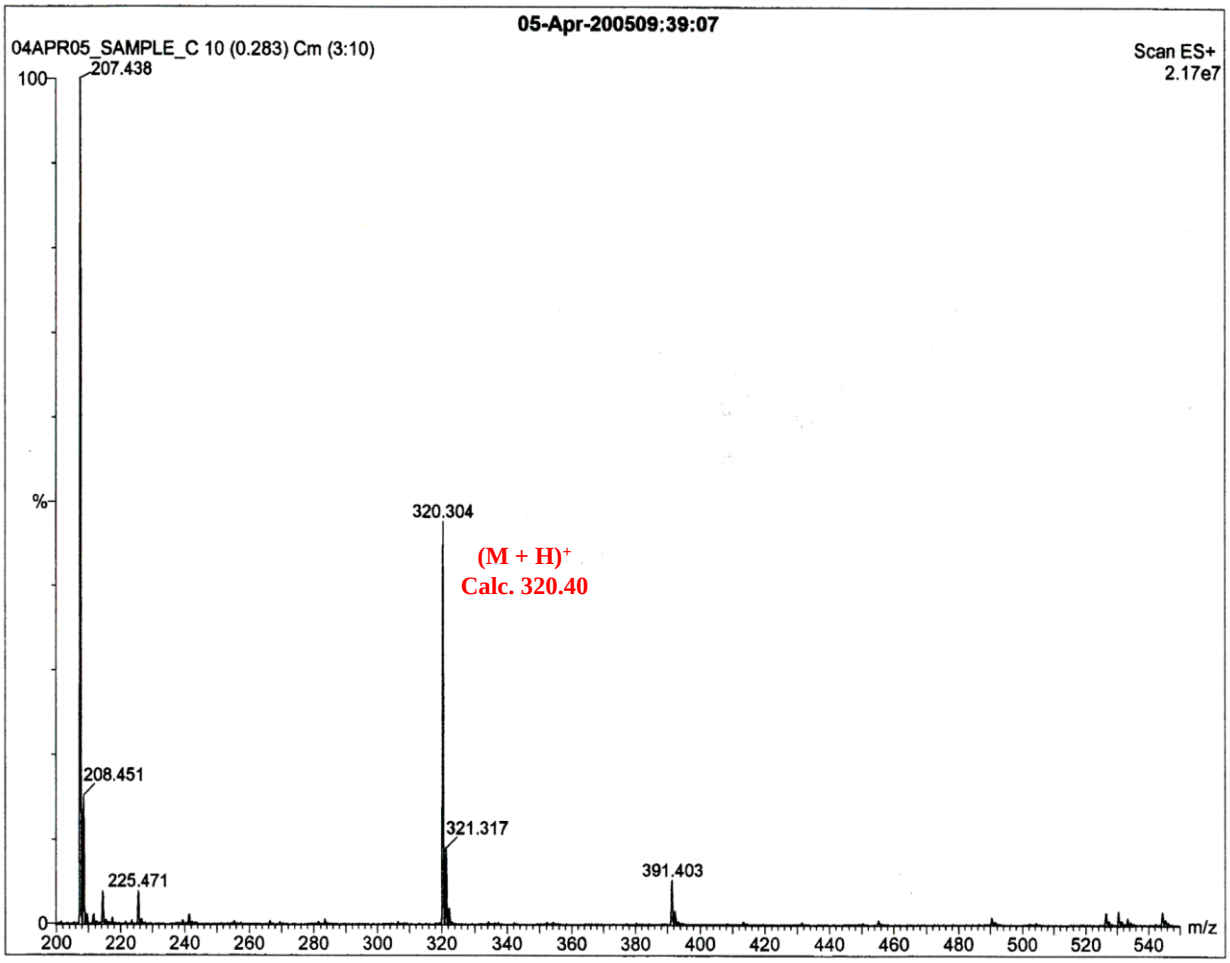


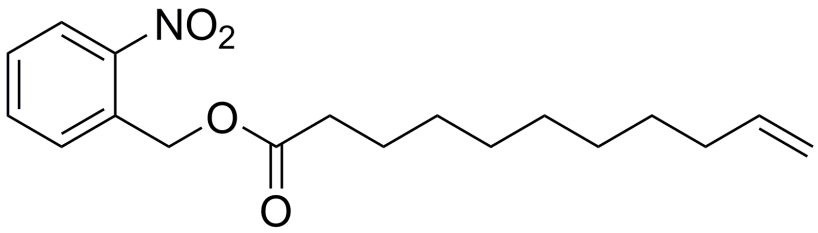
A.17: ^{13}C NMR of 2-nitrobenzyl-undec-10-enoate, *Chapter 4, Section 4.12*.



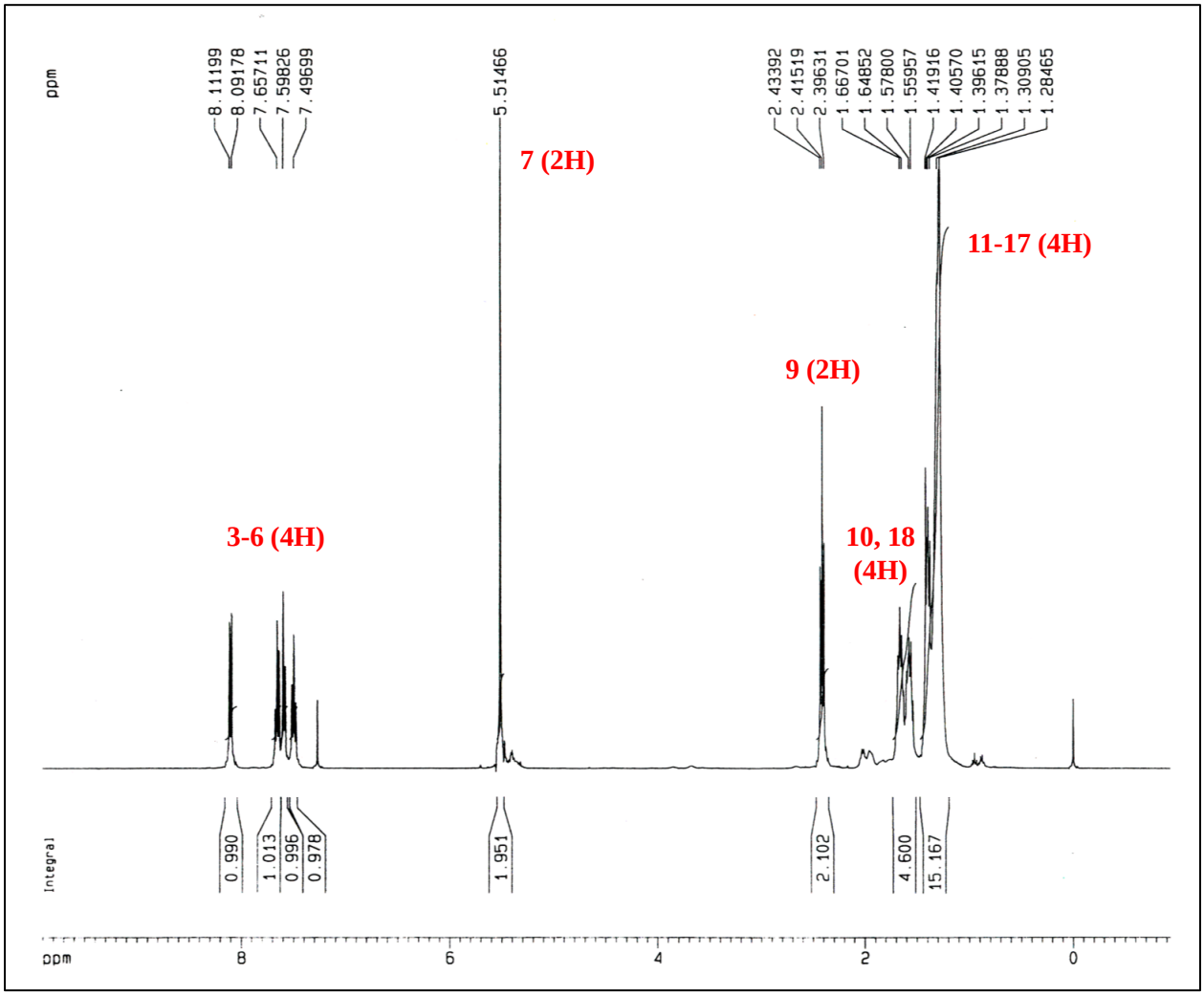


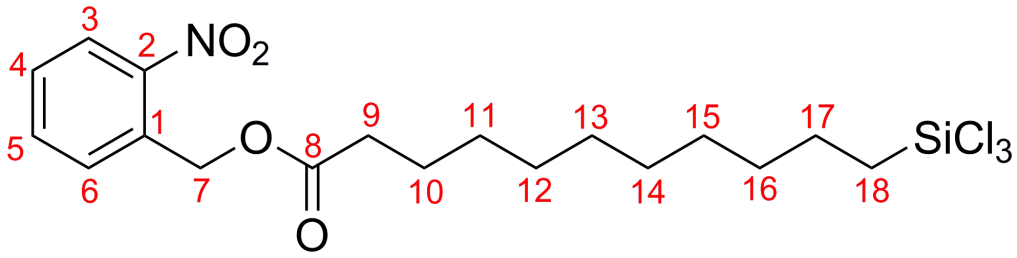
A.18: MS (ESI) of 2-nitrobenzyl-undec-10-enoate, *Chapter 4, Section 4.12.*



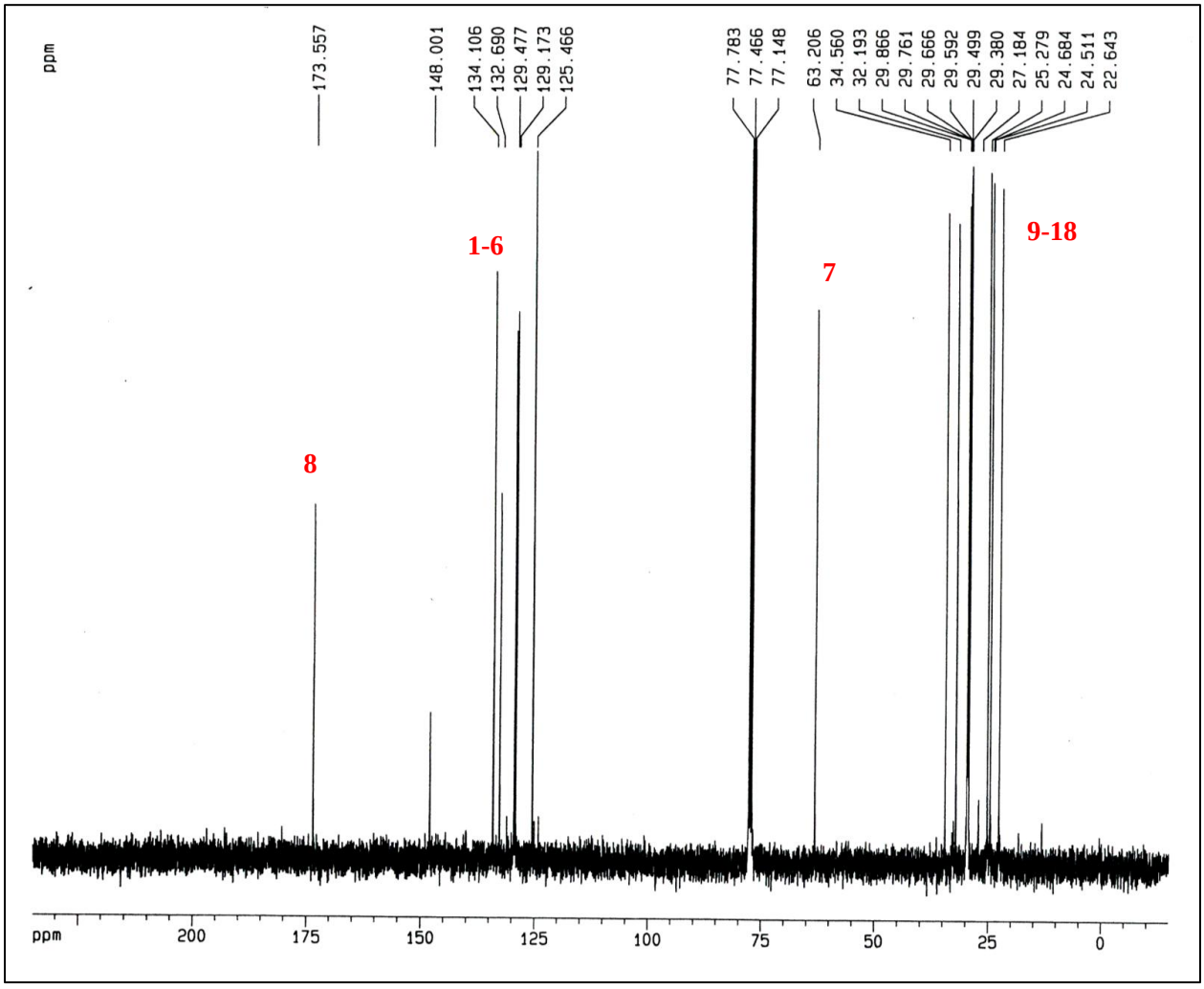


A.19: ^{1}H NMR of 2-nitrobenzyl-(11-trichlorosilyl)-undecanoate, *Chapter 4, Section 4.12*.

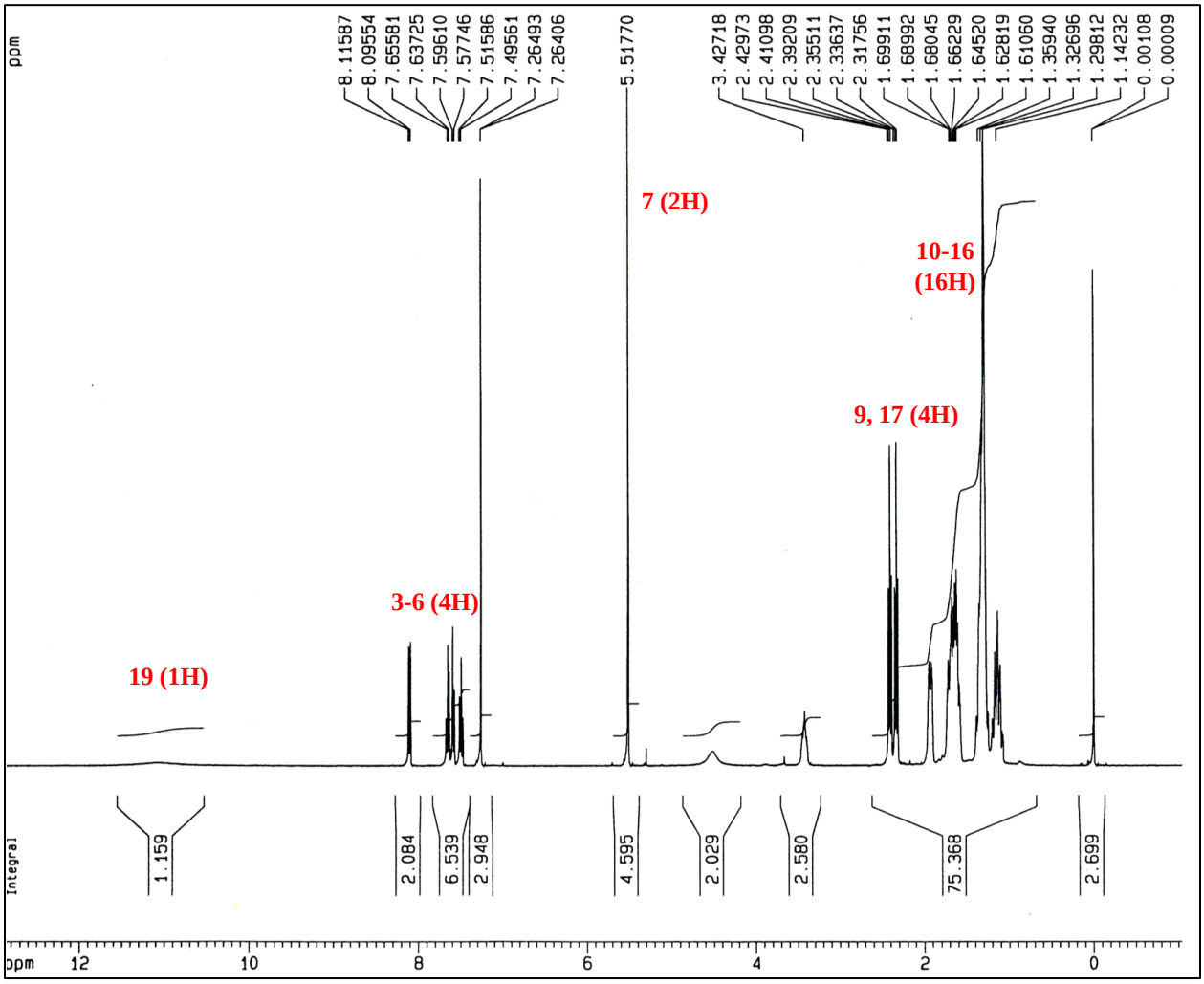


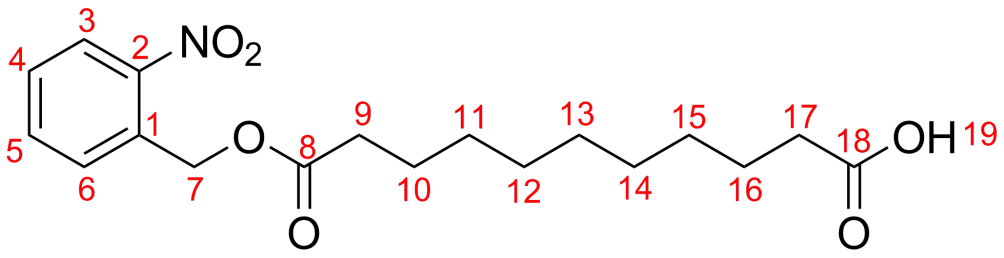


A.20: ^{13}C NMR of 2-nitrobenzyl-(11-trichlorosilyl)-undecanoate, *Chapter 4, Section 4.12*.

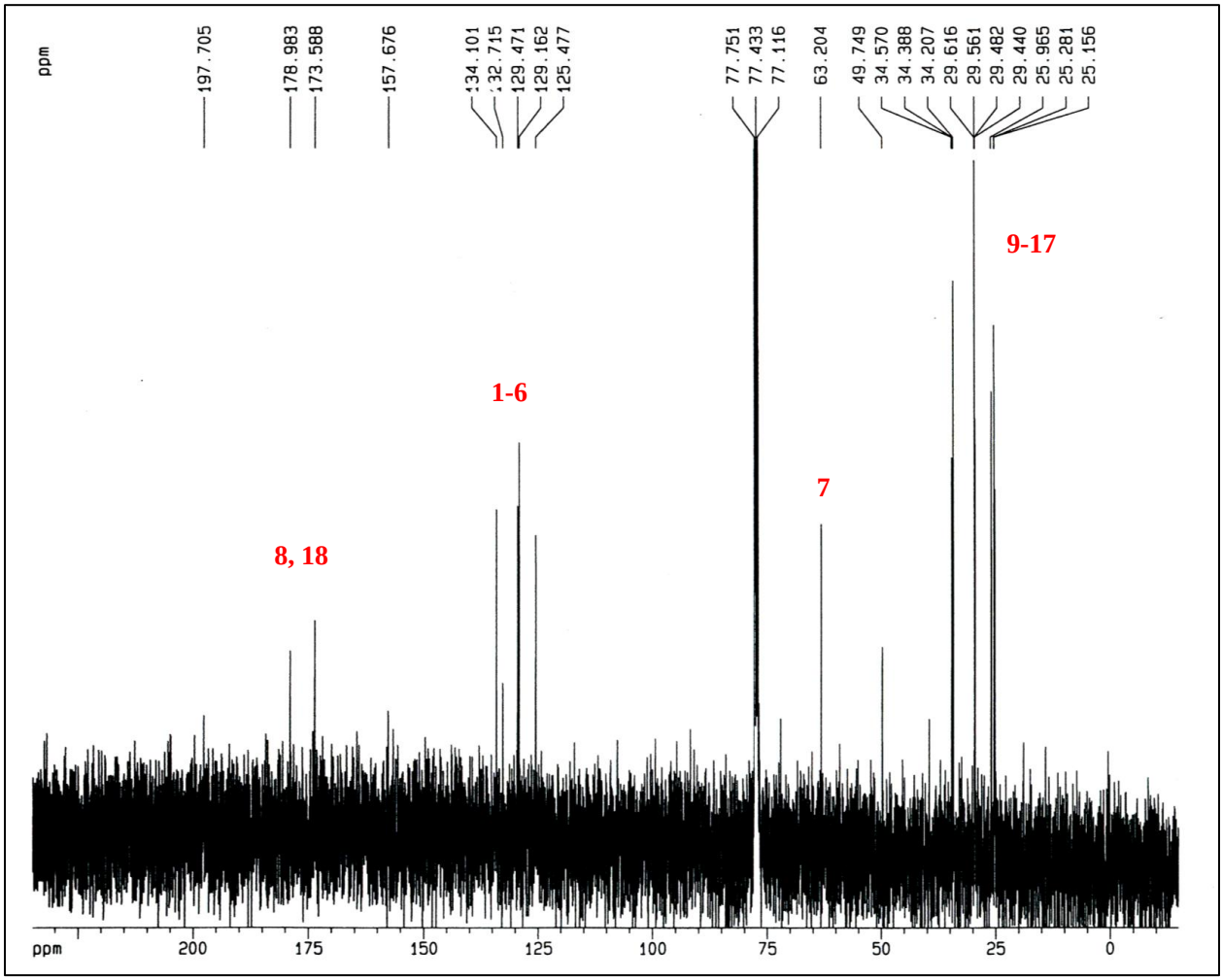


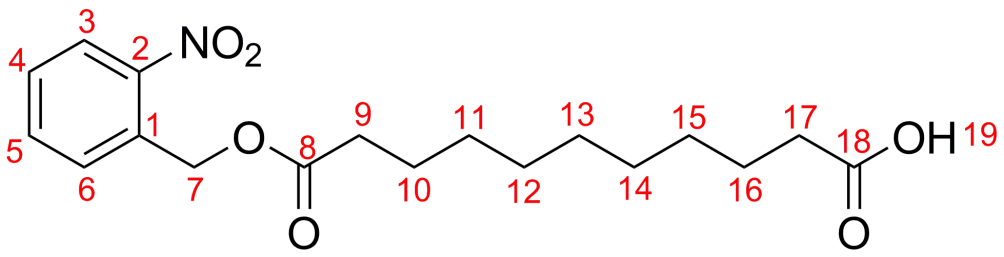
A.21: ^{1}H NMR of 11-(2-nitrobenzyloxy)-11-oxoundecanoic acid, *Chapter 4*, *Section 4.12*.



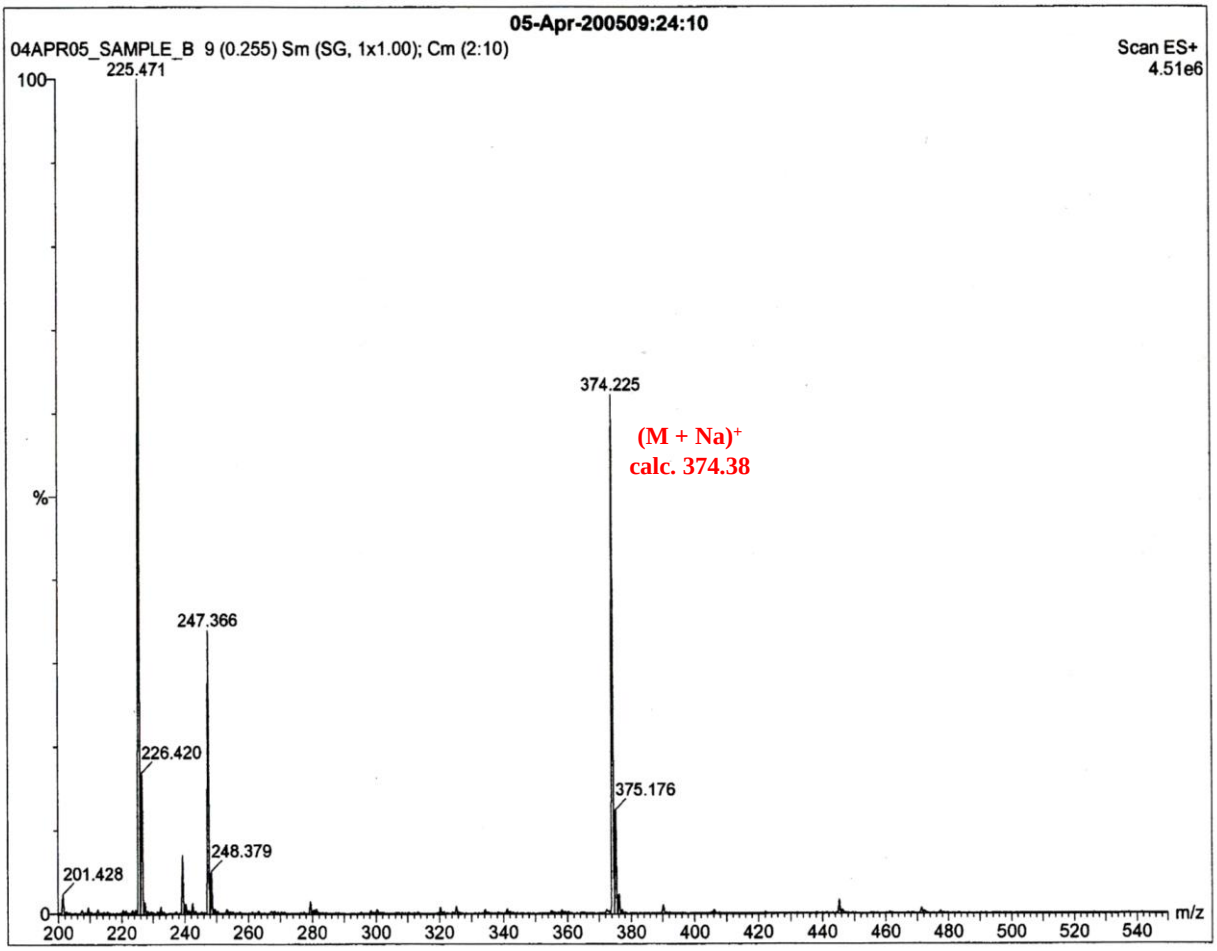


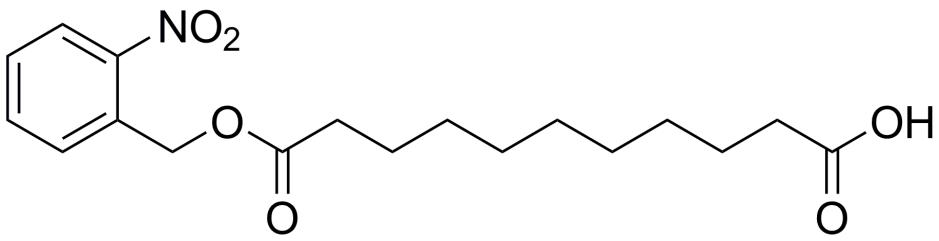
A.22: ^{13}C NMR of 11-(2-nitrobenzyloxy)-11-oxoundecanoic acid, *Chapter 4, Section 4.12*.



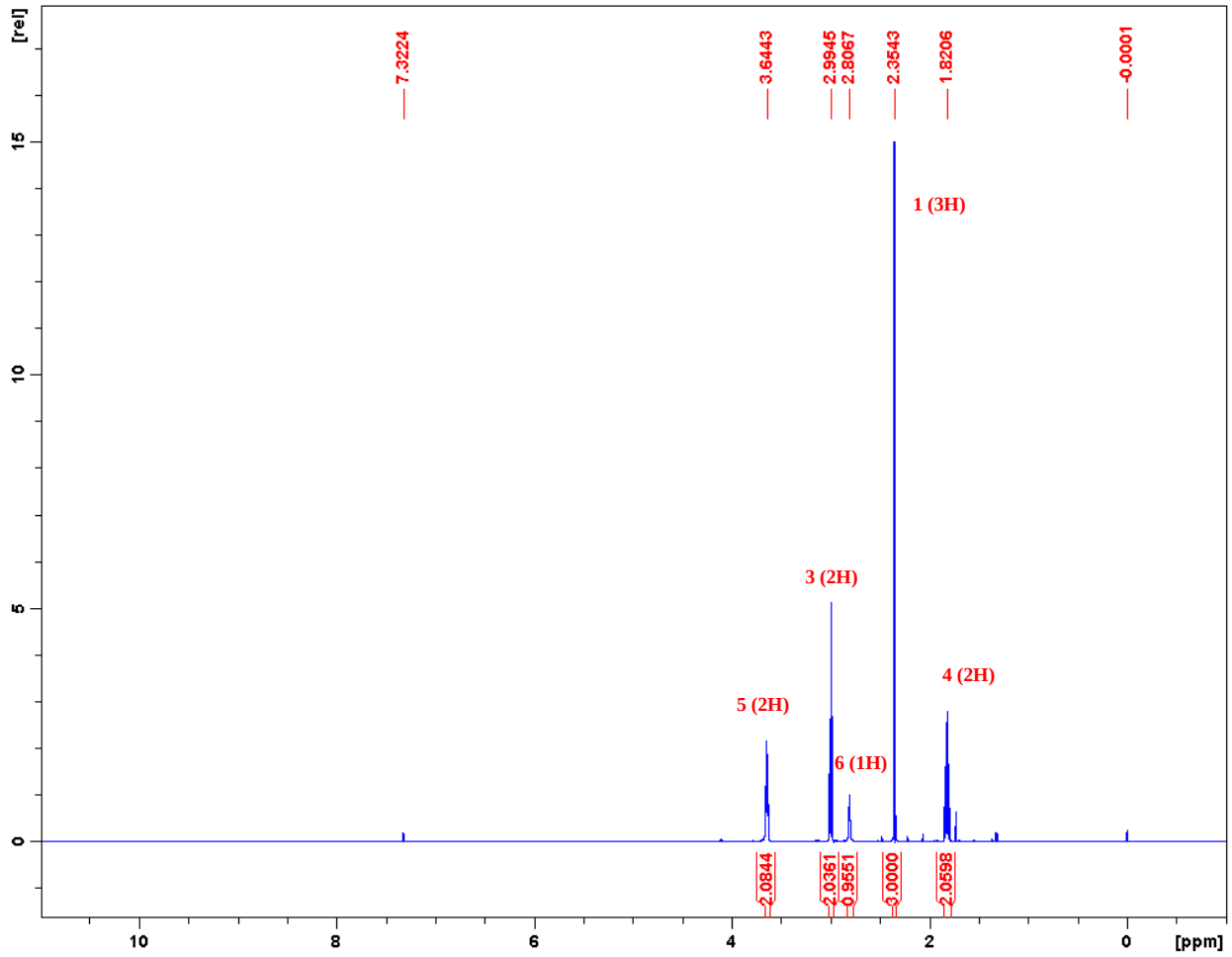


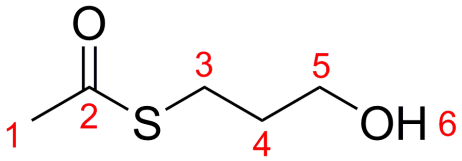
A.23: MS (ESI) of 11-(2-nitrobenzyloxy)-11-oxoundecanoic acid, *Chapter 4*, *Section 4.12*.



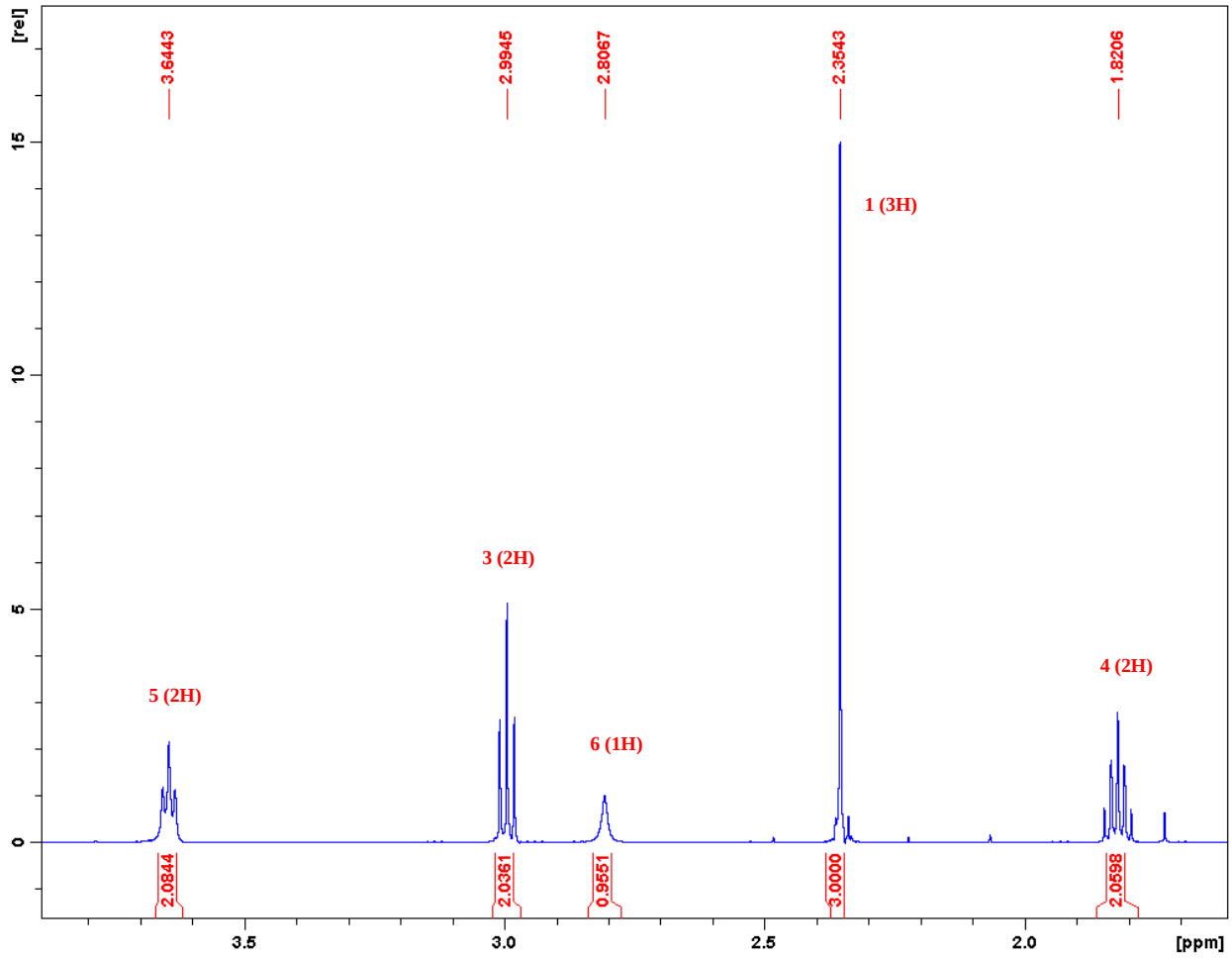


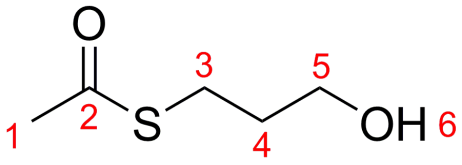
A.24: ^{1}H NMR of s-acetyl-3-mercaptopropanol, *Chapter 6*, *Section 6.13*.



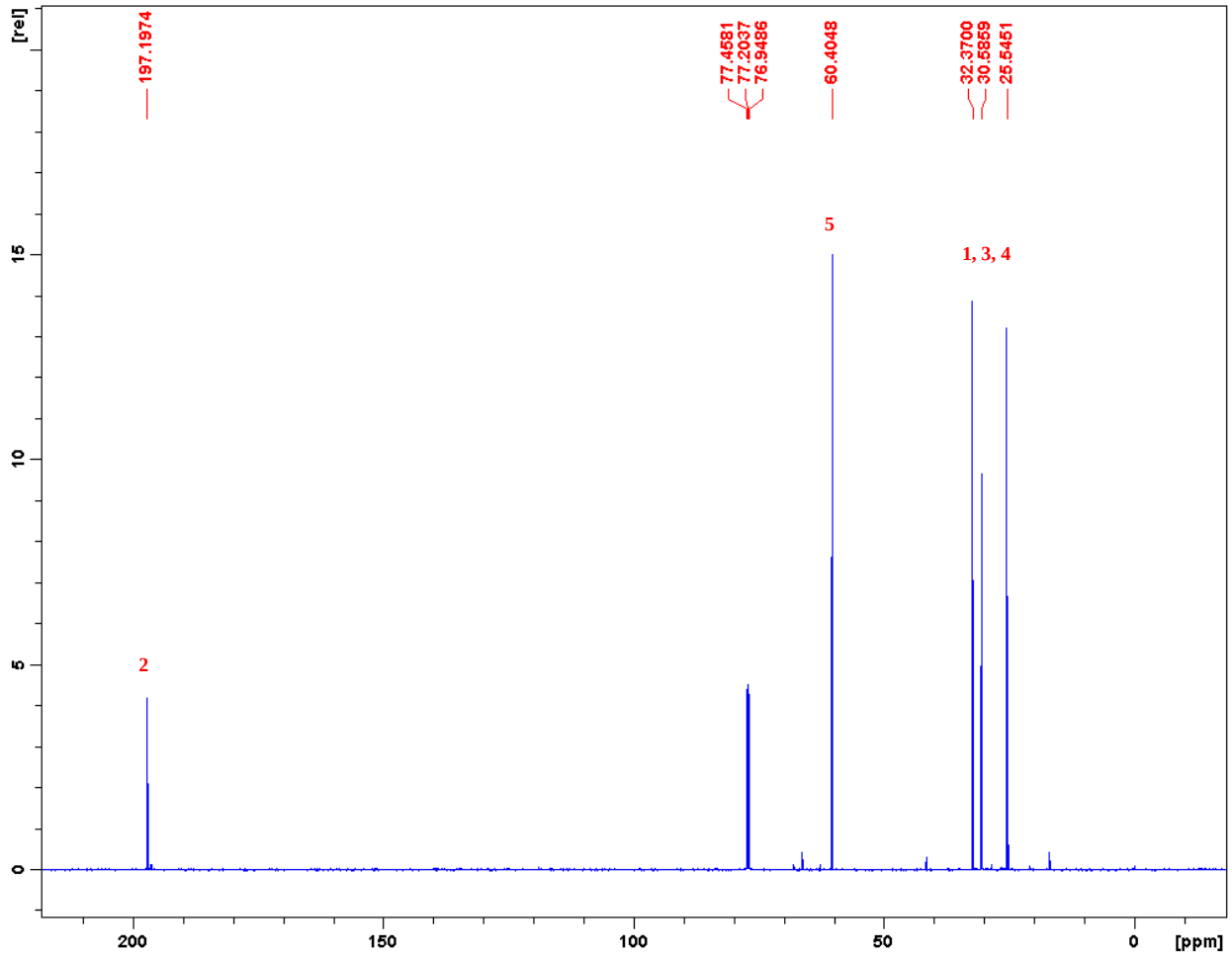


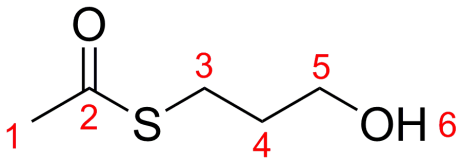
A.25: Expanded ^{1}H NMR of s-acetyl-3-mercaptopropanol, *Chapter 6, Section 6.13*.



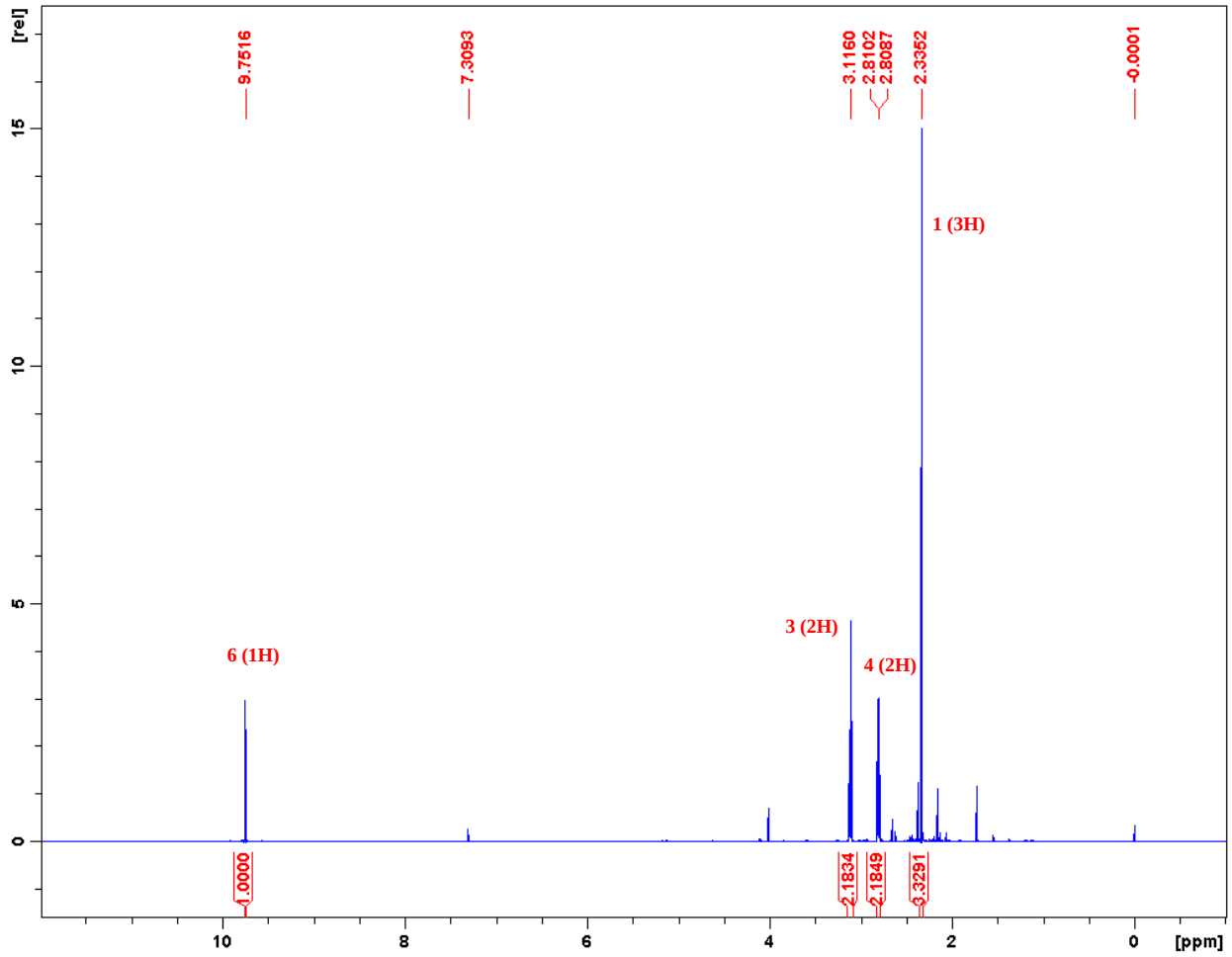


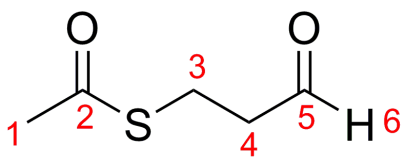
A.26: ^{13}C NMR of s-acetyl-3-mercaptopropanol, *Chapter 6, Section 6.13*.



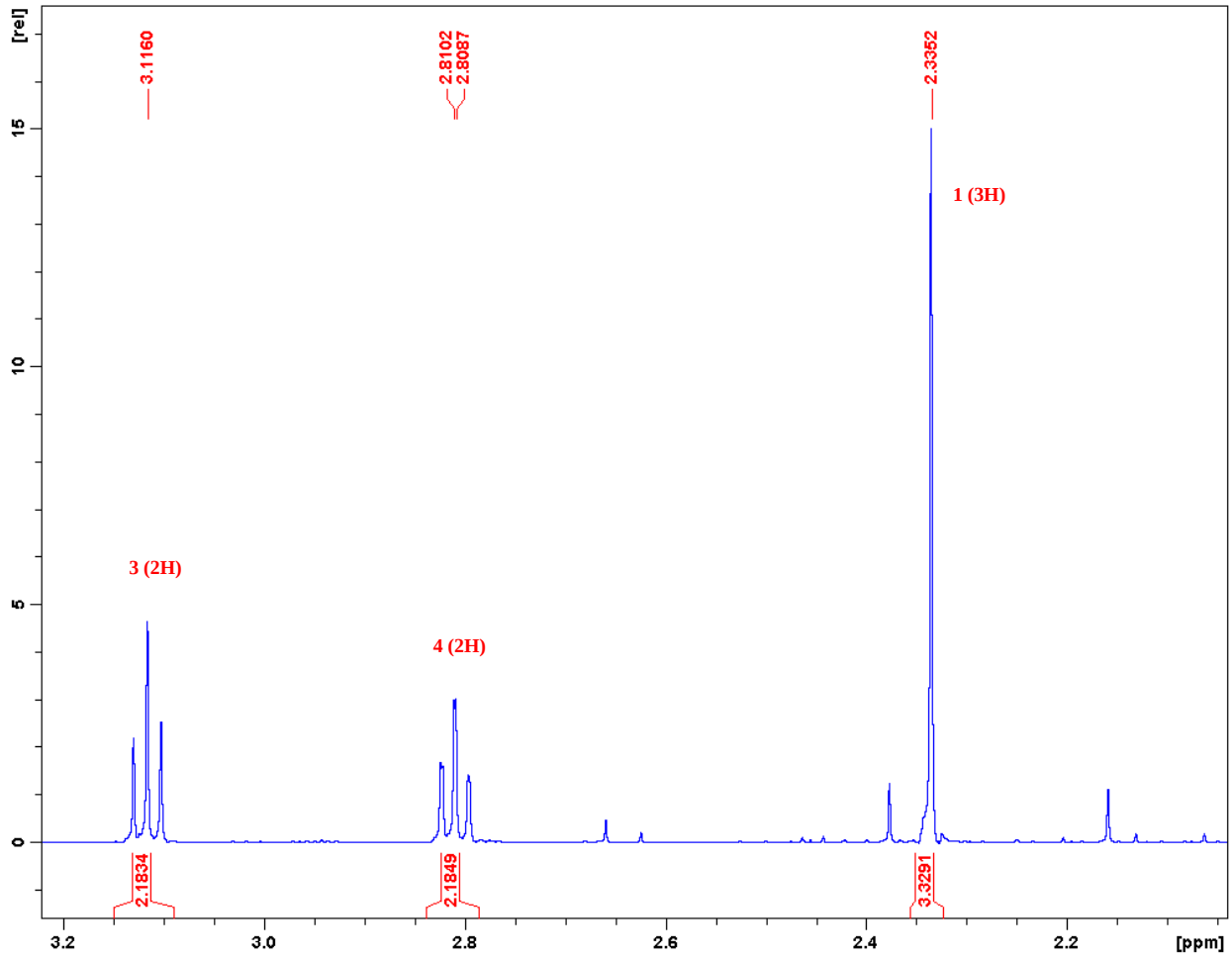


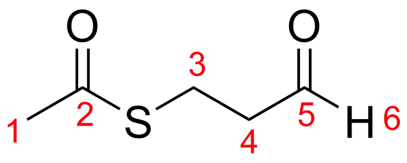
A.27: ^{1}H NMR of s-3-oxopropyl ethanethioate, *Chapter 6, Section 6.13*.



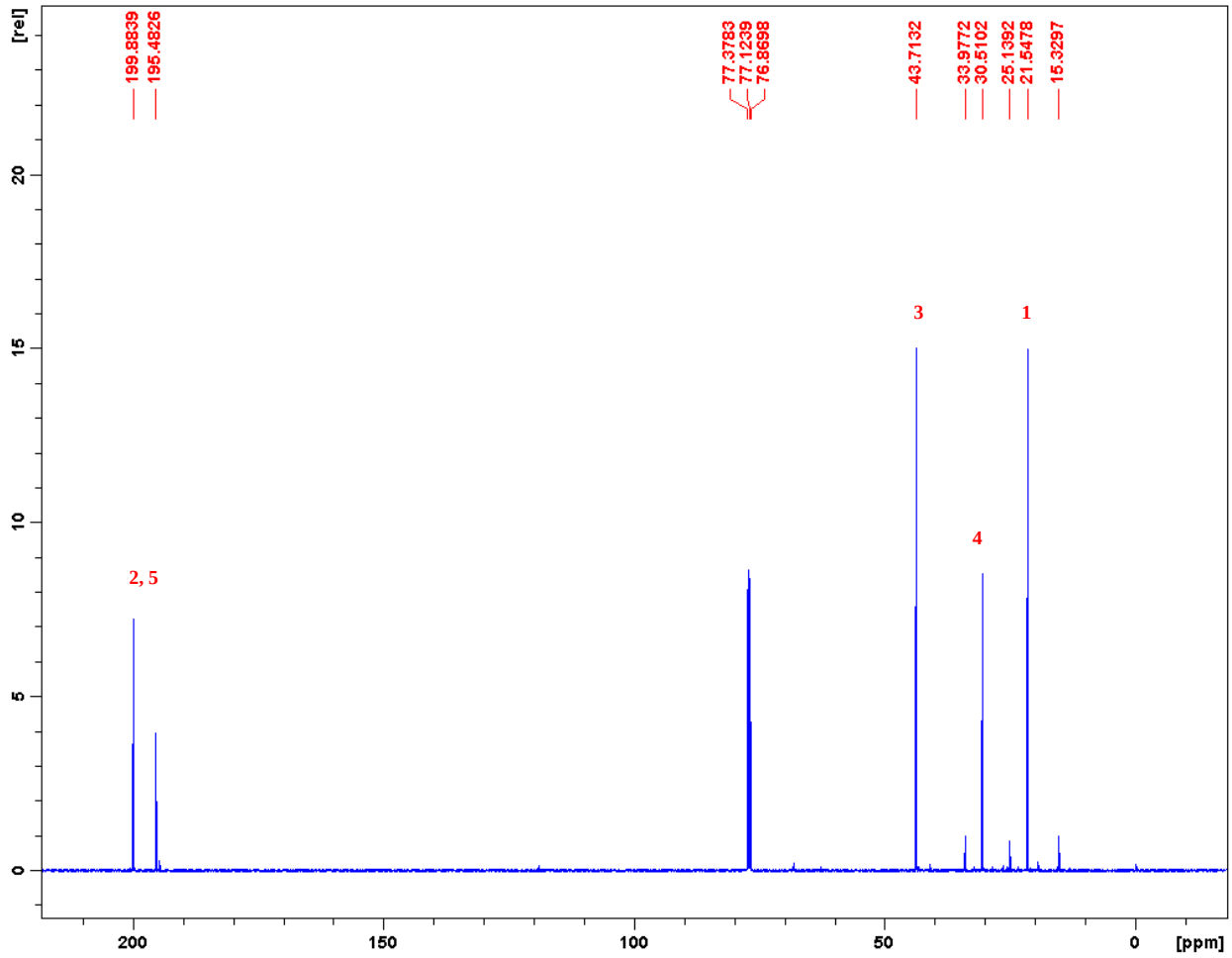


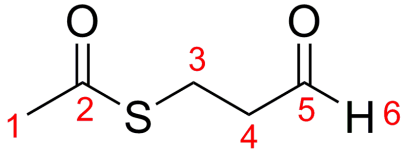
A.28: Expanded ^{1}H NMR of s-3-oxopropyl ethanethioate, *Chapter 6*, *Section 6.13*.



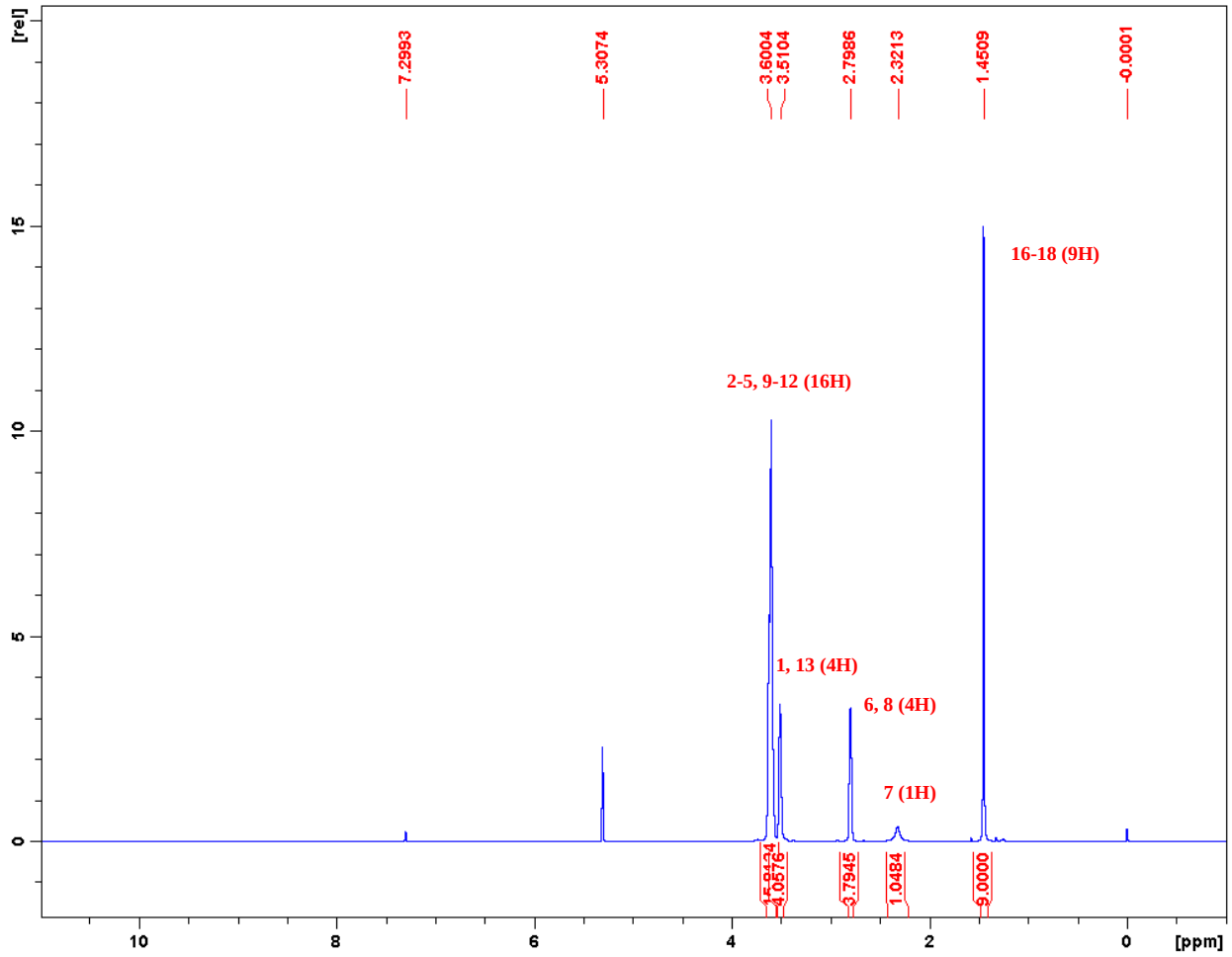


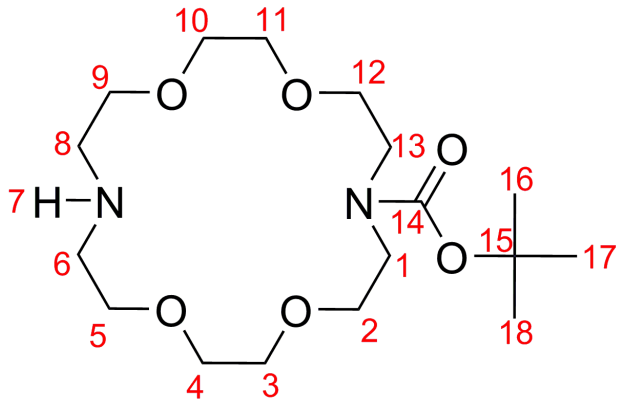
A.29: ^{13}C NMR of s-3-oxopropyl ethanethioate, *Chapter 6*, *Section 6.13*.



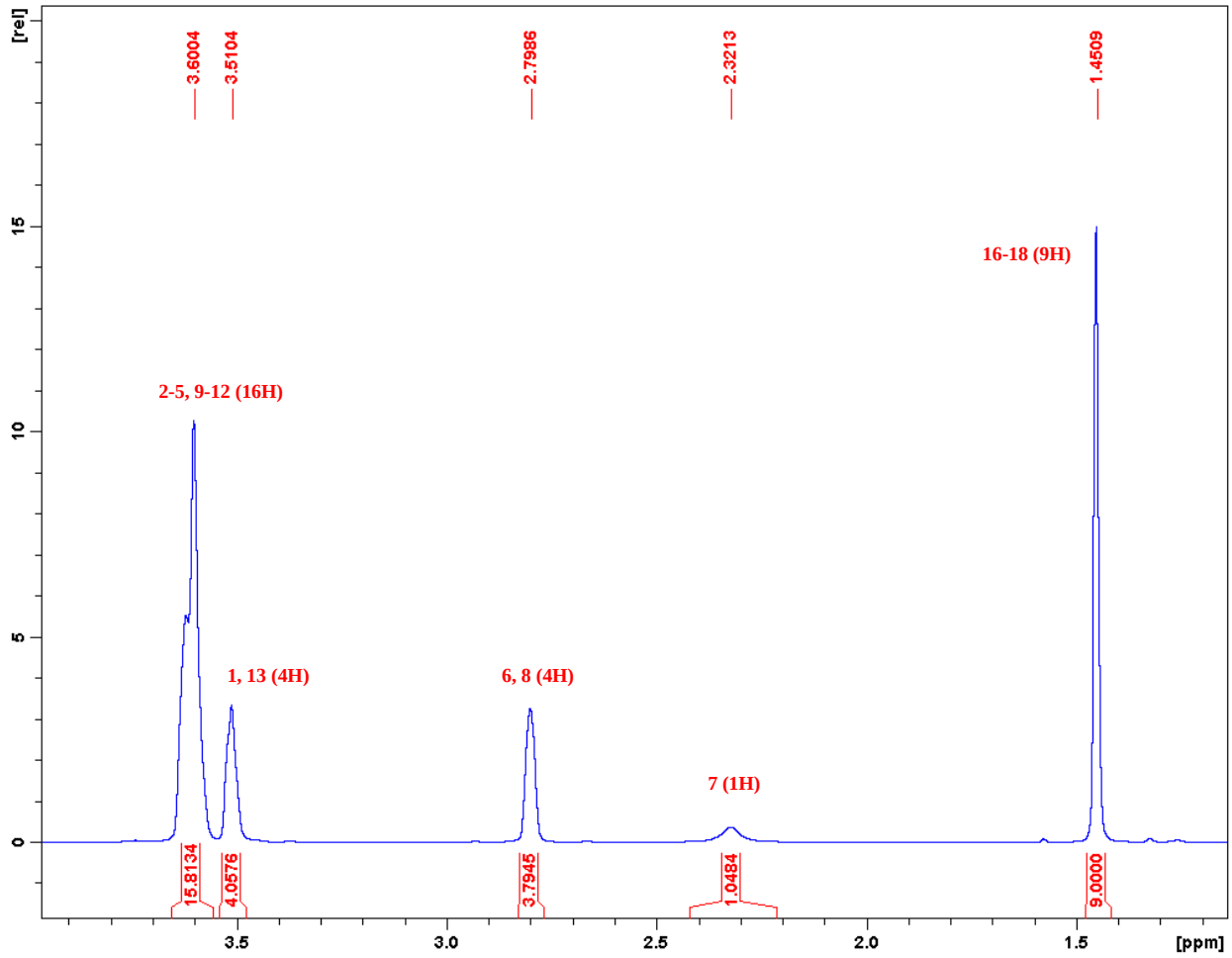


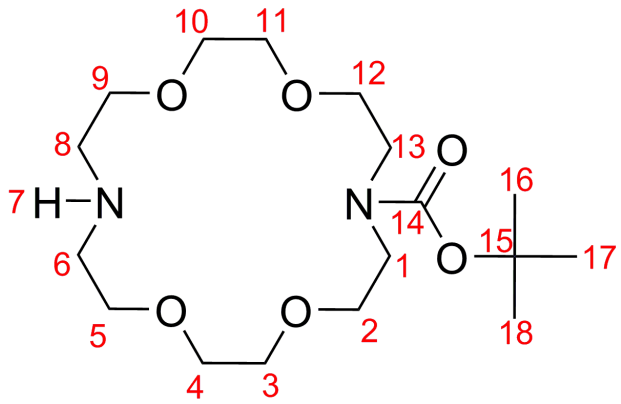
A.30: ^{1}H NMR of tert-butyl 1,4,10,13-tetraoxa-7,16-diazacyclooctadecane-7-carboxylate, *Chapter 6, Section 6.14.*



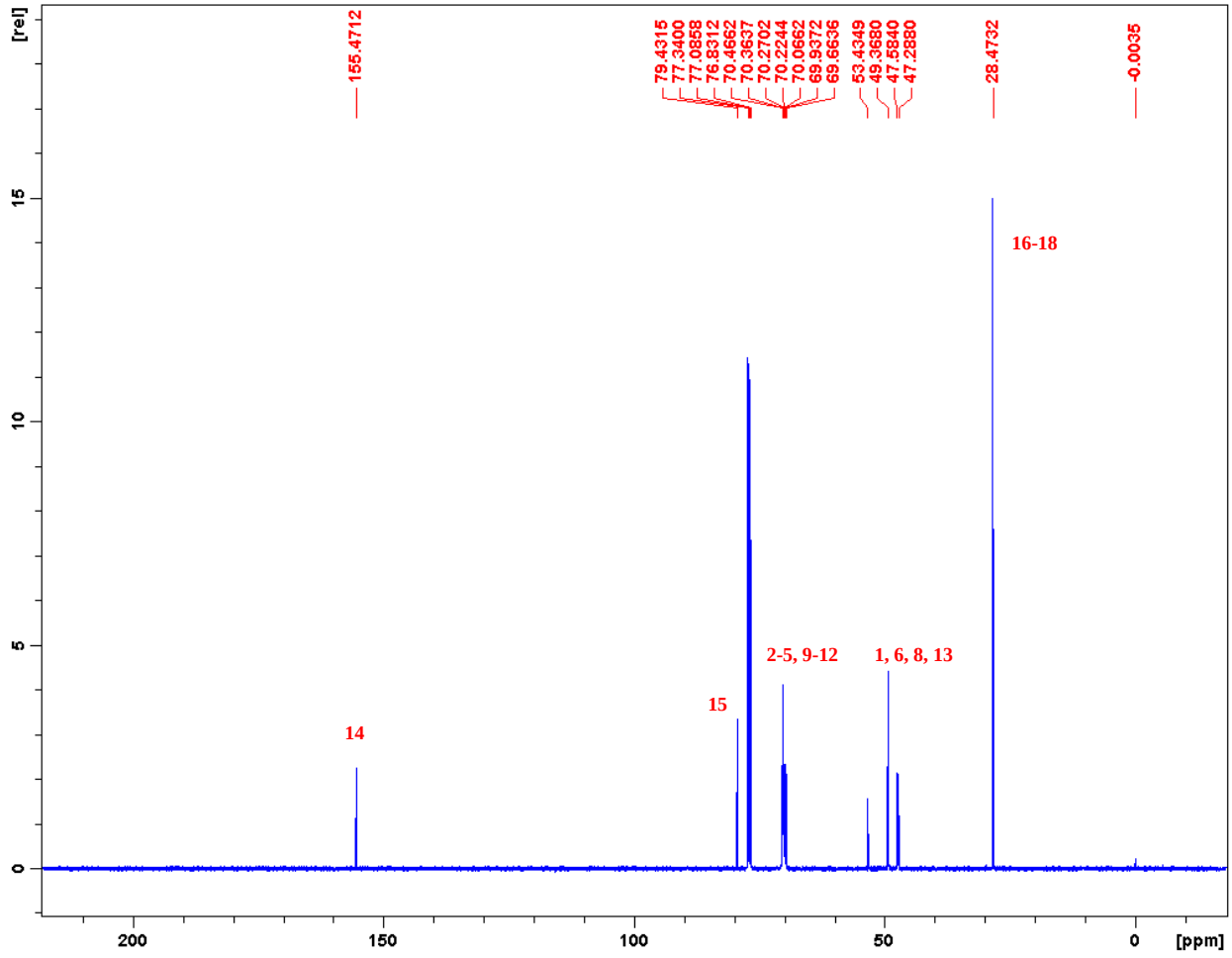


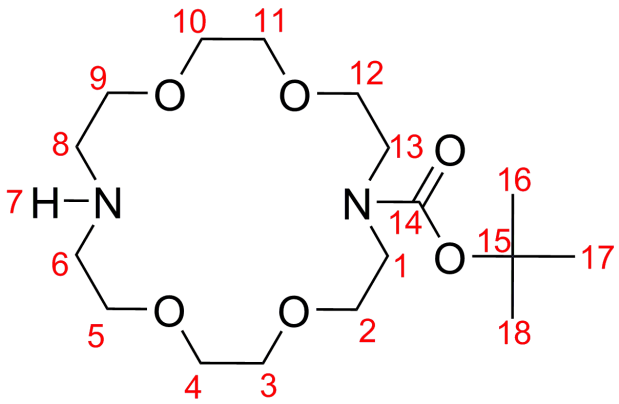
A.31: Expanded ^{1}H NMR of tert-butyl 1,4,10,13-tetraoxa-7,16-diazacyclooctadecane-7-carboxylate, *Chapter 6, Section 6.14*.



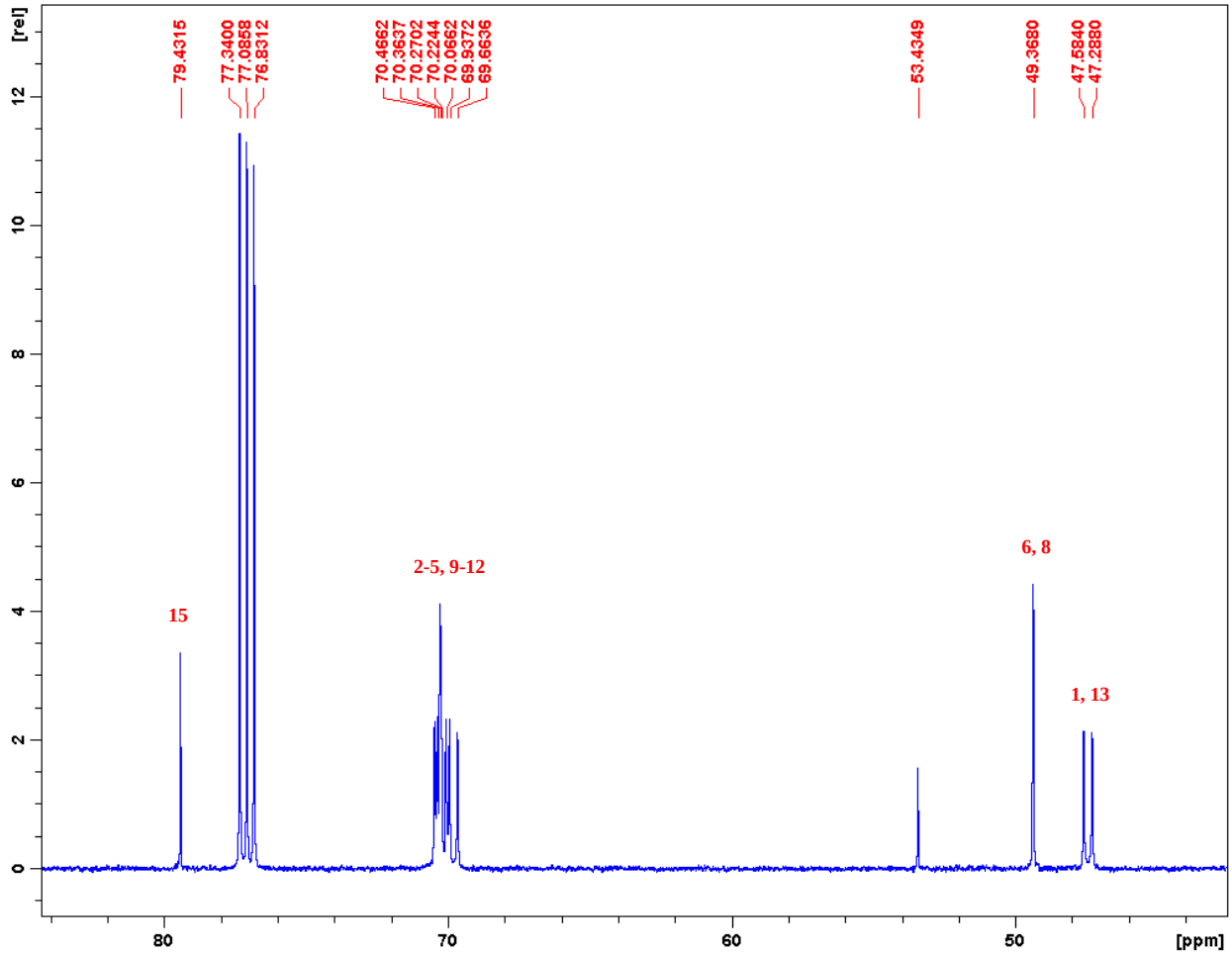


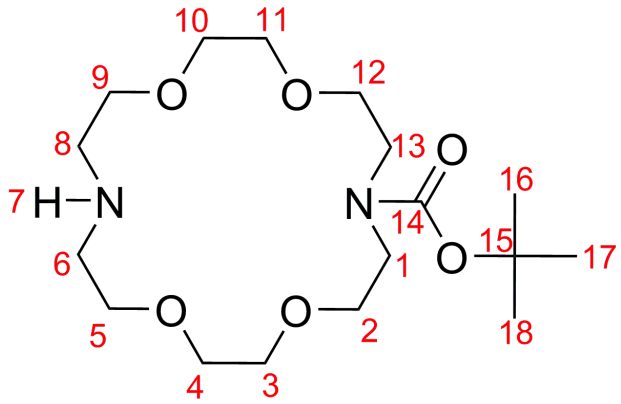
A.32: ^{13}C NMR of tert-butyl 1,4,10,13-tetraoxa-7,16-diazacyclooctadecane-7- carboxylate, *Chapter 6, Section 6.14.*



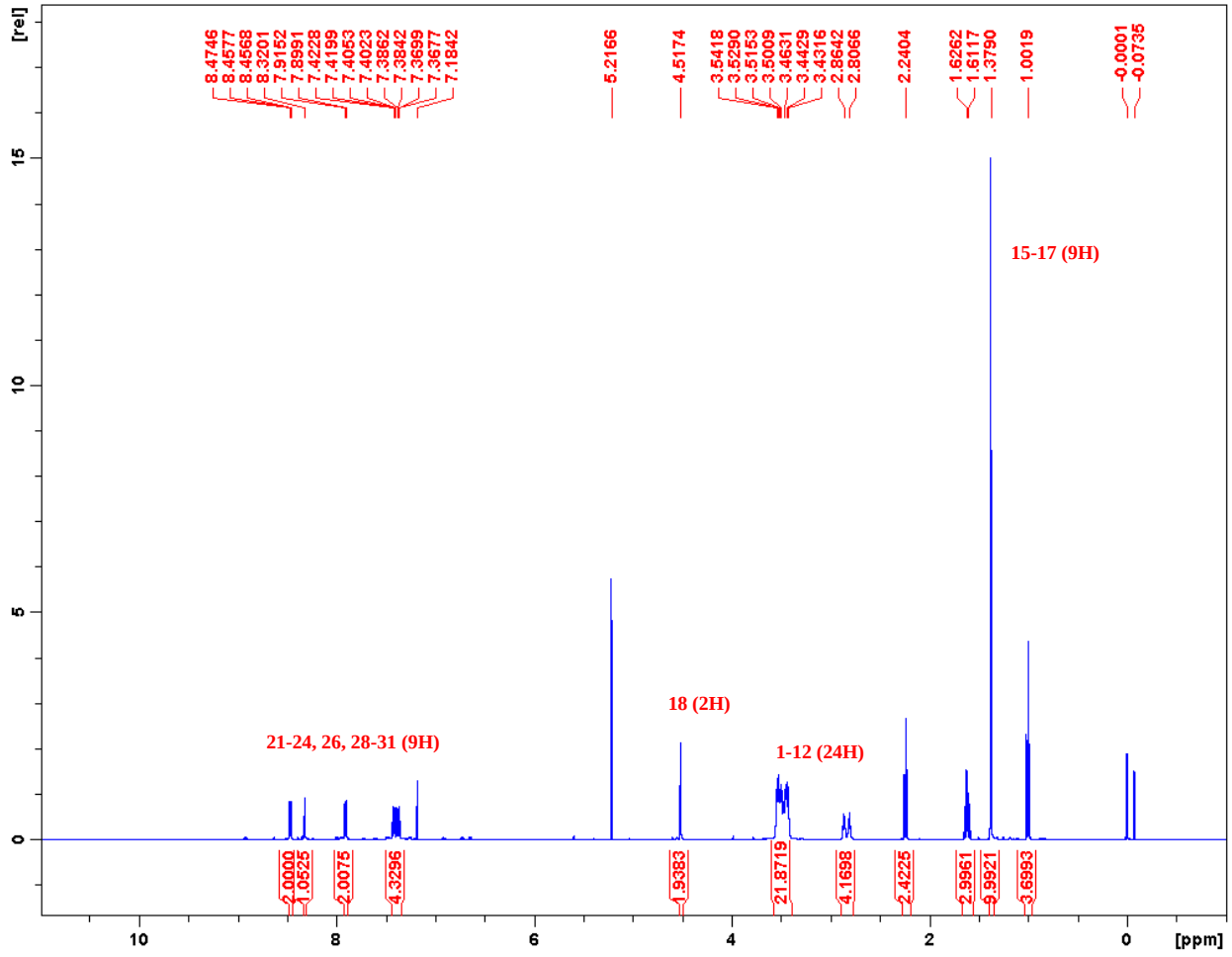


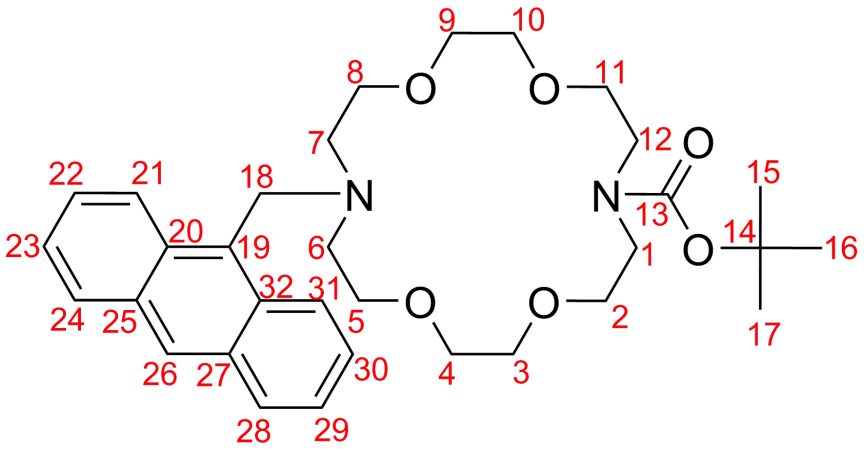
A.33: Expanded ^{13}C NMR of tert-butyl 1,4,10,13-tetraoxa-7,16-diazacyclooctadecane-7-carboxylate, *Chapter 6, Section 6.14*.



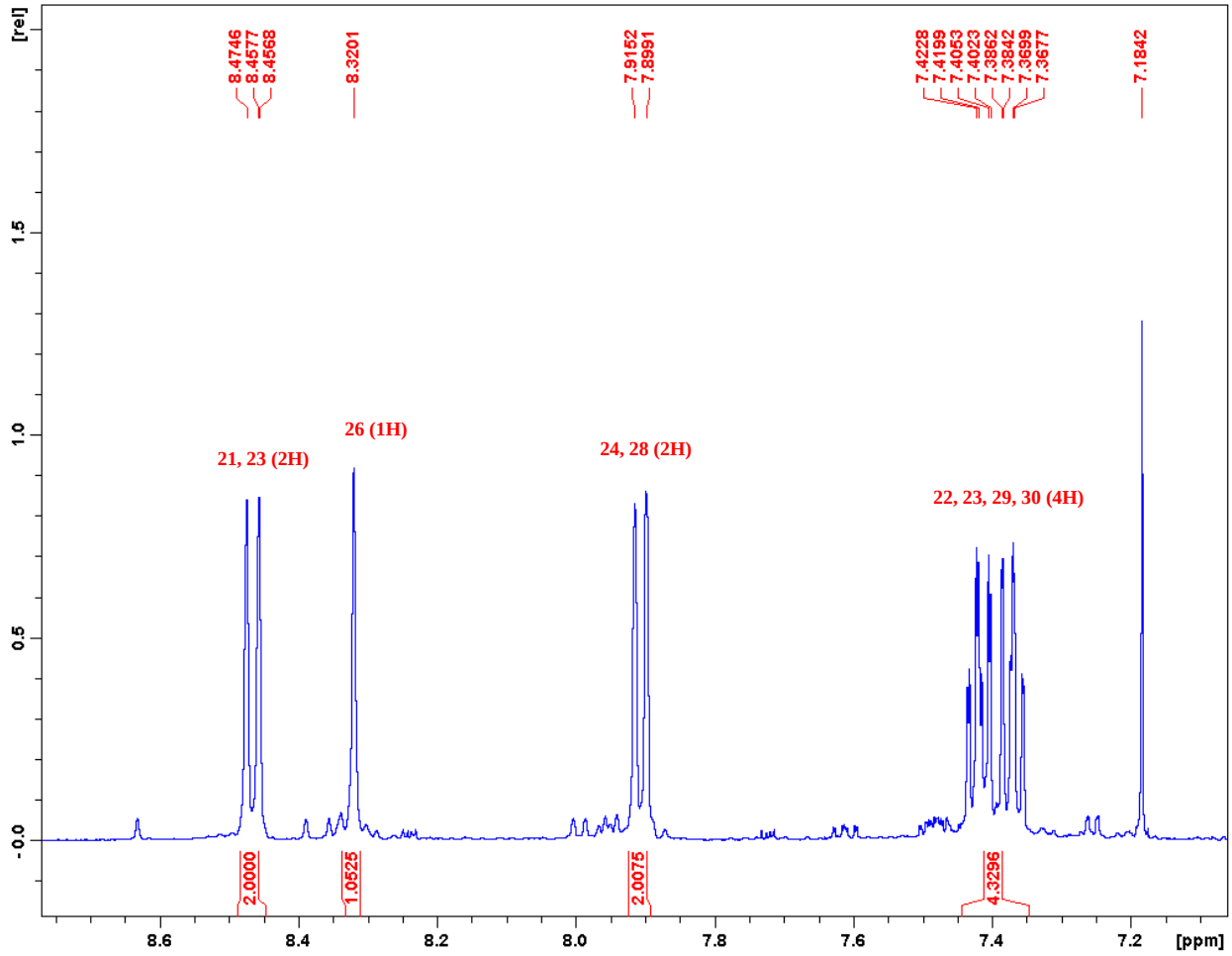


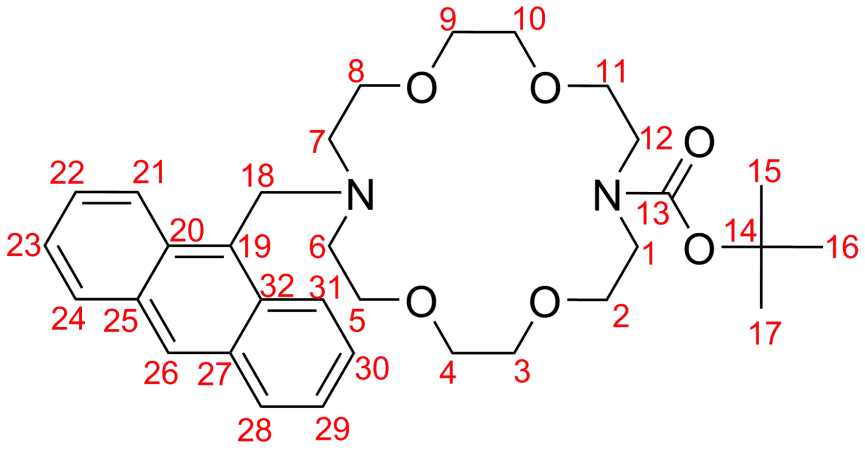
A.34: ^{1}H NMR of tert-butyl 16-(anthracen-9-ylmethyl)-1,4,10,13-tetraoxa-7,16-diazacyclooctadecane-7-carboxylate, *Chapter 6, Section 6.14*.



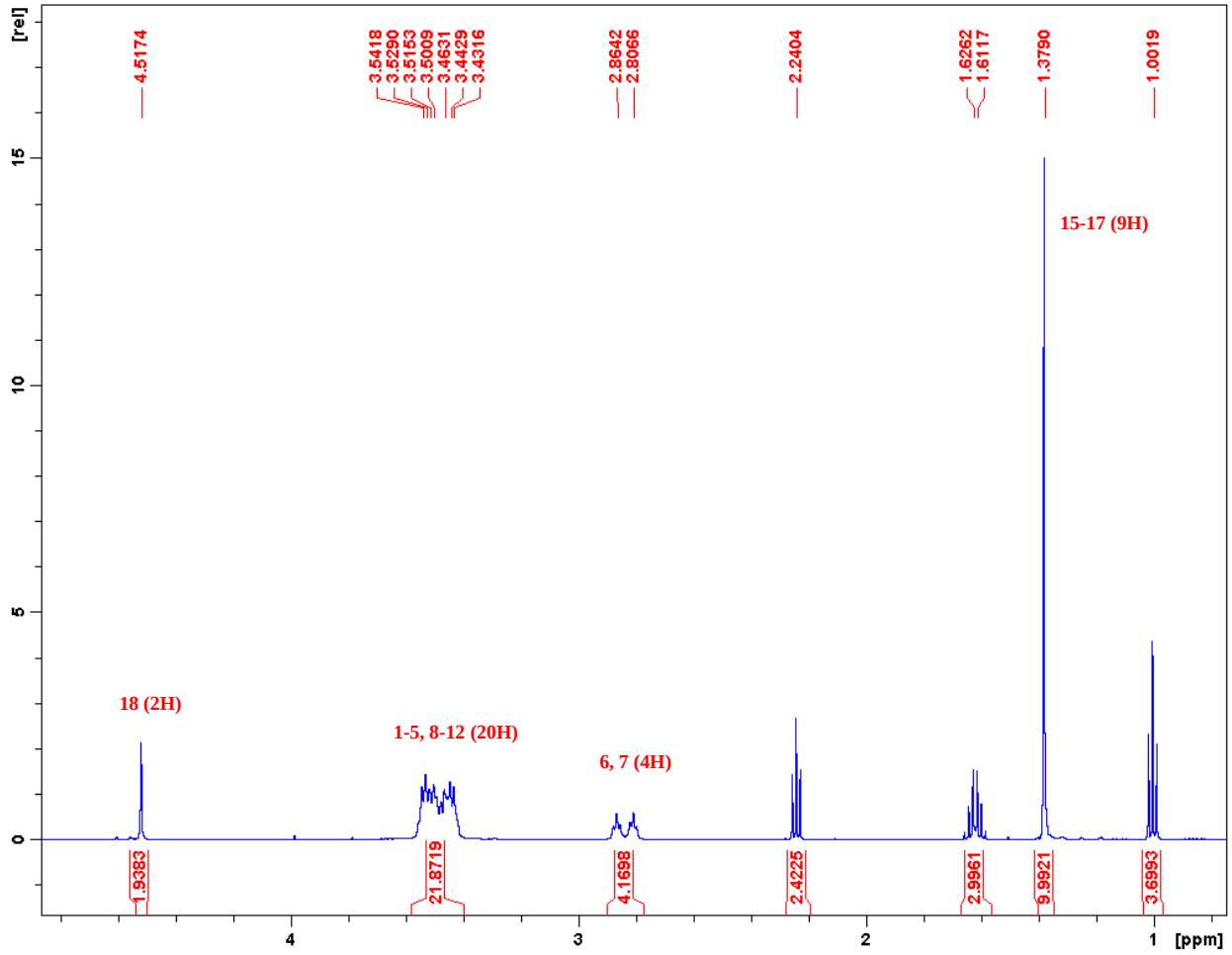


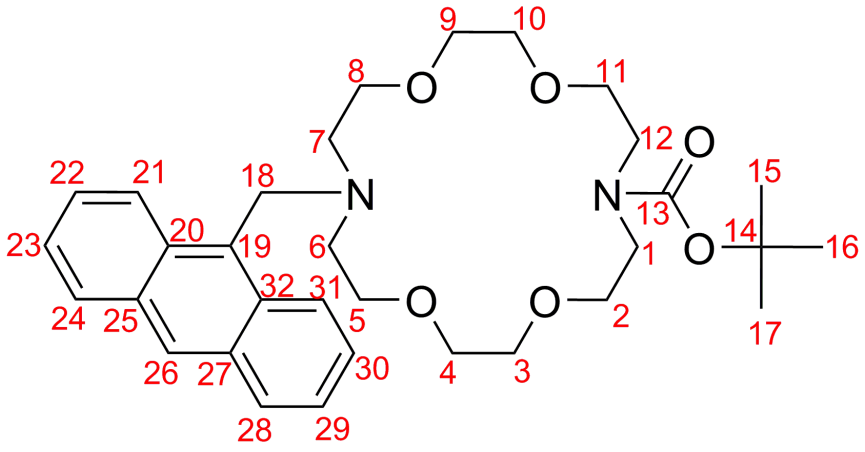
A.35: Expanded ^{1}H NMR of tert-butyl 16-(anthracen-9-ylmethyl)-1,4,10,13-tetraoxa-7,16-diazacyclooctadecane-7-carboxylate, *Chapter 6, Section 6.14*.



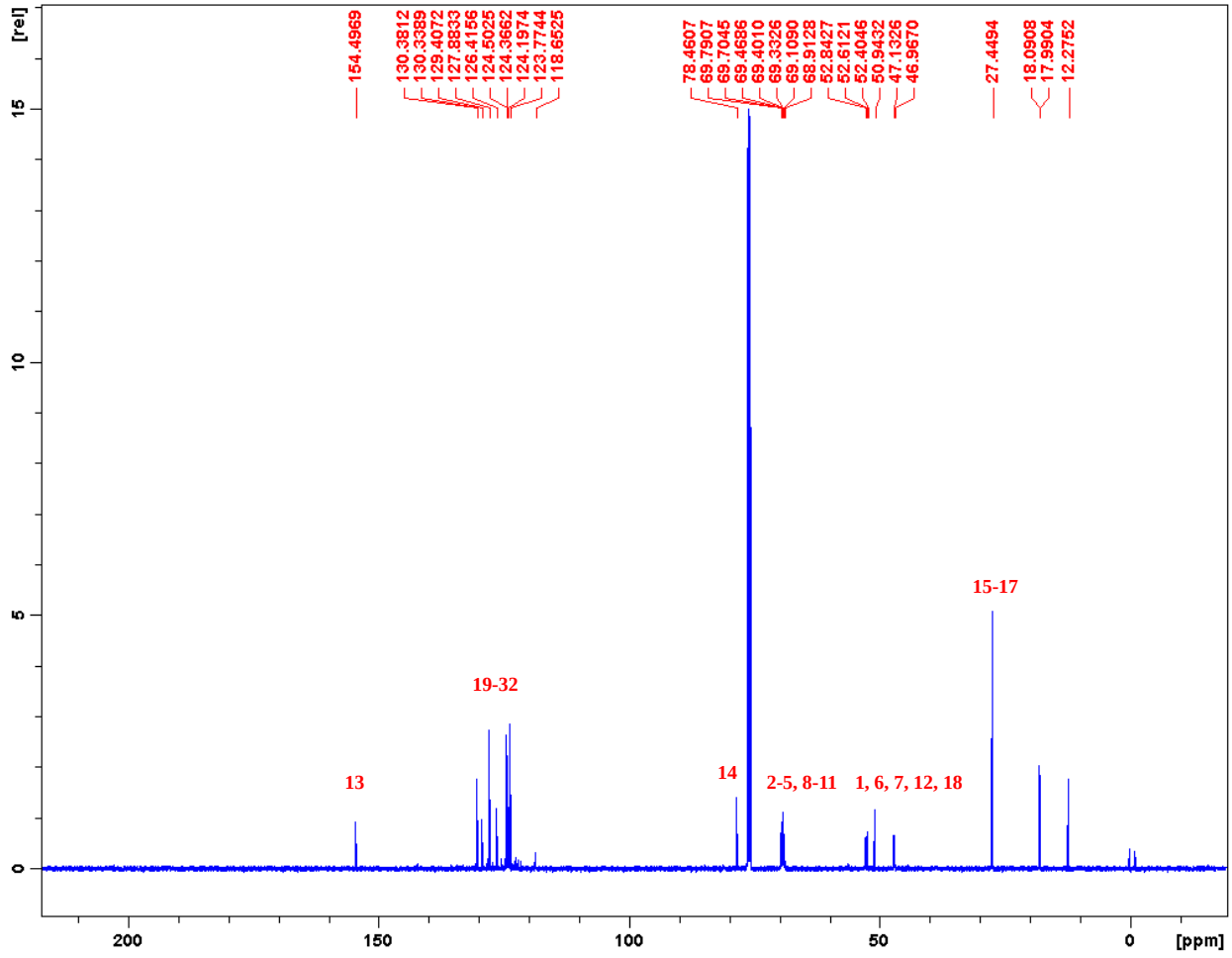


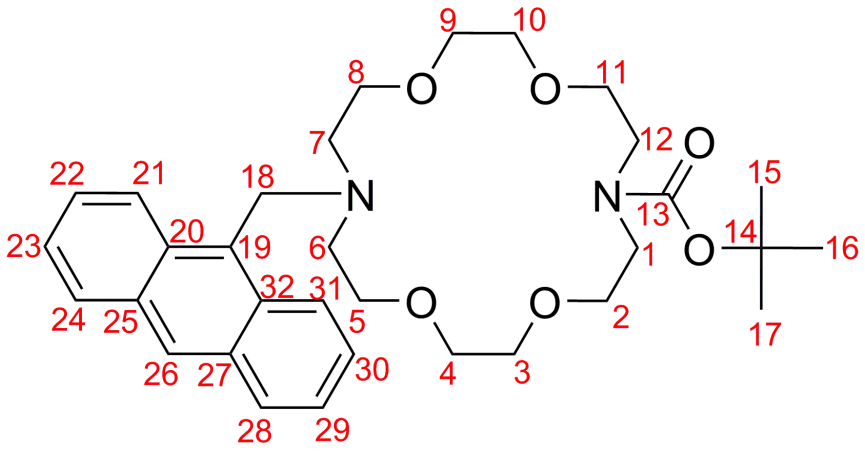
A.36: Expanded ^{1}H NMR of tert-butyl 16-(anthracen-9-ylmethyl)-1,4,10,13-tetraoxa-7,16-diazacyclooctadecane-7-carboxylate, *Chapter 6, Section 6.14*.



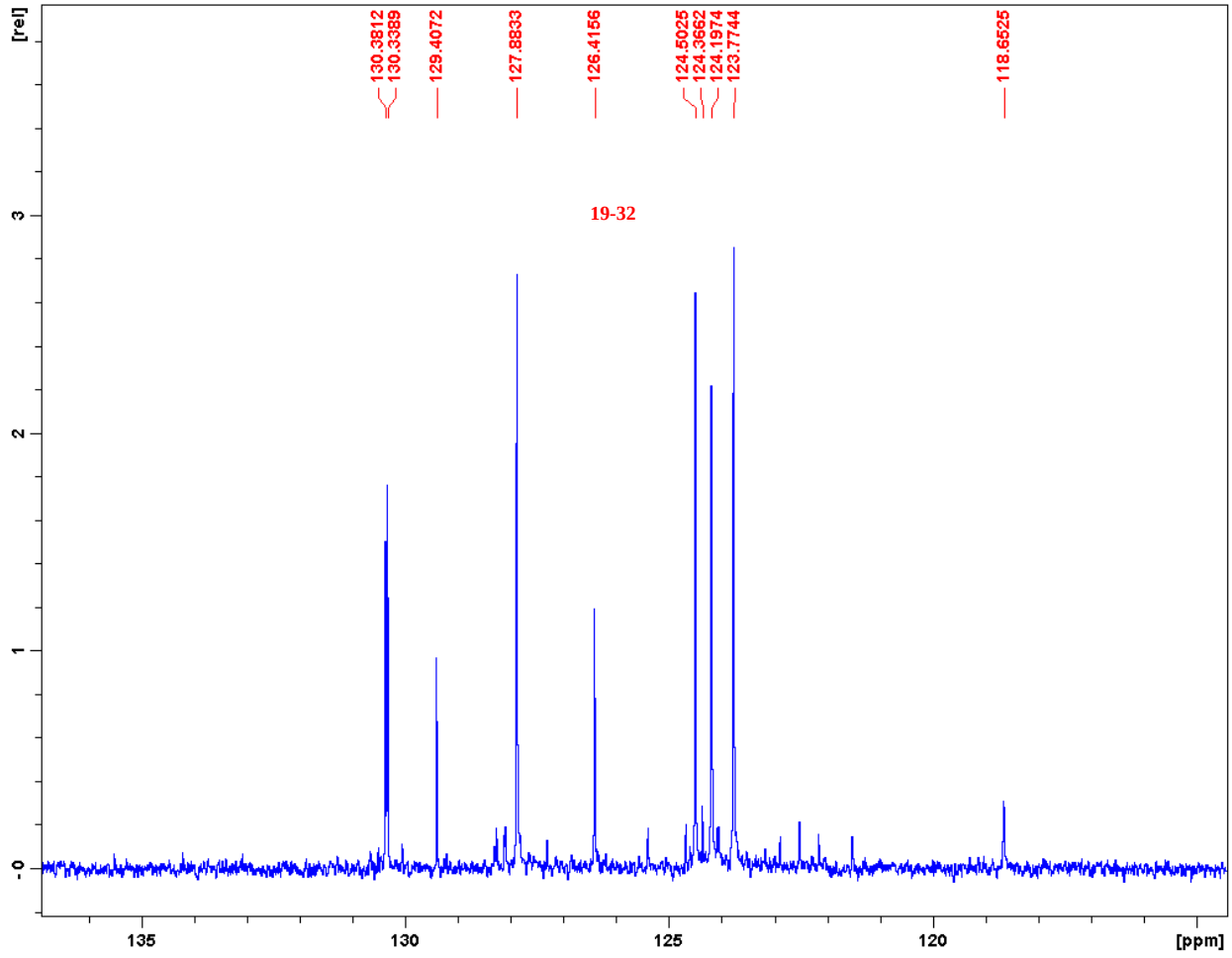


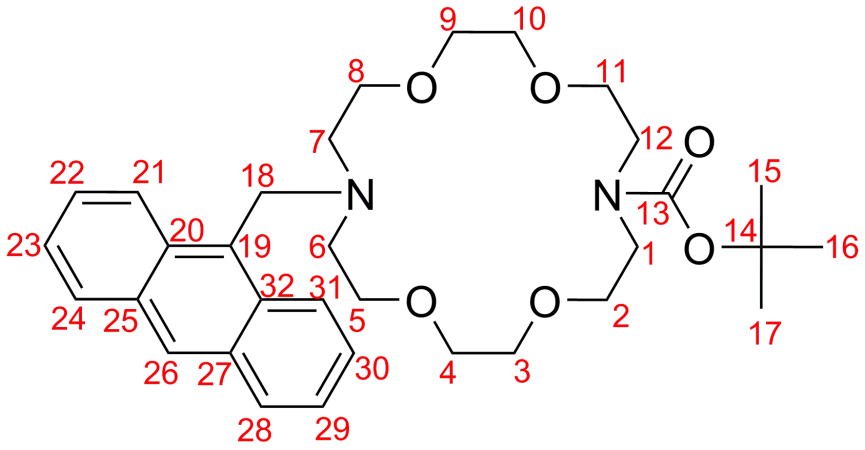
A.37: ^{13}C NMR of tert-butyl 16-(anthracen-9-ylmethyl)-1,4,10,13-tetraoxa-7,16-diazacyclooctadecane-7-carboxylate, *Chapter 6, Section 6.14*.



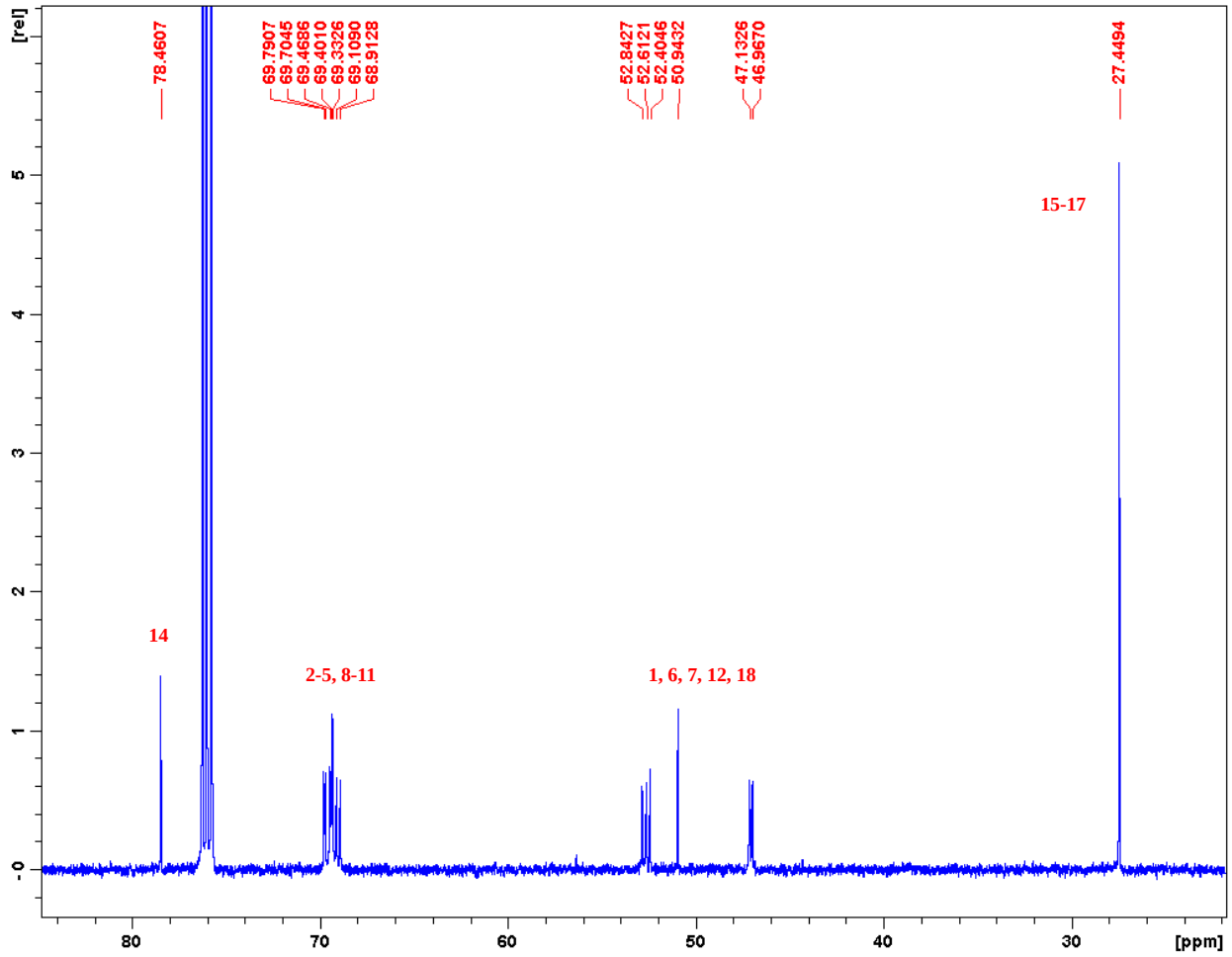


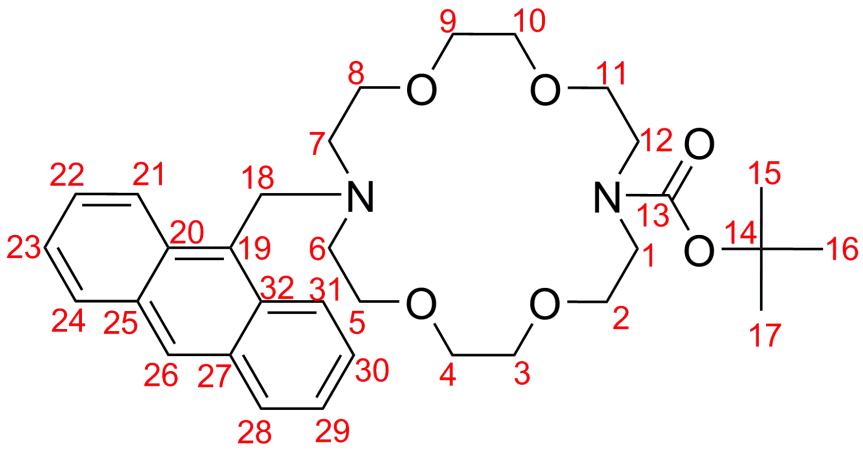
A.38: Expanded ^{13}C NMR of tert-butyl 16-(anthracen-9-ylmethyl)-1,4,10,13-tetraoxa-7,16-diazacyclooctadecane-7-carboxylate, *Chapter 6, Section 6.14*.



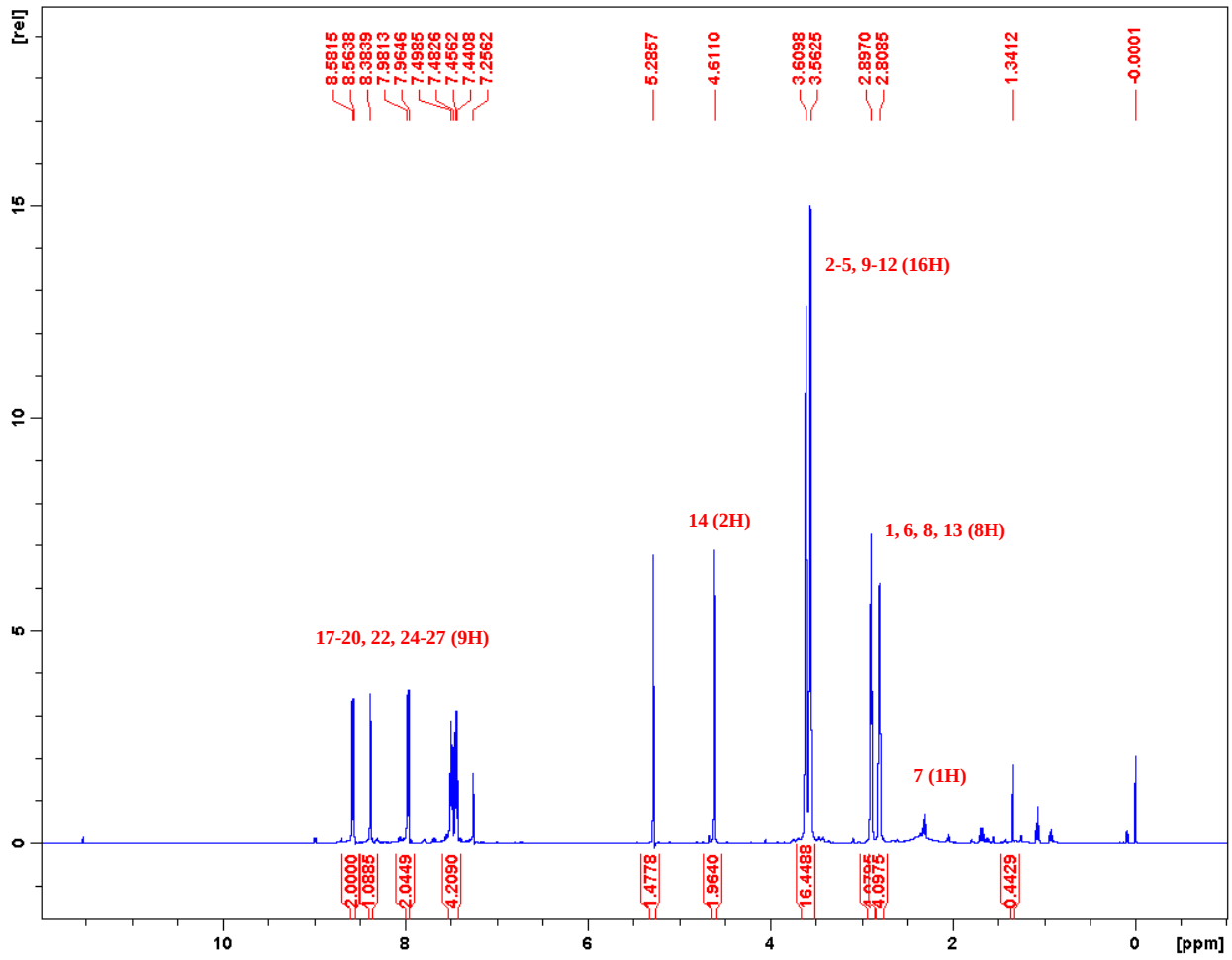


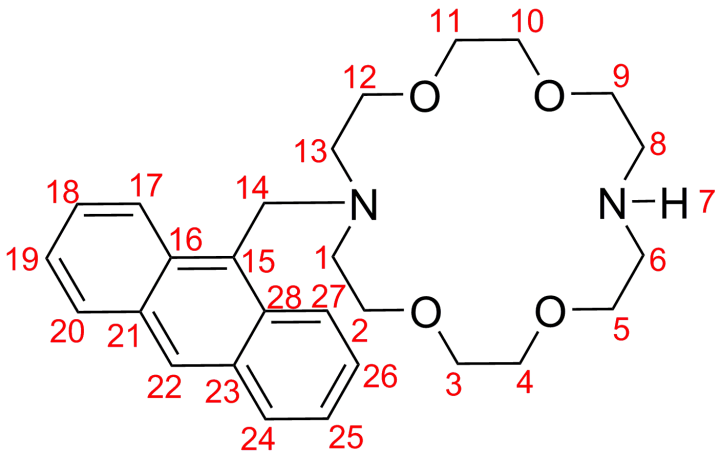
A.39: Expanded ^{13}C NMR of tert-butyl 16-(anthracen-9-ylmethyl)-1,4,10,13-tetraoxa-7,16-diazacyclooctadecane-7-carboxylate, *Chapter 6, Section 6.14*.



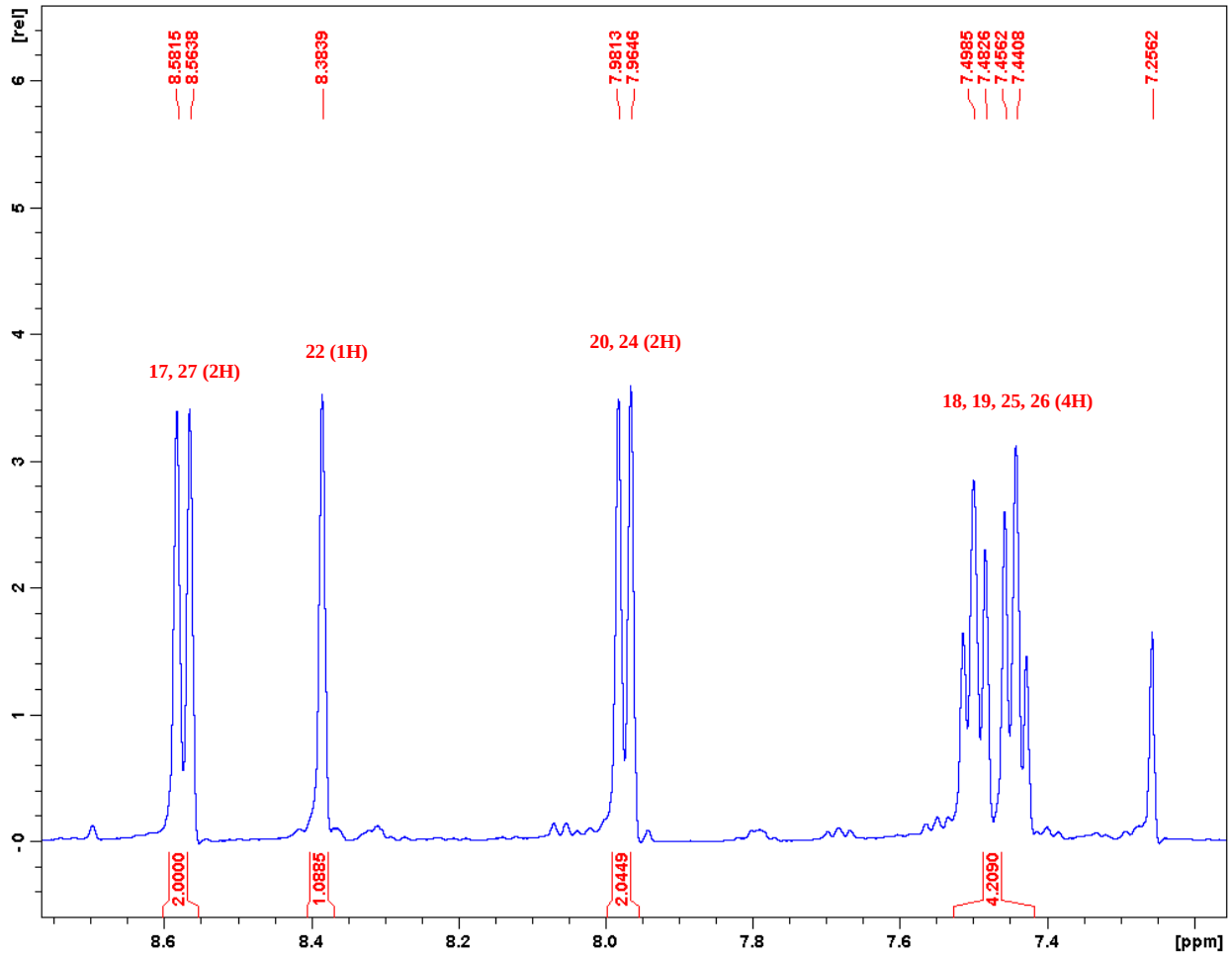


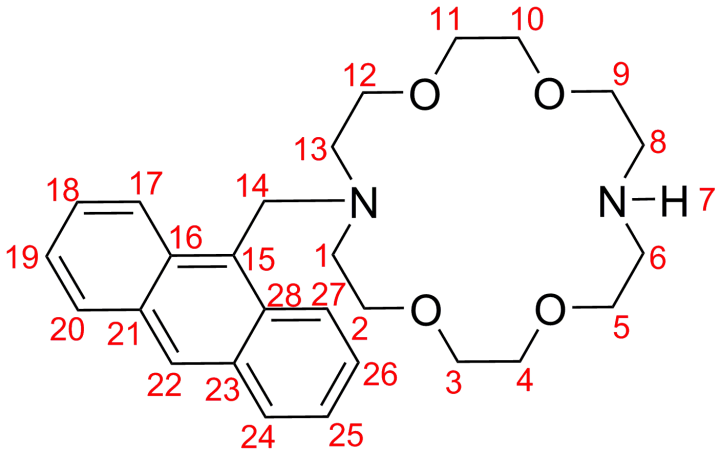
A.40: ^{1}H NMR of 7-(anthracen-9-ylmethyl)-1,4,10,13-tetraoxa-7,16-diazacyclooctadecane, *Chapter 6, Section 6.14.*



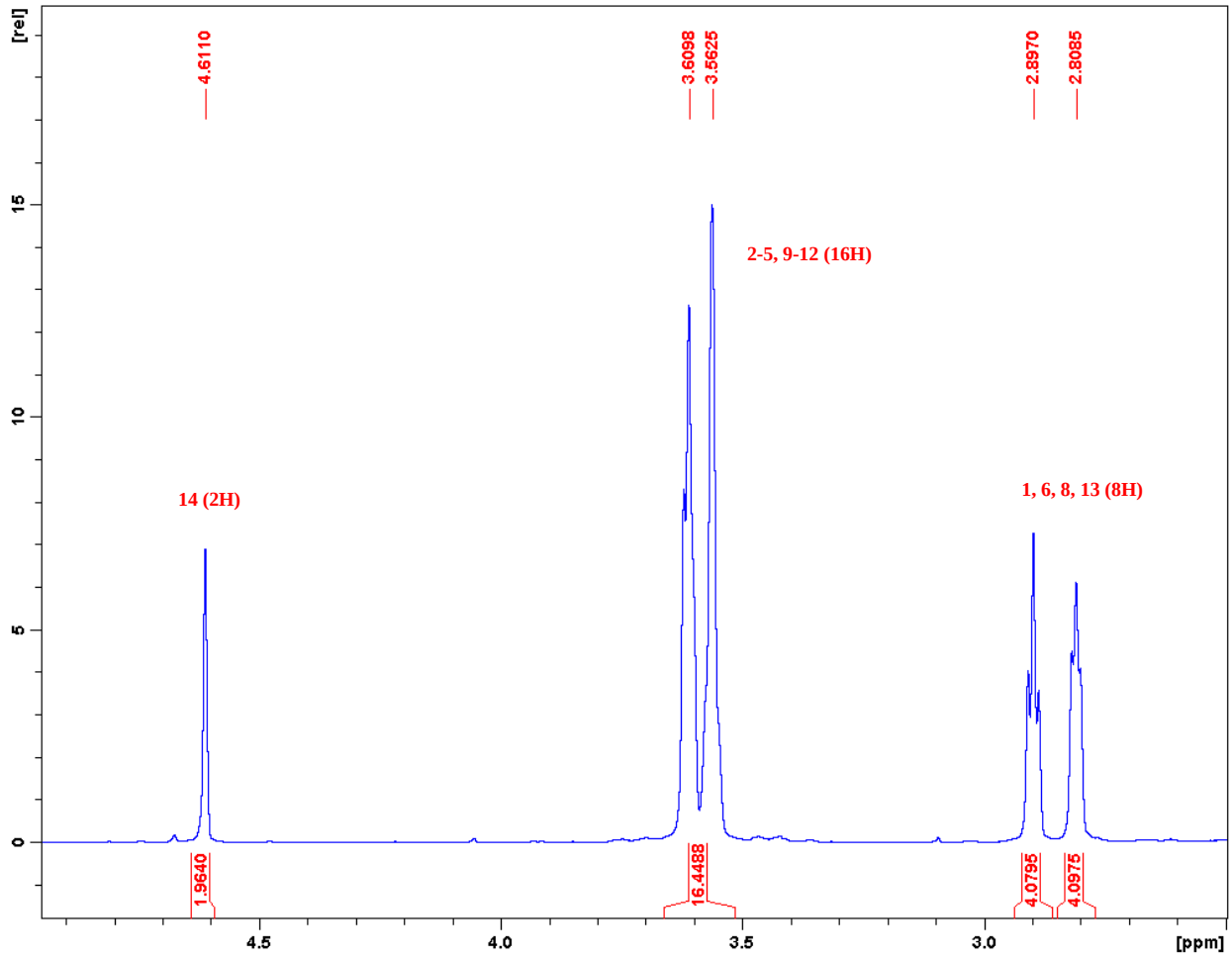


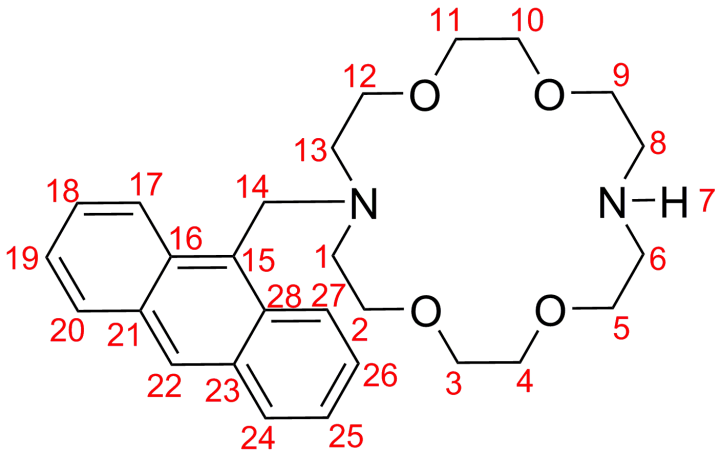
A.41: Expanded ^{1}H NMR of 7-(anthracen-9-ylmethyl)-1,4,10,13-tetraoxa-7,16-diazacyclooctadecane, *Chapter 6*, *Section 6.14*.



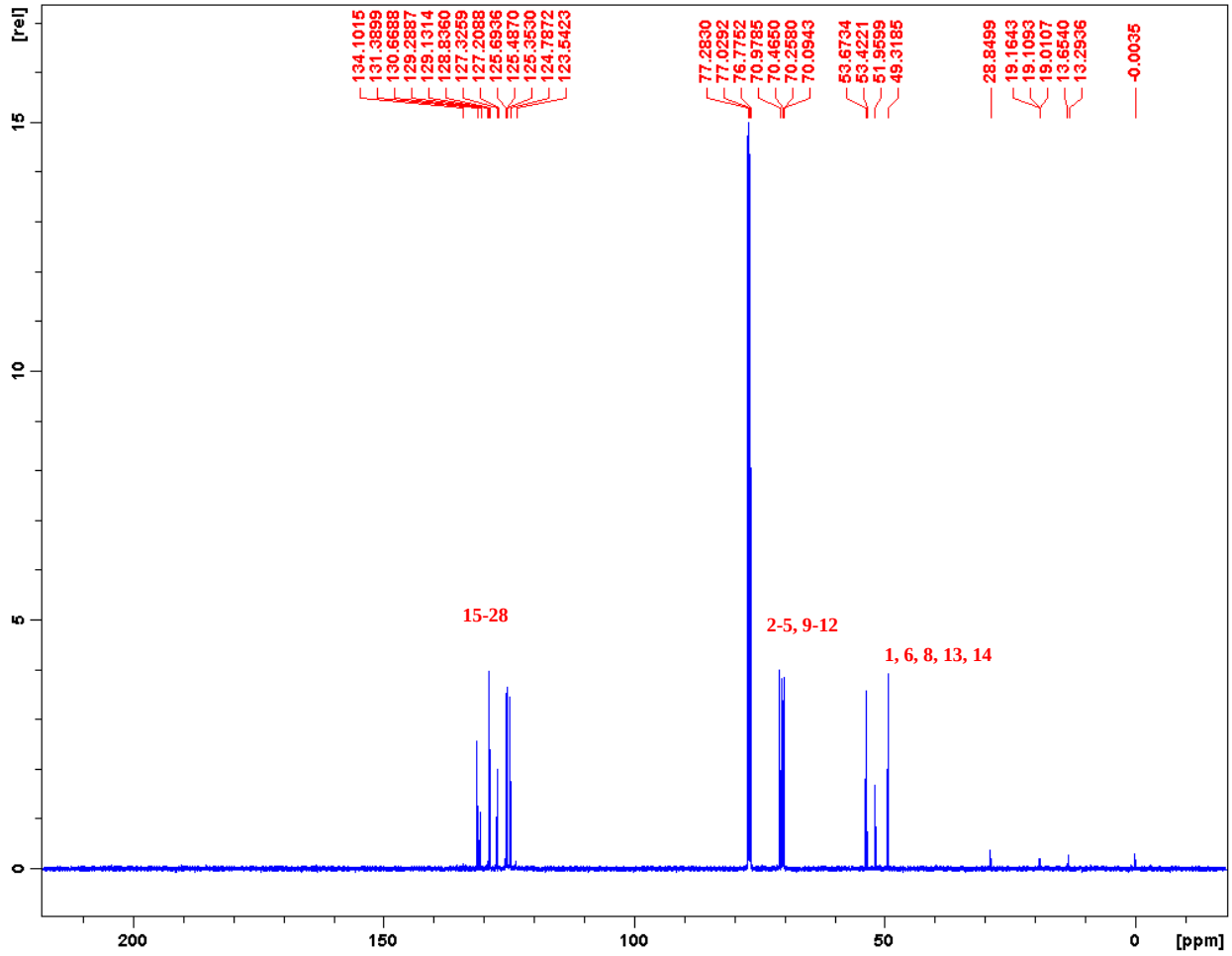


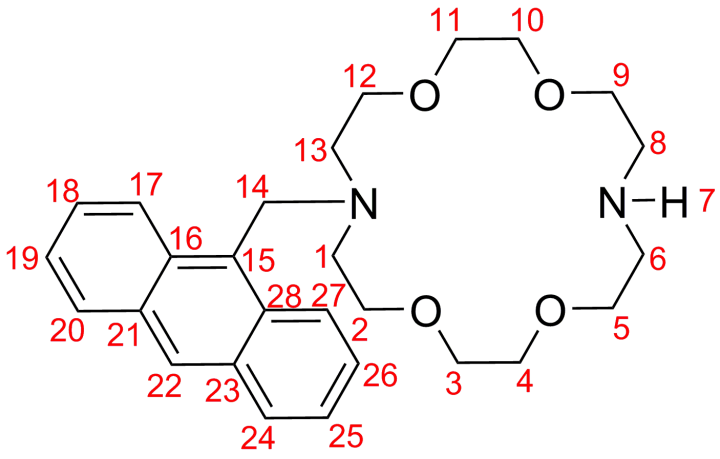
A.42: Expanded ^{1}H NMR of 7-(anthracen-9-ylmethyl)-1,4,10,13-tetraoxa-7,16-diazacyclooctadecane, *Chapter 6*, *Section 6.14*.



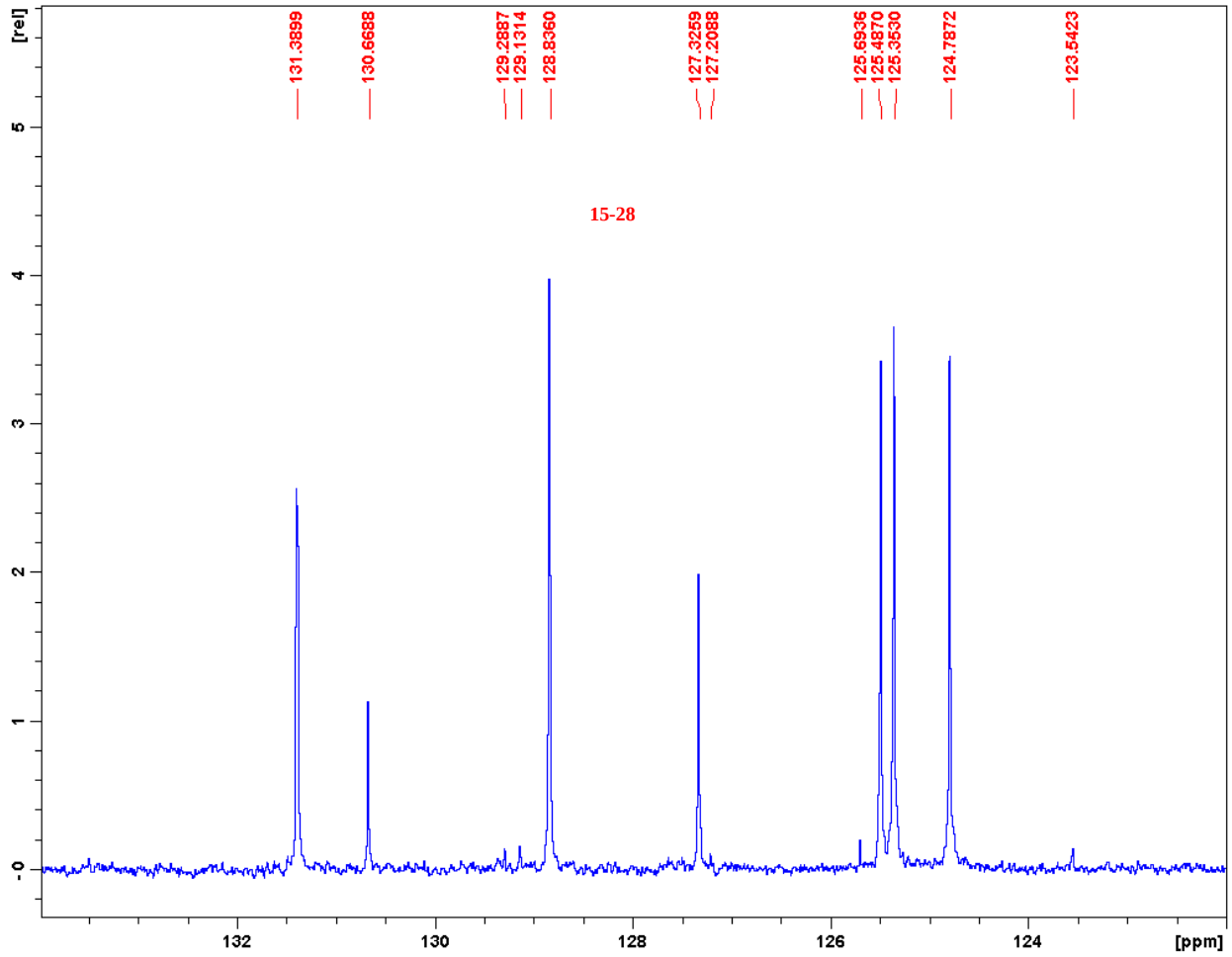


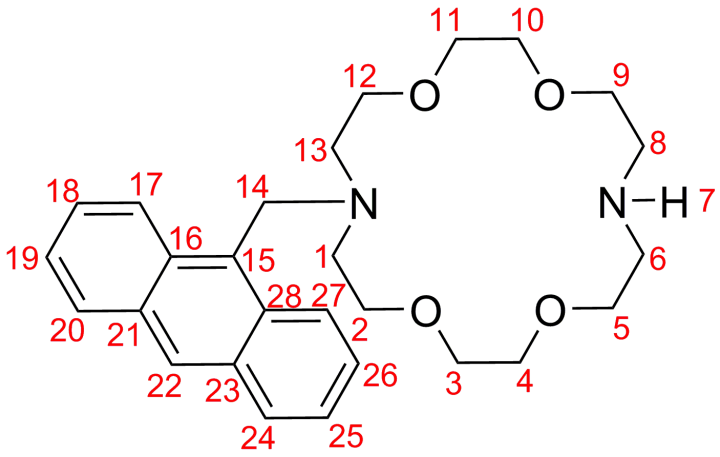
A.43: ^{13}C NMR of 7-(anthracen-9-ylmethyl)-1,4,10,13-tetraoxa-7,16- diazacyclooctadecane, *Chapter 6, Section 6.14.*



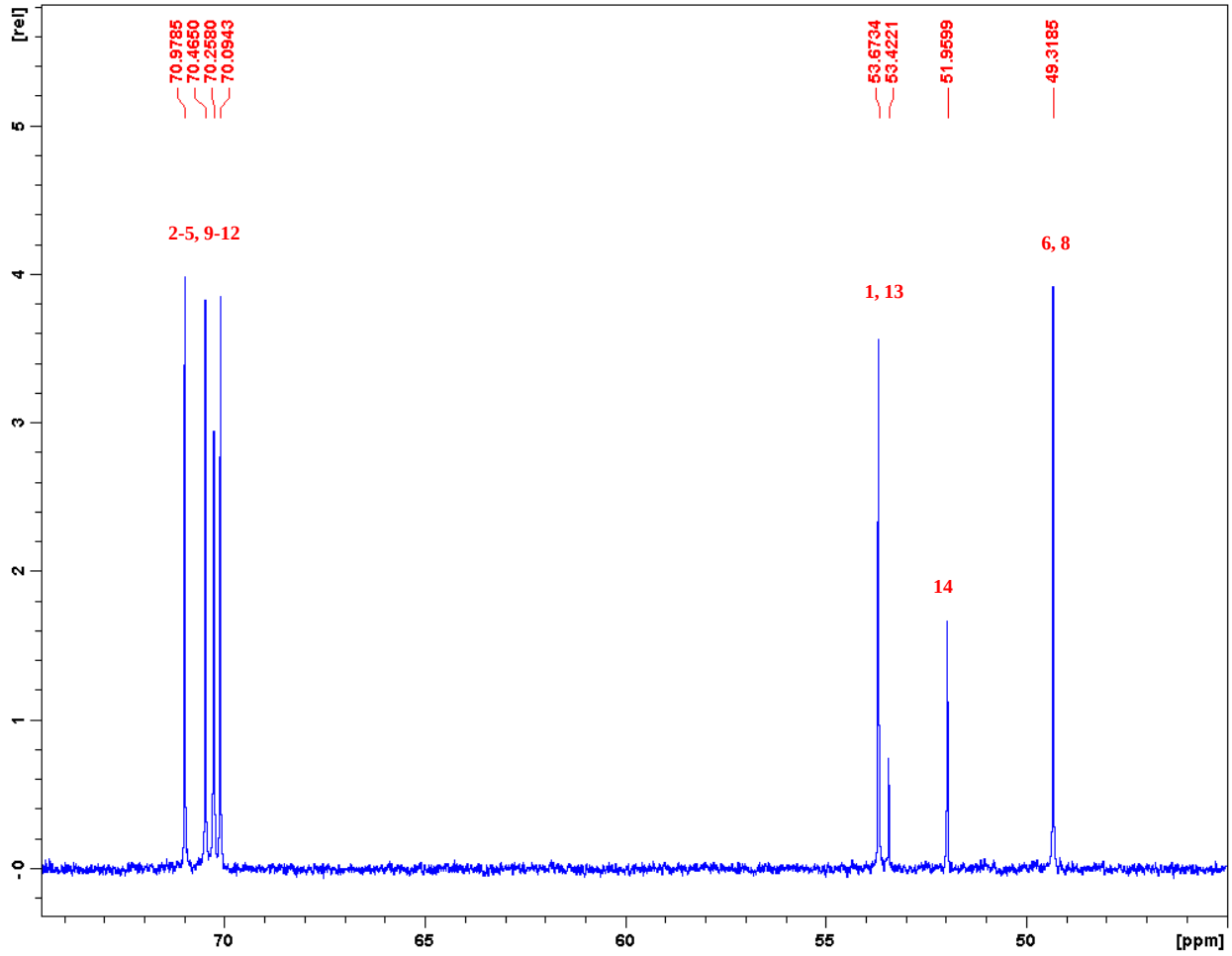


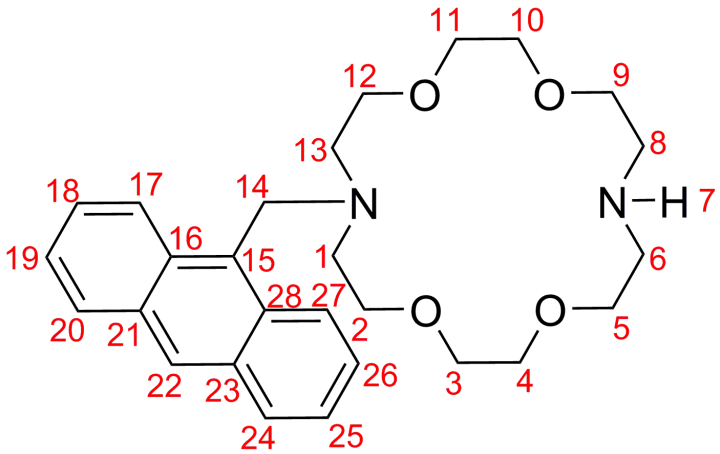
A.44: Expanded ^{13}C NMR of 7-(anthracen-9-ylmethyl)-1,4,10,13-tetraoxa-7,16-diazacyclooctadecane, *Chapter 6*, *Section 6.14*.





A.45: Expanded ^{13}C NMR of 7-(anthracen-9-ylmethyl)-1,4,10,13-tetraoxa-7,16-diazacyclooctadecane, *Chapter 6*, *Section 6.14*.





APPENDIX B:

CURRICULUM VITAE

PETER F. DRISCOLL – CURRICULUM VITAE

EDUCATION

Worcester Polytechnic Institute Worcester, MA
Ph.D. in Chemistry, December 2009
Thesis Title: "Bioanalytical Applications of Chemically Modified Surfaces"
Advisor: W. G. McGimpsey *GPA: 3.9/4.0*

Connecticut College New London, CT
Bachelor of Arts in Chemistry, 2001

EXPERIENCE

Research Assistant, **Worcester Polytechnic Institute** (2004-2009) Worcester, MA
- Utilized innovative surface modification techniques to functionalize metals, glass, and polymers
- Synthesized and fully characterized self-assembled monolayers for applications including controllable surface wettability, nanoscale surface patterning, photovoltaics, and ion sensing
- Designed and built microfluidic sensor devices capable of electrochemical analyte detection
- Integral in maintaining supplies, equipment, instruments, and computers in the research lab as well as supervising and assisting undergraduate students with independent research projects

Teaching Assistant, **Worcester Polytechnic Institute** (2006-2009) Worcester, MA
- Taught organic and general chemistry laboratory sections of 18-24 students
- Responsible for lab preparation, grading, and instrument maintenance

Research Technician, **Lithion, Inc.** (2002-2003) Pawcatuck, CT
- Developed new electrolytes and separators for rechargeable Lithium-ion batteries
- Fabricated Li-ion cells to test and analyze electrolyte, separator, anode, and cathode behavior
- Designed and tested overcharge proof safety systems on large capacity Li-ion cells

Research Assistant, Connecticut College (1999-2001) New London, CT
- Developed new synthetic routes to microporous manganese oxides with different pore sizes for applications in ion storage and exchange

SKILLS

Laboratory
- Experienced in common surface modification and characterization techniques
- Skilled in general organic synthetic and purification methods
- Proficient in manipulation of air-sensitive compounds using glove box/Schlenk line techniques
- Knowledgeable with a variety of analytical laboratory skills and procedures

Instrumental
- NMR (1H, 13C, 19F, COSY), MS, GC, IR, UV/Vis, AA, SEM, Fluorescence
- Electrochemistry including; Cyclic Voltammetry, Impedance Spectroscopy, and Potentiometry
- Surface characterization techniques such as; Contact Angle Goniometry, Ellipsometry, Surface Plasmon Resonance, Quartz Crystal Gravimetry, and Grazing Incidence IR

Computer
- Proficient with Windows operating systems and MS office (Word, Excel, PowerPoint)
- Familiar with a variety of instrument specific software and able to learn new programs quickly

AWARDS

American Institute of Chemists Award for Outstanding Graduate Student in Chemistry (2009)
Backlin Scholarship, Worcester Polytechnic Institute (2009)
Institute Fellowship, Worcester Polytechnic Institute (2004)
Keck Undergraduate Research Grant (2000)

AFFILIATIONS

American Chemical Society, Member (2000 to present)
American Association for the Advancement of Science (2007 to present)

PUBLICATIONS

Driscoll, P. F.; Milkani, E.; Lambert, C. R.; McGimpsey, W. G. "A Multilayered Approach to Complex Surface Patterning." *Langmuir* **2009**, published online November 4, 2009 **DOI:** 10.1021/la902966b.

Bush, K. A.; Driscoll, P. F.; Soto, E. R.; Lambert, C. R.; McGimpsey, W. G.; Pins G. D. "Designing Tailored Biomaterial Surfaces to Direct Keratinocyte Morphology, Attachment, and Differentiation." *J. Biomed. Mater. Res. A.* **2009**, *90A*, 999-1009.

Driscoll, P. F.; Douglass Jr., E. F.; Phewluangdee, M.; Soto, E. R.; Cooper, C. G. F.; MacDonald, J. C.; Lambert, C. R.; McGimpsey, W. G. "Photocurrent Generation in Non-Covalently Assembled Multilayered Thin Films." *Langmuir* **2008**, *24*, 5140-5145.

Douglass Jr., E. F.; Driscoll, P. F.; Lui, D.; Burnham, N. A.; Lambert, C. R.; McGimpsey, W. G. "Effect of Electrode Roughness On the Capacitive Behavior of Self-Assembled Monolayers." *Anal. Chem.* **2008**, *80*, 7670-7677.

McGimpsey, W. G.; Soto, E. R.; Driscoll, P. F.; Nowak, C.; Benco, J. S.; Cooper C. G. F.; Lambert, C. R. "13C-NMR Study of the Monovalent Cation Binding Behavior of a Bicyclic Ionophore." *Magn. Reson. Chem*. **2008**, *46*, 955-961.

Driscoll, P. F.; Purohit, N.; Wanichacheva, N.; Lambert, C. R.; McGimpsey, W. G. "Reversible Photoswitchable Wettability in Non-Covalently Assembled Multilayered Films." *Langmuir* **2007**, *23*, 13181-13187.

Barbarich, T. J.; Driscoll, P. F.; Izquierdo, S.; Zakharov, L. N.; Incarvito, C. D.; Rheingold, A. L. "New Family of Lithium Salts for Highly Conductive Nonaqueous Electrolytes." *Inorg. Chem*. **2004**, *43*, 7764-7773.

Barbarich, T. J.; Driscoll, P. F. "A Lithium Salt of a Lewis Acid-Base Complex of Imidazolide for Lithium-Ion Batteries." *Electrochem. Solid-State Lett*. **2003**, A113-A116.

Ching, S.; Driscoll, P. F.; Kieltyka, K. S.; Marvel, M. R.; Suib, S. L. "Synthesis of a new hollandite-type manganese oxide with framework and interstitial Cr(III)." *Chem. Commun*. **2001**, 2486-2487.

PRESENTATION ABSTRACTS

Gray, M.; Mallen, D.; Driscoll, P. F.; Lambert, C. R.; McGimpsey, W. G. "Directed Neuronal Adhesion and Growth using Self-Assembled Monolayers." *Abstract for poster presentation*, Biomedical Engineering Society Annual Fall Meeting, September 2007, Los Angeles, California.

Bush, K. A.; Driscoll, P.; Soto, E.; McGimpsey, W. G.; Pins, G. D. "Improving Bioengineered Skin Substitutes: Controlling the Extracellular Matrix to Direct Epidermal Regeneration." *Abstract for presentation*, NIH National Graduate Student Research Festival, October 2007, Bethesda, Maryland.

Bush, K. A.; Driscoll, P.; Soto, E.; McGimpsey, W. G.; Pins, G. D. "Improving Bioengineered Skin Substitutes: Controlling the Extracellular Matrix to Direct Epidermal Regeneration." *Abstract for poster presentation*, Methods in Bioengineering, July 2007, Boston, Massachusetts.

McGimpsey, W. G.; Lambert, C. R.; Driscoll, P. F.; Wanichacheva, N; Douglass, E. "Biomedical Applications of Chemically-Modified Materials." *Abstract for poster presentation*, Research Showcase of Research and Educational Partnerships in the Health Care Industry, Presented by the Colleges of Worcester Consortium at Abbott Bioresearch Center, April 2007, Worcester, Massachusetts.

Lambert, C. R.; McGimpsey, W. G.; Soto, E. R.; Wanichacheva, N.; Douglass, E.; Driscoll, P. F. "The Development of a Microfluidic Multianalyte Biomonitor." *Abstract for poster presentation*, American Association of Clinical Chemistry Critical and Point-of-Care Testing Division 21st International Symposium, September, 2006, Quebec City, Quebec.

Driscoll, P. F.; McGimpsey, W. G.; Gatsonis, N. A.; Thompson, R. W. "Investigations of Fluid Confinement and Fluid Movement in Nanodomains." *Abstract for poster presentation*, National Science Foundation Division of Design, Manufacture, and Industrial Innovation 2006 Design, Service, and Manufacturing Grantees and Research Conference, July 2006, St. Louis, Missouri.

McGimpsey, W. G.; Driscoll, P. F.; Soto, E. R.; Lambert, C. R. "A Non-Covalent Multi- Layered Approach to Complex Surface Patterning Using Ultraviolet Light." *Abstract for poster presentation*, Reactive Intermediates in Photochemistry, An International Symposium Celebrating Tito Scaiano's Achievements, August, 2005, Ottawa, Ontario.

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