Hans F. Ebel, Claus Bliefert William E. Russey

The Art of Scientific Writing

From Student Reports to Professional Publications in Chemistry and Related Fields

Second, Completely Revised Edition



Contents

I	Goals and Forms in Scientific Writing
1	Reports 3
1.1	The Scientist as Writer 3
1.1.1	Communication in the Natural Sciences 3
1.1.2	The Maintenance of Quality in Science 8
1.2	The Purpose and Significance of a Scientific "Report" 12
1.3	The Laboratory Notebook 15
1.3.1	The Role and Form of a Scientist's Notebook 15
1.3.2	Content 21
	Heading and Introduction • The Experimental Section • A Scientist's
	Ethical Responsibilities
1.3.3	Organizational Matters 27
	What is an Experiment? • Experiment Numbers
1.4	From Laboratory Notebook Entries to a Formal Report 31
1.4.1	Describing an Experiment 31
1.4.2	The Preparation of a Formal Report 34
	Proposed Subdivisions: An Outline • Drafting the Text • First Refinements.
	Perfecting the Language • Suggestions Related to Writing Style •
	Subsequent Drafts • Finished Copy
1.5	Various Types of Reports 47
1.5.1	The Academic Environment: Laboratory Reports, Grant Proposals, and the Like 47
1.5.2	The Corporate Environment: Technical Documentation 52
1.5.3	Commissioned Reports 54
2	Dissertations 57
2.1	Nature and Purpose 57
2.2	The Components of a Dissertation 60
2.2.1	Overview 60
2.2.2	Title and Title Page 63
2.2.3	Abstract 65
2.2.4	Preface 66
2.2.5	Table of Contents; Section Headings 67
	Basic Considerations • Headings and Hierarchical Structure • Structure
	and Form; Decimal Classification
2.2.6	Introduction 74

2.2.7	Results 77
2.2.8	Discussion 80
2.2.9	Conclusions 81
2.2.10	Experimental Section 82
2.2.11	References Section and Miscellaneous Components 83
2.3	Preparing the Dissertation 86
2.3.1	From Outline to Final Draft 86
	Developing a Concept • Writing Techniques
2.3.2	The Final Product: A First-Rate Doctoral Dissertation 93
2.3.3	The "Electronic Dissertation" 94
2.3.4	Last Steps on the Road Toward Acquiring Your Degree 95
3	Journal Articles 97
3.1	The Scholarly Journal as a Medium of Communication 97
3.1.1	"Publication" as a Concept 97
3.1.2	"Electronic Publication": Its Nature as Defined by Early
	Manifestations 101
	The Beginnings • The Prototype E-Journal: Current Clinical Trials •
	Further Ramifications of the Digital Revolution • Questions of
	"Permanence" • The Road Ahead • Effective and Efficient Acquisition
	of Information • The Quest for Knowledge
3.1.3	More from the World of Tomorrow (or Today!) 112
	Professional vs. Private Publication • The Scene Today • The Current State
	of the Electronic "Environment" • Information Acquisition Today: Search
	Capabilities • "Markup" of an Electronic Document • Authors and
	Authorship in the Twenty-First Century
3.1.4	The Various Types of Journals 129
3.2	Decisions Prior to Publication 132
3.2.1	Publish When? 132
3.2.2	Publish What, and With Whom? 134
3.2.3	Publish In What Form? 139
3.2.4	Publish Where? 141
3.3	The Components of a Journal Article 144
3.3.1	General Observations; Title and Authorship 144
3.3.2	Abstract 146
3.3.3	The Actual Article 148
3.4	Preparing the Manuscript 150
3.4.1	Text 150
	Introduction • Matters of Form
3.4.2	Formulas and Equations 154
3.4.3	Figures 157
	A Figure or a Table? • The Processing of Figures • Relating Figures to the
	Accompanying Text • Miscellaneous Matters

Ι

f ; } j

3AA	Tables 164
3.4.5	Footnotes and Other "Interjections" 165
3.4.6	Special Considerations Applicable to Direct Reproduction 165
3.5	From Manuscript to Publication 169
3.5.1	Publishers and Editors 169
	Publishing Houses • Editors and Editing
3.5.2	Submitting the Manuscript 174
3.5.3	Manuscript Review 177
3.5.4	Editing, Typesetting, and Page Proofs 180
3.5.5	Proofreading 184
	The Art of Proofreading • Marking the Mistakes
4	Books 189
4.1	Preliminary Thoughts 189
4.1.1	What Is a Book? 189
4.1.2	Where Do Books Come From? 193
4.1.3	What Are Books For? 197
4.1.4	Collaborating With a Publishing House 204
4.2	Planning and Preparation 208
4.2.1	First Drafts of the Title, Outline, and Preface 208
4.2.2	Sample Chapter 210
4.3	Developing the Manuscript 213
4.3.1	Organizational Considerations 213
4.3.2	Assembling the Background Literature 219
4.3.3	The Structure of the Book 221
4.3.4	Developing the Content 222
	First Draft • The "Special Features" • Revision
4.3.5	Final Copy 225
	Text • Other Elements
4.4	Typesetting and Printing 230
4.4.1	Processing the Manuscript 230
4.4.2	Page-Proof and Galley-Proof Correction 232
4.5	Final Steps 238
4.5.1	Index Preparation 238
4.5.2	Title Pages 248
4.5.3	Binding 251
II	Materials, Tools, and Methods in Scientific Writing
5	Writing Techniques 255
5.1	Introduction 255
5.2	Word Processing and Page Layout 258

5.2.1	Hardware and Operating Systems 258
	The Personal Computer • Keyboards • Miscellaneous Peripheral
	Components • Printers
5.2.2	Word-Processing and Page-Layout Software 277
5.3	Writing and Formatting with a Computer 281
5.3.1	Becoming Accustomed to Your System 281
	The Basics • Mouse Techniques • Windows and Toolbars • Text-Window
	Properties • Marking (Highlighting) • Formatting • Customization
5.3.2	The Utilization of Word-Processing Software 294
	A Writer's Dream Come True • The Benefits Conferred by Word Processing
5.3.3	Advanced Aspects of Text Editing 299
	Formats, Patterns, Styles, and Templates • Character Sets • "Styles" •
	AutoText Entries • Subdivisions • Anticipating the Need for an Index •
	Spell Checking • Search Operations • Editing Functions
5.4	Digital Data and Electronic Publishing 311
5.4.1	The Digital or Electronic Manuscript 311
	Basic Considerations • File Formats • Structured Markup Systems •
	Special Considerations Applicable to Electronic Manuscripts that Require
o	Typesetting
5.4.2	Electronic Editing 324
	Desktop Publishing • Strategic Considerations
5.5	General Formatting Guidelines 331
5.5.1	Text 331
	Fonts and Units of Measure in Typography • Specific Type Fonts and
	Document Formats • Manuscript Style and Markup • Headings,
o	Paragraphs, Equations, and Lists • Footnotes
5.5.2	Preparation of Final Copy 348
6	Formulas 351
6.1	Quantities 351
6.1.1	Quantities and Dimensions 351
6.1.2	Derived Quantities and Functions 358
6.1.3	More Regarding Symbols and Their Representation 362
6.1.4	Quantitative Expressions 366
6.2	SI Units 368
6.2.1	Base Units and Derived Units 368
6.2.2	Derived Units and "Supplementary" Units 370
6.2.3	Prefixes, Decimal Points, and Other Stylistic Matters 375
6.3	Special Units in Chemistry 377
6.3.1	"Amount of Substance" and the Mole 377
6.3.2	Molar Quantities and Mixtures of Substances 378
6.1	Numbers and Numerical Data 381

6.5	Working with Formulas and Equations 386
6.5.1	Combining Text with Equations 386
6.5.2	"Stacked" Expressions and "Fragmented" Formulas 388
6.5.3	Indices 390
6.5.4	Frequently Encountered Special Symbols 391
6.5.5	Additional Rules for Writing Formulas 395
6.5.6	Spacing 398
6.6	Programmed Typesetting of Formulas 400
6.6.1	LATEX as a Formula Generator 400
6.6.2	LATEX and Text 408
6.7	MATHTYPE and MATHML 410
7	Figures 413
7.1	General Considerations 413
7.1.1	Figures and Figure Numbers 413
7.1.2	Figure Captions 515
	Figure Identifiers and Titles • Legends • Miscellaneous Technical
	Observations • Legal Matters: The Citation of Figures
12	Line Art 422
7.2.1	What Is Line Art? 422
7.2.2	The Preparation of Line Drawings 426
	Useful Equipment • The Fundamentals
7.2.3	Coordinate Diagrams 430
	Graphic Presentations Based on a Set of Coordinate Axes • Technical
	Considerations • Scaling • Axis Labels
12A	Schematic Drawings and Graphs of Miscellaneous Types 442
7.2.5	Structural Formulas in Chemistry 446
7.3	Drawing With a Computer 449
7.3.1	Overview, and an Introduction to Vector Graphics 449
7.3.2	Miscellaneous Observations 452
7.4	Halftones 454
7.5	Overview of Software Useful in Editing Figures, both Line Drawings and
	Vector Graphics 458
8	Tables 461
8.1	The Logic Behind a Table 461
8.2	The Significance of a Table 465
8.3	The Form of a Table 468
8.4	The Components of a Table 471
8.4.1	Table Title 471
8.4.2	Table Heading 472
	Simple Table Heads • Working with Units • Structured Table Headings
8.4.3	Table Content 476

Contents

8.4.4 8.5	Table Footnotes 481 Workshoots Lists and Databases 481
8.5.1	Worksheets, Lists, and Databases 481
8.5.2	Spreadsheets and Worksheets 481 Databases 483
9	Collecting and Citing the Literature 489
9.1	The Acquisition of Information 489
9.1.1	Reading and Evaluating the Professional Literature 489
9.1.2	Effective Use of a Specialized Library 492
	"Classical" Resources • The Organization of a Library • The Library of the
	Twenty-First Century
9.2	Building One's Own Literature Collection 499
9.2.1	An Author Catalogue 499
9.2.2	The Computer-Supported Literature Collection 507
9.3	Citation Techniques 511
9.3.1	Citing and Citations 511
9.3.2	The Numerical System 514
9.3.3	The Name-Date System 516
9.3.4	A Comparison of the Two Systems 519
9.4	The Form of a Citation 520
9.4.1	Standards of Quality 520
9.4.2	Standardization in Citation Practice 523
	Background • The Vancouver Convention • The Current Outlook
9.5	Anatomy of a Source Description 527
9.5.1	General Characteristics 527
9.5.2	Sources of Various Types 529
	Books and Journals • Miscellaneous Documents and Sources
Apper	ndices
A	Reference Formats 537
В	Selected Quantities, Units, and Constants 544
C	The 20 Commandments of Electronic Manuscripts 547
D	Conversion Tips 549
D. 1	Conversions Between the MACINTOSH and WINDOWS Worlds 549
D.2	File Conversions Involving Two Different Layout Programs 550

Literature 554

Index 560