This laboratory manual originated from eighteen years of teaching the class Inorganic preparations, which follows the Descriptive Inorganic Chemistry course in the Inorganic Chemistry curriculum of Missouri State University. Both courses are designed for chemistry majors. They represent a logical progression and harmonic combination of theoretical background in the discipline at first, with enhancement and retention of gained knowledge during following experimental laboratory work.

This course is designed for lab sessions of four hours each. The book provides an extensive and necessary introduction for students to typical glassware and lab equipment (labware) which are normally used in the synthetic chemistry laboratory. This introduction is followed by a brief description of the main laboratory procedures and operations that are essential for safe and productive laboratory work. These were limited to: filtration, extraction, distillation and reflux, work with vacuum, anaerobic/moisture free procedures, flash column and preparative thinlayer chromatography, and products recovery from solutions. *In this context it is very important to note that this laboratory manual is neither intended to promote or advertise any of the equipment brands and their manufacturers, nor it is intended to show off, or brag about the laboratory capabilities that exist at the authors' institutions!* In fact, the glassware, apparatuses and equipment used in this book fit very well into the average teaching and research facilities typical of numerous institutions of higher education around the world. Moreover, during the description of laboratory glassware, hardware and laboratory methods at the beginning of this manual, special attention is drawn to inexpensive alternative solutions when building equipment for common procedures, as well as to cost-saving lab techniques.

All preparative experiments are designed for the synthesis of grams' quantities of compounds. This ensures students' satisfaction with the whole process of the synthesis, work-up procedures and post-lab handling of substances, many of which will be further studied. This manual is heavily illustrated with 224 figures, 12 schemes and 20 tables, to aid students in carrying out all experiments and to help them learn laboratory step with a new and younger generation of visual learners, who, in the digital age of the internet and mobile devises, truly value the old sentiment that 'a picture is better than a thousand words'. Almost all illustrative material was produced by the authors, taking photographs from actual lab equipment and setups, or making drawings using freely available software.

Before the description of many experiments and characterizations of the obtained compounds, there are brief and condensed sections of theoretical background information. These allow the reader to get familiar with the topic that follows. Thus, the following physical methods and techniques are presented in these short introductory sections:

- thermal analysis,
- X-ray diffraction methods,
- molecular weight determination - cryoscopic measurements,
- cyclic voltammetry measurements in solutions,

 solutions electrical conductivity measurements,
 magnetochemistry in solid state and in solution,
 spectroscopy (vibrational, electronic, ^{1}H and ^{13}C NMR).

The concept of indirect learning has been used by authors for many years. In our academic settings, that means splitting a class of students into two equal groups, both of which conduct the same kind of experimental preparations, but use different compounds and some alternative work-up and samples handling details. There are laboratory exercises with extensions A, B, or C. Being in the same laboratory for four hours, students, in an indirect way, learn what their peers in the other group are working on. All experiments are presented in clear, step-by-step fashion to help students to carry out particular syntheses, conduct important procedures, and accomplish necessary measurements. All sections in the book are supplied with appropriate literature references for the reader interested in further learning.

During the course of these lab experiments, suitable single crystals of several compounds were grown by students, and subsequently characterized using the X-ray analysis. The main results of this work are presented and discussed in this manual, with all CIFs for five determined structures deposited into the Cambridge Crystallographic Data Center (CCDC). Therefore, a combination of specially selected series' of experiments, with alternative lab work, accompanied with paragraphs of short and concise theoretical background, and detailed examples of calculations, make this book truly unique in the modern academic environment. This book also can be a useful reference for other synthetic chemists not limited to the inorganic/coordination chemistry field, who will be interested in the interpretation of vibrational, electronic, and - more importantly – 1D and 2D NMR spectra.

In summary, according to numerous students' feedback and evaluations, it is engaging, very intense, and yet likeable, and is considered to be a useful class. It has been a popular laboratory course, with 120+ chemistry majors who have enjoyed taking it, thus far.