

PORPHYRIN MODULE

Date	Class	Title	Notes
<i>Experiment 1: Synthesis and Characterization of Porphyrin, a Molecule of Life</i>			
Sep 3, Tue	1	Course Overview: Lab Tour Safety Training E-lab Notebook Chem Databases Overview of Projects Projects Begins: Purification of Chloroform (Distillation)	SciFinder Tutorial ; Web of Science Tutorial ; CSD Tutorial ; Reflux Prac ; Distillation Prac ; Schlenk line ; Freeze-Pump-Thaw ; Why Porphyrins - Photosynthesis ppt Lecture 1: Purification of Chloroform
Sep 5, Thu	2	Purification of Chloroform Continues (Distillation, Freeze-Pump-Thaw)	Experiment 1 Description ; Rotary Evaporation Prac ; Glovebox Prac ; Glovebox Prac1 ; Glovebox Prac2 ; Glovebox Prac3 ; Glovebox Prac4 ; Glovebox Notes ; Schlenk line ; Freeze-Pump-Thaw ; Synthesis of Porphyrinogen ; Synthesis of Porphyrin ; Porphyrinogen Synthesis (short video) ; Porphyrinogen Oxidation (short video) ; Neutralization TEA (short video) Lecture 2: Distillation, Freeze-Pump-Thaw
Sep 10, Tue	3	Porphyrin Synthesis, Workup, and Purification Absorption Spectroscopy	Synthesis of Porphyrinogen (short video) ; Synthesis of Porphyrin (short video) ; Neutralization TEA (short video) UV-vis Spectroscopy ppt ; Uv-vis and Emission Data ; Electronic Spectroscopy Lecture ; UV-vis Prac Mono-Hydroxychlorin Synthesis and Characterization Mono-Hydroxychlorin Supporting Information Proposed Mechanism for Mono-Hydroxychlorin Formation

			Lecture 3: Porphyrinogen and Porphyrin Syntheses Post-lab 1 Due in E-Notebook
Sep 12, Thu	4	Porphyrin Synthesis, Workup, and Purification Absorption Spectroscopy	Synthesis of Porphyrinogen (short video); Synthesis of Porphyrin (short video); Neutralization TEA (short video) UV-vis Spectroscopy ppt; Uv-vis and Emission Data; Electronic Spectroscopy Lecture; UV-vis Prac Mono-Hydroxychlorin Synthesis and Characterization Mono-Hydroxychlorin Supporting Information Proposed Mechanism for Mono-Hydroxychlorin Formation Lecture 3 continues: Porphyrinogen and Porphyrin Syntheses Lecture 4: Purification of Porphyrin and Corrole Post-lab 2 Due in E-Notebook
Characterization of Free Base Porphyrin			
Sep 17, Tue	5	Porphyrin Workup and Purification Continues ^1H , ^{19}F NMR and NMR Facility Visit	Experiment 1 Description, Synthesis of Porphyrinogen ppt, Reflux Prac, Rotary Evaporation Prac; Glovebox Prac; Glovebox Prac1; Glovebox Prac2; Glovebox Prac3; Glovebox Prac4; Glovebox Notes; Distillation Prac; Schlenk line; Synthesis of Porphyrinogen (short video); Synthesis of Porphyrin (short video); Neutralization TEA (short video) Experiment 1 HNMR Data, NMR Prac 1H NMR study questions 1H NMR Problem Set

			Lecture 5 NMR 1H NMR Lecture Post-lab 3 Due in E-Notebook
Sep 19, Thu	6	Porphyrin Workup and Purification Continues ^1H , ^{19}F NMR	Experiment 1 Description , Synthesis of Porphyrinogen ppt , Reflux Prac , Rotary Evaporation Prac ; Glovebox Prac ; Glovebox Prac1 ; Glovebox Prac2 ; Glovebox Prac3 ; Glovebox Prac4 ; Glovebox Notes ; Distillation Prac ; Schlenk line ; Synthesis of Porphyrinogen (short video) ; Synthesis of Porphyrin (short video) ; Neutralization TEA (short video) NMR ppt , Experiment 1 1H NMR Data , NMR Prac 1H NMR study questions Lecture 5 NMR . 1H NMR Lecture Mono-hydroxychlorin text Mono-hydroxychlorin SI Post-lab 4 Due in E-Notebook
Metalloporphyrin Synthesis			
Sep 24, Tue	7	Characterization of TFP and Chlorin	How to use MALDI-TOF Experiment 1 Description Leaves ppt ; Photosynthesis ppt TLC Leaf Prac , Rf Assignment , TLC Spotting Video Lecture 6: Absorption Emission Lecture 7: Metalation of TFP Post-lab 5 Due in E-Notebook
			Experiment 1 Description 1H NMR study Questions-

Sep 26, Thu	8	<p>Metal Insertion [Zn(II)TFP, Ni(II)TFP, Pd(II)TFP]</p> <p>Synthesis of Zn(II)Monohydroxychlorin</p> <p>Synthesis of Pd(II)TFP-(CH₃)₂</p>	<p>Answers: Metalation of TFP</p> <p>Lecture 6: Absorption Emission</p> <p>Lecture 7: Metalation of TFP</p> <p>Lecture 8: Electrochemistry</p> <p>Post-lab 6 Due in E-Notebook</p>
Oct 1, Tue	9	<p>Metal Insertion [Zn(II)TFP, Ni(II)TFP, Pd(II)TFP]</p> <p>Synthesis of Zn(II)Monohydroxychlorin</p> <p>Synthesis of Pd(II)TFP-(CH₃)₂</p>	<p>Cyclic Voltammetry Lecture, Cyclic Voltammetry ppt, Cyclic Voltammetry Prac.</p> <p>Lecture 7: Metalation of TFP</p> <p>Lecture 8: Electrochemistry</p> <p>Post-lab 7 Due in E-Notebook</p>
Oct 3, Thu	10	<ul style="list-style-type: none"> • Prepare NMR samples (1H and 19F) • Take NMR • work up NMR data 	<p>Leaves ppt; Photosynthesis ppt</p> <p>TLC Leaf Prac, Rf Assignment, TLC Spotting Video</p> <p>Post-lab 8 Due in E-Notebook</p>
Oct 8, Tue	11	<p>Characterization of [Zn(II)TFP, Ni(II)TFP, Pd(II)TFP]</p> <p>Synthesis of Zn(II)Monohydroxychlorin</p> <p>Synthesis of Pd(II)TFP-(CH₃)₂</p>	<p>Experiment 1 Description, Metalation of TFP</p> <p>Lecture 7: Metalation of TFP</p> <p>Lecture 9: Mass Spectrometry ppt</p> <p>Mass Spec Prac</p> <p>Post-lab 9 Due in E-Notebook</p>
Characterization of Metalloporphyrins			
Oct 10, Thu	12	<p>[Zn(II)TFP, Ni(II)TFP, Pd(II)TFP]</p> <p>Synthesis of Zn(II)Monohydroxychlorin</p> <p>Synthesis of Pd(II)TFP-(CH₃)₂</p> <p>Crystal Structure Setup</p>	<p>Electronic Spectroscopy Lecture; UV-vis Prac; Photometer "How To" ppt; UV-Vis Photometer Data Workup</p> <p>Lecture 7: Metalation of TFP</p> <p>Post-lab 10 Due in E-</p>

			Notebook
Oct 15, Tue	13	Evans Method Recrystallization of TBAF6P	<u>Evans Method ppt</u> <u>Electronic Spectroscopy</u> Post-lab 11 Due in E- Notebook
Oct 17, Thu	14	Evans Method Taking Emission spectra of [Zn(II)TFP, Ni(II)TFP, Pd(II)TFP] Zn(II)Monohydroxychlorin Pd(II)TFP-(CH ₃) ₂	<u>Evans Method ppt</u> <u>Evans Method;</u> <u>Evans Method Prac; _</u> Post-lab 12 Due in E- Notebook
Oct 22, Tue	15	Extinction Coefficient Determination [Zn(II)TFP, Ni(II)TFP, Pd(II)TFP] Zn(II)Monohydroxychlorin Pd(II)TFP-(CH ₃) ₂	<u>Experiment 1 EPR; _</u> <u>EPR ppt2;</u> <u>EPR Lecture</u> Post-lab 13 Due in E- Notebook
Oct 24, Thu	16	Single X-ray Crystallography X-ray diffraction	<u>X-Ray J Chem Ed 1; X-ray J Chem Ed2; CSD How To; Fundamentals of X-ray Crystallography; X-ray Crystallography ppt2 Chapter 1 Answers Key; X- Ray Crystallography by Wiliam Clegg-Ch01</u> Post-lab 14 Due in E- Notebook
Oct 29, Tue	17	Single X-ray Crystallography X-ray diffraction [Zn(II)TFP, Ni(II)TFP, Pd(II)TFP] Zn(II)Monohydroxychlorin Pd(II)TFP-(CH ₃) ₂	<u>Lecture 8: Electrochemistry</u> Post-lab 15 Due in E- Notebook <u>Mercury "how to"</u> <u>Pt(II)TFP O2 sensing</u>
Oct 31, Thu	18	Cyclic Voltammetry [Zn(II)TFP, Ni(II)TFP, Pd(II)TFP]	<u>Lecture 8: Electrochemistry</u> Post-lab 16 Due in E- Notebook

		Zn(II)Monohydroxychlorin Pd(II)TFP-(CH ₃) ₂	Mercury "how to" Pt(II)TFP O₂ sensing
Nov 5, Tue	19	Electrochemical Proton Reduction with Ni(II)TFP in THF Hydrogen Evolution Reaction (HER) [Zn(II)TFP, Ni(II)TFP, Pd(II)TFP] Pd(II)TFP-(CH ₃) ₂	HER
Nov 7, Thu	20	Electrochemical Proton Reduction with Ni(II)TFP in THF Hydrogen Evolution Reaction (HER) [Zn(II)TFP, Ni(II)TFP, Pd(II)TFP] Pd(II)TFP-(CH ₃) ₂	HER ACS Omega-Synthesis of TFP
<i>Manuscript Writing</i>			
Nov 12, Tue	21	Electrochemical Proton Reduction control experiments Paper-Writing Guide	
Nov 14, Thu	22	Paper Writing Continues	Paper-Writing Guide ACS Omega-Synthesis of TFP
Nov 19, Tue	23	Paper Writing Continues	Paper-Writing Guide ACS Omega-Synthesis of TFP
Nov 21, Thu	24	Thanksgiving Recess - No Class	Paper-Writing Guide ACS Omega-Synthesis of TFP
Nov 26, Tue	25	Finalize Manuscript, Lab Cleanup, Inventory	Paper-Writing Guide ACS Omega-Synthesis of TFP
Nov 28, Thu		No Class -University Holiday: Thanksgiving Recess Begins	Finalize Manuscript, Lab Cleanup, Inventory
Dec 3, Tue	26	Finalize Manuscript, Lab Cleanup, Inventory	Finalize Manuscript, Lab Cleanup, Inventory

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