General Notices and Requirements

Applying to Standards, Tests, Assays, and Other Specifications of the United States Pharmacopeia

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General Notices and Requirements

The General Notices and Requirements section (the General Notices) presents the basic assumptions, definitions, and default conditions for the interpretation and application of the United States Pharmacopeia (USP) and the National Formulary (NF).

Requirements stated in these General Notices apply to all articles recognized in the USP and NF (the “compendia”) and to all general chapters unless specifically stated otherwise. Where the requirements of an individual monograph differ from the General Notices or a general chapter, the monograph requirements apply and supersede the requirements of the General Notices or the general chapter, whether or not the monograph explicitly states the difference.

1. TITLE AND REVISION

The full title of this publication (consisting of three volumes and including its Supplements), is The Pharmacopeia of the United States of America, Thirty-Third Revision and the National Formulary, Twenty-Eighth Edition. These titles may be abbreviated to United States Pharmacopeia, Thirty-Third Revision (or to USP 33), to NF 28, and to USP 33–NF 28. The United States Pharmacopeia, Thirty-Third Revision, and the National Formulary, Twenty-Eighth Edition, supersede all earlier revisions. Where the terms “USP,” “NF,” or “USP–NF” are used without further qualification during the period in which these compendia are official, they refer only to USP 33, NF 28, and any Supplement(s) thereto. The same titles, with no further distinction, apply equally to print or electronic presentation of these contents. Although USP and NF are published under one cover and share these General Notices, they are separate compendia.

This revision is official beginning May 1, 2010, unless otherwise indicated in specific text.

Supplements to USP and NF are published periodically.

Interim Revision Announcements are revisions to USP and NF that are published in Pharmacopeial Forum. Interim Revision Announcements contain official revisions and their effective dates, announcements of the availability of new USP Reference Standards, and announcements of tests or procedures that are held in abeyance pending availability of required USP Reference Standards.

Revision Bulletins are revisions to official text or postannouncements that require expedited publication. They are published on the USP website and generally are official immediately unless otherwise specified in the Revision Bulletin. Errata are corrections to items erroneously published that have not received the approval of the Council of Experts and that do not reflect the official requirements. Errata are effective upon publication.

2. OFFICIAL STATUS AND LEGAL RECOGNITION

2.10. Official Text

Official text is text contained in USP and NF, including monographs, general chapters, and these General Notices. Revisions to official text are provided in Supplements, Interim Revision Announcements, and Revision Bulletins. General chapters numbered from 1000 to 1999 are considered interpretive and are intended to provide information on, give definition to, or describe a particular subject. They contain no mandatory requirements applicable to any official article unless specifically referenced in these General Notices, a monograph, or a general chapter numbered below 1000. General chapters numbered above 2000 apply only to articles that are intended for use as dietary ingredients and dietary supplements.

2.20. Official Articles

An official article is an article that is recognized in USP or NF. An article is deemed to be recognized and included in a compendium when a monograph for the article is published in the compendium and an official date is generally or specifically assigned to the monograph. The title specified in a monograph is the official title for such article. Other names considered to be synonyms of the official titles may not be used as substitutes for official titles.

Official articles include both official substances and official products. An official substance is a drug substance, excipient, dietary ingredient, other ingredient, or component of a finished device for which the monograph title includes no indication of the nature of the finished form.

An official product is a drug product, dietary supplement, compounded preparation, or finished device for which a monograph is provided.

2.30. Legal Recognition

The USP and NF are recognized in the laws and regulations of many countries throughout the world. Regulatory authorities may enforce the standards presented in the USP and NF, but because recognition of the USP and NF may vary by country, users should understand applicable laws and regulations. More information about the legal status of the USP and NF is provided in the Mission and Preface.

3. CONFORMANCE TO STANDARDS

3.10. Applicability of Standards

Standards for an article recognized in a USP compendium are expressed in the article’s monograph, applicable general chapters, and these General Notices. Unless specifically exempted elsewhere in a compendium, the identity, strength, quality, and purity of an article are determined by the official tests, procedures, and acceptance criteria, whether incorporated in the monograph itself, in the General Notices, or in the applicable general chapters.

The standards in the relevant monograph, general chapter(s), and General Notices apply at any time in the life of the article from production to expiration. The manufacturer’s specifications, and good manufacturing practices generally, are developed and followed to ensure that the article will comply with compendial standards until its expiration date, when stored as directed. Thus, any official article tested as directed in the relevant standards shall comply.

At times, compendial standards take on the character of statistical procedures, with multiple units involved and perhaps a sequential procedural design to allow the user to determine that the tested article meets or does not meet the standard. The similarity to statistical procedures may seem to suggest an intent to make inference to some larger group of units, but in all cases, statements about whether the compendial standard is met apply only to the units tested. Repeats, replicates, statistical rejection of outliers, or extrapolations of results to larger populations, as well as the necessity and appropriate frequency of batch testing, are neither specified nor proscribed by the compendia. First-party (manufacturer), second-party (buyer), or third-party (regulator) compliance testing may or may not require examination of additional specimens, in accordance with predetermined guidelines or sampling strategies.
Official products other than dietary supplements are prepared from ingredients that meet USP or NF standards, where standards for such ingredients exist.

Official substances are prepared according to recognized principles of good manufacturing practice and from ingredients complying with specifications designed to ensure that the resultant substances meet the requirements of the compendial monographs.

3.10.10. Applicability of Standards to Drug Products, Drug Substances, and Excipients

The applicable USP or NF standard applies to any article marketed in the United States that (1) is recognized in the compendium and (2) is intended or labeled for use as a drug or as an ingredient in a drug. The applicable standard applies to such articles whether or not the added designation “USP” or “NF” is used. The standards apply equally to articles bearing the official titles or names derived by transposition of the definitive words of official titles or transposition in the order of the names of two or more active ingredients in official titles.

3.10.20. Applicability of Standards to Medical Devices, Dietary Supplements, and Their Components and Ingredients

An article recognized in USP or NF shall comply with the compendial standards if the article is a medical device, component intended for a medical device, dietary supplement, or dietary ingredient, or other ingredient that is intended for incorporation into a dietary supplement, and is labeled as conforming to the USP or NF.

Generally, dietary supplements are prepared from ingredients that meet USP, NF, or Food Chemicals Codex standards. Where such standards do not exist, substances may be used in dietary supplements if they have been shown to be of acceptable food grade quality using other suitable procedures.

3.20. Indicating Conformance

A drug product, drug substance, or excipient may use the designation “USP” or “NF” in conjunction with its official title or elsewhere on the label only when (1) a monograph is provided in the specified compendium and (2) the article complies with the identity prescribed in the specified compendium.

When a drug product, drug substance, or excipient differs from the relevant USP or NF standard of strength, quality, or purity, as determined by the application of the tests, procedures, and acceptance criteria set forth in the related compendium, its actual content shall be plainly stated on its label.

When a drug product, drug substance, or excipient fails to comply with the identity prescribed in USP or NF or contains an added substance that interferes with the prescribed tests and procedures, the article shall be designated by a name that is clearly distinguishing and differentiating from any name recognized in USP or NF.

A medical device, dietary supplement, or ingredient or component of a medical device or dietary supplement may use the designation “USP” or “NF” in conjunction with its official title or elsewhere on the label only when (1) a monograph is provided in the specified compendium and (2) the article complies with the compendial standards and other applicable standards in the compendium.

The designation “USP” or “NF” on the label may not and does not constitute an endorsement by USP and does not represent assurance by USP that the article is known to comply with the relevant standards. USP may seek legal redress if an article purports to be or is represented as an official article in one of USP’s compendia and such claim is determined by USP not to be made in good faith.

The designation “USP–NF” may be used on the label of an article provided that the label also bears a statement such as “Meets NF standards as published by USP,” indicating the particular compendium to which the article purports to apply.

When the letters “USP,” “NF,” or “USP–NF” are used on the label of an article to indicate compliance with compendial standards, the letters shall appear in conjunction with the official title of the article. The letters are not to be enclosed in any symbol such as a circle, square, etc., and shall appear in capital letters.

If a dietary supplement does not comply with all applicable compendial requirements but contains one or more dietary ingredients or other ingredients that are recognized in USP or NF, the individual ingredient(s) may be designated as complying with USP or NF standards or being of USP or NF quality provided that the designation is limited to the individual ingredient(s) and does not suggest that the dietary supplement complies with USP standards.

4. MONOGRAPHS AND GENERAL CHAPTERS

4.10. Monographs

Monographs set forth the article’s name, definition, specification, and other requirements related to packaging, storage, and labeling. The specification consists of tests, procedures, and acceptance criteria that help ensure the identity, strength, quality, and purity of the article. For general requirements relating to specific monograph sections, see section 5, Monograph Components.

Because monographs may not provide standards for all relevant characteristics, some official substances may conform to the USP or NF standard but differ with regard to nonstandardized properties that are relevant to their use in specific preparations. To assure interchangeability in such instances, users may wish to ascertain functional equivalence or determine such characteristics before use.

4.10.10. Applicability of Test Procedures

A single monograph may include several different tests, procedures, and/or acceptance criteria that reflect attributes of different manufacturers’ articles. Such alternatives may be presented for different polymorphic forms, impurities, impurities, and dissolution cases. Monographs indicate the tests, procedures, and/or acceptance criteria to be used and the required labeling.

4.10.20. Acceptance Criteria

The acceptance criteria allow for analytical error, for unavoidable variations in manufacturing and compounding, and for deterioration to an extent considered acceptable under practical conditions. The existence of compendial acceptance criteria does not constitute a basis for a claim that an official substance that more nearly approaches 100 percent purity “exceeds” compendial quality. Similarly, the fact that an article has been prepared to tighter criteria than those specified in the monograph does not constitute a basis for a claim that the article “exceeds” the compendial requirements.

An official product shall be formulated with the intent to provide 100 percent of the quantity of each ingredient declared on the label. Where the minimum amount of a substance present in a dietary supplement is required by law to be higher than the lower acceptance criterion allowed for in the monograph, the upper acceptance criterion contained in the monograph may be increased by a corresponding amount.

The acceptance criteria specified in individual monographs and in the general chapters for compounded preparations are based on such attributes of quality as might be expected to characterize an article compounded from suitable bulk drug substances and ingredients, using the procedures provided or recognized principles of good compounding practice, as described in these compendia.

4.20. General Chapters

Each general chapter is assigned a number that appears in angle brackets adjacent to the chapter name (e.g., Chromatography (621)). General chapters may contain the following:

- Descriptions of tests and procedures for application through individual monographs,
- Descriptions and specifications of conditions and practices for pharmaceutical compounding,
- General information for the interpretation of the compendial requirements,
5. MONOGRAPH COMPONENTS

5.10. Molecular Formula

The use of the molecular formula for the active ingredient(s) named in defining the required strength of a compendial article is intended to designate the chemical entity or entities, as given in the complete chemical name of the article, having absolute (100 percent) purity.

5.20. Added Substances, Excipients, and Ingredients

Substances are regarded as unsuitable for inclusion in an official article and therefore prohibited unless: (1) they do not exceed the minimum quantity required for providing the intended effect; (2) their presence does not impair the bioavailability, therapeutic efficacy, or purity of the article; and (3) they are not interfered with by assays and tests prescribed for determining compliance with compendial standards.

The air in a container of an official article may, where appropriate, be evacuated or replaced by carbon dioxide, helium, argon, or nitrogen, or a mixture of these gases. The use of such gas need not be declared in the labeling.

5.20.10. Added Substances, Excipients, and Ingredients in Official Substances

Official substances may contain only the specific added substances that are permitted by the individual monograph. Where such addition is permitted, the label shall indicate the name(s) and amount(s) of any added substance(s).

5.20.20. Added Substances, Excipients, and Ingredients in Official Products

Suitable substances and excipients such as antimicrobial agents, pharmaceutical bases, carriers, coatings, flavors, preservatives, stabilizers, and vehicles may be added to an official product to enhance its stability, usefulness, or elegance, or to facilitate its preparation, unless otherwise specified in the individual monograph.

Additional ingredients may be added to dietary supplements for purposes of enhancing the stability, usefulness, or elegance, or to facilitate its preparation, unless otherwise specified in the individual monograph.

The proportions of the substances constituting the base in ointment and suppository products and preparations may be varied to maintain a suitable consistency under different climatic conditions, provided that the concentrations of active ingredients are not varied and provided that the bioavailability, therapeutic efficacy, and safety of the preparation are not impaired.

5.20.20.1. In Compounded Preparations

Compounded preparations for which a complete composition is given shall contain only the ingredients named in the formulas unless specifically exempted herein or in the individual monograph. Deviation from the specified processes or methods of compounding, although not from the ingredients or proportions thereof, may occur provided that the finished preparation conforms to the relevant standards and to preparations produced by following the specified process.

Where a monograph for a compounded preparation calls for an ingredient in an amount expressed on the dried basis, the ingredient need not be dried before use if due allowance is made for the water or other volatile substances present in the quantity taken.

Specially denatured alcohol formulas are available for use in accordance with federal statutes and regulations of the Internal Revenue Service. A suitable formula of specially denatured alcohol may be substituted for Alcohol in the manufacture of official preparations intended for internal or topical use, provided that the denaturant is volatile and does not remain in the finished product. A preparation that is intended for topical application to the skin may contain specially denatured alcohol, provided that the denaturant is either a usual ingredient in the preparation or a permissible added substance; in either case the denaturant shall be identified on the label of the topical preparation.

5.30. Description and Solubility

Only where a quantitative solubility test is given in a monograph and is designated as such is it a test for purity.

A monograph may include information regarding the article’s description. Information about an article’s “description and solubility” also is provided in the reference table Description and Relative Solubility of USP and NF Articles. The reference table merely denotes the properties of articles that comply with monograph standards. The reference table is intended primarily for those who use, prepare, and dispense drugs and/or related articles.

The approximate solubility of a compendial substance is indicated by one of the following descriptive terms:

<table>
<thead>
<tr>
<th>Descriptive Term</th>
<th>Parts of Solvent Required for 1 Part of Solute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very soluble</td>
<td>Less than 1</td>
</tr>
<tr>
<td>Freely soluble</td>
<td>From 1 to 10</td>
</tr>
<tr>
<td>Soluble</td>
<td>From 10 to 30</td>
</tr>
<tr>
<td>Sparingly soluble</td>
<td>From 30 to 100</td>
</tr>
<tr>
<td>Slightly soluble</td>
<td>From 100 to 1,000</td>
</tr>
<tr>
<td>Very slightly soluble</td>
<td>From 1,000 to 10,000</td>
</tr>
<tr>
<td>Practically insoluble, or</td>
<td>Greater than or equal to 10,000</td>
</tr>
<tr>
<td>Insoluble</td>
<td></td>
</tr>
</tbody>
</table>

5.40. Identification Test

The compendial test titled Identification is provided as an aid in verifying the identity of articles as they are purported to be, e.g., those taken from labeled containers. Tests presented in the Identification section shall be used to assist in establishing the identity of the substance but are not necessarily sufficient to establish proof of identity. Other tests and specifications in the monograph are necessary to establish or confirm the identity of an article. Failure of an article to meet the requirement of a prescribed Identification test may indicate that the article is mislabeled.

5.50. Assay

Assay tests for compounded preparations are not intended for evaluating a compounded preparation before dispensing, but instead are intended to serve as the official test in the event of a question or dispute regarding the preparation’s conformity to official standards.

5.50.10. Units of Potency (Biological)

For substances that cannot be completely characterized by chemical and physical means, it may be necessary to
express quantities of activity in biological units of potency, each defined by an authoritative, designated reference standard.

Units of biological potency defined by the World Health Organization (WHO) for International Biological Standards and International Biological Reference Preparations are termed International Units (IU). Monographs refer to the units defined by USP Reference Standards as “USP Units.” For biological products, units of potency are defined by the corresponding U.S. Standard established by FDA, whether or not International Units or USP Units have been defined (see Biologies (1041)).

5.60. Impurities and Foreign Substances
Tests for the presence of impurities and foreign substances are provided to limit such substances to amounts that are unobjectionable under conditions in which the article is customarily employed (see also Impurities in Official Articles (1086)).

Nonmonograph tests and acceptance criteria suitable for detecting and controlling impurities that may result from a change in the processing methods or that may be introduced from external sources should be employed in addition to the tests provided in the individual monograph, where the presence of the impurity is inconsistent with applicable good manufacturing practices or good pharmaceutical practice.

5.60.10. Other Impurities in USP and NF Articles
If a USP or NF monograph includes an assay or organic impurity test based on chromatography, other than a test for residual solvents, and that monograph procedure does not detect an impurity present in the substance, the amount and identity of the impurity, where both are known, shall be stated in the labeling (certificate of analysis) of the official substance, under the heading Other Impurity(ies).

The presence of any unlabeled other impurity in an official substance is a variance from the standard if the content is 0.1% or greater. The sum of all Other Impurities combined with the monograph-detected impurities may not exceed 2.0% (see Ordinary Impurities (466)), unless otherwise stated in the monograph.

The following categories of drug substances are excluded from Other Impurities requirements:
- fermentation products and semi-synthetics derived therefrom,
- radiopharmaceuticals,
- biologics,
- biotechnology-derived products,
- peptides,
- herbs, and
- crude products of animal or plant origin.

Any substance known to be toxic shall not be listed under Other Impurities.

5.60.20. Residual Solvents in USP and NF Articles
All USP and NF articles are subject to relevant control of residual solvents, even when no test is specified in the individual monograph. If solvents are used during production, they must be of suitable quality. In addition, the toxicity and residual level of each solvent shall be taken into consideration, and the solvents limited according to the principles defined and the requirements specified in Residual Solvents (467), using the general methods presented therein or other suitable methods.

5.70. Performance Tests
Where content uniformity determinations have been made using the same analytical methodology specified in the Assay, with appropriate allowances made for differences in sample preparation, the average of all of the individual content uniformity determinations may be used as the Assay value.

5.80. USP Reference Standards
USP Reference Standards are authentic specimens that have been approved by the USP Reference Standards Expert Committee as suitable for use as comparison standards in USP or NF tests and assays. (See USP Reference Standards (11).) Current official lots of USP Reference Standards are published in the USP Reference Standards Catalog. Where a procedure calls for the use of a compendial article rather than for a USP Reference Standard as a material standard of reference, a substance meeting all of the compendial monograph requirements for that article shall be used. No new USP or NF standard or procedure requiring the use of a new USP Reference Standard shall be official until the specified USP Reference Standard is available.

Unless a reference standard label bears a specific potency or content, assume the reference standard is 100.0% pure in the official application unless otherwise directed in the procedure in the individual monograph or in a general chapter, USP Reference Standards are to be used in accordance with the instructions on the label of the Reference Standard.

6. TESTING PRACTICES AND PROCEDURES

6.10. Safe Laboratory Practices
In performing compendial procedures, safe laboratory practices shall be followed, including precautionary measures, protective equipment, and work practices consistent with the chemicals and procedures used. Before undertaking any procedure described in the compendia, the analyst should be aware of the hazards associated with the chemicals and the techniques and means of protecting against them. These compendia are not designed to describe such hazards or protective measures.

6.20. Automated Procedures
Automated and manual procedures employing the same basic chemistry are considered equivalent.

6.30. Alternative and Harmonized Methods and Procedures
Alternative methods and/or procedures may be used if they provide advantages in terms of accuracy, sensitivity, precision, selectivity, or adaptability to automation or computerized data reduction, or in other special circumstances. Such alternative procedures and methods shall be validated as described in the general chapter Validation of Compendial Procedures (1225) and must be shown to give equivalent or better results. Only those results obtained by the methods and procedures given in the compendium are conclusive.

Alternative procedures should be submitted to USP for evaluation as a potential replacement or addition to the standard (see section 4.10, Monographs).

Certain general chapters contain a statement that the text in question is harmonized with the corresponding text of the European Pharmacopoeia and/or the Japanese Pharmacopoeia and that these texts are interchangeable. Therefore, if a substance or preparation is found to comply with a requirement using an interchangeable method or procedure from one of these pharmacopoeias, it should comply with the requirements of the USP. When a difference appears, or in the event of dispute, only the result obtained by the method and/or procedure given in the USP is conclusive.

6.40. Dried, Anhydrous, Ignited, or Solvent-Free Basis
All calculations in the compendia assume an “as-is” basis unless otherwise specified.

Test procedures may be performed on the undried or unignited substance and the results calculated on the dried, anhydrous, or ignited basis, provided a test for Loss on drying, or Water, or Loss on ignition, respectively, is given in the monograph. Where the presence of moisture or other volatile material may interfere with the procedure, previous drying of the substance is specified in the individual monograph and is obligatory.

The term “solvent-free” signifies that the calculation shall be corrected for the presence of known solvents as determined using the methods described in Residual Solvents (467) unless a test for limit of organic solvents is provided in the monograph.

The term “previously dried” without qualification signifies that the substance shall be dried as directed under Loss on Drying (731) or Water Determination (921) (gravimetric determination).
Where drying in vacuum over a desiccant is directed, a vacuum desiccator, a vacuum drying pistol, or other suitable vacuum drying apparatus shall be used.

6.40.10. Ignite To Constant Weight

Ignite to constant weight” means that ignition shall be continued at 800±25°C, unless otherwise indicated, until two consecutive weighings, the second of which is taken after an additional period appropriate to the nature and quantity of the residue, do not differ by more than 0.50 mg per g of substance taken.

6.40.20. Dried To Constant Weight

“Dried to constant weight” means that drying shall be continued until two consecutive weighings, the second of which is taken after an additional drying period appropriate to the nature and quantity of the residue, do not differ by more than 0.50 mg per g of substance taken.

6.50. Preparation of Solutions

6.50.10. Filtration

Where a procedure gives direction to “filter” without further qualification, the liquid shall be passed through suitable filter paper or equivalent device until the filtrate is clear. Due to the possibility of filter effects, the initial volumes of a filtrate may be discarded.

6.50.20. Solutions

Unless otherwise specified, all solutions shall be prepared with Purified Water. Solutions for quantitative measurements shall be prepared using accurately weighed or accurately measured analytes (see section 8.20, About).

An expression such as “(1 in 10)” means that 1 part by volume of a liquid shall be diluted with, or 1 part by weight of a solid shall be dissolved in, a sufficient quantity of the diluent or solvent to make the volume of the finished solution 10 parts by volume. An expression such as “(20 : 5 : 2)” means that the respective numbers of parts, by volume, of the designated liquids shall be mixed, unless otherwise indicated.

6.50.20.1. Adjustments to Solutions

When a specified concentration is called for in a procedure, a solution of other normality or molarity may be used, provided that allowance is made for the difference in concentration and that the change does not increase the error of measurement.

Unless otherwise indicated, analyte concentrations shall be prepared to within ten percent (10%) of the indicated value. In the special case in which a procedure is adapted to the working range of an instrument, solution concentrations may differ from the indicated value by more than ten percent (10%), with appropriate changes in associated calculations. Any changes shall fall within the validated range of the instrument.

When adjustment of pH is indicated with either an acid or base and the concentration is not indicated, appropriate concentrations of that acid or base may be used. Accuracy. These characteristics shall be qualified as appropriate for the intended use and is of equivalent or greater sensitivity and accuracy. These characteristics shall be qualified as appropriate for the intended use.

6.50.20.2. Test Solutions

Information on Test Solutions (TS) is provided in the Test Solutions portion of the Reagents, Indicators, and Solutions section of the USP–NF. Use of an alternative Test Solution or a change in the Test Solution used may require validation.

6.50.20.3. Indicator Solutions

Where a procedure specifies the use of an indicator solution, approximately 0.2 mL, or 3 drops, of the solution shall be added unless otherwise directed.

6.60. Units Necessary to Complete a Test

Unless otherwise specified, a sufficient number of units to ensure a suitable analytical result shall be taken.

6.60.10. Tablets

Where the procedure of a Tablet monograph directs to weigh and finely powder not fewer than a given number of Tablets, a counted number of Tablets shall be weighed and reduced to a powder. The portion of the powdered Tablets taken shall be representative of the whole Tablets and shall, in turn, be weighed accurately.

6.60.20. Capsules

Where the procedure of a Capsule monograph gives direction to remove, as completely as possible, the contents of not fewer than a given number of the Capsules, a counted number of Capsules shall be carefully opened and the contents quantitatively removed, combined, mixed, and weighed accurately. The portion of mixed Capsules contents taken shall be representative of the contents of the Capsules and shall, in turn, be weighed accurately.

6.70. Reagents

The proper conduct of the compendial procedures and the reliability of the results depend, in part, upon the quality of the reagents used in the performance of the procedures. Unless otherwise specified, reagents conforming to the specifications set forth in the current edition of Reagent Chemicals published by the American Chemical Society (ACS) shall be used. Where such ACS reagent specifications are not available or where the required purity differs, compendial specifications for reagents of acceptable quality are provided (see the Reagents, Indicators, and Solutions section of the USP–NF). Reagents not covered by any of these specifications should be of a grade suitable to the proper performance of the method of assay or test involved.

Listings of these reagents, including the indicators and solutions employed as reagents, in no way implies that they have therapeutic utility; furthermore, any reference to USP or NF in their labeling shall include also the term “reagent” or “reagent grade.” USP may supply reagents if they otherwise may not be generally commercially available.

6.80. Equipment

Unless otherwise specified, a specification for a definite size or type of container or apparatus in a procedure is given solely as a recommendation. Other dimensions or types may be used if they are suitable for the intended use.

6.80.10. Apparatus for Measurement

Where volumetric flasks or other exact measuring, weighing, or sorting devices are specified, this or other equipment of at least equivalent accuracy shall be employed.

6.80.10.1. Pipet

Where a pipet is specified, a suitable buret may be substituted. Where a “to contain” pipet is specified, a suitable volumetric flask may be substituted.

6.80.10.2. Light Protection

Where low-actinic or light-resistant containers are specified, either containers specially treated to protect contents from light or clear containers that have been rendered opaque by application of a suitable coating or wrapping may be used.

6.80.20. Instrumental Apparatus

An instrument may be substituted for the specified instrument if the substitute uses the same fundamental principles of operation and is of equivalent or greater sensitivity and accuracy. These characteristics shall be qualified as appropriate. Where a particular brand or source of a material, instrument, or piece of equipment, or the name and address of a manufacturer or distributor, is mentioned (ordinarily in a footnote), this identification is furnished solely for informational purposes as a matter of convenience, without implication of approval, endorsement, or certification.

6.80.20.1. Chromatographic Tubes and Columns

The term “diameter” refers to internal diameter (ID).

6.80.20.2. Tubing

The term “diameter” refers to outside diameter (OD).

6.80.20.3. Steam Bath

Where use of a steam bath is directed, use actively flowing steam or another regulated heat source controlled at an equivalent temperature.

6.80.20.4. Water Bath

A water bath requires vigorously boiling water unless otherwise specified.
7. TEST RESULTS

7.10. Interpretation of Requirements
Analytical results observed in the laboratory (or calculated from experimental measurements) are compared with stated acceptance criteria to determine whether the article conforms to compendial requirements. The reportable value, which often is a summary value for several individual determinations, is compared with the acceptance criteria. The reportable value is the end result of a completed measurement procedure, as documented. Where acceptance criteria are expressed numerically herein through specification of an upper and/or lower limit, permitted values include the specified values themselves, but no values outside the limit(s). Acceptance criteria are considered significant to the last digit shown.

7.10.10. Equivalence Statements in Titrimetric Procedures
The directions for titrimetric procedures conclude with a statement of the weight of the analyte that is equivalent to each mL of the standardized titrant. In such an equivalence statement, the number of significant figures in the concentration of the titrant should be understood to correspond to the number of significant figures in the weight of the analyte. Corrections to calculations based on the blank determination are to be made for all titrimetric assays where appropriate (see Titrimetry (541)).

7.20. Rounding Rules
The observed or calculated values shall be rounded off to the number of decimal places that is in agreement with the limit expression. Numbers should not be rounded until the final calculations for the reportable value have been completed. Intermediate calculations (e.g., slope for linearity) may be rounded for reporting purposes, but the original (not rounded) value should be used for any additional required calculations. Acceptance criteria are fixed numbers and are not rounded.

When rounding is required, consider only one digit in the decimal place to the right of the last place in the limit expression. If this digit is smaller than 5, it is eliminated and the preceding digit is unchanged. If this digit is equal to or greater than 5, it is eliminated and the preceding digit is increased by 1.

8. TERMS AND DEFINITIONS

8.10. Abbreviations
- RS refers to a USP Reference Standard.
- CS refers to a Colorimetric Solution.
- TS refers to a Test Solution.
- VS refers to a Volumetric Solution that is standardized in accordance with directions given in the individual monograph or in the Reagents, Indicators, and Solutions section of USP–NF.

8.20. About
"About" indicates a quantity within 10%.

8.30. Alcohol Content
Percentages of alcohol, such as those under the heading Alcohol content, refer to percentage by volume of C₂H₅OH at 15.56 °.

8.40. Atomic Weights
Atomic weights used in computing molecular weights and the factors in the assays and elsewhere are those established by the IUPAC Commission on Atomic Weights and Isotopic Abundances.

8.50. Blank Determinations
Where it is directed that "any necessary correction" be made by a blank determination, the determination shall be conducted using the same quantities of the same reagents treated in the same manner as the solution or mixture containing the portion of the substance under assay or test, but with the substance itself omitted.

8.60. Concomitantly
"Concomitantly" denotes that the determinations or measurements are to be performed in immediate succession.

8.70. Desiccator
The instruction "in a desiccator" indicates use of a tightly closed container of suitable size and design that maintains an atmosphere of low moisture content by means of a suitable desiccant such as anhydrous calcium chloride, magnesium perchlorate, phosphorus pentoxide, or silica gel. See also section 8.220, Vacuum Desiccator.

8.80. Logarithms
Logarithms are to the base 10.

8.90. Microbial Strain
A microbial strain cited and identified by its ATCC catalog number shall be used directly or, if subcultured, shall be used not more than five passages removed from the original strain.

<table>
<thead>
<tr>
<th>Compendial Requirement</th>
<th>Unrounded Value</th>
<th>Rounded Result</th>
<th>Conforms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assay limit ≥98.0%</td>
<td>97.96%</td>
<td>98.0%</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>97.9%</td>
<td>97.9%</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>97.95%</td>
<td>98.0%</td>
<td>Yes</td>
</tr>
<tr>
<td>Assay limit ≤101.5%</td>
<td>101.55%</td>
<td>101.6%</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>101.46%</td>
<td>101.5%</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>101.45%</td>
<td>101.5%</td>
<td>Yes</td>
</tr>
<tr>
<td>Limit test ≤0.02%</td>
<td>0.025%</td>
<td>0.03%</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>0.01%</td>
<td>0.02%</td>
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</tr>
<tr>
<td></td>
<td>0.02%</td>
<td>0.03%</td>
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</tr>
<tr>
<td>Limit test ≤3 ppm</td>
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<td>Yes</td>
</tr>
<tr>
<td></td>
<td>3.4 ppm</td>
<td>3 ppm</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>2.5 ppm</td>
<td>3 ppm</td>
<td>Yes</td>
</tr>
</tbody>
</table>
8.10. Negligible
“Negligible” indicates a quantity not exceeding 0.50 mg.

8.110. NLT/NMT
“NLT” means “not less than.” “NMT” means “not more than.”

8.120. Odor
“Odorless,” “practically odorless,” “a faint characteristic odor,” and variations thereof indicate evaluation of a suitable quantity of freshly opened material after exposure to the air for 15 minutes. An odor designation is descriptive only and should not be regarded as a standard of purity for a particular lot of an article.

8.130. Percent
“Percent” used without qualification means:
- For mixtures of solids and semisolids, percent weight in weight.
- For solutions or suspensions of solids in liquids, percent weight in volume;
- For solutions of liquids in liquids, percent volume in volume;
- For solutions of gases in liquids, percent weight in volume.

For example, a 1 percent solution is prepared by dissolving 1 g of a solid or semisolid, or 1 mL of a liquid, in sufficient solvent to make 100 mL of the solution.

8.140. Percentage Concentrations
Percentage concentrations are expressed as follows:
- Percent Weight in Weight (w/w) is defined as the number of g of a solute in 100 g of solution.
- Percent Weight in Volume (w/v) is defined as number of g of a solute in 100 mL of solution.
- Percent Volume in Volume (v/v) is defined as the number of mL of a solute in 100 mL of solution.

8.150. Pressure
Pressure is determined by use of a suitable manometer or barometer calibrated in terms of the pressure exerted by a column of mercury of the stated height.

8.160. Reaction Time
Reaction time is 5 minutes unless otherwise specified.

8.170. Specific Gravity
Specific gravity is the weight of a substance in air at 25° divided by the weight of an equal volume of water at the same temperature.

8.180. Temperatures
Temperatures are expressed in centigrade (Celsius) degrees, and all measurements are made at 25° unless otherwise indicated. Where moderate heat is specified, any temperature not higher than 45° (113° F) is indicated.

8.190. Time
Unless otherwise specified, rounding rules, as described in section 7.20, Rounding Rules, apply to any time specified.

8.200. Transfer
“Transfer” indicates a quantitative manipulation.

“Vacuum” denotes exposure to a pressure of less than 20 mm of mercury (2.67 kPa), unless otherwise indicated.

8.220. Vacuum Desiccator
“Vacuum desiccator” indicates a desiccator that maintains a low-moisture atmosphere at a reduced pressure of not more than 20 mm of mercury (2.67 kPa) or at the pressure designated in the individual monograph.

8.230. Water
8.230.10. Water as an Ingredient in an Official Product
As an ingredient in an official product, water meets the requirements of the appropriate water monograph in USP or NF.

When used in the manufacture of official substances, water may meet the requirements for drinking water as set forth in the regulations of the U.S. Environmental Protection Agency (potable water).

8.230.30. Water in a Compendial Procedure
Water is called for in a compendial procedure, the USP article Purified Water shall be used unless otherwise specified. Definitions for High-Purity Water and Carbon Dioxide–Free Water are provided in Containers—Glass (660). Definitions of other types of water are provided in Water for Pharmaceutical Purposes (1231).

8.240. Weights and Measures
In general, weights and measures are expressed in the International System of Units (SI) as established and revised by the Conférence générale des poids et mesures. For compendial purposes, the term “weight” is considered to be synonymous with “mass.”

Moality is designated by the symbol m preceded by a number that represents the number of moles of the designated solute contained in 1 kilogram of the designated solvent.

Molarity is designated by the symbol M preceded by a number that represents the number of moles of the designated solute contained in an amount of the designated solvent that is sufficient to prepare 1 liter of solution.

Normality is designated by the symbol N preceded by a number that represents the number of equivalents of the designated solute contained in an amount of the designated solvent that is sufficient to prepare 1 liter of solution.

Symbols commonly employed for SI metric units and other units are as follows:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Unit Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bq</td>
<td>Becquerel</td>
</tr>
<tr>
<td>kBq</td>
<td>Kilobecquerel</td>
</tr>
<tr>
<td>MBq</td>
<td>Megabecquerel</td>
</tr>
<tr>
<td>GBq</td>
<td>Gigabecquerel</td>
</tr>
<tr>
<td>Ci</td>
<td>Curie</td>
</tr>
<tr>
<td>mCi</td>
<td>MilliCurie</td>
</tr>
<tr>
<td>µCi</td>
<td>MicroCurie</td>
</tr>
<tr>
<td>nCi</td>
<td>Nanocurie</td>
</tr>
<tr>
<td>Gy</td>
<td>Gray</td>
</tr>
<tr>
<td>mGy</td>
<td>Milligray</td>
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<tr>
<td>m</td>
<td>Meter</td>
</tr>
<tr>
<td>dm</td>
<td>Decimeter</td>
</tr>
<tr>
<td>cm</td>
<td>Centimeter</td>
</tr>
<tr>
<td>mm</td>
<td>Millimeter</td>
</tr>
<tr>
<td>µm</td>
<td>Micrometer</td>
</tr>
<tr>
<td>nm</td>
<td>Nanometer</td>
</tr>
<tr>
<td>µm</td>
<td>Micrometer</td>
</tr>
<tr>
<td>µl</td>
<td>Microliter</td>
</tr>
<tr>
<td>mL</td>
<td>Milliliter</td>
</tr>
<tr>
<td>µl</td>
<td>Microliter</td>
</tr>
<tr>
<td>L</td>
<td>Liter</td>
</tr>
<tr>
<td>M</td>
<td>Milliliter</td>
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<td>mg</td>
<td>Milligram</td>
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<td>µg</td>
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<td>µg</td>
<td>Microgram</td>
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<tr>
<td>µg</td>
<td>Microgram</td>
</tr>
<tr>
<td>µg</td>
<td>Microgram</td>
</tr>
</tbody>
</table>

8.240.1. One milliliter (mL) is used herein as the equivalent of one cubic centimeter (cc).

8.240.2. One milligram (mg) is used in the manufacture of official substances. One milligram (mg) is used in the manufacture of official substances.

8.240.3. One milliliter (mL) is used herein as the equivalent of one cubic centimeter (cc).

8.240.4. One milligram (mg) is used in the manufacture of official substances.

8.240.5. One milliliter (mL) is used herein as the equivalent of one cubic centimeter (cc).

8.240.6. One milligram (mg) is used in the manufacture of official substances.

8.240.7. One milliliter (mL) is used herein as the equivalent of one cubic centimeter (cc).

8.240.8. One milligram (mg) is used in the manufacture of official substances.

8.240.9. One milliliter (mL) is used herein as the equivalent of one cubic centimeter (cc).

8.240.10. One milligram (mg) is used in the manufacture of official substances.

8.240.11. One milliliter (mL) is used herein as the equivalent of one cubic centimeter (cc).

8.240.12. One milligram (mg) is used in the manufacture of official substances.

8.240.13. One milliliter (mL) is used herein as the equivalent of one cubic centimeter (cc).

8.240.14. One milligram (mg) is used in the manufacture of official substances.

8.240.15. One milliliter (mL) is used herein as the equivalent of one cubic centimeter (cc).

8.240.16. One milligram (mg) is used in the manufacture of official substances.

8.240.17. One milliliter (mL) is used herein as the equivalent of one cubic centimeter (cc).

8.240.18. One milligram (mg) is used in the manufacture of official substances.

8.240.19. One milliliter (mL) is used herein as the equivalent of one cubic centimeter (cc).

8.240.20. One milligram (mg) is used in the manufacture of official substances.

8.240.21. One milliliter (mL) is used herein as the equivalent of one cubic centimeter (cc).

8.240.22. One milligram (mg) is used in the manufacture of official substances.

8.240.23. One milliliter (mL) is used herein as the equivalent of one cubic centimeter (cc).

8.240.24. One milligram (mg) is used in the manufacture of official substances.

8.240.25. One milliliter (mL) is used herein as the equivalent of one cubic centimeter (cc).

8.240.26. One milligram (mg) is used in the manufacture of official substances.
amount that is the metric equivalent of the prescribed amount shall be dispensed. Apothecary unit designations on labels and labeling shall not be used.

9.20 Changes in Volume
In the dispensing of prescription medications, slight changes in volume owing to variations in room temperatures may be disregarded.

10. PRESERVATION, PACKAGING, STORAGE, AND LABELING

10.10. Storage Under Nonspecific Conditions
If no specific directions or limitations are provided in the Packaging and Storage section of an individual USP monograph or in the labeling of an article recognized in NF, the conditions of storage shall include storage at controlled room temperature, protection from moisture, and, where necessary, protection from light. Such articles shall be protected from moisture, freezing, and excessive heat, and, where necessary, from light during shipping and distribution. Drug substances are exempt from the requirements in this paragraph.

Regardless of quantity, where no specific storage directions or limitations are provided in an individual NF monograph or stated in the labeling of an article recognized in NF, the conditions of storage and distribution shall include protection from moisture, freezing, excessive heat, and, where necessary, from light.

10.20. Containers
The container is that which holds the article and is or may be in direct contact with the article. The immediate container is that which is in direct contact with the article at all times. The closure is a part of the container.

Before being filled, the container should be clean. Special precautions and cleaning procedures may be necessary to ensure that each container is clean and that extraneous matter is not introduced into or onto the article.

The container does not interact physically or chemically with the article placed in it so as to alter the strength, quality, or purity of the article beyond the official requirements. The compendial requirements for the use of specified containers apply also to articles as packaged by the pharmacist or other dispenser, unless otherwise indicated in the individual monograph.

10.20.10. Tamper-Evident Packaging
The container or individual carton of a sterile article intended for ophthalmic or otic use, except where contemporaneously compounded for immediate dispensing on prescription, shall be so sealed that the contents cannot be used without obvious destruction of the seal.

Articles intended for sale without prescription are also required to comply with the tamper-evident packaging and labeling requirements of the FDA where applicable. Preferably, the immediate container and/or the outer container or protective packaging used by a manufacturer or distributor for all dosage forms that are not specifically exempt is designed so as to show evidence of any tampering with the contents.

10.20.20. Light-Resistant Container
A light-resistant container (see Light Transmission Test under Containers—Performance Testing (671)) protects the contents from the effects of light by virtue of the specific properties of the material of which it is composed, including any coating applied to it. Alternatively, a clear and colorless or a translucent container may be made light-resistant by means of an opaque covering, in which case the label of the container bears a statement that the opaque covering is needed until the contents are to be used or administered. Where it is directed to “protect from light” in an individual monograph, preservation in a light-resistant container is intended.

Where an article is required to be packaged in a light-resistant container, and if the container is made light-resistant by means of an opaque covering, a single-use, unit-dose container or mnemonic pack for dispensing may not be removed from the outer opaque covering before dispensing.

10.20.30. Well-Closed Container
A well-closed container protects the contents from extraneous solids and from loss of the article under the ordinary or customary conditions of handling, shipment, storage, and distribution.

10.20.40. Tight Container
A tight container protects the contents from contamination by extraneous liquids, solids, or vapors; from loss of the article; and from efflorescence, deliquescence, or evaporation under the ordinary or customary conditions of handling, shipment, storage, and distribution; and is capable of tight reclosure. Where a tight container is specified, it may be replaced by a hermetic container for a single dose of an article.

A gas cylinder is a metallic container designed to hold a gas under pressure. As a safety measure, for carbon dioxide, cyclopropane, helium, nitrous oxide, and oxygen, the Pin Index Safety System of matched fittings is recommended for cylinders of Size E or smaller.

[NOTE—Where packaging and storage in a tight container or a well-closed container is specified in the individual monograph, the container used for an article when dispensed on prescription meets the requirements under Containers—Performance Testing (671)].

10.20.50. Hermetic Container
A hermetic container is impervious to air or any other gas under the ordinary or customary conditions of handling, shipment, storage, and distribution.

10.20.60. Single-Unit Container
A single-unit container is one that is designed to hold a quantity of drug product intended for administration as a single dose or a single finished device intended for use promptly after the container is opened. Preferably, the immediate container and/or the outer container or protective packaging shall be so designed as to show evidence of any tampering with the contents. Each single-unit container shall be labeled to indicate the identity, quantity and/or strength, name of the manufacturer, lot number, and expiration date of the article.

10.20.70. Single-Unit Container
A single-dose container is a single-unit container for articles intended for parenteral administration only. A single-dose container is labeled as such. Examples of single-dose containers include prefilled syringes, cartridges, fusion-sealed containers, and closure-sealed containers when so labeled. (See also Containers for Injections under Injections (1).)

10.20.80. Single-Dose Container
A single-dose container is a single-unit container for articles intended for administration by other than the parenteral route as a single dose, direct from the container.

10.20.90. Unit-of-Use Container
A unit-of-use container is one that contains a specific quantity of a drug product and that is intended to be dispensed as such without further modification except for the addition of appropriate labeling. A unit-of-use container is labeled as such.

10.20.100. Multiple-Unit Container
A multiple-unit container is a container that permits withdrawal of successive portions of the contents without changing the strength, quality, or purity of the remaining portion.

10.20.110. Multiple-Dose Container
A multiple-dose container is a multiple-unit container for articles intended for parenteral administration only. (See also Containers for Injections under Injections (1)).

10.20.120. Requirements under the Poison Prevention Packaging Act (PPPA)
This act (see the website, www.cpsc.gov/businfo/pppa.html) requires special packaging of most human oral prescription drugs, oral controlled drugs, certain non-oral pre-
scription drugs, certain dietary supplements, and many over-the-counter (OTC) drug preparations in order to pro-
tect the public from personal injury or illness from misuse of these preparations (16 CFR § 1700.14).

The immediate packaging of substances regulated under the
PPPA shall comply with the special packaging standards
(16 CFR § 1700.15 and 16 CFR § 1700.20). The PPPA reg-
ulations for special packaging apply to all packaging types
including reclosable, nonclosable, and unit-dose types.

Special packaging is not required for drugs dispensed
within a hospital setting for inpatient administration. Manu-
facturers and packagers of bulk-packaged prescription drugs
do not have to use special packaging if the drug will be
repackaged by the pharmacist. PPPA-regulated prescription
drugs may be dispensed in non–child-resistant packaging
upon the request of the purchaser or when directed in a

Manufacturers or packagers of OTC preparations are allowed to package one size in non–child-resis-
tant packaging as long as popular-size, special packages are
also supplied. The non–child-resistant package requires spe-
cial labeling (16 CFR § 1700.5).

Various types of child-resistant packages are covered in
ASTM International Standard D-3475, Standard Classifica-
tion of Child-Resistant Packaging. Examples are included as an
aid in the understanding and comprehension of each type
of classification.

10.30. Storage Temperature and Humidity

Specific directions are stated in some monographs with
respect to the temperatures and humidity at which official
articles shall be stored and distributed (including the ship-
ment of articles to the consumer) when stability data indi-
cate that storage and distribution at a lower or a higher
humidity produce undesirable results. Such directions apply except where the label on an
article states a different storage temperature on the basis of
stability studies of that particular formulation. Where no spe-
cific storage directions or limitations are provided in the in-
dividual monograph, but the label of an article states a stor-
age temperature that is based on stability studies of that
particular formulation, such labeled storage directions apply.
(See also Pharmaceutical Stability (1150.)) The conditions are
defined by the following terms.

10.30.10. Freezer

“Freezer” indicates a place in which the temperature is
maintained thermastically between −25 °C and −10 °C (−13 °
and 14 °F).

10.30.20. Cold

Any temperature not exceeding 8 °C (46 °F) is “cold.” A “ref-
frigerator” is a cold place in which the temperature is main-
tained thermistically between 2 °C and 8 °C (36 °F and 46 °F).

10.30.30. Cool

Any temperature between 8 °C and 15 °C (46 °F and 59 °F) is
“cool.” An article for which storage in a cool place is di-
rected may, alternatively, be stored and distributed in a re-
frigerator, unless otherwise specified by the individual
monograph.

10.30.40. Controlled Cold Temperature

“Controlled cold temperature” is defined as temperature
maintained thermastically between 2 °C and 8 °C (36 °F
and 46 °F), that allows for excursions in temperature between 0 °C and 15 °C (32 °F and 59 °F) that may be experienced during
storage, shipping, and distribution such that the allowable
calculated mean kinetic temperature is not more than 8 °C
(46 °F). Transient spikes up to 25 °C (77 °F) may be permitted if the manufacturer so instructs and provided that such
spikes do not exceed 24 hours unless supported by stability
data or the manufacturer instructs otherwise.

10.30.50. Room Temperature

“Room temperature” indicates the temperature prevailing
in a working area.

10.30.60. Controlled Room Temperature

“Controlled room temperature” indicates a temperature
maintained thermostatically that encompasses the usual and
customary working environment of 20 °C to 25 °C (68 ° to
77 °F); that results in a mean kinetic temperature calculated
to be not more than 25 °C; and that allows for excursions
between 15 °C and 30 °C (59 °F and 86 °F) that are experienced
in pharmacies, hospitals, and warehouses. Provided the
mean kinetic temperature remains in the allowed range,
 transient spikes up to 40 °C are permitted as long as they do not
exceed 24 hours. Spikes above 40 °C may be permitted if
the manufacturer so instructs. Articles may be labeled for
storage at “controlled room temperature” or at “up to 25 °C,”
or other wording based on the same mean kinetic tempera-
ture. The mean kinetic temperature is a calculated value
that may be used as an isothermal storage temperature that
simulates the nonsiological effects of storage temperature
variations. (See also Pharmaceutical Stability (1150).)

An article for which storage at controlled room temperature
is directed may, alternatively, be stored and distributed in a
cool place, unless otherwise specified in the individual mono-
graph or on the label.

10.30.70. Warm

Any temperature between 30 °C and 40 °C (86 ° and 104 °F) is
“warm.”

10.30.80. Excessive Heat

“Excessive heat” means any temperature above 40 °C
(104 °F).

10.30.90. Protection From Freezing

Where, in addition to the risk of breakage of the
article, freezing subjects an article to loss of strength or
potency, or to destructive alteration of its characteristics, the
container label bears an appropriate instruction to protect
the article from freezing.

10.30.100. Dry Place

The term “dry place” denotes a place that does not ex-
ceed 40% average relative humidity at Controlled Room Tem-
perature or the equivalent water vapor pressure at other
temperatures. The determination may be made by direct
measurement at the place or may be based on reported
climatic conditions. Determination is based on not less than
12 equally spaced measurements that encompass either a
season, a year, or, where recorded data demonstrate, the
storage period of the article. There may be values of up to
45% relative humidity provided that the average value is
40% relative humidity.

Storage in a container validated to protect the article
from moisture vapor, including storage in bulk, is consid-
ered storage in a dry place.

10.40.10. Amount of Ingredient Per Dosage Unit

The strength of a drug product is expressed on the
container label in terms of micrograms or milligrams or
grams or percentage of the therapeutically active moiety or
drug substance, whichever form is used in the title, unless
otherwise indicated in an individual monograph. Both the
active moiety and drug substance names and their equivalent amounts are then provided in the labeling.

Official articles in capsule, tablet, or other unit dosage form shall be labeled to express the quantity of each active ingredient or recognized nutrient contained in each unit; except that, in the case of unit-dose oral solutions or suspensions, whether supplied as liquid preparations or as liquid preparations that are constituted from solids upon addition of a designated volume of a specific diluent, the label shall express the quantity of each active ingredient or recognized nutrient contained under the conditions prescribed in Deliverable Volume (698). Official drug products not in unit dosage form shall be labeled to express the quantity of each active ingredient in each milliliter or in each gram, or to express the percentage of each such ingredient (see 8.140., Percentage Concentrations), except that oral liquids or solids intended to be constituted to yield oral liquids may, alternatively, be labeled in terms of each 5-mL portion of the liquid or resulting liquid. Unless otherwise indicated in a monograph or chapter, such declarations of strength or quantity shall be stated only in metric units. See also 5.50.10., Units of Potency (Biological).

10.40.20. Use of Leading and Terminal Zeros
To help minimize the possibility of errors in the dispensing and administration of drugs, the quantity of active ingredient when whole numbers shall be shown without a decimal point that is followed by a terminal zero (e.g., express as 4 mg [not 4.0 mg]). The quantity of active ingredient when expressed as a decimal number smaller than 1 shall be shown with a zero preceding the decimal point (e.g., express as 0.2 mg [not .2 mg]).

10.40.30. Labeling of Salts of Drugs
It is an established principle that official articles shall have only one official title. For purposes of saving space on labels, and because chemical symbols for the most common inorganic salts of drugs are well known to practitioners as synonymous with the written forms, the following alternates are permitted in labeling official articles that are salts: HCl for hydrochloride; HBr for hydrobromide; Na for sodium; and K for potassium. The symbols Na and K are intended for use in abbreviating names of the salts of organic acids, but these symbols are not used where the word Sodium or Potassium appears at the beginning of an official title (e.g., Phenobarbital Na is acceptable, but Na Salicylate is not to be written).

10.40.40. Labeling Vitamin-Containing Products
The vitamin content of an official drug product shall be stated on the label in metric units per dosage unit. The amounts of vitamins A, D, and E may be stated also in USP Units. Quantities of vitamin A declared in metric units refer to the equivalent amounts of retinol (vitamin A alcohol). The label of a nutritional supplement shall bear an identifying lot number, control number, or batch number.

10.40.50. Labeling Botanical-Containing Products
The label of an herb or other botanical intended for use as a dietary supplement bears the statement, “If you are pregnant or nursing a baby, seek the advice of a health professional before using this product.”

10.40.60. Labeling Parenteral And Topical Preparations
The label of a preparation intended for parenteral or topical use states the names of all added substances (see 5.20., Added Substances, Excipients, and Ingredients and see Labeling under Injections (1)), and, in the case of parenteral preparations, also their amounts or proportions, except that for substances added for adjustment of pH or to achieve isotonicity, the label may indicate only their presence and the reason for their addition.

10.40.70. Labeling Electrolytes
The concentration and dosage of electrolytes for replacement therapy (e.g., sodium chloride or potassium chloride) shall be stated on the label in milliequivalents (mEq). The label of the product shall indicate also the quantity of ingredient(s) in terms of weight or percentage concentration.

10.40.80. Labeling Alcohol
The content of alcohol in a liquid preparation shall be stated on the label as a percentage (v/v) of C₂H₅OH.

10.40.90. Special Capsules and Tablets
The label of any form of Capsule or Tablet intended for administration other than by swallowing intact bears a prominent indication of the manner in which it shall be used.

10.40.100. Expiration Date and Beyond-Use Date
The label of an official drug product or nutritional or dietary supplement product shall bear an expiration date. All articles shall display the expiration date so that it can be read by an ordinary individual under customary conditions of purchase and use. The expiration date shall be prominently displayed in high contrast to the background or sharply embossed, and easily understood (e.g., “EXP 6/08,” “Exp. June 08,” or “Expires 6/08”). [NOTE—For additional information and guidance, refer to the Consumer Healthcare Products Association’s Voluntary Codes and Guidelines of the Self-Medication Industry.]

The monographs for some preparations state how the expiration date that shall appear on the label shall be determined. In the absence of a specific requirement in the individual monograph for a drug product or nutritional supplement, the label shall bear an expiration date assigned for the particular formulation and package of the article, with the following exceptions: the label shall not bear an expiration date in the case of a drug product or nutritional supplement packaged in a container that is intended for sale without prescription and the labeling of which states no dosage limitations, and which is stable for not less than 3 years when stored under the prescribed conditions.

Where an official article is required to bear an expiration date, such article shall be dispensed solely in, or from, a container labeled with an expiration date, and the date on which the article is dispensed shall be within the labeled expiry period. The expiration date identifies the time during which the article may be expected to meet the requirements of the compendial monograph, provided it is kept under the prescribed storage conditions. The expiration date limits the time during which the article may be dispensed or used. Where an expiration date is stated only in terms of the month and the year, it is a representation that the intended expiration date is the last day of the stated month. The beyond-use date is the date after which an article shall not be used. The dispenser shall place on the label of the prescription container a suitable beyond-use date to limit the patient’s use of the article based on any information supplied by the manufacturer and the General Notices. The beyond-use date placed on the label shall not be later than the expiration date on the manufacturer’s container.

For articles requiring constitution before use, a suitable beyond-use date for the constituted product shall be identified in the labeling.

For all other dosage forms, in determining an appropriate period of time during which a prescription drug may be retained by a patient after its dispensing, the dispenser shall take into account, in addition to any other relevant factors, the nature of the drug; the container in which it was packaged by the manufacturer and the expiration date thereon; the characteristics of the patient’s container, if the article is repackaged for dispensing; the expected storage conditions to which the article may be exposed; any unusual storage conditions to which the article may be exposed; and the expected length of time of the course of therapy. The dispenser, on taking into account the foregoing, place on the label of a multiple-unit container a suitable beyond-use date to limit the patient’s use of the article. Unless otherwise specified in the individual monograph, or in the absence of stability data to the contrary, such beyond-use date shall not be later than (a) the expiration date on the manufacturer’s container, or (b) 1 year from the date the drug is dispensed, whichever is earlier. For nonsterile solid and liquid dosage forms that are packaged in single-unit and unit-dose con-
tainers, the beyond-use date shall be 1 year from the date
the drug is packaged into the single-unit or unit-dose
container or the expiration date on the manufacturer’s
container, whichever is earlier, unless stability data or the
manufacturer’s labeling indicates otherwise.

The dispenser shall maintain the facility where the dosage
forms are packaged and stored, at a temperature such that
the mean kinetic temperature is not greater than 25°. The
plastic material used in packaging the dosage forms shall
afford better protection than polyvinyl chloride, which does
not provide adequate protection against moisture perme-
ation. Records shall be kept of the temperature of the facil-
ity where the dosage forms are stored, and of the plastic
materials used in packaging.

10.40.100.1. Compounded Preparations

The label on the container or package of an official com-
pounded preparation shall bear a beyond-use date. The be-
yond-use date is the date after which a compounded prepa-
ration is not to be used. Because compounded preparations
are intended for administration immediately or following
short-term storage, their beyond-use dates may be assigned
based on criteria different from those applied to assigning
expiration dates to manufactured drug products.

The monograph for an official compounded preparation
typically includes a beyond-use requirement that states the
time period following the date of compounding during
which the preparation, properly stored, may be used. In the
absence of stability information that is applicable to a spe-
cific drug and preparation, recommendations for maximum
beyond-use dates have been devised for nonsterile com-
pounded drug preparations that are packaged in tight,
light-resistant containers and stored at controlled room tem-
perature unless otherwise indicated (see Stability Criteria and
Beyond-Use Dating under Stability of Compounded Prepara-
tions in the general test chapter Pharmaceutical Com-
pounding—Nonsterile Preparations (795)).

10.50. Guidelines for Packaging and Storage Statements

In order to provide users of the USP and NF with proper
guidance on how to package and store official articles, every
monograph in the USP and NF shall have a packaging and
storage specification.

For the packaging portion of the statement, the choice of
containers is given in this section 10, Preservation, Packag-
ing, Storage, and Labeling, and includes Light-Resistant
Container, Well-Closed Container, Tight Container, Hermetic
Container, Single-Unit Container, Single-Dose Container, Unit-
Dose Container, and Unit-of-Use Container. For most prepara-
tions, the choice is determined by the container in which it
shall be dispensed (e.g., tight, well-closed, hermetic, unit-of-
use, etc.). For drug substances, the choice would appear to
be tight, well-closed, or, where needed, a light-resistant
container. For excipients, given their typical nature as large-
volume commodity items, with containers ranging from
drums to tank cars, a well-closed container is an appropriate
default. Therefore, in the absence of data indicating a need
for a more protective class of container, the phrase “Pre-
save in well-closed containers” should be used as a default
for excipients.