

Cal Poly Pomona, CHM 422/422L, Dr. Laurie S. Starkey

Experimental Organic Chemistry, 2nd Ed., by Harwood & Moody

Experimental Organic Chemistry is a very useful textbook that contains lots of great information. To help make the most of this book as a valuable resource, following is an index to the topics covered. Take some time to familiarize yourself with these topics so you know what is available. You are expected to refer to the appropriate sections in preparation for each laboratory experiment.

Chapter 1: Safety in the Chemical Laboratory

- 3 Essential rules
- 6 Hazardous chemicals
- 10 Disposal of hazardous waste
- 11 Accident procedures

Chapter 2: Glassware and Equipment in the Laboratory

- 15 Introduction
- 16 Glassware
- 23 Hardware
- 25 Heating: burners, baths, heating mantles, hot plates, heating guns
- 33 Stirring: magnetic stirrers, mechanical stirrers
- 36 Vacuum pumps: water aspirator, oil immersion rotary vacuum pump, manometers
- 46 Manometers and Pressure regulation
- 49 Rotary evaporator (Rotovap)
- 54 Catalytic hydrogenation
- 57 Ozonolysis
- 59 Irradiation, Photolysis
- 64 Compressed gases: cylinders, regulators

Chapter 3: Organic Reactions: from Starting Materials to Pure Organic Product

3.1 Handling Chemicals

- 69 Safety
- 70 Measuring and transferring chemicals
- 74 Filtration
- 79 Air and moisture-sensitive compounds: syringe techniques, drying apparatus and solvents, inert atmosphere, transferring reagents

3.2 The Reaction

- 91 Assembling the apparatus: stirring, addition funnels, inert atmosphere, heating, continuous removal of water (Dean-Stark trap), addition of gases, liquid ammonia
- 105 Temperature control
- 108 Following the progress of a reaction
- 109 Reaction workup: isolation of product, use of separatory funnel, microscale extraction

3.3 Purification of Organic Compounds

- 118 Extraction: aqueous-organic, acid-base-neutral, solids
- 130 Drying organic solutions
- 131 Crystallization
- 140 Drying solids
- 143 Distillation theory
- 146 Simple distillation, Distilling solvents

- 148 Fractional distillation
- 152 Vacuum distillation, Short path distillation (Kugelrohr)
- 155 Steam distillation
- 158 Microscale distillation
- 159 Sublimation
- 160 Chromatography theory
 - 165 Thin layer chromatography (TLC), common stains p 170
 - 175 Gravity column chromatography
 - 180 Flash column chromatography
 - 184 Dry flash column chromatography
 - 188 High performance liquid chromatography (HPLC)
 - 191 Gas chromatography (GC)

Chapter 4: Qualitative Analysis of Organic Compounds

4.1 Purity

- 204 Introduction, safety
- 206 Melting point determination
- 213 Boiling point determination
- 218 Refractive index
- 220 Specific rotation
- 223 Chromatography: TLC, GC

4.2 Structure Determination

- 226 Introduction to qualitative analysis, sodium fusion (elemental analysis)
- 235 Functional group tests
- 247 Reaction TLC (RTLC): small scale derivatives as FG tests
- 252 Preparation of derivatives

Chapter 5: Spectroscopic Analysis of Organic Compounds

- 276 **5.1** Absorption spectroscopy
- 278 **5.2** Infrared (IR) spectroscopy and IR spectrometer
 - 280 Sample preparation
 - 287 Running a spectrum and Interpreting IR spectra (correlation tables on pp 684–686)
- 306 **5.3** Nuclear magnetic resonance spectroscopy (NMR)
 - 310 Sample preparation and acquisition of spectra
 - 314 Interpreting NMR spectra (correlation tables on pp 687–690)
 - 341 ¹³C NMR
 - 345 Special topics
- 256 **5.4** Ultraviolet spectroscopy (UV) (correlation tables on pp 691–693)
- 373 **5.5** Mass spectrometry (MS) (correlation tables on pp 694–696)

Chapter 6: Keeping Records: the Laboratory Notebook & the Chemical Literature

- 398 Laboratory notebook, reporting spectroscopic data, calculating yields, data, refs
- 408 Research reports
- 411 Chemical literature (journal titles and abbreviations, p 413)

Appendix 1: Hazardous Properties of Common Chemicals, pp 669–676

Appendix 2: Organic Solvents: Properties and Purification, pp 677–682