

# Polyatomic Ions

Can a group of atoms have a charge?

## Why?

Do you know you eat a lot of "-ates"? Next time you look at a food label, read the ingredients and you will likely find a number of ingredients that end with "-ate," such as sodium phosphate or calcium carbonate. Did you ever wonder what the chemical formulas of these ingredients look like? In this activity we will explore polyatomic ions, which are groups of atoms that carry a charge. These ions are found in our food ingredients, natural waterways, and many other chemical compounds you encounter every day.

## Model 1 – Types of Ions

Monatomic Ions	Nitride 	Sulfide 	Chloride 
Polyatomic Ions	Nitrate 	Sulfate 	Ammonium 
	Nitrite 	Sulfite 	Hydroxide 

1. Use Model 1 to complete the table below.

Name of Ion	Nitride	Nitrate	Sulfate	Sulfite	Ammonium
Charge on Ion	-3	-1	-2	-2	+1
Type and Number of Atoms	1 nitrogen	1 nitrogen 3 oxygen	1 sulfur 4 oxygen	1 sulfur 3 oxygen	1 nitrogen 4 hydrogen
Chemical Formula	$N^{3-}$	$NO_3^{1-}$	$SO_4^{2-}$	$SO_3^{2-}$	$NH_4^{1+}$

# Polyatomic Ions Pogil

**SJ Ball**



## **Polyatomic Ions:**

**Polyatomic Ions for Surface Analysis and Modification** Erick Ryan Fuoco, 2003      Standard Thermodynamic Functions of Gaseous Polyatomic Ions at 100-1000 K Aharon Loewenschuss, Y. Marcus, 1987      **Fragmentation of Diatomic and Polyatomic Ions in the Gas Phase** Christopher John Proctor, 1981      **Unimolecular and Collision-induced Dissociation Study of Polyatomic Ions at High Collision Energy** Xuedong Zhou, 2001

**Investigations Into the Origins of Polyatomic Ions in Inductively Coupled Plasma-mass Spectrometry**, 2010 An inductively coupled plasma mass spectrometer ICP MS is an elemental analytical instrument capable of determining nearly all elements in the periodic table at limits of detection in the parts per quadrillion and with a linear analytical range over 8 to 10 orders of magnitude. Three concentric quartz tubes make up the plasma torch. Argon gas is spiraled through the outer tube and generates the plasma powered by a looped load coil operating at 27.1 or 40.6 MHz. The argon flow of the middle channel is used to keep the plasma above the innermost tube through which solid or aqueous sample is carried in a third argon stream. A sample is progressively desolvated, atomized, and ionized. The torch is operated at atmospheric pressure. To reach the reduced pressures of mass spectrometers, ions are extracted through a series of two approximately one millimeter wide circular apertures set in water-cooled metal cones. The space between the cones is evacuated to approximately one torr. The space behind the second cone is pumped down to or near to the pressure needed for the mass spectrometer. The first cone, called the sampler, is placed directly in the plasma plume and its position is adjusted to the point where atomic ions are most abundant. The hot plasma gas expands through the sampler orifice and in this expansion is placed the second cone, called the skimmer. After the skimmer, traditional MS designs are employed, i.e., quadrupoles, magnetic sectors, time-of-flight. ICP MS is the leading trace element analysis technique. One of its weaknesses is polyatomic ions. This dissertation has added to the fundamental understanding of some of these polyatomic ions, their origins, and behavior. Although mainly continuing the work of others, certain novel approaches have been introduced here. Chapter 2 includes the first reported efforts to include high temperature corrections to the partition functions of the polyatomic ions in ICP MS. This and other objections to preceding papers in this area were addressed. Errors in the measured  $T_{\text{sub}}$  gas values were found for given errors in the experimental and spectroscopic values. The ionization energy of the neutral polyatomic ion was included in calculations to prove the validity of ignoring more complicated equilibria. Work was begun on the question of agreement between kinetics of the plasma and interface and the increase and depletion seen in certain polyatomic ions. This dissertation was also the first to report day-to-day ranges for  $T_{\text{sub}}$  gas values and to use a statistical test to compare different operating conditions. This will help guide comparisons of previous and future work. Chapter 4 was the first attempt to include the excited electronic state 2 in the partition function of ArO, as well as the first to address the different dissociation products of the ground and first electronic levels of ArO. Chapter 5 reports an interesting source of memory in ICP MS that could affect

mathematical corrections for polyatomic ions For future work on these topics I suggest the following experiments and investigations Clearly not an extensive list they are instead the first topics curiosity brings to mind

- 1 Measurement of T sub gas values when using the flow injection technique of Appendix B It was believed that there was a fundamental difference in the plasma when the auto sampler was used versus a continuous injection Is this reflected in T sub gas values
- 2 The work of Chapter 3 can be expanded and supplemented with more trials new cone materials i e copper stainless steel and more cone geometries Some of this equipment is already present in the laboratory others could be purchased or made
- 3 T sub gas values from Chapter 3 could be correlated with instrument pressures during the experiment Pressures after the skimmer cone were recorded for many days but have yet to be collated with the measured T sub gas values
- 4 The work in Chapter 5 could be expanded to include more metals Does the curious correlation between measured T sub gas and element boiling point persist
- 5 Investigate non linear correlations to T sub gas values of the MO memory in Chapter 5 Temperatures along the skimmer walls are not a linear gradient Ring deposits have been observed on the cone and photographs of the interface show light intensities shaping a sort of tailing peak along the outside skimmer wall Is there a physical property of the metals or metal oxides that would give this peak with the T sub gas values
- 6 Chemical state speciation of the metal deposits on the skimmers of Chapter 5 There may be a more logical correlation between Tgas and a physical property of the deposit ing chemical if all the metals do not deposit in the same form
- 7 A collaboration with our computational colleagues would be most welcome Newer calculations for ArO and RuO would be very helpful

**Fragmentation of Diatomic and Polyatomic Ions in the Gas Phase** Christopher John Proctor,1981      **The Particulate Nature of Polyatomic Ions** ,2007

**Investigations Into the Origins of Polyatomic Ions in Inductively Coupled Plasma-mass Spectrometry** Sally M. McIntyre,2010      **High Resolution Studies of the Origins of Polyatomic Ions in Inductively Coupled Plasma-Mass Spectrometry** Jill Wisnewski Ferguson,2006 The inductively coupled plasma ICP is an atmospheric pressure ionization source Traditionally the plasma is sampled via a sampler cone A supersonic jet develops behind the sampler and this region is pumped down to a pressure of approximately one Torr A skimmer cone is located inside this zone of silence to transmit ions into the mass spectrometer The position of the sampler and skimmer cones relative to the initial radiation and normal analytical zones of the plasma is key to optimizing the useful analytical signal

- 1 The ICP both atomizes and ionizes the sample Polyatomic ions form through ion molecule interactions either in the ICP or during ion extraction l Common polyatomic ions that inhibit analysis include metal oxides MO sup adducts with argon the gas most commonly used to make up the plasma and hydride species While high resolution devices can separate many analytes from common interferences this is done at great cost in ion transmission efficiency a loss of 99% when using high versus low resolution on the same instrument
- 2 Simple quadrupole devices which make up the bulk of ICP MS instruments in existence do not present this option Therefore if the source of polyatomic interferences can be determined and then manipulated this could potentially improve the figures

of merit on all ICP MS devices not just the high resolution devices often utilized to study polyatomic interferences

**Dissociative Recombination of Polyatomic Ions** David R. Bates, Queen's University of Belfast. Department of Applied Mathematics and Theoretical Physics, 1991      Structure of Free Polyatomic Molecules Kozo Kuchitsu, 2013-03-09 This

volume Structure of Free Polyatomic Molecules Basic Data contains frequently used data from the corresponding larger Landolt B r nstein handbooks in a low price book for the individual scientists working in the laboratory Directories link to the more complete volumes in the library The book contains important information about a large number of semiconductors

Energy Partitioning and Timescales for the Surface-induced Dissociation of Polyatomic Ions David Garrett Schultz, 1999

**Surface-induced Dissociation of Polyatomic Ions** Ashok Ramesh Dongre, 1996      *Sputtering of Indium Under Polyatomic Ion Bombardment* Andrey V. Samartsev, 2004      Structure Data of Free Polyatomic Molecules K.

Kuchitsu, 1995-11-27 Since the publication of Volumes II 7 in 1976 and its supplements II 15 in 1987 and II 21 in 1992 the information on the structure of free molecules in the ground state and in excited electronic states has increased considerably Therefore this volume II 23 contains data from 148 inorganic and 498 organic polyatomic free molecules including free radicals and molecular ions published between 1990 and 1993 inclusively and a small number of structures published 1994 All experimental methods for the determination of structural data of free molecules have been considered all data obtained by these methods have been critically evaluated and compiled The structural data for more than 3400 polyatomic free molecules can be completely surveyed and easily retrieved by means of this volume      *Polyatomic Ion Impact on Solids and*

*Related Phenomena* Y Le Beyec, Y Hoppilliard, H Bernas, 1994      **Experimental Studies of Polyatomic Ion Interactions**

**with Clean and Adsorbate Covered Metal Surfaces** Samuel B. Wainhaus, 1997      **Polyatomic Ion-surface**

**Interactions** Luke Hanley, 1998      **Special issue polyatomic ion surface interactions** Luke Hanley, 1998

**Modification of Polymeric and Organic Surfaces by Low Energy Atomic and Polyatomic Ions** Earl T. Ada, 1998

## Whispering the Techniques of Language: An Psychological Journey through **Polyatpmic Ions Pogil**

In a digitally-driven world where monitors reign great and instant interaction drowns out the subtleties of language, the profound secrets and psychological nuances concealed within phrases usually move unheard. However, situated within the pages of **Polyatpmic Ions Pogil** a charming fictional value pulsing with natural emotions, lies an exceptional quest waiting to be undertaken. Published by a skilled wordsmith, this enchanting opus attracts readers on an introspective trip, lightly unraveling the veiled truths and profound impact resonating within ab muscles material of each and every word. Within the mental depths of the moving review, we can embark upon a sincere exploration of the book is core styles, dissect their fascinating publishing type, and succumb to the powerful resonance it evokes strong within the recesses of readers hearts.

[https://crm.avenza.com/public/Resources/Download\\_PDFS/service%20manual%2089%20kz1.pdf](https://crm.avenza.com/public/Resources/Download_PDFS/service%20manual%2089%20kz1.pdf)

### **Table of Contents Polyatpmic Ions Pogil**

1. Understanding the eBook Polyatpmic Ions Pogil
  - The Rise of Digital Reading Polyatpmic Ions Pogil
  - Advantages of eBooks Over Traditional Books
2. Identifying Polyatpmic Ions Pogil
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Polyatpmic Ions Pogil
  - User-Friendly Interface
4. Exploring eBook Recommendations from Polyatpmic Ions Pogil
  - Personalized Recommendations
  - Polyatpmic Ions Pogil User Reviews and Ratings

- Polyatpmic Ions Pogil and Bestseller Lists
- 5. Accessing Polyatpmic Ions Pogil Free and Paid eBooks
  - Polyatpmic Ions Pogil Public Domain eBooks
  - Polyatpmic Ions Pogil eBook Subscription Services
  - Polyatpmic Ions Pogil Budget-Friendly Options
- 6. Navigating Polyatpmic Ions Pogil eBook Formats
  - ePub, PDF, MOBI, and More
  - Polyatpmic Ions Pogil Compatibility with Devices
  - Polyatpmic Ions Pogil Enhanced eBook Features
- 7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Polyatpmic Ions Pogil
  - Highlighting and Note-Taking Polyatpmic Ions Pogil
  - Interactive Elements Polyatpmic Ions Pogil
- 8. Staying Engaged with Polyatpmic Ions Pogil
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Polyatpmic Ions Pogil
- 9. Balancing eBooks and Physical Books Polyatpmic Ions Pogil
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Polyatpmic Ions Pogil
- 10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
- 11. Cultivating a Reading Routine Polyatpmic Ions Pogil
  - Setting Reading Goals Polyatpmic Ions Pogil
  - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Polyatpmic Ions Pogil
  - Fact-Checking eBook Content of Polyatpmic Ions Pogil
  - Distinguishing Credible Sources

13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
14. Embracing eBook Trends
  - Integration of Multimedia Elements
  - Interactive and Gamified eBooks

### **Polyatpmic Ions Pogil Introduction**

Polyatpmic Ions Pogil Offers over 60,000 free eBooks, including many classics that are in the public domain. Open Library: Provides access to over 1 million free eBooks, including classic literature and contemporary works. Polyatpmic Ions Pogil Offers a vast collection of books, some of which are available for free as PDF downloads, particularly older books in the public domain. Polyatpmic Ions Pogil : This website hosts a vast collection of scientific articles, books, and textbooks. While it operates in a legal gray area due to copyright issues, its a popular resource for finding various publications. Internet Archive for Polyatpmic Ions Pogil : Has an extensive collection of digital content, including books, articles, videos, and more. It has a massive library of free downloadable books. Free-eBooks Polyatpmic Ions Pogil Offers a diverse range of free eBooks across various genres. Polyatpmic Ions Pogil Focuses mainly on educational books, textbooks, and business books. It offers free PDF downloads for educational purposes. Polyatpmic Ions Pogil Provides a large selection of free eBooks in different genres, which are available for download in various formats, including PDF. Finding specific Polyatpmic Ions Pogil, especially related to Polyatpmic Ions Pogil, might be challenging as theyre often artistic creations rather than practical blueprints. However, you can explore the following steps to search for or create your own Online Searches: Look for websites, forums, or blogs dedicated to Polyatpmic Ions Pogil, Sometimes enthusiasts share their designs or concepts in PDF format. Books and Magazines Some Polyatpmic Ions Pogil books or magazines might include. Look for these in online stores or libraries. Remember that while Polyatpmic Ions Pogil, sharing copyrighted material without permission is not legal. Always ensure youre either creating your own or obtaining them from legitimate sources that allow sharing and downloading. Library Check if your local library offers eBook lending services. Many libraries have digital catalogs where you can borrow Polyatpmic Ions Pogil eBooks for free, including popular titles. Online Retailers: Websites like Amazon, Google Books, or Apple Books often sell eBooks. Sometimes, authors or publishers offer promotions or free periods for certain books. Authors Website Occasionally, authors provide excerpts or short stories for free on their websites. While this might not be the Polyatpmic Ions Pogil full book , it can give you a taste of the authors writing style. Subscription Services Platforms like Kindle Unlimited or Scribd offer subscription-based access to a wide range of Polyatpmic Ions Pogil eBooks, including some popular titles.



## **FAQs About Polyatpmic Ions Pogil Books**

How do I know which eBook platform is the best for me? Finding the best eBook platform depends on your reading preferences and device compatibility. Research different platforms, read user reviews, and explore their features before making a choice. Are free eBooks of good quality? Yes, many reputable platforms offer high-quality free eBooks, including classics and public domain works. However, make sure to verify the source to ensure the eBook credibility. Can I read eBooks without an eReader? Absolutely! Most eBook platforms offer webbased readers or mobile apps that allow you to read eBooks on your computer, tablet, or smartphone. How do I avoid digital eye strain while reading eBooks? To prevent digital eye strain, take regular breaks, adjust the font size and background color, and ensure proper lighting while reading eBooks. What the advantage of interactive eBooks? Interactive eBooks incorporate multimedia elements, quizzes, and activities, enhancing the reader engagement and providing a more immersive learning experience. Polyatpmic Ions Pogil is one of the best book in our library for free trial. We provide copy of Polyatpmic Ions Pogil in digital format, so the resources that you find are reliable. There are also many Ebooks of related with Polyatpmic Ions Pogil. Where to download Polyatpmic Ions Pogil online for free? Are you looking for Polyatpmic Ions Pogil PDF? This is definitely going to save you time and cash in something you should think about. If you trying to find then search around for online. Without a doubt there are numerous these available and many of them have the freedom. However without doubt you receive whatever you purchase. An alternate way to get ideas is always to check another Polyatpmic Ions Pogil. This method for see exactly what may be included and adopt these ideas to your book. This site will almost certainly help you save time and effort, money and stress. If you are looking for free books then you really should consider finding to assist you try this. Several of Polyatpmic Ions Pogil are for sale to free while some are payable. If you arent sure if the books you would like to download works with for usage along with your computer, it is possible to download free trials. The free guides make it easy for someone to free access online library for download books to your device. You can get free download on free trial for lots of books categories. Our library is the biggest of these that have literally hundreds of thousands of different products categories represented. You will also see that there are specific sites catered to different product types or categories, brands or niches related with Polyatpmic Ions Pogil. So depending on what exactly you are searching, you will be able to choose e books to suit your own need. Need to access completely for Campbell Biology Seventh Edition book? Access Ebook without any digging. And by having access to our ebook online or by storing it on your computer, you have convenient answers with Polyatpmic Ions Pogil To get started finding Polyatpmic Ions Pogil, you are right to find our website which has a comprehensive collection of books online. Our library is the biggest of these that have literally hundreds of thousands of different products represented. You will also see that there are specific sites catered to different categories or niches related with Polyatpmic Ions Pogil So depending on what exactly you are searching, you will be able to choose ebook to suit your own need. Thank you for reading Polyatpmic Ions

Pogil. Maybe you have knowledge that, people have search numerous times for their favorite readings like this Polyatpmic Ions Pogil, but end up in harmful downloads. Rather than reading a good book with a cup of coffee in the afternoon, instead they juggled with some harmful bugs inside their laptop. Polyatpmic Ions Pogil is available in our book collection an online access to it is set as public so you can download it instantly. Our digital library spans in multiple locations, allowing you to get the most less latency time to download any of our books like this one. Merely said, Polyatpmic Ions Pogil is universally compatible with any devices to read.

### **Find Polyatpmic Ions Pogil :**

~~service manual 89 kz1000~~

~~service manual braun 100b 54 radio~~

**service manual clarion pp2449v b c cd player**

~~service manual clarion vr935vd car player~~

~~service manual for 1996 honda cbr f4~~

~~service manual 2015 cadillac deville~~

~~service manual datex ohmeda s5~~

~~service manual 2004 suzuki katana 750~~

~~service manual for caterpillar 14g motor grader~~

~~service manual field service~~

~~service manual 1998 dodge dakota~~

**service manual excavator 320d**

**service manual Epson Stylus C79**

~~service manual for 2014 polaris rzr 800~~

~~service manual 4290~~

### **Polyatpmic Ions Pogil :**

I Will Lift Up Mine Eyes - SATB - Naylor Original scriptural setting from Psalm 121:1-4, arranged for mixed chorus (SATB) and piano. ... Difficulty: Medium / medium-difficult acc. Performance time: 4:00. I Will Lift Up Mine Eyes I Will Lift Up Mine Eyes. A Cantata for Tenor Solo, S.A.T.B. Chorus, and Orchestra (Piano-Vocal Score). Adolphus Hailstork (composer), Anonymous (lyricist) ... I Will Lift Mine Eyes Unto the Hills (Psalm 121) ... Music Sample: CGB528 I Will Lift Mine Eyes Unto

the Hills (Psalm 121) (Full Score). Description: This calm, meditative original composition directly ... I will lift up mine eyes - Sheet Music - John Rutter John Rutter. I will lift up mine eyes. Vocal score. Forces or Category: SATB & organ/orchestra. Orchestration: 2.2.2.2-2.0.0.0-timp(opt)-hp-str. I to the Hills Will Lift Mine Eyes (Psalm 121) I to the Hills Will Lift Mine Eyes (Psalm 121): from Tenebrae (III) (Full Score) - 8598A. \$17.00 ; I to the Hills Will Lift Mine Eyes (Psalm 121): from Tenebrae ... I Will Lift Up Mine Eyes Vocal Range: High ; Pitch Range: E4- F#5 ; Composer: Michael Head ; Text Source: Ps 121 ; Publisher: Carl Fischer ... John Tavener: I Will Lift Up Mine Eyes ... John Tavener: I Will Lift Up Mine Eyes Unto The Hills (Vocal Score). German Edition. John Tavener: I Will Lift Up Mine Eyes Unto The Hills (Vocal Score). I Will Lift My Eyes - Full Score and Parts Vocal Forces: SATB, Cantor, Solo, Assembly. Accompaniment: Keyboard. Guitar: Yes. Instrumental parts included: C Instrument, Flute I, Flute II, Oboe, ... I Will Lift up Mine Eyes - Marzo, Eduardo Jul 5, 2014 — Marzo, Eduardo - I Will Lift up Mine Eyes Psalm 121. Voice High and ... "For over 20 years we have provided legal access to free sheet music. I Will Lift Up Mine Eyes (Sowerby, Leo) [7 more...]For voice, mixed chorus, organ; Scores featuring the voice; Scores ... Note: I can only provide full works, not arrangements or individual movements. Pelobatoidea The Pelobatoidea are a superfamily of frogs. They typically combine a toad-like body shape with a frog-like, pointed face Phylogenetically they stand ... European spadefoot toad The European spadefoot toads are a family of frogs, the Pelobatidae, with only one extant genus Pelobates, containing six species. They are native to Europe ... Pelobatidae They are collectively known as the "spadefoot toads" due to the presence of a keratinized "spade" on each hind foot which are used in burrowing. While all ... European Spadefoot Toads (Family Pelobatidae) The European spadefoot toads are a family of frogs, the Pelobatidae, with only one extant genus Pelobates, containing four species. ADW: Pelobatidae: INFORMATION Pelobatids are squat and toadlike, with soft skins and fossorial habits. This treatment places Megophryidae in a separate family, leaving but two or three ... Spadefoot Toads (Pelobatidae) Frogs in this family are often mistaken for toads (exemplified by the common name, "spadefoot toads"). They do not have the warty skin of true toads, however, ... Natural History of the White-Inyo Range Spadefoot Toads (Family Pelobatidae). Great Basin Spadefoot Toad, Spea ... A related species in southeastern California, the Couch's Spadefoot Toad (*S. couchii*) ... Couch's spadefoot (*Scaphiopus couchi*) Couch's spadefoot (*Scaphiopus couchi*). Order: Salientia Family: Pelobatidae (spadefoots) Other common name: spadefoot toad. Spanish names: sapo con espuelas ... Spadefoot toad | burrowing, nocturnal, desert 3 days ago — All spadefoot toads are classified in the family Pelobatidae. Spadefoot toads have a broad, horny "spade" projecting from the inside of each Pelobatidae - European Spadefoot Toad Family - Apr 21, 2017 — The family Pelobatidae is the European Spadefoot toads but they aren't just found in Europe, they are also found in Asia and Northern Africa. Principles of Polymer Engineering - N. G. McCrum The second edition of Principles of Polymer Engineering brings up-to-date coverage for undergraduates studying materials and polymer science. Principles of Polymer Engineering The second edition of Principles of Polymer Engineering brings up-to-date coverage for undergraduates studying materials

and polymer science. Principles of Polymer Engineering This revised and updated second edition develops the principles of polymer engineering from the underlying materials science, and is aimed at undergraduate and ... Principles of Polymer Processing (2nd Edition) This volume is an excellent source and reference guide for practicing engineers and scientists as well as students involved in plastics processing and ... Principles of Polymer Engineering Aimed at undergraduates and postgraduate students of engineering and materials science, the book opens with chapters showing why plastics and rubbers have such ... Principles of Polymer Engineering Rheology Provides the basic background needed by engineers to determine experimentally and interpret the rheological behavior of polymer melts--including not only ... Principles of polymer engineering, by N. G. McCrum, C. P. ... by D Feldman · 1989 · Cited by 1 — Principles of polymer engineering, by N. G. McCrum, C. P. Buckley and C. B. Bucknall, Oxford University Press, New York, 1988, 391 pp. Price: \$44.95. Principles of Polymer Engineering by McCrum, N. G. The opening chapters show why plastics and rubbers have such distinctive properties and how they are affected by temperature, strain rate, and other factors. Principles of Polymer Systems - 6th Edition A classic text in the field, the new edition offers a comprehensive exploration of polymers at a level geared toward upper-level undergraduates and beginning ... Fundamentals of Polymer Engineering by A Kumar · 2003 — ISBN: 0-8247-0867-9. The first edition was published as Fundamentals of Polymers by McGraw-Hill, 1997. This book is printed on acid-free paper. Headquarters.