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INTRODUCTION

A FEW WORDS ABOUT WRITING STYLE

Aim at clear, concise expression with a variety of word use and sentence structure. Although your sentences should vary in structure and length, lean toward short, simple constructions and avoid rambling complexity. Except for the necessary scientific and engineering terms, choose shorter, simpler, more concrete words that are easily visualized and avoid or minimize abstract or ponderous terms. Avoid “killing” the verb: write applying the approach instead of the application of this approach. Introduce more active voice into your text (which shortens and tightens it at the same time) by writing the scientists performed the experiment instead of the experiment was performed by the scientists.

REFERENCE MATERIALS

- General spelling and word usage—Merriam-Webster ’s Unabridged Dictionary (MW)
- Technical spelling and some word usage (MW generally takes precedence)—Dictionary of Mining, Mineral, and Related Terms (2nd ed.)
- Also refer to the Editor’s Appendix for more information.
AUTHOR GUIDELINES
for Style and Design

ABBREVIATIONS AND ACRONYMS
It is important to be consistent in abbreviating or spelling out terms throughout your manuscript and to consider the needs of your audience or readers in deciding whether to abbreviate or not. If you use numerous abbreviations/ acronyms, include a glossary.

Use abbreviations for units of time and measurement: 1,367 W/m$^2$. (See also “Numbers” and “Appendix B.”)

Spell out units of measurement when not accompanied by numerals: several millimeters. Abbreviate days (d), seconds (s), minutes (min), hours (h), and years (yr) only in combination with other abbreviated units of measure (24 h/d, 4 m/s, 300 d/yr). Otherwise, spell out (6 minutes, 24 hours, 3 days, 14 seconds).

An acronym is an abbreviation that can be pronounced like a word (AMAX, OPEC). Some acronyms are so common that they are no longer capitalized (e.g., laser, radar, sonar, scuba).

An abbreviation that reads as a series of letters (BBC, DNA) is referred to as an initialism. Acronyms/abbreviations may be used in contexts where the meaning is common knowledge and clear to readers.

AIDS
ASCII
DNA
HIV
HVAC
NASA
pKa (or pK$_a$)
RNA
U.K.
U.S.
UV

If the acronym is less familiar and occurs more than once in a chapter or paper, it must be introduced at first occurrence. Use the acronym alone for all other occurrences in the chapter or paper.

Rare earth elements (REEs) were originally produced in minor amounts from granitic pegmatite. Extraction from a potentially economic REE resource is strongly dependant on its REE mineralogy.

...in Figures/Tables
Because tables and figures stand alone (apart from text) it is a good idea to introduce or spell out abbreviations/ acronyms as necessary in each figure and table. Unit-of-measure abbreviations may be used in figures and tables even when they are not used with a numeral. (See “Appendix B.”)

...of Foreign Terms
When an abbreviation is from a foreign language (and the letters represent the foreign language but don’t directly translate to English), use the following style:

- International Bureau of Weights and Measures (BIPM, Bureau International des Poids et Mesures)
- General Conference on Weights and Measures (CGPM, Conférence Générale des Poids et Mesures)

ABSTRACTS
Use italics type for the body of an abstract. Treat the abstract and body of chapter as two entities; therefore, introduce acronyms in abstracts and reintroduce acronyms in body text. Use acronyms sparingly and only if the acronym is used more than once in the abstract.

ACADEMIC/PROFESSIONAL TITLES
Academic and professional titles such as doctor or professor and their abbreviations (e.g., Ph.D., P.E.) are not used unless they refer to a medical doctor (M.D.). (See also “Names”)
ACKNOWLEDGMENTS

An acknowledgments section may be included as part of the front matter of a stand-alone publication or just prior to the reference list in a paper to be published in a compiled book. Acknowledgments serve to recognize the reviews, comments, and other assistance of those who helped you prepare your manuscript.

When wording the acknowledgments section, do not include academic titles, professional designations, or forms of address (Mr., Mrs., Ms.). Use Dr. only when indicating a medical doctor.

Note the U.S. spelling of Acknowledgments (not Acknowledgements).

See also “Front Matter” and “Names.”

ALPHABETIZATION

Use word-by-word alphabetization for reference lists and glossaries. For reference lists, also see “Alphabetization” in the Editor’s Appendix.

APPENDICES

It is often helpful to include detailed background or technical information, derivations, equations, or data in one or more appendices. For example, large, detailed tables are often included in an appendix rather than in the body of the publication. The same is true for long lists of names and addresses.

If you have more than one appendix, use letters in the titles (Appendix A, B, C, etc.) and include the letter of the appendix in captions for figures and tables (Figure A.1, Table B.3, and so forth). If you have only one appendix, no letter designation needs to be assigned. Refer to an unnumbered appendix in text with a lowercase “a” (e.g., “the appendix”).

BACK MATTER

The back matter of a publication can include any or all of the following: reference list, bibliography, glossary, appendices, and index. The references usually appear immediately after the body or text of a publication, and the index is at the very end. (See also “Front Matter.”)

BETWEEN and AMONG

Between is used for two terms: between two beds.
Among is used for three or more terms: among three choices.

BIBLIOGRAPHY

A bibliography differs from a reference list in that it contains a list of literature related to your subject but not necessarily cited in your publication. Some modern bibliographies have titles such as “For Further Information” or “Selected Reading.” Arrange the bibliographic entries alphabetically. (See also “Alphabetization” in the Editor’s Appendix.)

BRACKETS

Use brackets to enclose editorial comments, explanations, and additions to direct quotes that are not what the person actually said or wrote:

“This procedure represents a real breakthrough [in mining exploration],” Brown said.
Use brackets for parenthetical material inside parentheses (see also “Parentheses”):

Overseas mining exploration is not part of this year’s urban planning (though he recommended development of their overseas program for next year in his report [Smith 1992]).

**BRITISH/CANADIAN SPELLINGS**

Use U.S. spellings, not British or Canadian (e.g., color, not colour). Retain British/Canadian spellings only for names of companies, organizations, societies, etc., and for published titles of publications.

**BULLETED LISTS**

Bulleted lists can highlight important items, draw attention to main points, or list information so readers can find it easily. If you have a single item to highlight, indent it and omit the bullet.

When items in lists are referred to elsewhere in text, numbered or lettered lists are preferable to bullets, for reference purposes. Numbered lists are also used for procedural steps (see also “Numbered Lists”).

Following are guidelines for including bulleted lists in your manuscript:

- Bulleted lists should be parallel in construction. The items should consistently begin with nouns or verbs, but not both. Items should be complete sentences, or phrases, but not both.
- Use colons after independent clauses that introduce lists.
- Do not use colons after verbs or prepositions that introduce lists.
- Separate items by commas unless internal commas are required, in which case all items should be separated with semicolons.
- Items that are subordinate to bulleted material can be set off with en dashes:
  - Make sure you have at least two items at all levels.
  - Indent all items as in this example.
- All bullet items begin with a capital letter.
- Omit periods at the ends of bulleted items unless they are complete sentences.

**CAPITALIZATION**

...of Book Elements

- Within text, capitalize the names of book elements when they refer to a specific titled and numbered part: *Figure 1, Table 2, Chapter 5, Appendix A, Section 4.2.*
- Use lowercase when book elements appear without a number: the preface, the contents, the introduction, the references, the appendix.
- Do not capitalize the word page with a number: on page 3.
- Capitalize names of sections cited within chapters and add quotation marks. *(See also “Citing Sections Within Chapters.”)*

...of Earth

Generally use lowercase for earth when used with the and capitalize when referred to by name: the earth, to Earth, on Earth, unlike Earth.

...in Figures and Tables

Use sentence-style capitalization for figure captions and table heads. The words *FIGURE* and *TABLE* are in all capitals in captions and heads only. Labels and axes wording for figures, and row headings in tables take headline-style capitalization. Column headings in tables take headline-style capitalization.
...of Geologic Time

- The words age, eon, epoch, and era are all lowercase (e.g., Permian age).
- The words early, late, and middle are usually capitalized, with exceptions:
  - Early Cambrian (*but* early Middle Cambrian)
  - Late Quaternary (*but* in late Pleistocene times)
  - Middle Cambrian

...of Geographic Areas

- The regions of the United States are capitalized when they appear by themselves: *the East, the Southwest, the North,* and *the South.*
- General areas of the country or of a state are generally not capitalized: *the eastern United States and northern New Mexico,* but *Southern California.*
- The words formation, group, series, member, limestone, sandstone, and shale are capitalized when preceded by a definite name; for example, Mansfield Formation, Spar Mountain Member, and Salem Limestone. When these terms are used more generically, they are lowercased; for example, *the Salem limestones or the sandstone from the Spar Mountain Member.*

Examples:

<table>
<thead>
<tr>
<th>Area</th>
<th>Danner Area; San Francisco Area, <em>but</em> San Francisco Bay area</th>
</tr>
</thead>
<tbody>
<tr>
<td>aquifer</td>
<td>Upper Klamath aquifer; Mississippi River alluvial aquifer</td>
</tr>
<tr>
<td>anticline</td>
<td>Ventura anticline</td>
</tr>
<tr>
<td>Basin</td>
<td>Danner Basin, <em>but</em> Danner River basin</td>
</tr>
<tr>
<td>City</td>
<td>New York City, <em>but</em> city of New York</td>
</tr>
<tr>
<td>Complex</td>
<td>Ranney Ridge Complex, <em>but</em> the complex</td>
</tr>
<tr>
<td>deposit</td>
<td>Danner deposit</td>
</tr>
<tr>
<td>District</td>
<td>Danner District, <em>but</em> Danner and Sykes districts</td>
</tr>
<tr>
<td>Formation</td>
<td>Morrison Formation</td>
</tr>
<tr>
<td>Group</td>
<td>Danner Group</td>
</tr>
<tr>
<td>Margin</td>
<td>Chukchi Margin <em>but</em> the margin</td>
</tr>
<tr>
<td>Member</td>
<td>Niobrara Member</td>
</tr>
<tr>
<td>ore body</td>
<td>Danner ore body</td>
</tr>
<tr>
<td>process</td>
<td>Danner process</td>
</tr>
<tr>
<td>Province</td>
<td>Danner Province, <em>but</em> Danner and Sykes provinces</td>
</tr>
<tr>
<td>Reef</td>
<td>Merensky Reef</td>
</tr>
<tr>
<td>region</td>
<td>Danner region</td>
</tr>
<tr>
<td>Reservoir</td>
<td>Chatfield Reservoir, <em>but</em> Chatfield and Cherry Creek reservoirs</td>
</tr>
<tr>
<td>Rise</td>
<td>Chukchi Rise, <em>but</em> the rise</td>
</tr>
<tr>
<td>River</td>
<td>Danner River, <em>but</em> Danner and Sykes rivers; the river Thames</td>
</tr>
<tr>
<td>salt formation</td>
<td>Danner salt formation</td>
</tr>
<tr>
<td>Series</td>
<td>Grenville Series, Holocene Series</td>
</tr>
<tr>
<td>State</td>
<td>Danner State, <em>but</em> the state of Danner; New England states</td>
</tr>
<tr>
<td>Subgroup</td>
<td>Danner Subgroup</td>
</tr>
<tr>
<td>Supergroup</td>
<td>Dykwa Supergroup</td>
</tr>
<tr>
<td>Township</td>
<td>Danner Township</td>
</tr>
<tr>
<td>tuff; Tuff</td>
<td>generally lowercase (glassy tuff; tuff of Stony Point); capitalize for specific names (Stony Point Tuff; Campanian Tuff, Neapolitan Yellow Tuff)</td>
</tr>
<tr>
<td>Trough</td>
<td>Puget Trough, <em>but</em> the trough</td>
</tr>
<tr>
<td>uplift</td>
<td>(lowercase)</td>
</tr>
<tr>
<td>Valley</td>
<td>the Nile Valley, <em>but</em> the Nile River valley</td>
</tr>
<tr>
<td>vein</td>
<td>Delta vein</td>
</tr>
<tr>
<td>vein system</td>
<td>Danner vein system</td>
</tr>
<tr>
<td>zone</td>
<td>(lowercase)</td>
</tr>
</tbody>
</table>
...of Head Levels

The following rules apply to head levels, titles, figure text, and table column heads:

- Capitalize all nouns, pronouns, verbs, adjectives, adverbs, and subordinate conjunctions regardless of number of letters.
- Capitalize first and last words of a heading, regardless of part of speech.
- Capitalize main words in a unit modifier: High-Temperature System, Cross-Linked Polymer.
- Do not capitalize coordinating conjunctions (and, but, or, nor, yet, so), articles (a, an, the), or prepositions less than five characters (After, Between, Versus, Through, with, from) unless they’re the first or last word in the heading.
- Capitalize particles that are part of phrasal verbs (e.g., Build Up, Hand Out, Set Up) and phrasal adjectives (e.g., In-Plane Atoms).
- Lowercase to and as in any context, for simplicity’s sake.

...of Mine Names

Generally, the words mine, shaft, pit, preparation plant, or quarry, or the words of a particular type of mine such as diamond mine are lowercase, unless words reflect the actual name of that particular mine. Most actual mine names do not use the word mine but a derivative such as Mining or Mines.

<table>
<thead>
<tr>
<th>Mine Name</th>
<th>City/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ajax operation</td>
<td>Cane Creek potash mine</td>
</tr>
<tr>
<td>Clara plant</td>
<td>Clara mine</td>
</tr>
<tr>
<td>Clara Mining Company</td>
<td>MPI Mines Ltd.</td>
</tr>
<tr>
<td>McClure preparation plant</td>
<td>Anaconda pit</td>
</tr>
</tbody>
</table>

...of Proper Names

Capitalize proper names of programs, groups, organizations, companies, titles (when they precede a name), specific geographic areas or features, and ethnic groups:

- the U.S. Bureau of Mines
- the Colorado River
- the Southwest (but southwestern)
- Black, Hispanic, Asian, or Caucasian Americans
- President Lincoln (but president of the company)

...of Taxonomic Names

In scientific writing about botanical and zoological divisions, capitalize the names of all those higher than species: genera, families, orders, classes, and phyla. Use italics for genera, species, and varieties.

Spell out and capitalize the genus at first mention: Escherichia coli. Abbreviate the genus after the first mention: E. coli.

...of Titles

State is capitalized when used with the entire official name (the State of Colorado), but not in general (the authority for enforcing this regulation resides with the states). Titles and names of groups are lowercased when they do not precede or are not part of proper names:

- the president of the country (but President Lincoln)
- the division, branch, section, or group and their managers
- the chair of the committee (but Chairman Smith)

...of Trade Names

Trade names are usually capitalized. It is not necessary to include a trademark (™) symbol or other symbol (e.g., ®) if the term is capitalized.
CENTURY
Spell out particular centuries from first through ninth; use numerals for 10th and up: ninth century, 21st century.

CHEMICAL COMPOUNDS/MOLECULAR FORMULAS
It is not necessary to spell out single elements from the periodic table (e.g., Au, Ag, S, Mo). But do spell out compounds (e.g., NaCN, NaOH, CaCO₃) on first mention. It is acceptable to use the abbreviation thereafter, even when it is not accompanied by a numeral (e.g., chlorine and/or Cl₂):

- When first mention appears with numerical units, introduce parenthetically after the compound: ...assaying 30% P₂O₅ (phosphorus pentoxide).
- When first mention is introduced without numerals, spell out the compound with the abbreviation following in parentheses: ...with calcium fluoride (CaF₂).

Chemical and molecular terms are usually not hyphenated even when they are used as modifiers (e.g., carbon dioxide levels, hydrogen ion activity). Prefixes in chemical terms are hyphenated (e.g., L(+)-2, 3-butanediol and trans-glycol.)

Use a small times dot (·) and no space on either side for chemical compounds (e.g., CuSO₄·5H₂O). Do not use a large times dot (•).

CITING SECTIONS WITHIN CHAPTERS
Use quotation marks for enclosing titles of specific headings within chapter text:

A complete description is given in the section “Materials and Resources.”
but
The preface [introduction, glossary, appendix] describes...

COLONS
Colons formally introduce a list or series, a question, or an amplification. Colons also separate the parts of a ratio.

We tested three types of rock: granite, gypsum, and slate.
We added enough water to obtain a 3:1 dilution.

Colons usually do not follow such terms as that is, namely, or such as. When a verb or preposition precedes a list (includes, to, with, between, etc.), you can omit the colon. When a noun (the following) precedes the list, the noun usually takes a colon.

COMMAS
The Chicago Manual of Style (15th ed.) is an excellent guide to using commas. Common sense can also be a reliable guide; if you think your readers need to pause, offer them a well-placed comma. (See also “e.g. and i.e.,” “Months and Years,” and “States and Provinces.”)

- Use the serial comma before conjunctions (e.g., igneous, sedimentary, and metamorphic rocks).
- Separate the parts of a compound sentence (unless it is very short) that are linked by a coordinating conjunction—and, but, or, or nor—when each part has its own subject and verb (e.g., The subsystem will be delivered in two weeks, and we will modify it for deposition work.).
- Set off nonrestrictive or nonessential (parenthetical) words, phrases, and clauses from the rest of the sentence; in other words, the commas signal that the information between them is something extra—and not
essential to the meaning of the sentence (e.g., The subsystem, which takes a day or two to install, will be delivered in two weeks.).

- Do not use commas to separate compound subjects (more than one subject) from a single verb or compound verbs from a single subject:
  
  Theorists and nonspecialists alike agree on the importance of this discovery. The researchers rolled out the metal sheet and formed it into coils.

- Commas are not necessary when words, phrases, or clauses are restrictive or essential to the meaning of a sentence:
  
  Only the sensors that were attached to the outer edge failed. The system will work efficiently if it includes storage.

- Do not use commas as decimal points (European convention); use periods.

COMPANY NAMES

In running text, give company names in full at first mention (e.g., spell out Company and Corporation), although tags such as Inc. and PLC (which are rarely spelled out) may be omitted unless relevant to the context. It is not necessary to include company locations.

Change company names that are all caps to initial caps (e.g., change from the RAND Corporation to the Rand Corporation).


CONVERSION TO SI UNITS

See “Metric and Customary Units.”

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COUNTRIES

Pay particular attention to names of countries and the time frame to which they are referenced because many have undergone name changes in recent years (e.g., the Congo is now Zaire; Czechoslovakia is now divided into two countries: the Czech Republic and Slovakia). Use the former U.S.S.R. when referring to the former country and Russia when referring to the present-day country. Use U.K. and U.S. as adjectives and United Kingdom and United States as nouns. Use USA only in postal addresses.

CURRENCY

Use the dollar sign for costs under $1 million: $0.25; $0.08–$0.10; and $200,000. For millions and billions of dollars: $3.5 million, $1.5–$2.0 million, and $2 billion. Repeat dollar signs in ranges: $1.5–$2.0 million.

If distinction from U.S. dollars is necessary, use the following symbols for currencies from selected countries:

US$100 (United States)  A$100 (Australian)  Can$100 (Canadian)
DASHES

Em Dashes
An em dash (—) is longer than both an en dash (–) and a hyphen (-). Em dashes may be used to amplify or explain an element or to set off words that would otherwise be misunderstood:

Demand depends on the necessity for this vital construction material—steel and its alloys.
All three parameters—height, weight, and length—were measured.

En Dashes
An en dash (–) is slightly longer than a hyphen (-). Use the en dash in the following situations:

- Between spans of three or more numbers: 6–8 cm, 12–24 hours
- Between ranges of months, years, or pages: March–April, 1960–1968, pp. 43–56
- Between mixture components (en dash or slash): metal–ligand mixture or metal/ligand mixture; gas–liquid interface or gas/liquid interface
- For single bonds: C–H distances, C–C bond
- To mean the equivalent of and, to, or versus in two-word concepts where both words are of equal weight:
  - acid–base titration
  - dose–response relationship
  - oxidation–reduction potential
  - Gaudin–Schumann equation
  - carbon–oxygen bond
  - log–normal function
  - metal–ligand complex
  - Eh–pH curve
  - metal–metal bonding
  - mineral–water system
  - pulp–froth interface

DATA IN TABLES
Place a zero to the left of the decimal for any number less than 1 in both text and tables. Align columns of data vertically on the decimals. When the units of measurement differ in a column of data, though, this alignment isn’t necessary. For clarity, if your table includes cells that are empty or contain dashes, consider adding a footnote(s) to explain what the cells or dashes represent. (See also “Numbers” and “Tables.”)

DATES
Spell out full dates in running text: January 1, 2002. Months and years may be abbreviated in tables to save space.

DEGREE SYMBOL
The degree symbol is printed between the number and the symbol for the temperature scale, without spaces (e.g., 36°C and 85°F). In a range, only the degree symbol is repeated (e.g., 32°–36°C). Note that kelvins are expressed as K without a degree symbol (e.g., 85 K).

DOLLARS
See “Currency.”

DUE TO AND BECAUSE OF
Due to is an adjective phrase that must modify a noun, not a verb. Because of is an adverb phrase that modifies a verb, not a noun.

Examples:
The response is due to hemimicelle formation (modifies the noun response); not The response is because of hemimicelle formation.
The plant closed because of declining metal prices (modifies the verb closed); not The plant closed due to declining metal prices.

E.G. AND I.E.

Avoid *e.g.* (which means *for example*) and *i.e.* (which means *that is*) in running text. Use the spelled-out forms in running text. Place commas after *e.g.* and *i.e.* and use only in parenthetical material (e.g., *like this*).

Do not use *etc.* at the end of a list that is introduced by *e.g.*

ELLIPSES

When you want to leave out part of quoted material, you can use ellipsis marks (three dots) to indicate the omission:

Thus, if some particles were retained in an oil-layer...[the process] was spoken of as *bulk-oil flotation*.

Retain a period at the end of a sentence, even after adding three ellipsis dots. When you add a word (or words) to a quote for clarity, enclose that addition in brackets to show that it isn’t part of the original quote.

*See also “Quotations.”*

EM/EN DASH

See “Dashes.”

EPA AND USEPA

In general, use the acronym *EPA*, not *USEPA*, for the U.S. Environmental Protection Agency. Alphabetize under *E* in a reference list.

EQUATIONS

Authors are responsible for verifying the accuracy of equations before submitting their manuscript to SME. Please adhere to the following conventions when preparing your document:

- All terms should be defined by use of a “where” list. Variables must be defined in the where list at least once in the chapter but do not need to be redefined in each subsequent where list unless the meaning has changed from one equation to another.
- Enumerate equations by chapter (e.g., 3.5) or sequentially if there are no chapter numbers (e.g., 1, 2, 3, etc.). Only equations referenced elsewhere in text need to be numbered (it is acceptable, however, if all are numbered). Center the equations, and right-justify the equation numbers (see Example 1).
- Variables that are italicized in an equation should be italicized in text as well. Do not use italic type for Greek variables.
- Use regular type for acronyms used as variables (e.g., DOF for degrees of freedom); numbers are typically not italicized.
- Where lists may be in paragraph or list format (see Examples 1 and 2, respectively). Indent and align the equal signs in list format.
- When words/phrases are used in equations, use lowercase (see Example 1).
- When referring to equations in text, capitalize the word *Equation* and include the number without parentheses (e.g., as written in Equation 3.5).
- Do not use punctuation (e.g., comma, period, semicolon) at ends of equations.

Example 1:

\[ \text{ratio of reduction } (R_r) = \frac{F}{P} \]  \hspace{1cm} (5.6)

where \( F \) is the feed and \( P \) is the product.

Example 2:

Calculate an initial sample size using the following equation:

\[ n = \left( \frac{Z}{s} \right)^2 \frac{1}{(B)^2} \]  \hspace{1cm} (5.7)

where

\begin{align*}
n & = \text{uncorrected sample size estimate} \\
Z & = \text{standard normal coefficient} \\
s & = \text{standard deviation} \\
B & = \text{desired precision level expressed as half the maximum acceptable confidence interval width}
\end{align*}

ET AL.

Use et al. in parenthetical references citations for three or more authors (Smith et al. 2005). It is also acceptable to use Smith et al. 2005 or Smith and others (2005) or Smith and colleagues (2005) in running text.

Do not use a comma before et al. when it follows a single item (e.g., Smith et al. 2004); Use a comma before et al. when it follows two or more names (e.g., Smith, Jones, Franklin, et al. 2004).

ETC.

It is acceptable to use etc. in parenthetical material, but change to and so forth in running text. Do not use etc. at the end of a list that is introduced by e.g.

FEWER AND LESS

A rule of thumb for deciding when to use fewer and when to use less is that fewer describes people and things that can be counted (fewer researchers are studying this; we are conducting fewer experiments) and less describes things that are expressed in amounts or as mass (less material was covered in this conference; we added less phosphorus to the film). “Fewer in number; less in amount” is a good memory device.

FIGURES

Provide a clear printout of each figure (even if you supply an electronic file) on a separate page with the accompanying figure caption. (See also “Graphics Preparation.”) If taken from a copyrighted source, include the source of each figure on a separate line above the caption. Number figures by chapter; for example, the second figure to appear in Chapter 3 would be numbered Figure 3.2. For papers that will be included in a proceedings, number as Figure 1, Figure 2, and so forth. Be sure all figures are referenced in the text.

Figure captions (except for the word Figure itself) take sentence-style capitalization (except for capitalized acronyms and proper names). There is no punctuation at the end of a caption, unless the caption has more than one sentence (in that case, punctuate the caption like running text).

Within the figure, the terms and other elements take headline-style capitalization. Units of measure are in Roman following a comma, not in parentheses.

Figures should be consistent (size and format), legible, and understandable, and all the terms in them should be clear.
and correspond to terms in the text. For example, if text measurements are in nanometers, the scales in the figures that illustrate the text should also be in nanometers.

Example:

![Graph](image)


**FIGURE 5.15 Components of U.S. supply and demand for potash**

**FOOTNOTES**

In SME publications, footnotes contain detailed explanatory or supplementary information and references contain citations of other works. Footnotes are marked with asterisks, daggers, double daggers, section symbols, and so on (* † ‡ § †† ‡‡ ‡§ †‡ §‡ §§, etc.), both in text and at the bottom of the page, rather than with numbers. Footnote symbols are printed outside most punctuation marks but inside dashes:

The experiment took place in February.*
We discussed these three necessities for writing†—time, ownership, and response.

**FOREIGN WORDS, PHRASES, AND ABBREVIATIONS**

Use italics for less-common foreign words (*carpe diem, chacun à son gout, fait accompli*). Do not use italics type for common foreign words (a priori, e.g., et al., i.e., in vitro, in situ). *See also* “Abbreviations and Acronyms.”

**FRACTIONS**

Simple fractions can be written out and hyphenated in text (e.g., one-tenth, one-half, three-fourths). Complex fractions can be printed with numerals separated by a solidus (e.g., 1/64 and 24/32). *See also* “Equations.”

**FRONT MATTER**

Front matter for a book typically includes the following (in this order):

- Title page, which includes the names of all authors and authors’ affiliations, including city/state location
- Table of contents (but there is no need to include page numbers as they will be generated automatically at the end of a book’s production)
- Foreword, which is typically written by a prominent person (not the author)
- Preface, which generally includes reasons for undertaking the work, methods of research, and history of the work
- Acknowledgments—if lengthy, a separate acknowledgments section, which identifies those individuals the authors wish to acknowledge, should be included; if the acknowledgment is not lengthy, it can be part of the preface.
GENDER-NEUTRAL LANGUAGE

Authors who try to avoid gender connotations often ask, “How can I include females in my writing without endlessly repeating he or she or using such unpronounceable constructions as s/he?”

Some good solutions are to use a neutral noun rather than a pronoun (researcher, employee, staff member, worker), or a third-person plural pronoun (they, them), or to rewrite the sentence in another way to eliminate the need for a third-person singular pronoun such as he or him. These forms are not universally accepted as neutral pronouns.

GEOGRAPHIC AREAS/GEOLOGIC NAMES

See “Capitalization...of Geographic Areas.”

GLOSSARY

Glossaries define special or technical terms, and abbreviations or acronyms. Include them in publications that contain many terms requiring definition. Glossaries usually are placed at the end of a document.

GRAPHICS PREPARATION

IMPORTANT: Do not embed figures in Word files. These may not be accurately extracted using the software at SME.

Acceptable file formats and other graphics considerations are outlined in the sections that follow. Please save graphics as .tif (raster art) or .eps (vector art) files:

- Raster art includes digital photographs and scanned images composed of dots or pixels.
- Vector art is composed of defined elements (e.g., lines and type) created in programs such as Adobe Illustrator, FreeHand, CorelDraw, etc.

CAD plotter files are best scanned as line art. PowerPoint files are also acceptable. Digital photographs may be provided as .jpg (but expect a loss of quality if compressed).

Color and Shaded Graphics (3-D charts, shaded graphics, etc.)

AVOID COLOR and SHADING if image is to be scanned. If color adds meaning to a chart or graph, modify graphics to use black and white patterns before saving as .eps or .tif. Color and shading will not reproduce well in grayscale unless provided as a vector.eps illustration. It is best to convert all graphics to gray-scale before sending to see if details remain clear. Always include a clean printed copy because translation problems may require the art to be scanned.

Line Art Images (charts, CAD drawings, illustrations, etc.)

Scan line art at 800 pixels per inch (dpi) or 354 pixels per cm (dpc) at final size. In general, images will be sized no larger than 4.5 x 3.5 inches unless there is an extraordinary amount of detail in the graphic. These images may be submitted as .eps files. Always include a clean printed copy because translation problems may require the art to be scanned.

Photographs (digital and print photographs)

Digital photograph files should be sent as gray-scale images at 300 dpi or 118 dpc at final size. Digital photos (at 72 dpi) need to be 4x the final output size for good print reproduction.

Print photographs may be scanned and saved as a .tif or .eps file, again at 300 dpi at final size. If such equipment is not accessible to you, submit a high-quality print of the photograph (no photocopies), and SME will scan for you. Please send a duplicate of each print and slide you send. Originals will not be returned.
GREEK LETTERS

Greek letters are often used in equations. Be sure to distinguish the letters clearly from each other and from regular letters. Writing the letter’s name on your draft in the margin near the letter is helpful:

\[ \text{efficiency} = \eta \] (eta)

When you include Greek letters in a glossary or abbreviations list, alphabetize them according to their place in the Greek alphabet.

HARDNESS

Express measures of hardness using the following formats:

- Brinell hardness number: Bhn
- Diamond pyramid hardness: Dph
- Mohs: 2.5 (not 2½)
- Rockwell “C” (or other letters): Rc
- Vickers hardness number: Vhn

HEADINGS

Use the following examples for heading levels in the manuscript:

Title: The title of your paper should be bold, initial caps, centered, standing alone on a line with an extra space below:

*Geochemical Behavior of Ferric Arsenates*

Level 1 Heads: These heads should be bold, all caps, flush left, standing alone on a line with an extra space above and below:

**SITE DESCRIPTION**

Level 2 Heads: Level 2 heads should be bold, initial caps, flush left, standing alone on a line with an extra space above and below:

**Tailings Solids of the Plains**

Level 3 Heads: This level head should be bold, italics, initial caps, flush left, standing alone on a line with an extra space above and below:

*Alkalinity Consumption*

Level 4 Heads: Level 4 heads should be bold, indented, sentence style, and end with a period. The head then leads into the paragraph that follows:

*Alkalinity consumption.* Comparing the initial aqueous-phase acidity…

HYPHENS

Modern style and usage guidelines have changed some traditional rules for using hyphens. For example, the use of a hyphen between an adverb ending in -ly and another word in a unit modifier has been dropped (e.g., heavily skewed results, partially hidden cameras).

…and Ambiguity

SME style favors retaining the hyphen in other unit modifiers (e.g., 5-year plan) unless the unit modifier is so well known that its meaning isn’t likely to be misunderstood (e.g., high school students).

Hyphens are indispensable, however, in unit modifiers that are ambiguous or could be misunderstood without the hyphen. Suppose, for example, you were to write six-foot tall person rather than six-foot-tall person. Both phrases indicate that you’re talking about a tall person, but one of the phrases confuses you about how many feet he or she
has. Therefore, hyphens can still be very helpful (e.g., on-site experiments, rot-producing fungus, fatigue-induced wear).

...and Capitals
When both words of a unit modifier are capitalized, they are not hyphenated: Bronze Age tools, Vietnam Era veterans, Mining Program objectives.

...and Compounds
Use hyphens in compounds: half-life, cross-link, back-reaction.

...and Double Surnames
but
Use an en dash between names of equal weight: Bond–Miller equation.

...and Foreign Terms Used as Unit Modifiers
Use hyphens for foreign terms used as unit modifiers unless the term is uncommon and therefore in italics: in-situ evaluation in-vivo reactions, ad-hoc committee, carpe diem definition.

...and Fractions
Use hyphens in fractions such as one-half, one-ninth, three-fourths.

...and Moved Modifiers
When you move a unit modifier so that it follows the noun rather than coming before it, omit the hyphens:
state-of-the-art equipment, but equipment that reflects the state of the art
last-minute adjustments, but adjustments made at the last minute
on-site experiments, but experiments done on site

...and Numbers
When using numbers in unit modifiers, retain all the necessary hyphens:
2-in.-diameter tubes 13-cm-wide substrate 50-Å-thick film
Do not use hyphens in unit modifiers that use symbols as adjectives (–, +, >, etc.):
–100 mesh size fraction, but minus-100-mesh size fraction

...and Prefixes
Hyphens do not follow most prefixes (such as pre-, post-, multi-, sub-). Use hyphens in the following situations:
• Between a prefix and a proper noun: non-Newtonian, non-SME, post-Vietnam
• Between some repeated consonants: non-native, non-nuclear, sub-bandwidth
• With words of five or more syllables: post-reorganization

...and Ranges
Hyphens also show ranges, but en dashes, if available, are preferable (see also “Dashes”); e.g., 32°–36°C and 3–5 cm. Suspended hyphens are printed like this: 3- to 5-cm apertures, or 3–5-cm apertures.

...and Two-Word Compounds
non-radiation-caused effects non-tumor-bearing organ pre-steady-state condition
...and Two-Word Verbs
  air-dry  freeze-dry  jump-start  vacuum-dry

...and Unit Modifiers
  above-average results  first-order reaction  high-frequency transition
time-dependent reaction  silver-coated electrode  low-pressure density
high-performance module  high-temperature dose  higher-temperature values
free-energy radical  least-squares analysis  long-chain enzyme
solid-state reaction  water-soluble mixture  blue-green solution

but

very well studied hypothesis, very high density lipoprotein
Exception: particle size distribution

...and Unit Modifiers of Three or More Words
  signal-to-noise ratio  root-mean-square analysis  high-molecular-weight compound

I.E.
See “E.G. and I.E.”

ITALICS

…for Emphasis
Use italics to emphasize a word or phrase that deserves special attention (but sparingly).

…for Foreign Words
Italicize uncommon foreign words and phrases as supra, infra, and inter alia; however, if the word or phrase is commonly used in the field, omit the italics (in situ, a priori).

…for Hyphenated Prefixes
Italicize hyphenated prefixes (such as cis-, trans-, o-, m-, and p-) to chemical formulas: trans-1,2-dibenzoylethylene, and trans-glycol.

…for Published Documents
Use italics for the titles of brochures, reports, books, and the names of trade journals and magazines. (Note that names of trade journals and magazines will be spelled out in text but abbreviated in reference lists. See also the Editor’s Appendix.)

  Stability in Surface Mining  Applied Physics Letters
  FY 1999 Annual Report  Science
  Gone with the Wind  Mineral Commodity Summaries

…for Taxonomic Names
Use italics for genera, species, and varieties: Clostridium thermocellum and C. thermocellum.

…for Words as Words
Use italics when referring to a word as a word or to a phrase as a phrase:
The word footnote is often used in place of reference.
These labels should have handle with care printed on them.
NOTE: Generally, no italics or quotes are used for informal definitions, often expressed by the words called, so-called, referred to as, also known as, defined as. See also “Quotation Marks vs. Italics.”

JUNIOR/SENIOR
Do not use commas before Jr., Sr., III, and so forth (e.g., John Smith Jr.). In reference lists, use the following format:
Smith, A.E., III. 1960.

LISTS
Following are guidelines for including lists in your manuscript (see also “Bulleted Lists” and “Numbered Lists”):

- You may use bulleted or numbered lists (use numbered lists if you’ll be referring to a list element later).
- You should include at least two items in a bulleted or numbered list.
- Bulleted and numbered lists are indented to the first tab.
- Lists should be parallel in construction. The items should consistently begin with nouns or verbs, but not both. Items should be complete sentences, or phrases, but not both.
- Use colons after independent clauses that introduce lists.
- Do not use colons after verbs or prepositions that introduce lists.
- Separate items by commas unless internal commas are required, in which case all items should be separated with semicolons.

Run-in Lists
For short lists, use (1) and (2) in running text, not 1) and 2) (note open and closed parentheses).

Examples:
You are advised to pack (1) warm clothing, (2) food, and (3) shelter items.
Data are available for three groups: (1) rocks and minerals; (2) commodities, markets, and uses; and (3) transportation.

When each item is a complete sentence, use either a bulleted or numbered list format.

Lists Punctuated as Sentences

Example:
Reporting for the committee, Smith noted that
1. A fundraising campaign director was being sought;
2. The salary for this director, about $50,000 a year, could be paid; and
3. The fundraising campaign would be launched in the spring of 2005.

MATHEMATICAL SYMBOLS
Print most mathematical symbols used as operation signs with a space on both sides:

\[ T_i - T_{ni} \quad a + b \quad x = y^2 \]

The exception is the solidus (/): \( a/b \).

Do not leave a space between numerals and the symbols for degrees, dollars, cents, and percentages (°, $, ¢, %); e.g., 52%. Don’t leave a space between symbols such as >, <, \(^3\), and the numeral unless these are the operation signs in an
equation. Do leave a space between numerals and symbols of measurement such as \( cm \) and \( Å \): 2.5 \( cm \) (see also “Numbers” for examples).

**MESH SIZES**

It is acceptable to mix the following usages, but try for consistency within chapters.

- minus 10 mesh or \(-10\) mesh (note the use of an en dash instead of a hyphen)
- plus 10 mesh or \(+10\) mesh
- \(-10\) mesh fraction or minus-10 mesh size fraction
- 40/60 mesh
- 325 mesh
- 80% passing 20 \( \mu m \)
- 80% passing 325 mesh

Two common mesh scales are the Tyler Standard Scale (Tyler Series) or the U.S. Sieve Series (U.S. Standard Series).

Hyphenate mesh sizes when used as adjectives (e.g., a 325 mesh size, 1,400 mesh screens) except with adjectival forms (e.g., ~325 mesh size, >325 mesh size).

For ranges, an en dash can be used in most cases, but it is preferable to use \( to \) for adjectival forms: \( 100–325\) mesh, \( ~100\) to \( 325\) mesh; \( <100\) to \( 325\) mesh.

**METRIC AND CUSTOMARY UNITS**

SME authors are responsible for converting English units of measurement to SI (International System of Units) values. Unless it is inappropriate (for example, when writing about 1-in. pipe or \( 2 \times 4 \) lumber), the metric system is the standard for SME publications. (A conversion table is included in Appendix C.)

- Metric is the preferred unit of measure for all SME publications. Customary units can follow metric units in parentheses: \( 38.1\ m\ (125\ ft) \).
- Customary units for industry standard measurements (common drill sizes, U.S. Standard fastener sizes, commercial pipe sizes) are acceptable without conversion (e.g., \( 2 \times 4 \) lumber, 1-in. pipe, half-inch drill).

See Appendix B for SME units-of-measure abbreviations.

**MOLECULAR FORMULAS**

See “Chemical Compounds/Molecular Formulas.”

**MONTHS AND YEARS**

Spell out the names of months in text when used alone or with a year (e.g., The project will continue until December 2001.). In tables, months may be abbreviated to save space.

When the day is included, put a comma after the year if the sentence continues (e.g., On October 1, 2001, the operation began.).

**NAMES**

Generally, use initials for the first and middle names of persons, and omit titles and form of address such as \( Dr.,\ Professor, Mr., Mrs., \) or \( Ms. \) Use \( Dr. \) only when it indicates a medical doctor. (See also “Academic/Professional Titles.”)
NON-SI UNITS OF MEASURE
See “Metric and Customary Units.”

NUMBERED LISTS
Following are guidelines for including numbered lists in your manuscript:

1. Use numbered lists for procedural steps and for items in lists referred to in text by number.
2. Make sure you have two or more items at all levels.
   a. Use lowercase letters to set off subordinate items.
   b. Indent all items.
   c. Omit periods at the ends of items unless they are complete sentences.
3. Use colons after independent clauses that introduce lists.
4. Do not use colons after verbs or prepositions that introduce lists.
5. Separate items by commas unless internal commas are required, in which case all items should be separated with semicolons.

NUMBERS
General Rules
Use numerals with units of time and measurement, like this: 2 days, 3 weeks, 1 month, and 87 years. The words days, weeks, and years are not abbreviated unless used in combination with other units (4 d/wk, 8 h/d); the word month is never abbreviated.

Abbreviate units of measure when they accompany numerals: 5 mL. Spell out units of measure that do not follow numerals: several milligrams, a few milliliters.

When a sentence starts with a specific quantity, spell out the number as well as the unit of measure: Fifteen milliliters of chlorine was added to the tube. Even when a sentence starts with a spelled-out quantity, use numerals when appropriate in the rest of the sentence: Eight milliliters was added but 5 mL was tested.

Separate groups of three digits with a comma:

50,182  113,728  2,225,000  8,712

Typically, it isn’t necessary to spell out the unit of measure on first use for a technical audience. But if you think a reader might not know the unit, spell it out on first use and use the abbreviation thereafter.

...and En Dashes
When either one or both numbers are negative or include a symbol that modifies the number, use to or through instead of the en dash:

−20 to +120 K  −145 to −30°C  10 to >600 mL  −50 to 60

Suspended hyphens: 3- to 5-cm apertures or 3–5-cm apertures

...and Fractions
Spell out and hyphenate fractions whose terms are both less than 10 (e.g., one-fifth, one-half, 1/20 of the subjects; 1/12 of the volume). Hyphenate fractions whether used as nouns or adjectives.
...and Hyphens

Hyphenate most units of measure as unit modifiers:

- 5-mL flask
- 100-mm-thick layer
- 13-cm-wide substrate
- a 1- to 2-h sampling time (or a 1–2-h sampling time)
- a 25–30-mL aliquot (or a 25–30-mL aliquot)
- 100-, 200-, and 300-mL aliquots
- 25- to 50-mg samples (or 25–50-mg samples)

Do not hyphenate numbers and units of concentration or temperature:

- 5 K isotherm
- 0.1 M NaCL

Do not hyphenate complex numbers or units of measurement:

- 0.1 mol dm$^{-3}$ solution
- 3 N HCl solution
- 1.2 × 10$^{-4}$ cm$^{-1}$ peak
- 2 × 4 lumber

Ranges of Numbers

To show ranges, use an en dash or the word to when you use of or from with the range. When you want to express a range between some number and another one, always use and in the range:

- 15%–25%
- 32°–38°C
- 6–12 cm
- of 13 to 18 mL
- 10–20 m$^3$
- from 16 to 18 Å
- between 8 and 12 m

Note that symbols such as ° and %, which are right next to the number, are repeated for both values. Whether you use an en dash or the word to, be consistent within your manuscript.

Scientific Notation

Express multiples of SI (metric) units in powers of 10 with the appropriate prefixes; e.g., mm (millimeters, 10$^{-3}$ m) and MJ (megajoules, 10$^6$ J).

Use standard scientific notation, whenever it is appropriate, to express very small and very large numbers; e.g., 2.5 × 10$^{-3}$ and 3.56 × 10$^6$.

Avoid using M for thousands or MM for millions, to prevent confusion with the SI prefix M (mega, or millions).

Spelling Out Numbers

Except with units of time and measurement, spell out numbers lower than 10 in publications (eight experimental runs and three different minerals).

Spell out all numbers at the beginning of sentences:

- Fifteen trials showed almost no deviation in the outcomes.
- Thirty-five people attended the seminar.

However, if a sentence begins with a large number that would be awkward to spell out (e.g., 253 tons of ore were mined), it is best to reword the sentence (e.g., Mining yielded 253 tons of ore).

Spell out the first of two adjacent numbers unless the first one requires three or more words:

- ten 5-kW sites but 135 16-cm plots

Parallel Construction

When a sentence contains one or more numbers greater than nine that are related in kind to a smaller number, use numerals for all of them:
5, 8, and 12 experiments 2nd and 20th examples 5–15 repetitions

...was reduced in 2 pairs, not significantly changed in 11 pairs, and increased in 6 pairs.

If the numbers don’t refer to the same or similar things, they don’t have to be treated the same way:

We conducted three trial runs at 18°C.

**Time and Measure**

| 6 minutes | 6 min/d | 4 days | 1 billion | 180° |
| 25 mL     | 0.30 g  | 6 months | $15 million | 76°C |
| 50–100 mL | 3.5 h (not 3½ h) | 3.7 × 10^5 | 400× | <15 |
| 50%       | the 90s | 8 years | 2 million pounds | 1960s |
| 4:00 PM   | 12:15 AM | two-thirds | 1/12 the volume |

**Usage Other than Time and Measure**

Use words for cardinal numbers less than 10; use numerals for 10 and above. Spell out ordinals *first* through *ninth*; use numerals for *10th* or greater:

three flasks
30 flasks
third flask
12th flask

sixfold
10-fold
seven trees
10 trees

Use numerals in the following instances: *methods 1 and 2; series 2 and 3; phases 1 and 2; samples 8 and 9.*

**PARENTHESES**

**…in Equations**

In equations, use parentheses, brackets, and braces in a repeated progression from parentheses inside to braces outside: {[(()]}

**…in Measurements**

Use parentheses to enclose English measurements that follow SI or metric measurements: 38.1 m (125 ft).

**…in References**

When you use parentheses in text, such as for author-date reference callouts, SME style generally places commas after the parentheses, when necessary:

In earlier research (Jones 1989), the integrity of the soil was confirmed.

For more examples of parentheses used in references, also see the Editor’s Appendix.

**…in Running Text**

Use parentheses (or em dashes) to set off explanatory or digressive material that doesn’t bear a close logical relationship to the rest of the sentence; when the material is closely related, use commas:

The results of the last experiment (conducted after we moved the apparatus to another laboratory) confirmed Jones’s hypothesis.

or

The results of the last experiment—conducted after we moved the apparatus to another laboratory—confirmed Jones’s hypothesis.

and

Timed test runs showed that the titanium oxide coating, rather than the emulsion, produced the best results.

When you need to use parentheses within parentheses, use brackets on the inside and parentheses outside *(see also “Brackets”):*
Some controversy has surrounded this method (a number of investigators [e.g., Markowitz 1989] have questioned its safety), so we wrote a new safe operating procedure before beginning.

PARTS/SECTIONS
SME books may be divided into parts (groups of chapters or papers), and individual chapters may be divided into sections.

PERCENT AND PERCENTAGE
Generally, you can determine whether to treat percent and % as a singular or as a plural by looking at the noun following them:

Six percent of the pipes were rusty. 15%–25% or 15% to 25%
More than 10% of that amount was allocated to planning.

Note that percent is spelled out as one word when it accompanies a number spelled out at the beginning of a sentence.

Elsewhere in text, and in figures and tables, use a number and the % symbol. When there is no number, use percentage.

The maximum glucose yield was 60%. This table shows the percentages of state and federal sites used for mining.

Use the percent sign (%) in text, tables, and figures: 5% Au (not 5 percent Au).

PERMISSION/COPYRIGHT RELEASE REQUIREMENTS
See Appendix A for specific copyright release information.

PHONE NUMBERS
Style phone numbers with hyphens between elements: 800-555-1212, not (800) 555-1212 or 800.555.1212

PLURALS
Do not add an “s” to measurement abbreviations to form the plural; they are written like this: 4 in. and 23 cm.
Use a lowercase s but not an apostrophe to form plurals of acronyms, nonmeasurement abbreviations, and decades: PUCs, 1990s, and GPSs.
Use the apostrophe for a possessive: I remember 1985’s worst event.

PREPOSITIONS
Use uppercase for prepositions of five or more characters in head levels and figure/table text (e.g., for, with, from, After, Through, Between).

QUOTATIONS
Always use some form of direct quotation to denote the exact words of another writer or speaker. Enclose quotes in quotation marks or, if they’re longer than two or three text lines, separate the quoted material from the main text with a line space above and below and indent on each side. Indented quotations, or “block quotations,” do not take quotation marks except for quoted material within them. Use double quotation marks for quotes inside block quotations.
Reference numbers and author-date citations go outside quotation marks and before the final punctuation in quotes and after the final punctuation in block quotations. *(See also “Ellipses.”)*

All quotations must include sources, although it is not necessary to include page numbers for the citations.

**Quotation Marks**

Use quotation marks to indicate direct quotes and to introduce new words or words you are using differently in your work (e.g., We called our process “a simple plan.”). Place quotation marks outside periods and commas, but inside colons and semicolons:

> “Let’s meet again in 6 months,” the director said, “to discuss our progress.”
> She presented a paper titled “Techniques for Estimating Slope Stability.”
> He asked me to define “serendipity”; I referred him to the dictionary.

Use single quotation marks for quotes inside quotations.

**QUOTATION MARKS vs. ITALICS**

Use quotation marks in the following situations:

- When the word doesn’t appear anywhere (the dictionary, the literature, etc.; a made-up word)
- When the context clearly indicates that authors know that it means something else, but here they’re using it to mean such-and-such.
- For citing names of sections within chapters (see “Citing Sections within Chapters”).

Use italics in the following situations:

- For emphasis (use sparingly)
- For foreign words that don’t appear in the English dictionary (only on first usage; italics unnecessary on subsequent usages)
- For key terms introduced in a particular context: Glass can be either *flat* or *float*.
- For words introduced as words, often introduced by the expression *the term or the word* (e.g., the term *nonplastic* is used...)

**NOTE:** To introduce new words or terms, generally italics are used, especially if the word or term is formal (as in scientific usage, for example), and quote marks for more informal usage. See also “Italics...for Words as Words.”

**RATIOS AND MIXTURE NOTATION**

Use a colon or slash between *numbers* in a ratio. Use slash or en dash between *words* in a ratio or components of a mixture:

- dissolved in 5:1 glycerin/water
- dissolved in 5:1 glycerin–water
- the metal/ligand (1:1) reaction mixture
- the metal–ligand (1:1) reaction mixture the metal–ligand (1:1) reaction mixture
- the methane/oxygen/argon (1/50/450) matrix
- the methane/oxygen/argon (1:50:450) matrix

**REFERENCES (IN TEXT)**

Do not include references that are not cited in text. Place bibliographic material that has not been cited in the text into a separate “Bibliography” or “Selected Readings” section. Whether a book contains a Bibliography or Selected Readings
section will be at the discretion of SME.

Multiple References

Use semicolons between two or more references in a single parenthetical citation: (Smith 1990; Jones 1997; Harley 2004).

Same Author(s), Same Year

Distinguish works by the same author(s) published in the same year with a, b, c, etc.; but if the order of authors changes or different authors are listed, then a, b, etc., cannot be used.

Undated

Use n.d. for undated (no date) references: ...of metallurgical grade (Metorex Limited, n.d.).

Examples:

One author in text—(Smith 1990)

in references—Smith, A.B. 1990.

Two authors in text—(Smith and Lee 1990)


Three or more in text—(Smith et al. 1990)


Multiple refs in text (Smith 1990; Smith and Lee 1990; Smith et al. 1990; Smith 2004a,b)

REFERENCE LIST

References cited in text must be included in a reference list at the end of the manuscript. At a minimum, the following information is needed (as applicable):

- Author(s)
- Editor(s), if any
- Year of publication
- Article and/or book title
- Title of trade journal
- Name and location of publisher (city/state/country)
- Volume, issue number, and inclusive range of pages, in that order, for trade journal references: e.g., 124(8):18–26.
- Conferences/Meetings (unpublished): date and city/state/country location of conference
- Conferences/Meetings (published): name and location of publisher.
- Web sites: URL and month/year accessed.

When in doubt, imagine yourself trying to look up or obtain a copy of the particular publication you are citing, and provide all the information that the reader will need to track down the publication. See the Editor’s Appendix for examples of various reference styles.

SI UNITS (METRIC SYSTEM)

SME follows national policies and those of scientific societies in using the SI (International System of Units) or metric system to express measurements. English units are to be placed in parenthesis following metric units when this is appropriate for a publication’s audience. Use English units alone for the standard names of certain items, such as 1-in. pipe and 2 × 4 lumber. (See also “Metrics and Customary Units.”)
SOLIDUS
Also called slant, slash, shilling mark, or virgule, the solidus has mathematical as well as textual functions.

...in Fractions
Use a solidus to express a quotient in text when you do not need to display an equation:

These structures yield lifetimes that are related to bulk lifetime by the expression $1/t = 1/t_o + 2S/d$.

...in Text
In text, the solidus can indicate junctions, interfaces, and components:

The gas/liquid interface (an en dash is also acceptable) 1-butyl acetate/acetic acid/water (3:1:1)

With abbreviated units of measurement, use the solidus to stand for per in abbreviated metric units of measure, like this: 2 g/cm$^2$ and 355 W/m$^2$.

But use per rather than a solidus with spelled-out versions of units of measurement, like this: several cubic feet per second and a few cents per kilowatt-hour.

SOURCE LINES
Be sure to cite the sources of the figures and tables of others that you use in your publication. Add the source line at the end of a figure caption or at the bottom of a table. Any reference included with a figure or table must also be cited in the reference list, although courtesy lines need not be included.

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Measurement errors in physical quantities are usually expressed like this in SME publications: $6 \text{ m} \pm 0.2 \text{ m}$.

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When citing standards in text, cite only the organization acronym and the standard number, with no date. (See the Editor’s Appendix for sample formats for standards in reference lists.)
...ASTM D3565 or (ASTM D3565), if the text is parenthetical.
...ISO 10545-3 or (ISO 10545-3), if the text is parenthetical.

STATES AND PROVINCES

In running text, spell out names of states and provinces when used alone and with a city name. Put commas around names of states or provinces when they appear with cities:

The researchers went to Alaska to continue their work.
The conference was held in Raleigh, North Carolina, last year.

In tables, figures, and reference lists, use 2-letter U.S. Postal Service abbreviations when states are included after a city name (e.g., AZ, CA, CO, ON, QC).

Use U.S. Postal Service abbreviations for states in full addresses that include streets or post office boxes: P.O. Box 123, Denver, CO 80101-0101. Also use state abbreviations in the reference list when giving a city name:


U.S. Postal Service Abbreviations

<table>
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<th>State, Abbreviation</th>
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<td>New Mexico NM</td>
<td>Alberta AB</td>
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<td>Idaho ID</td>
<td>North Dakota ND</td>
<td>New Brunswick NB</td>
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<td>Newfoundland and Labrador NL</td>
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<td>Oklahoma OK</td>
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<td>Oregon OR</td>
<td>Nova Scotia NS</td>
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<td>Saskatchewan SK</td>
</tr>
<tr>
<td>Massachusetts MA</td>
<td>Tennessee TN</td>
<td>Yukon YT</td>
</tr>
</tbody>
</table>

Canadian Province,

| Alberta AB         | British Columbia BC | Nova Scotia NS |
| New Brunswick NB   |
| Newfoundland and Labrador NL |
| Northwest Territories NT |

TABLES

All tables must be included with the text document. Number tables by chapter; e.g., the second table to appear in Chapter 3 would be numbered Table 3.2. Include this number designation with the table title. Be sure to reference each table in the text. If taken from a copyrighted source, include the source at the end of the table, before any footnotes. Every table must have a title. Table heads (except for the word Table itself) take sentence-style capitalization, except for proper nouns and capitalized abbreviations. There is no punctuation at the end of the title. Refer to Table 1.

Within the table, column heads are capitalized and the rows and other elements take sentence-style capitalization. If a measurement follows introductory text, use a comma followed by the measurement in Roman type (e.g., Output, mg/L). Do not include measurement in parentheses unless parenthetical.
If a “spanner” rule is used above several columns of measurements, no comma necessary after column head text that appears above the spanner rule (see Table 1). In source lines, separate multiple sources by a semicolon.

Example:

**TABLE 1** Sentence style, no period at end (in millimeters)*

<table>
<thead>
<tr>
<th>Capitalize Text Here†</th>
<th>Text</th>
<th>ft²</th>
<th>mph (km/h)</th>
<th>kPa</th>
<th>%</th>
</tr>
</thead>
<tbody>
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<td>xxx</td>
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<td>xxx</td>
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<tr>
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<td>xxx</td>
<td>xxx</td>
<td>xxx (xxx)</td>
<td>xxx</td>
<td>NA†</td>
</tr>
</tbody>
</table>

*Source: Smith 1991; Jones 1980a,b.
†Footnote symbols will be superscripts in the table body. Footnote symbols are not superscripts at bottom of table.
‡NA = not applicable.

**TAXONOMIC NAMES**

Capitalize the names of botanical and zoological divisions higher than species: genera, families, orders, classes, and phyla. Use italics for genera, species, and varieties: Clostridium thermocellum and Escherichia coli. Abbreviate the genus after the first mention: E. coli.

**TEMPERATURE**

Use the following styles for temperature:

16°C, 78°F, 55 K (no degree sign for Kelvin units)
16°–32°C
16°, 32°, and 38°C

**TIME**

Use small caps for AM and PM (e.g., 4:30 AM).

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Abbreviate names of trade journals in reference lists according to abbreviations provided in the Editor’s Appendix.

**TRADE NAMES**

Trade names are usually capitalized (e.g., Kleenex tissue, Gilsonite). Midcaps may be retained (e.g., WordPerfect, IsaMill, HydroFloat). Change all caps to initial caps (e.g., change from VERTIMILL to Vertimill). It is not necessary to include a (™) or other symbol (e.g., ®) if the term is capitalized, nor is it necessary to include manufacturer information.

**USEPA**

See “EPA and USEPA.”
VERSUS
Spell out *versus* in text. Abbreviate *(vs.)* in figures, tables, and within parentheses.

ZEROES
Place a zero before all decimals; e.g., 0.5, 0.125, and 0.00125.
APPENDIX A
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32
COPYRIGHT PERMISSIONS LOG
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Authors: _________________________________________________________

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</tbody>
</table>
## APPENDIX B

### SME ABBREVIATIONS FOR UNITS OF MEASURE

### A

- **absolute** .................................. abs
- **acre** ..................................... ac
- **acre-foot** ................................... ft³
- **alternating current** .......... ac
- **ampere** ..................................... A
- **ampere-hour** ................................... Ah
- **ampere per meter** .............. A/m
- **ampere per meter squared** ........ A/m²
- **angstrom unit** ...................... Å
- **atomic weight** ...................... atomic wt
- **atmosphere** ............................. atm
- **average** ...................................... avg
- **avoirdupois** ............................. avdp

### B

- **barrel** ..................................... bbl
- **Baumé** .................................... BÉ
- **Beequerel** ................................. Bq
- **billion years** ......................... Ga
- **board feet** ................................. bd ft
- **boiling point** .............................. bp
- **brake horsepower** ..................... bhp
- **brake horsepower-hour** ........... bhp-h
- **British thermal unit** ................. Btu
- **bushel** ....................................... bu

### C

- **calorie** ...................................... cal
- **candela** .................................... cd
- **candle** ................................. spell out
- **candle-hour** ................................. h-candle
- **carat** ......................................... cta
- **cent** ........................................... c
- **centigram** ................................. cg
- **centiliter** ................................. cL
- **centimeter** ................................. cm
- **centimeter-gram-second** .......... cgs
- **centipoise** ................................. cP
- **coefficient** ............................... coef
- **cologarithm** ............................. colog
- **cosecant** ................................. cosec
- **cosine** ....................................... cos
- **cotangent** ................................. cotan
- **coulomb** ................................. Coulomb
- **cubic centimeter** ................. cm³
- **cubic foot** ..................................... ft³
- **cubic feet per minute** ........... cfm
- **cubic feet per second** ........... cfs
- **cubic inch** ................................. in³
- **cubic meter** ............................... m³
- **cubic micron** .............................. µ³
- **cubic millimeter** ..................... mm³
- **cubic yard** ................................. yd³
- **curie** ......................................... Ci

### D

- **dalton** ...................................... Da
- **day** .............................................. d
- **deadweight ton** .................... dwt
- **decibel** ....................................... db
- **decimeter** ................................. dm
- **degree absolute** .............. ° Abs
- **degree Celsius** ..................... ° C
- **degree Fahrenheit** .............. ° F
- **degree Reaumur** ..................... ° R
- **diameter** ...................................... diam
- **direct current** ...................... dc
- **dollar** ........................................... $
- **dozen** ........................................... doz
- **dram** ............................................ drm
- **dyne** ............................................. dyn

### E

- **electromotive force** ............ spell out or emf in equations
- **electronvolt** ......................... eV
- **erg** .............................................. spell out
  
### F

- **farad** ......................................... F
- **feet board measure** ................ spell out
- **foot (board feet)** .................. ft³
- **feet per hour** ......................... fph
- **feet per minute** ....................... fpm
- **feet per second** ....................... fps
- **fluid** ............................................ spell out
- **flywheel horsepower** ............. fwhp
- **foot-candle** .......................... ft-candle
- **foot-pound** ......................... ft·lb

### G

- **gallon** ......................................... gal
- **gallons per minute** ............. gpm
- **gallons per second** ........... gss
- **gigaheertz** .............................. GHz
- **gram** .............................................. gr
- **gram atom** ................................. g-atom
- **gram calorie** ......................... g-cal
- **grams per liter** .................... g/L
- **gravity** .......................... spell out or g (in italics)
- **greater than** ......................... >

### H

- **hectare** ..................................... ha
- **henry** ......................................... H
- **horsepower** ............................. hp

### I

- **inch** ............................................ in.
- **inch-pound** ......................... in·lb
- **indicated horsepower** .......... indicated hp
- **indicated horsepower-hour** ....... indicated hp-h

### J

- **joule** ........................................... J
- **joule per kilogram** .......... J/kg

### K

- **kilocalorie** ............................... kcal
- **kilocycles per second** .......... kc/s
- **kilogram** .................................... kg
- **kilogram-calorie** ................. kg-cal
- **kilogram-meter** ..................... kg·m
- **kilograms per cubic meter** ...... kg/m³
- **kilogram per mole** ............... kg/mol
- **kilograms per second** .......... kg/s or kgps
- **kilohertz** ................................. kHz
- **kilohm** ....................................... kΩ
- **kiloliter** ................................. kL
- **kilometer** ................................. km
- **kilometers per second** .......... km/s or kmps
- **kilopond** ................................. kp
- **kilopond (pond = 980.665 dynes)** ...
- **kiloton** ................................. kt
- **kilotons per year** .............. ktpy
- **kilovolt** ................................. kV
- **kilovolt-ampere** ................. kVA
- **kilowatt** ................................. kW
- **kilowatt-hour** ..................... kWh
- **1,000 electron volts** .......... keV

### L

- **less than** ......................... <
- **liter** .......................................... L
- **logarithm (common)** ............. log
- **logarithm (natural)** ................ log or ln
- **long tons (gross tons)** ........ spell out or lt
- **long tons per day** .............. ltpd
- **long tons per hour** ............. lthp
- **long tons per month** .......... ltpm
- **long tons per year** ............. ltpy
- **lumen** ......................................... lm
- **lumen-hour** ............................ lm·h
- **lumens per watt** ............... lm/W
- **lux** ............................................. lx
# Appendix C

## Conversions

The following table provides a selected list of conversion factors that may be most generally used in the minerals industry.

<table>
<thead>
<tr>
<th>Convert From</th>
<th>To</th>
<th>Multiple By</th>
</tr>
</thead>
<tbody>
<tr>
<td>acre</td>
<td>meter squared (m²)</td>
<td>4.046856 x 10⁴⁵</td>
</tr>
<tr>
<td>acre-foot</td>
<td>meter cubed (m³)</td>
<td>1.233482 x 10⁴³</td>
</tr>
<tr>
<td>ampere, U.S. legal 1948</td>
<td>ampere (A)</td>
<td>1.000008 x 10⁻⁸</td>
</tr>
<tr>
<td>ampere-hour</td>
<td>coulomb (C)</td>
<td>3.600000 x 10⁻⁹</td>
</tr>
<tr>
<td>angstrom</td>
<td>meter (m)</td>
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<tr>
<td>atmosphere (normal)</td>
<td>pascal (Pa)</td>
<td>1.589873 x 10⁻¹</td>
</tr>
<tr>
<td>barrel (for petroleum, 42 gal)</td>
<td>meter cubed (m³)</td>
<td>2.359737 x 10⁻¹</td>
</tr>
<tr>
<td>board foot</td>
<td>meter cubed (m³)</td>
<td>1.055056 x 10⁻³</td>
</tr>
<tr>
<td>British thermal unit (International Table)</td>
<td>joule (J)</td>
<td>2.326000 x 10⁻³</td>
</tr>
<tr>
<td>Btu (International Table) per pound/mass</td>
<td>joule (J)</td>
<td>2.930711 x 10⁻¹</td>
</tr>
<tr>
<td>calorie (International Table)</td>
<td>joule (J)</td>
<td>4.186800 x 10⁻³</td>
</tr>
<tr>
<td>calorie (kilogram, International Table)</td>
<td>kilogram (kg)</td>
<td>2.000000 x 10⁻⁴</td>
</tr>
<tr>
<td>carat (metric)</td>
<td>second (s)</td>
<td>8.640000 x 10⁻⁴</td>
</tr>
<tr>
<td>day (mean solar)</td>
<td>pascal (Pa)</td>
<td>1.000000 x 10⁻⁴</td>
</tr>
<tr>
<td>decibar</td>
<td>radian (rad)</td>
<td>1.745329 x 10⁻²</td>
</tr>
<tr>
<td>degree (angle)</td>
<td>kelvin (K)</td>
<td>K = °C + 273.15</td>
</tr>
<tr>
<td>degree (Celsius)</td>
<td>newton (N)</td>
<td>C = (°F - 32)/1.8</td>
</tr>
<tr>
<td>degree centigrade</td>
<td>joule (J)</td>
<td>1.000000 x 10⁻⁰</td>
</tr>
<tr>
<td>degree Fahrenheit</td>
<td>joule (J)</td>
<td>1.000000 x 10⁻³</td>
</tr>
<tr>
<td>degree Fahrenheit</td>
<td>farad (F)</td>
<td>9.99505 x 10⁻⁴</td>
</tr>
<tr>
<td>dye</td>
<td>meter</td>
<td>3.408000 x 10⁻⁵</td>
</tr>
<tr>
<td>electron volt</td>
<td>meter cubed/second (m³/s)</td>
<td>2.831685 x 10⁻²</td>
</tr>
<tr>
<td>erg</td>
<td>meter cubed/second (m³/s)</td>
<td>2.831685 x 10⁻²</td>
</tr>
<tr>
<td>farad, international U.S.</td>
<td>meter cubed (m³)</td>
<td>9.290304 x 10⁻⁴</td>
</tr>
<tr>
<td>foot</td>
<td>meter cubed/second (m³/s)</td>
<td>8.464667 x 10⁻⁵</td>
</tr>
<tr>
<td>foot, cubic per minute</td>
<td>meter/second (m/s)</td>
<td>5.080000 x 10⁻⁴</td>
</tr>
<tr>
<td>foot, cubic per second</td>
<td>meter/second (m/s)</td>
<td>5.080000 x 10⁻⁴</td>
</tr>
<tr>
<td>foot, square</td>
<td>meter/second squared (m²/s²)</td>
<td>3.048000 x 10⁻⁴</td>
</tr>
<tr>
<td>foot per hour</td>
<td>meter cubed (m³)</td>
<td>1.076391 x 10⁻⁶</td>
</tr>
<tr>
<td>foot per minute</td>
<td>meter cubed (m³)</td>
<td>3.048000 x 10⁻⁶</td>
</tr>
<tr>
<td>foot per second</td>
<td>meter cubed (m³)</td>
<td>3.048000 x 10⁻⁶</td>
</tr>
<tr>
<td>footcandle</td>
<td>kilogram</td>
<td>3.785412 x 10⁻³</td>
</tr>
<tr>
<td>foot per second squared</td>
<td>kilogram/meter cubed (kg/m³)</td>
<td>3.785412 x 10⁻³</td>
</tr>
<tr>
<td>gallon (U.S. liquid)</td>
<td>henry (H)</td>
<td>4.381264 x 10⁻⁶</td>
</tr>
<tr>
<td>gallon (U.S. liquid)</td>
<td>watt (W)</td>
<td>6.039020 x 10⁻⁵</td>
</tr>
<tr>
<td>gallon (U.S. liquid) per day</td>
<td>second (s)</td>
<td>1.000000 x 10⁻⁷</td>
</tr>
<tr>
<td>gallon (U.S. liquid) per minute</td>
<td>meter (m)</td>
<td>1.000000 x 10⁻⁷</td>
</tr>
<tr>
<td>gram</td>
<td>meter squared (m²)</td>
<td>7.456999 x 10⁻²</td>
</tr>
<tr>
<td>gram per cubic centimeter</td>
<td>meter cubed (m³)</td>
<td>3.600000 x 10⁻³</td>
</tr>
<tr>
<td>henry, international U.S.</td>
<td>meter cubed (m³)</td>
<td>2.540000 x 10⁻³</td>
</tr>
<tr>
<td>horsepower (550 ft x lbf per second)</td>
<td>meter/second (m/s)</td>
<td>6.451600 x 10⁻⁵</td>
</tr>
<tr>
<td>hour (mean solar)</td>
<td>pascal (Pa)</td>
<td>1.638706 x 10⁻⁵</td>
</tr>
<tr>
<td>inch</td>
<td>inch</td>
<td>2.731177 x 10⁻⁷</td>
</tr>
<tr>
<td>inch, square</td>
<td>inch</td>
<td>2.540000 x 10⁻³</td>
</tr>
<tr>
<td>inch, cubic</td>
<td>inch</td>
<td>3.73685 x 10⁻³</td>
</tr>
<tr>
<td>inch, cubic, per minute</td>
<td>inch</td>
<td>2.4884 x 10⁻²</td>
</tr>
<tr>
<td>inch per second</td>
<td>inch</td>
<td>1.000000 x 10⁻⁴</td>
</tr>
<tr>
<td>inch of mercury (60°F)</td>
<td>inch</td>
<td>1.000000 x 10⁻⁴</td>
</tr>
<tr>
<td>inch of water (60°F)</td>
<td>inch</td>
<td>1.000000 x 10⁻⁴</td>
</tr>
</tbody>
</table>

(continued next page)
<table>
<thead>
<tr>
<th>Unit (International Table)</th>
<th>Unit (US)</th>
<th>Conversion Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>kilocalorie</td>
<td>joule (J)</td>
<td>4.186800 × 10^3</td>
</tr>
<tr>
<td>kilowatt-hour</td>
<td>joule (J)</td>
<td>3.600000 × 10^6</td>
</tr>
<tr>
<td>liter</td>
<td>meter cubed (m^3)</td>
<td>1.000000 × 10^-3</td>
</tr>
<tr>
<td>microinch</td>
<td>meter (m)</td>
<td>2.540000 × 10^-8</td>
</tr>
<tr>
<td>micron</td>
<td>meter (m)</td>
<td>1.000000 × 10^-6</td>
</tr>
<tr>
<td>mile (US statute)</td>
<td>meter (m)</td>
<td>1.609344 × 10^-3</td>
</tr>
<tr>
<td>mile, square (US statute)</td>
<td>meter squared (m^2)</td>
<td>2.589988 × 10^6</td>
</tr>
<tr>
<td>mile per hour (US statute)</td>
<td>meter/second (m/s)</td>
<td>4.470400 × 10^-1</td>
</tr>
<tr>
<td>millimeter of mercury (0°C)</td>
<td>pascal (Pa)</td>
<td>1.333224 × 10^-2</td>
</tr>
<tr>
<td>minute (angle)</td>
<td>radian (rad)</td>
<td>2.908882 × 10^-4</td>
</tr>
<tr>
<td>minute (mean solar)</td>
<td>second (s)</td>
<td>6.000000 × 10^-1</td>
</tr>
<tr>
<td>month (mean calendar)</td>
<td>second (s)</td>
<td>2.268000 × 10^-6</td>
</tr>
<tr>
<td>ohm, international US</td>
<td>ohm (Ω)</td>
<td>1.000495 × 10^00</td>
</tr>
<tr>
<td>ohm-centimeter</td>
<td>ohm-meter (Ωm)</td>
<td>1.000000 × 10^-2</td>
</tr>
<tr>
<td>ounce (avoirdupois)</td>
<td>kilogram (kg)</td>
<td>2.834952 × 10^-2</td>
</tr>
<tr>
<td>ounce (troy or apothecary)</td>
<td>kilogram (kg)</td>
<td>3.110348 × 10^-2</td>
</tr>
<tr>
<td>ounce (US fluid)</td>
<td>meter cubed (m^3)</td>
<td>2.957353 × 10^-5</td>
</tr>
<tr>
<td>pint (US liquid)</td>
<td>meter cubed (m^3)</td>
<td>4.731765 × 10^-4</td>
</tr>
<tr>
<td>pound-force (lbf avoirdupois)</td>
<td>newton (N)</td>
<td>4.448222 × 10^00</td>
</tr>
<tr>
<td>pound-force per square inch (psi)</td>
<td>pascal (Pa)</td>
<td>6.894757 × 10^03</td>
</tr>
<tr>
<td>pound-mass (lbm avoirdupois)</td>
<td>kilogram (kg)</td>
<td>4.535924 × 10^-1</td>
</tr>
<tr>
<td>quart (US liquid)</td>
<td>meter cubed (m^3)</td>
<td>9.463529 × 10^-4</td>
</tr>
<tr>
<td>second (angle)</td>
<td>kilogram (kg)</td>
<td>4.848137 × 10^-6</td>
</tr>
<tr>
<td>ton (long, 2,240 lbm)</td>
<td>kilogram (kg)</td>
<td>1.016047 × 10^-3</td>
</tr>
<tr>
<td>ton (metric)</td>
<td>kilogram/second (kg/s)</td>
<td>1.000000 × 10^-13</td>
</tr>
<tr>
<td>ton (short, 2,000 lbm)</td>
<td>kilogram (kg)</td>
<td>9.071847 × 10^-2</td>
</tr>
<tr>
<td>ton (short, mass) per hour</td>
<td>watt (W)</td>
<td>2.519958 × 10^-1</td>
</tr>
<tr>
<td>tonne</td>
<td>joule (J)</td>
<td>1.000000 × 10^-13</td>
</tr>
<tr>
<td>volt (US legal 1948)</td>
<td>meter (m)</td>
<td>1.000008 × 10^-10</td>
</tr>
<tr>
<td>watt (US legal 1948)</td>
<td>meter squared (m^2)</td>
<td>1.000017 × 10^-10</td>
</tr>
<tr>
<td>watt-hour</td>
<td>meter cubed (m^3)</td>
<td>3.600000 × 10^-15</td>
</tr>
<tr>
<td>yard</td>
<td>meter cubed/second (m^3)/s</td>
<td>9.144000 × 10^-3</td>
</tr>
<tr>
<td>yard, square</td>
<td>second (s)</td>
<td>8.361274 × 10^-1</td>
</tr>
<tr>
<td>yard, cubic</td>
<td>second (s)</td>
<td>7.645549 × 10^-1</td>
</tr>
<tr>
<td>yard, cubic per minute</td>
<td>second (s)</td>
<td>1.274258 × 10^-2</td>
</tr>
<tr>
<td>year (calendar)</td>
<td>second (s)</td>
<td>3.153600 × 10^-7</td>
</tr>
</tbody>
</table>

*The conversion factor is exact and all subsequent digits after the 6th decimal place are zero.*
EDITOR’S APPENDIX

GENERAL NOTES
This appendix provides information and guidance useful for editing and proofreading SME publications. Authors may also find this section helpful when referencing sources in their manuscripts.

Reference Materials
- Style points and book publishing guidelines—The ACS Style Guide (ACS, 2nd ed.), Chicago Manual of Style (CMS, 15th ed.), and Scientific Style and Format: The CSE Manual for Authors, Editors, and Publishers (7th ed.). These style guides may be referenced by section (e.g., CMS 8.07) or page number (e.g., ACS, p. 117) within this appendix for additional guidance.
- General spelling and word usage—Merriam-Webster’s Unabridged Dictionary (MW)
- Technical spelling and some word usage (MW generally takes precedence)—Dictionary of Mining, Mineral, and Related Terms (2nd ed.)

Publications
In addition to its book titles, SME publishes the following periodicals:
- Mining Engineering, a monthly trade magazine
- Minerals & Metallurgical Processing (MM&P), a quarterly journal of peer-reviewed technical papers for researchers and operations personnel
- SME eNewsletter, the official biweekly newsletter for SME members (available online at www.smenet.org)

THE HISTORY OF SME
Knowing a little about SME’s history can be useful when preparing and editing a manuscript, particularly when questions arise about how to cite SME publications over the years. For example, depending on the year of publication, the acronym SME may stand for the former Society of Mining Engineers, or the current Society for Mining, Metallurgy, and Exploration.

The current Society for Mining, Metallurgy, and Exploration, Inc. (SME) is a member society of the American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc. (AIME), which was formed in 1871 by 22 coal mining engineers at a meeting in Wilkes-Barre, Pennsylvania. The original name of the organization was the American Institute of Mining Engineers.

The word Metallurgical was added to the institute name in 1919 to recognize that the American Institute of Metals had become part of the organization the previous year. Petroleum was added in 1956 to recognize the significant growth of the petroleum engineering profession in the organization.

As the institute grew, divisions were formed in response to the increasing trend toward specialization among mineral industry engineers. The SME divisions and their year of formation are the Coal Division (1930), the Industrial Minerals Division (1935), the Mineral Processing Division (1948), the Mining and Exploration Division (1949), and the Environmental Division (1996).

Although it remained a centralized organization, in 1949 AIME recognized the polarization of its activities around the disciplines of its name by forming three branches—Mining, Metals, and Petroleum. Each branch then launched its own monthly magazine. SME’s magazine is Mining Engineering, which replaced the institute’s journal, Mining & Metallurgy.

AIME continued to grow and the nature of its activities increased in complexity. In the 1950s, it became apparent that each of the branches needed greater autonomy, and in 1957, three constituent societies were formed: the Society of Mining Engineers (SME), the Metallurgical Society (TMS), and the Society of Petroleum Engineers (SPE). In 1972,
each of the constituent societies assumed responsibility for its own business affairs, which had previously been handled by the centralized AIME business office. On December 1, 1974, the Iron and Steel Society (ISS) became the fourth constituent society of AIME. Its membership comprises the Iron and Steel Division of TMS and related industrial conference committees.

Also in the early 1970s, SME voted to relocate its headquarters to Salt Lake City, Utah, partly because of the geographic concentration of a significant portion of its membership and partly because of the economic stress of continuing to provide full service to its membership from a New York location. The move began in 1973 and was completed in the spring of 1974.

Continued membership growth and a need to establish appreciating assets brought to life the dream of building a permanent headquarters for SME. In 1978, land in the Ken Caryl Ranch Business Center in Jefferson County, Colorado was purchased. The building was completed in the summer of 1979, and SME took occupancy in August of that year.

For business and liability reasons, and after years of study, the AIME bylaws were amended in 1983 to permit separate incorporation of the constituent entities. All four societies elected to pursue this option, and following the approval of proposed articles of incorporation and bylaws by the membership, the societies applied for incorporation in their home states and for federal income tax exemption under Section 501(c)(3) of the Internal Revenue Code. On September 18, 1984, the Society of Mining Engineers (SME), Inc., was established as a Colorado corporation and subsequently granted 501(c)(3) tax exemption status. Governance, operations, and assets were transferred from SME-AIME to SME, Inc., on December 2, 1985.

Therefore, SME publications before 1985 may be hyphenated as SME-AIME, but from 1986 to present they should be SME.

<table>
<thead>
<tr>
<th>SME Location</th>
<th>Year</th>
<th>AIME Location</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt Lake City</td>
<td>1974 to ~1979</td>
<td>Littleton, Colorado</td>
<td>2003 to present</td>
</tr>
<tr>
<td>Littleton, Colorado</td>
<td>Aug. 1979 to present</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For years, explorationists, metallurgists, mineral economists, and other members had expressed concern that the society’s name did not truly represent the breadth of interests of the membership. In addition, the name was considered misleading to many potential members, who perceived that they needed to be mining engineers to join. At the annual meeting of members held in Las Vegas, Nevada, on February 26, 1989, the members voted to change the name from the Society of Mining Engineers, Inc., to the Society for Mining, Metallurgy, and Exploration, Inc. The acronym remained the same.

ABBREVIATIONS AND ACRONYMS

General Notes

- Spell out states when no city is mentioned; otherwise use 2-letter U.S. Postal Service abbreviations. (See “States and Provinces” in Author Guidelines.)
- Abbreviate specific volume or editions (Vol. 1, 6th ed.). Abbreviate the terms editor(s) (e.g., ed. and eds.)
- AG and SAG: Use AG and SAG only as adjectives; spell out as nouns (autogenous grinding, semiautogenous grinding).

...in Text vs. Figures/Tables

Chapter text is to be treated independently from tables and figures. Regardless of whether an abbreviation has been introduced in a table or figure, it must be separately introduced at first mention in text. In addition,

- Do not introduce an acronym if used only as a reference citation at first mention: ... in the literature (DOE 1999).
• If the same acronym is used again in text, introduce it as if first-mention: ... in the Department of Energy (DOE)....

A few acronyms and abbreviations may be used in figures and tables without first being defined: AG, SAG, O/F, O/S, ROM, U/F, U/S, Tail, Conc.

ACCESSION DATES
Provide only month and year for accession dates of Internet references (do not include day, even if day is provided):

ACRONYMS
Acronyms may be used for organizations as author when defined in parentheses afterward, and may only be used in publisher names if previously introduced in the citation.

Examples:

AIME AS PUBLISHER
The spelled-out version of AIME (as publisher) will vary depending on the year of publication, as follows:
1871–1918: American Institute of Mining Engineers
1919–1955: American Institute of Mining and Metallurgical Engineers
1956 to present: American Institute of Mining, Metallurgical, and Petroleum Engineers

ALPHABETIZATION
Alphabetize reference lists according to the following rules:

1. Alphabetize EPA (Environmental Protection Agency) under E, not U (for U.S. EPA).
2. Alphabetize according to the first authors’ surnames.
3. When the same first author is common to multiple references:
   a. Group single-author refs first, in chronological order (old to new). Use lowercase letters to distinguish among references having the same year (a, b, c, etc.).
   b. Group two-author refs next—by first author, then second author, then in chronological order. Use lowercase letters to distinguish among references having the same year (a, b, c, etc.).
   c. Group all authors of three or more by first author, then in chronological order. Use lowercase letters to distinguish among references having the same year (a, b, c, etc.). Alphabetization according to article title or book name is not necessary.

Examples:
AND/AMPERSAND
For consistency, use the word *and* in references (including publisher names); do not use the ampersand (*&*): John Wiley and Sons.

ASTM, BOOK OF STANDARDS

*Example:*

ASTM INDIVIDUAL STANDARDS
See “Standards” in this appendix for formatting of individual standards.

AUTHOR BYLINES
The format for author bylines may vary from book to book and will be determined by SME. Names and affiliations may be included in the byline, or the name only may appear with affiliations included in footnotes. Affiliations may be included in a separate location at the front or back of the book.

AUTHOR NOT GIVEN
In author-date format when no author (or organization) is named, list the reference alphabetically according to the first word in the title of the book, report, or article.

BOOKS

*Examples:*

General

Book Volume with Separate Title

Chapters in Edited Books

Edited Books

Multivolume Books
Page Numbers in Book

Inclusion of page numbers for books and chapters of book are optional. If included, use the following formats. Examples:


BULLETINS

Use either form of citation (book-type or trade-journal-type, respectively) as follows. Examples:


Article in Bulletin


CAPITALIZATION

In titles where the style is to use capitalization, capitalize all major words (nouns, verbs, adverbs, pronouns) as well as prepositions of five or more letters: with, for, from, Through, After, Versus.

In article subtitles, use a capital letter for the first word after a colon or an em dash: (1) *Diamond exploration: A review*; (2) *Fluorspar in focus—Light at the end of the tunnel*.

CD-ROMS

Examples:

Hicks, R.J. 1996. *Nuclear Medicine, from the Center of Our Universe*. CD-ROM. Victoria, Australia: ICE T Multimedia.


CITING REFERENCES WITHIN REFERENCES

If, for example, work by John Doe is referenced in George Smith’s book, include complete references information for George Smith’s book in the reference list, and use the word see in text according to the following format: *John Doe ’s patent (see Smith 2003) demonstrated....*

COMBINING REFERENCES

If two or more references are the same except for page numbers, combine them into one reference. For a book, delete page numbers unless they can be inclusive in one range of page numbers: *pp. 24–26*. For page numbers in a trade journal or magazine, use commas between page numbers: *142(2):14, 18, 91*.
CONFERENCES AND MEETINGS

There are three types of citations for conferences and meetings: (1) Full citations that resemble a book format; (2) full citations that resemble a trade journal format; and (3) citations pertaining to oral presentations, papers presented at conferences, demonstrations, and meetings wherein there is no publication information.

Examples:

Published Proceedings—Book Format


Note: Meeting location is separated from the name of the proceedings by a comma and is in regular type. Page numbers are optional.

Published Proceedings—Trade Journal—Type Citation


Note: Okay if date and/or meeting location not given.

No Publisher Information


Note: Okay if date and/or meeting location not given.

CORPORATE AUTHORS

Example:


DISSERTATIONS or THESES

Examples:


Notes: (1) Other degrees may be used in place of Ph.D. in above example; (2) No need to repeat city name if included in name of university.

EDITION

For a book reference, use a comma before the edition number (e.g., Title of Book, 2nd ed.)

EM DASHES

Use 3 em dashes followed by a period (———.) for repetitive (identical) authors. If authors are listed in a different order for different books, do not use the em dashes.
ET AL.
List names of all authors in reference list (avoid use of et al.).

EUROPEAN UNION (EU) COUNCIL DIRECTIVES
Example:

FOREIGN PUBLICATIONS
Use the following style for foreign publications (CMS 17.177):
Smith, J.S. 1999. Title of Publication. [In French.] Location: Publisher.

FORTHCOMING/NO DATE
Use n.d. (which means “no date”) when the date of publication is not known. Lowercase letters are used so as not to confuse it with author initials.
When a book is under contract to be published but the date of publication is not known, forthcoming may be used in place of the date.
Examples:
           Forthcoming.

GUIDEBOOKS
Example:

INDUSTRIAL MINERALS AND ROCKS (IMAR)
Correct references for the various editions of IMAR are as follows:
1937. 1st ed.
1949. 2nd ed.
Notes: The 5th and 7th editions contain two volumes.
Example:
The following is a different book with the same title. Note that AIME-SME is not the publisher:


**INDUSTRIAL MINERALS (TRADE JOURNAL)**

Examples:


**NOTE:** Use this style when volume or issue number is given; either one (or both) are placed in front of the colon.


**NOTE:** Use this style when only the month is given but no issue volume or number.

**INFORMATION CIRCULARS**

Example:


**INTERNAL COMMUNICATIONS**

Example:


**JOURNAL ARTICLES**

See “Trade Journal Articles.”

**MINERAL COMMODITY SUMMARIES**

The *Mineral Commodity Summaries* were published by USBM prior to 1996 and by USGS from 1996 to present.

Example:


**MINERALS YEARBOOKS**

The *Minerals Yearbooks* were published by USBM before 1996 and by USGS from 1996 to present.


**MONTH/SEASON OF PUBLICATION**

Use en dash for span of months: *March* –*April*. When the volume is listed by name of month or season, place month in parentheses, followed by a colon and a space (CMS 17.164):

Examples:


MULTIPLE YEARS CITED
It is occasionally acceptable to cite multiple years of the same book or series with an en dash. This is not a standard practice but may be used as a space-saver.

Example:

MULTIVOLUME BOOKS
See “Books” in this appendix.

NEWSPAPERS, ONLINE ARTICLE
Omit initial The in newspaper titles (CMS 17.195).

Example:

NO DATE (n.d.)
See “Forthcoming/No Date” in this appendix.

ONLINE REFERENCE WORKS

Example:

PATENTS
Do not include No. or # in front of patent number. It is acceptable if the month/day of patent are not included.

Example:

PERSONAL COMMUNICATIONS
Include parenthetically in text only (not reference list), and do NOT include date/year, affiliation, or other extra info. Change the words written/oral/verbal to personal. Style as follows: text (J. Smith, personal communication).

PREPRINTS, SME

Example:
PROCEEDINGS
See “Conferences and Meetings.”

PROFESSIONAL PAPERS
Example:

PUBLISHER LOCATIONS
The following cities do not need state identifiers in reference lists because of reader familiarity with these locations:

Atlanta  Houston  Philadelphia
Baltimore  Indianapolis  Phoenix
Boston  Las Vegas  Pittsburgh
Chicago  Los Angeles  Salt Lake City
Cincinnati  Miami  San Antonio
Cleveland  Milwaukee  San Diego
Dallas  Minneapolis  San Francisco
Denver  New Orleans  Seattle
Detroit  New York  St. Louis
Honolulu  Oklahoma City  Washington, DC

REPORTS, OPEN-FILE
Example:

REPORTS, TECHNICAL
Example:

REPORTS, UNPUBLISHED
Example:

SERIES
Examples:

Note: The volume number is 71; no need to add the word volume. Adding the issue number is optional.


NOTE: In 2000 [beginning with Vol. 39], the Reviews in Mineralogy book series was renamed Reviews in Mineralogy and Geochemistry.

STANDARDS
No accession date is required for these Web sites because the reader is being told where to find the standard and not when the author accessed the site.

Occasionally a standard doesn’t have an associated date, which is acceptable (do not add no date, undated, or latest revision).

Examples:

ASTM Standards:


NOTE: West Conshohocken, Pa., and Philadelphia, Pa., are both accepted locations for ASTM International.

Australian Standards:


ISO Standards:


or


TECHNICAL PAPERS/PUBLICATIONS

Examples:

NOTE: The spelled-out version of AIME will vary depending on the year of publication. See also “AIME as Publisher” in this appendix.


THESES
See “Dissertations/Theses” in this appendix.

TRADE JOURNAL ARTICLES

Example:

See list of trade journal abbreviations at the end of this appendix.

TRANSACTIONS (AIME)

Examples:

NOTE: Because there are five AIME divisions, Mill. Methods may be interchanged with one of the following, depending on the division:
Coal Div.
Iron Steel Div.

TRANSACTIONS (SME)

Example:

TRANSACTIONS (TRANS. IMM, TRANS. B)

Examples:

UNDATED WORKS
Use n.d. (which means no date) when the date of publication cannot be ascertained. If the date of publication is a
guess, the year can be placed in brackets with a question mark (e.g., Smith, E.G. [1750?]. Title of Book...).

Example:


UNPUBLISHED WORKS

If materials are intended for future publication in a trade journal, see “Forthcoming/No Date” section in this appendix. For unpublished reports, see the “Reports, Unpublished” section in this appendix. For other works not intended for publication, use the following format.

Example:


URLs

Do not include http:// in URLs (e.g., www.sme.org), unless the URL does not contain a www indicator, which occurs in rare instances (e.g., http://lcweb2.loc.gov/hlas/journals.html).

VOLUME (NO VOLUME NUMBER)

When a trade journal uses issue numbers only, without volume numbers, a comma follows the journal title and no. is included before issue number (CMS 17.165).

Example:


WEB SITE, ORIGINAL CONTENT

Example:

### Trade Journal Abbreviations

Abbreviate names of trade journals in the references list. For those not listed below, refer to [www.library.ubc.ca/scieng/coden.html](http://www.library.ubc.ca/scieng/coden.html) or [http://lcweb2.loc.gov/hlas/journals.html](http://lcweb2.loc.gov/hlas/journals.html). Single-word titles are not abbreviated (e.g., *Science*). Omit internal smaller words (e.g., *the, and, of, in*).

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*n.a.* = no abbreviation; spell out.

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