

CHEM 141 Fall 2015

Lewis Structure Fundamentals

In previous lessons, we have investigated the **composition** of chemical compounds; that is, which elements are present in each, and in what atomic proportions. Knowledge of the chemical formula for a compound is important, but it is not the whole story in determining the identity of a compound (many may have the same chemical formula as one another!) or in predicting the properties of a compound. For a complete picture, we want to know not just the composition of a compound, but also its **constitution**; that is, which specific atoms are chemically bonded to one another in a molecule of the compound. There are many ways to represent the constitution of a compound; we will start in this course with the Lewis structure (named after Gilbert N. Lewis, who originated the idea of the covalent bond as a way for atoms to complete their valence electron shells without forming ions). The Lewis structure is the most detailed structural convention that chemists tend to use – the position of every atom and every valence electron (whether bonding or non-bonding) is accounted for explicitly, as are any non-zero formal charges present in the molecule. In this exercise, we will practice drawing reasonable Lewis structures for a variety of compounds.

Some general tips for drawing Lewis structures consisting mostly of p-block elements are as follows:

1. Count the valence electrons in the compound based on the chemical formula and the number of valence electrons each neutral atom should contribute.
 - Adjust our valence electron count appropriately if your compound is charged. Add one electron for a negative charge, and subtract one for a positive charge.
2. Draw a reasonable skeletal structure showing which atoms are connected to one another, using single bonds only.
 - Elements with lower group number or lower electronegativity tend to be central atoms.
 - Hydrogen atoms are virtually always terminal atoms, because they can only accommodate two electrons (a single bond).
 - Subtract the number of electrons in your skeletal structure (two for each bond) from the total number of valence electrons you have to work with to see how many remain.
3. Add electrons to peripheral atoms to complete their octets.
 - Subtract the number of electrons added in this way from your electron tally.
 - If you still have valence electrons that need placing, add them to the central atom.
4. Once all valence electrons have been accounted for, check that all atoms have complete valence shells (duets for hydrogen, octets for other p-block elements).
 - If any atom does not have a complete octet, you might need to use lone pairs on adjacent atoms to form double or triple bonds to complete the valence shell.

Give it a try! Go through the process with the compound phosphorus trifluoride (PF_3).

PF_3 : Total Valence Electrons: 26

Skeletal Structure	Complete Peripheral Octets	Final Structure
Valence Electrons Remaining: 20	Valence Electrons Remaining: 2	Valence Electrons Remaining: ZERO

Lab Manual Answer Key Chem 141

Frank R. Spellman



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Laboratory Manual of Pharmaceutical Chemistry Dr. Remeth J. Dias, Dr. Prashant D. Aragade, Mr. Sushant Sudhir Pande, 2023-09-28 We are very pleased to put forth the revised edition of Laboratory Manual of Pharmaceutical chemistry We have incorporated all the suggestions modified it to make it easier student friendly and relevant in terms of achieving curriculum outcome We are very much thankful to all the learned teachers who have given their feedback whole heartedly We have even incorporated the changes in this manual based on the feedback given by the teachers from all the institutes Now we believe that the manual has been fulfilling the aspirations of Pharmacotherapeutics teachers and students too This manual is prepared as per PCI Education Regulations 2020 for Diploma Course in Pharmacy The methods of all the experiments are reviewed and added from the recent research papers so that the advancement in the methods or apparatus can be addressed This manual is designed for outcome based education and each experiment is arranged in a uniform way such as practical significance practical outcomes PrOs and its mapping with course outcomes minimum theoretical background resources used procedure precautions observations result conclusion references and related questions Moreover assessment scheme is also given to help the student and teacher to know what to be assessed Each experiment offers an opportunity to perform practical work allowing students to gain proficiency in effectively managing equipment handling glassware chemicals and reagents and writing analytical reports In addition questions are provided at the end of the experiments to enhance students knowledge which will be beneficial for them as they pursue higher studies We hope that this manual will assist students in understanding concepts principles and performing procedures We wish you all the best

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Lab Manual London, Jim Stone, 2000-10 **The Pharmaceutical Era**, 1920 *A Laboratory Manual of Physics for Use in High Schools* Henry Crew, Robert Richardson Tatnall, 1902 *Mathematics Manual for Water and Wastewater Treatment Plant Operators: Wastewater Treatment Operations* Frank R. Spellman, 2023-07-31 To properly operate a waterworks or wastewater treatment plant and to pass the examination for a waterworks wastewater operator's license it is necessary to know how to perform certain calculations All operators at all levels of licensure need a basic understanding of arithmetic and problem solving techniques to solve the problems they typically encounter in the workplace Hailed on its first publication as a masterly account written in an engaging highly readable user friendly style the fully updated Mathematics Manual for Water and Wastewater Treatment Plant Operators Wastewater Treatment Operations covers all the necessary computations used in wastewater treatment today It presents math operations that progressively advance to higher more practical applications including math operations that operators at the highest level of licensure would be expected to know and perform Features Provides a strong foundation based on theoretical math concepts which it then applies to solving practical

problems for both water and wastewater operations Updated throughout and with several new practical problems added Provides illustrative examples for commonly used waterworks and wastewater treatment operations covering unit process operations found in today's treatment facilities **Reference Catalogue of Current Literature** ,1920 **Industrial Arts Index** ,1928 **Introduction to Chemistry, Laboratory Manual** T. R. Dickson,1994-12-23 Teaches chemistry by offering a dynamic provocative and relevant view of the topic and its importance to society and our daily lives Three themes are stressed throughout the text developing chemical thinking and a chemical vision learning problem solving methods and utilizing group work and discussion activities These themes involve and engage the students in their own learning processes they are challenged to be active The presentation of topics has been altered to include a new chapter which introduces the students to scientific thinking and shows that chemistry involves interesting and relevant topics The reorganization presents many core concepts in the first five chapters preparing students for later chapters In addition the author has added vignettes throughout the chapters referring to health technology the environment and society as well as to specific tools of direct use to students **The Chemical News and Journal of Physical Science** ,1864 *Tietz Textbook of Clinical Chemistry and Molecular Diagnostics - E-Book* Carl A. Burtis,Edward R. Ashwood,David E. Bruns,2011-12-16 As the definitive reference for clinical chemistry Tietz Textbook of Clinical Chemistry and Molecular Diagnostics 5th Edition offers the most current and authoritative guidance on selecting performing and evaluating results of new and established laboratory tests Up to date encyclopedic coverage details everything you need to know including analytical criteria for the medical usefulness of laboratory procedures new approaches for establishing reference ranges variables that affect tests and results the impact of modern analytical tools on lab management and costs and applications of statistical methods In addition to updated content throughout this two color edition also features a new chapter on hemostasis and the latest advances in molecular diagnostics Section on Molecular Diagnostics and Genetics contains nine expanded chapters that focus on emerging issues and techniques written by experts in field including Y M Dennis Lo Rossa W K Chiu Carl Wittwer Noriko Kusukawa Cindy Vnencak Jones Thomas Williams Victor Weedn Malek Kamoun Howard Baum Angela Caliendo Aaron Bossler Gwendolyn McMillin and Kojo S J Elenitoba Johnson Highly respected author team includes three editors who are well known in the clinical chemistry world Reference values in the appendix give you one location for comparing and evaluating test results NEW Two color design throughout highlights important features illustrations and content for a quick reference NEW Chapter on hemostasis provides you with all the information you need to accurately conduct this type of clinical testing NEW Six associate editors lend even more expertise and insight to the reference NEW Reorganized chapters ensure that only the most current information is included Resources in Education ,1999-04 Chemical News and Journal of Physical Science ,1860 Chemical News and Journal of Industrial Science ,1918 **Regulation of Antibiotic Production in Actinomycetes** Yvonne Mast,Evi Stegmann,Yinhua Lu,2020-09-08 This eBook is a collection of articles from a Frontiers

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