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Every time.

**NSF Reference Standards Catalog
Winter 2012**



An NSF International Company

Dear NSF Client,

Thank you for your interest in NSF Reference Standards. **We know you need to be certain of the quality of your products, every time. This is why each NSF Reference Standard is carefully chosen, tested and qualified to meet your exact requirements.** As an organization with 25 years of pharma expertise, NSF understands the importance of conformance and traceability.

Every NSF Reference Standard undergoes rigorous testing through a collaborative process that includes a minimum of three independent laboratories. Each reference standard is tested to meet the compendial requirements of the individual pharmacopeial monographs and includes a detailed documentation package with a Certificate of Analysis and Material Safety Data Sheet. This level of detail ensures its complete traceability to official pharmacopeial standards, as established by the US Pharmacopeia® (USP) and the European Pharmacopoeia (EP).

NSF Reference Standards is part of the NSF International Health Sciences Division based in the United States. NSF International is a global, independent public health and safety organization whose mission is to protect human health and provide safety risk management solutions to organizations, governments and consumers. Founded in 1944, NSF International writes standards for products that come into contact with food or water, and for consumer goods, in order to minimize adverse health effects. NSF certifies products to those and other standards. NSF operates in more than 120 countries and is a World Health Organization Collaborating Centre for both Food and Water Safety and for Indoor Environment.

The NSF Reference Standards team of experts includes veteran pharmaceutical professionals with significant backgrounds and experience in manufacturing, quality and regulatory requirements. On the whole, the members of NSF's Health Science Division have on average more than 25 years of pharma industry experience. This includes pharmaceutical training, auditing and consultancy through NSF-DBA (formerly David Begg Associates); a full range of GLP and GMP analytical services to the pharmaceutical and biotechnology industry through NSF Pharmalytica; and GMP auditing, training, testing and certification for the dietary supplement industry.

We look forward to serving your Reference Standards needs. To place an order or for more information, visit our website at www.nsf-rs.org, contact customer services at any time at RSinfo@nsf.org or call us to talk at **+1.734.214.6234.**

We look forward to working with you.



Steve Lane

General Manager – Reference Standards Program

OUR TEAM

LORI L. BESTERVELT, PH.D.

Senior Vice President and Chief Technical Officer

As Senior Vice President, Dr. Lori Bestervelt oversees NSF International's Health Sciences Division. As Chief Technical Officer, Dr. Bestervelt oversees NSF's global laboratories.



Dr. Bestervelt has more than 25 years of expertise in nutritional and toxicological sciences, with technical expertise in cell culture, enzymology/analytical biochemistry, molecular biology and regulatory toxicology. Her scientific expertise also includes endocrine, reproductive and molecular toxicology, metabolism, and nutritional biochemistry. She has applied this knowledge to the assessment of human risk and regulatory issues and has addressed the safety of hundreds of materials for use in dietary supplements, pharmaceuticals, drinking water, food products and equipment. She has developed risk assessments for the US Environmental Protection Agency and Health Canada and has worked with the World Health Organization on food safety and drinking water issues.

Dr. Bestervelt is a member of the Society of Risk Analysis, American Association for the Advancement of Science, American Chemical Society and the Michigan Society of Toxicology. She has taught courses on regulatory toxicology and is a member of the advisory board for molecular biology/biology at Eastern Michigan University. Dr. Bestervelt earned her Doctorate degree in Toxicology and Master's degree in Nutritional Biochemistry from the University of Michigan.

STEVEN LANE

General Manager, NSF International Reference Standards

As General Manager, Steven Lane oversees all aspects of NSF's Reference Standards production and regulatory compliance. This includes testing, packaging and labeling and rigorous qualification processes to ensure the quality, purity, and suitability of NSF reference standards.



Steven has over 22 years' experience in FDA- and DEA-regulated industries. Steven has also held a faculty position at Johns Hopkins University since January 2003, where he teaches three graduate-level courses. Prior to his current position at NSF, Steven was employed by the United States Pharmacopeia in Rockville, Maryland USA, where he was the Vice President of Reference Standards Operations, with oversight responsibility for over 175 scientific, office, and production staff in the US, India, China and Brazil. Prior to this position, Steven spent 12 years in the pharmaceutical, medical device and biotechnology industries in positions of increasing responsibility. Steven holds a BS in Microbiology and Chemistry from East Tennessee State University and an MS in Biotechnology from Johns Hopkins University.

OUR TEAM

TOM SAVAGE

Director of Scientific and Regulatory Compliance, NSF International Reference Standards

As Director of Scientific and Regulatory Compliance for NSF International's Reference Standards program, Tom Savage manages the laboratory qualification testing of NSF reference standard candidates and ensures the Certificate of Analysis package provided with each NSF reference standard meets regulatory requirements worldwide.



Tom has more than 35 years of experience with the US Food and Drug Administration (FDA). His expertise includes performing inspections of pharmaceutical facilities worldwide and training FDA analysts on laboratory Good Manufacturing Practices. Tom also initiated and managed the testing of USP reference standard candidates by FDA laboratories throughout the US. Tom served in a variety of roles at the FDA: Senior Policy Advisor for the FDA Center for Drug Evaluation and Research (CDER), which regulates over-the-counter and prescription drugs; Senior Coordinator for Pharmaceutical Sciences in the FDA Division of Field Sciences; and Supervisory Chemist for the FDA Seattle District Laboratory.

Tom earned a Bachelor's degree in Chemistry from Michigan State University.

LINDA CARLISLE

Technical Program Manager, NSF International Reference Standards

As Technical Program Manager of NSF International's Reference Standards program, Linda Carlisle facilitates the qualification of each NSF Reference Standard, which includes developing analytical protocols and coordinating with other independent labs to collaboratively characterize each reference standard. She will also be responsible for the release of each reference standard through the coordinating efforts of the NSF Technical Review Board. The Board is comprised of independent scientific experts that review all analytical data before an NSF Reference Standard is approved.



Linda has more than 20 years of experience in the pharmaceutical industry, with expertise in the technical aspects of pharmaceutical production, quality assurance and testing. She has served in many leading quality assurance and production management positions at United States Pharmacopeia (USP), including Production Planning Manager, where she successfully ensured consistent availability of reference standards.

Linda is a member of The Association for Operations Management and a certified supply chain professional. She earned an Apprenticeship degree as a Chemist at EM Science in Germany.

**CUSTOMER
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HOW TO USE NSF REFERENCE STANDARDS

NSF REFERENCE STANDARDS

Reference standards are used by pharmaceutical manufacturers worldwide as comparative standards to demonstrate the identity, purity, quality and strength of their products and ingredients. NSF Reference Standards are highly characterized specimens of drug substances, excipients, reportable impurities, and degradation products. All NSF Reference Standards are tested independently by a minimum of three collaborating laboratories to ensure quality, purity and stability and are traceable to official pharmacopeial standards, as established by the United States Pharmacopeia® (USP) and the European Pharmacopoeia (EP). Traceability of NSF Reference Standards to official pharmacopeial standards is in accordance with the principles of current Good Manufacturing Practices (cGMPs).

APPLICATIONS OF NSF REFERENCE STANDARDS

Each NSF Reference Standard is fully traceable and intended for use with compendial (USP and/or EP) methods; therefore, NSF Reference Standards can be used in place of compendial standards. Applications for NSF Reference Standards include:

- Qualitative Uses – tests for identification, qualitative impurity determinations, chromatographic system suitability tests, and similar qualitative uses.
- Quantitative Uses – assays, uniformity tests, and other quantitative determinations on dosage forms, active pharmaceutical ingredients, and similar quantitative uses.
- Other uses such as Total Organic Content (TOC) determinations, microbiological analyses, and the like.

PACKAGING AND LABELING OF NSF REFERENCE STANDARDS

NSF Reference Standards are evaluated, packaged and labeled in the United States at NSF's laboratory in accordance with the principles of cGMPs. The packaging environment is determined by the ingredients used in each reference standard and is based on factors such as light sensitivity, humidity, oxidation potential, toxicity, etc.

NSF REFERENCE STANDARD DEVELOPMENT AND RELEASE PROCESS

Every NSF Reference Standard undergoes a rigorous qualification process to ensure its quality, purity, and suitability for compendial use. Steps in the qualification process include:

1. Reference Standard Candidate Selection
2. Procurement of Highly Purified Bulk Chemical
3. GMP Packaging and Labeling
4. Analytical Protocol Development
5. Collaborative Analytical Characterization
6. Unanimous Approval by Independent Technical Review Board
7. Creation of Certificate of Analysis Package
8. Release as NSF Reference Standard



HOW TO USE NSF REFERENCE STANDARDS — continued

Each reference standard is qualified by testing according to USP and EP methods including assay, identification, and other relevant tests. Specific chromatographic and spectroscopic methods are also added to the qualification process when necessary to further define the identity and purity of the standard.

The NSF Reference Standard Technical Review Board is comprised of independent scientific experts that evaluate all data from the collaborative testing. Once the review is complete and a unanimous approval is given by the NSF Reference Standard Technical Review Board, a new reference standard is released.

NSF REFERENCE STANDARD LABEL

The text written on the label and the Certificate of Analysis details the specific information needed for proper storage and use, including drying instructions when appropriate. The user is expected to follow all directions for use and to adhere to the safety precautions provided.



Labels will, when applicable, include usage instructions such as:

- **Use As-is:** The reference standard should be used as received, with no drying or water determination required.
- **Dry Before Use:** The reference standard is to be dried before use. Drying conditions are stated on the label. Do not dry in the original vial, but rather by transferring a portion to a separate vessel suitable for this purpose. Ideally, this should be done immediately prior to testing.
- **Apply Water Correction:** Loss on Drying (LoD) or Karl Fisher water determination should be performed appropriately for correction of water content.

For quantitative applications, traceability factors to USP and EP standards are provided. The traceability factors indicate how the quantitative purity was determined (i.e., by chromatographic methods) and compares it to the compendial standards when used according to directions on the label. When the purity of the standards has been established by absolute means (i.e., titrimetric methods), a calculation factor also is provided.

CERTIFICATES OF ANALYSIS (COA) AND MATERIAL SAFETY DATA SHEETS (MSDS)

A Certificate of Analysis (CoA) package is provided with each NSF Reference Standard. The package includes all analytical information used to qualify the standard, such as raw data, chromatograms and spectra, calculations, and other relevant technical information. The package can therefore be used to prove traceability to compendial (USP and/or EP) reference standards, as may be required by regulatory authorities. A Material Safety Data Sheet (MSDS) also is provided for each reference standard.

TESTING AFTER RELEASE

NSF routinely retests its reference standards after they are released. The retesting intervals vary depending on the properties of the individual reference standard and are based on available stability data.

EXPIRATION DATES

The expiration date for specific lots of NSF Reference Standards is stated on the Certificate of Analysis. The date is based on the available stability data and the expiration date assigned by the manufacturer of the chemical entity.

PROPER STORAGE OF NSF REFERENCE STANDARDS

Proper storage of the Reference Standard is very important. All NSF Reference Standards must be stored according to the prescribed conditions and handled carefully at all times. NSF Reference Standards must be stored in their original containers, properly closed, away from direct light and heat. An environment with controlled humidity is highly recommended. Refrigeration or sub-zero storage information is indicated as needed on the label and within catalog listing for specific NSF Reference Standards. Should a discrepancy occur between the information stated on the label and the catalog, the label information takes precedence.

ABOUT NSF INTERNATIONAL

The NSF Reference Standards Program is part of NSF International's Health Sciences Division (www.nsf.org/info/healthsciences). NSF scientists and technical experts offer analytical method development and testing to Good Manufacturing Practices (GMP) and Good Laboratory Practices (GLP), and GMP consulting, auditing, certification and training for pharmaceuticals, dietary supplements and medical devices globally. Visit www.nsf.org/info/healthsciences for more information about these programs. Visit NSF-DBA (www.nsf-dba.com) and NSF Pharmalytica (www.nsf-pharmalytica.com) to learn more about NSF's pharma programs. NSF International operates in more than 120 countries throughout North America, Asia-Pacific, Latin America, Europe, the Middle East and Africa.

Other NSF International services include NSF Training and Education courses; safety audits for the food and water industries; management systems registrations (e.g., ISO 14001) delivered through NSF International Strategic Registrations; and sustainable business services through NSF Sustainability.

CONTACT INFORMATION:

Please log on to our website at www.nsf-rs.org to get the latest information on new additions to our product line. You can also subscribe to our e-newsletter that provides various interesting articles as well as industry news and updates on the NSF Reference Standards program. You can contact our main Customer Service anytime at RSinfo@nsf.org, should you have any questions or need assistance, or contact our Regional Customer Service locations:

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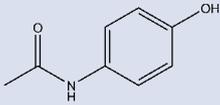
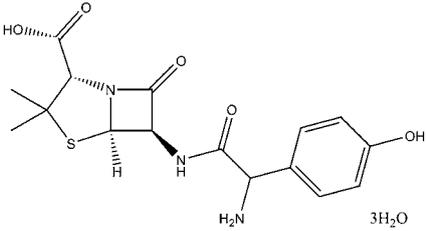
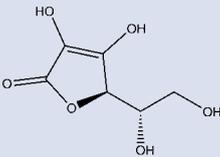
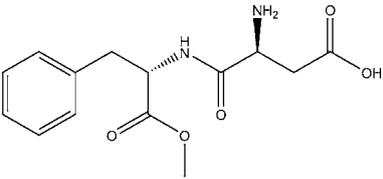
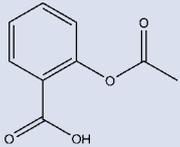
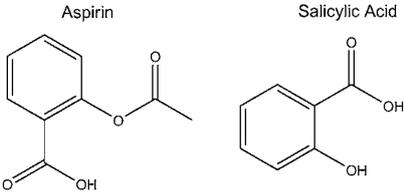
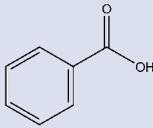
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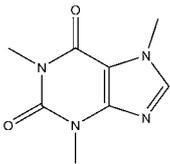
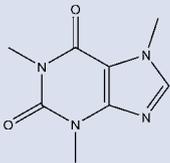
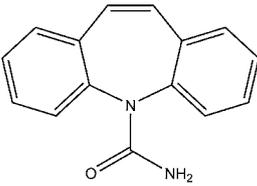
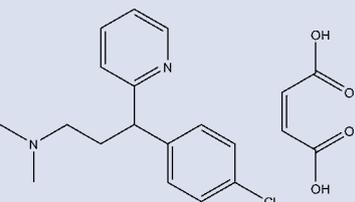
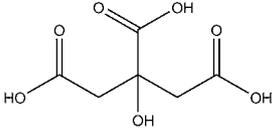
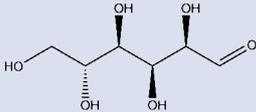
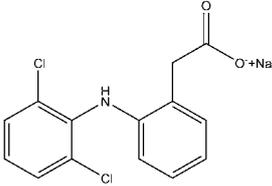
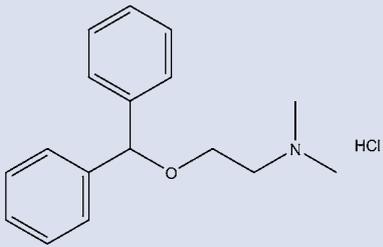
For more information on NSF's range of Health Science Services, including dietary supplement testing and certification, pharmaceutical training, auditing and consultancy services, please visit www.nsf.org or call +1.734.827.6856.

| PRODUCT NAME & QUANTITY | CHEMICAL NAME | CAS# | ITEM# | LOT# | MOLECULAR FORMULA | MOLECULAR WEIGHT | PRICE (USD) |
|---|--|------------|----------|-----------|---|------------------|-------------|
| 1,4-Benzoquinone, 200 mg | Cyclohexa-2,5-diene-1,4-dione | 106-51-4 | RS1-0002 | 11S001-00 | C ₆ H ₄ O ₂ | 108.10 g/mol | \$99 |
| Acetaminophen, 400 mg | <i>N</i> -(4-hydroxyphenyl)acetamide | 103-90-2 | RS1-0007 | 11S002-00 | C ₈ H ₉ NO ₂ | 151.17 g/mol | \$119 |
| Amoxicillin, 250 mg | (2 <i>S</i> ,5 <i>R</i> ,6 <i>R</i>)- 6-[[<i>(2R)</i> -2-amino-2-(4-hydroxyphenyl)- acetyl] amino]- 3,3-dimethyl- 7-oxo-4-thia- 1-azabicyclo[3.2.0]heptane- 2-carboxylic acid trihydrate | 61336-70-7 | RS1-0018 | 12S007-00 | C ₁₆ H ₁₉ N ₃ O ₅ S•3H ₂ O | 419.45 g/mol | \$119 |
| Ascorbic Acid, 1 g | (5 <i>R</i>)-[(1 <i>S</i>)-1,2-dihydroxyethyl]-3,4-dihydroxyfuran-2(5 <i>H</i>)-one | 50-81-7 | RS1-0040 | 11S025-00 | C ₆ H ₈ O ₆ | 176.12 g/mol | \$119 |
| Aspartame, 250 mg | (<i>S</i>)-3-amino-4-[(<i>S</i>)-1-methoxy-1-oxo-3-phenylpropan-2-ylamino]-4-oxobutanoic acid | 22839-47-0 | RS1-0067 | 12S022-00 | C ₁₄ H ₁₈ N ₂ O ₅ | 294.30 g/mol | \$119 |
| Aspirin, 500 mg | 2-acetoxybenzoic acid | 50-78-2 | RS1-0001 | 10S001-00 | C ₉ H ₈ O ₄ | 180.16 g/mol | \$119 |
| Aspirin and Impurity Combination Kit | 2-acetoxybenzoic acid and 2-Hydroxybenzoic acid | NA | RS1-0072 | NA | NA | NA | \$179 |
| Benzoic Acid, 300 mg | Benzoic Acid | 65-85-0 | RS1-0008 | 11S005-00 | C ₇ H ₆ O ₂ | 122.12 g/mol | \$119 |

| MOLECULAR STRUCTURE | PRODUCT DETAIL |
|---|--|
|  | <p>1,4-Benzoquinone (or para-benzoquinone) is a six-member ring compound that is the oxidized derivative of 1,4-hydroquinone.</p> |
|  | <p>Acetaminophen is a benzene ring core with one hydroxyl group and the nitrogen atom of an amide group substituted in the para (1,4) pattern.</p> |
|  | <p>Amoxicillin is a beta-lactam antibiotic that works by inhibiting cell wall synthesis in susceptible organisms.</p> |
|  | <p>Ascorbic acid is a water soluble, white to light yellow crystalline reductone sugar acid.</p> |
|  | <p>Aspartame is a methyl ester of the aspartic acid/phenylalanine dipeptide and is an artificial, non-saccharide sweetener.</p> |
|  | <p>Aspirin is an acetyl derivative of salicylic acid prepared by the esterification of the phenolic hydroxyl group of salicylic acid. It is a white, crystalline, weakly acidic substance.</p> |
|  | <p>This Kit contains 1 vial of Aspirin (RS1-0001) and 1 vial of Salicylic Acid (RS1-0017).</p> |
|  | <p>Benzoic acid is a colorless crystalline solid. Benzoic acid is produced by partial oxidation of toluene with oxygen utilizing cobalt or manganese naphthenates as a catalyst.</p> |

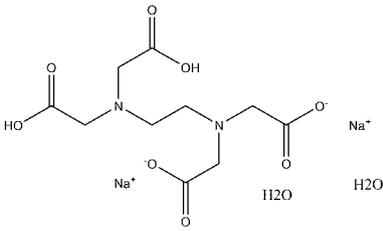
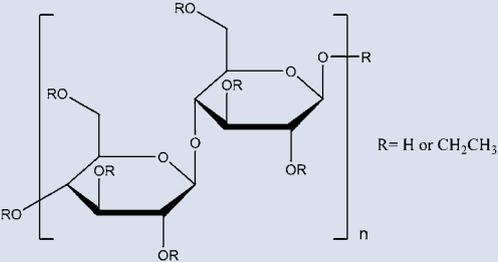
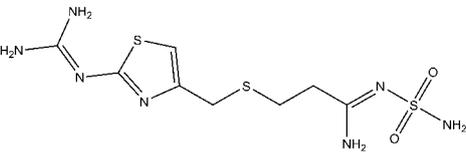
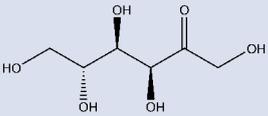
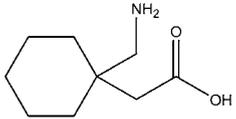
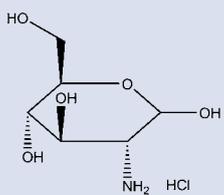
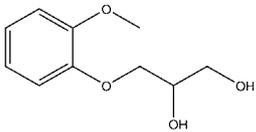
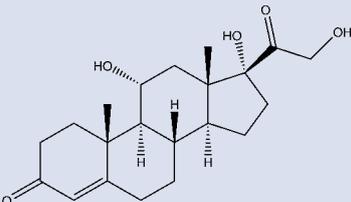
HOW TO BUY? See page 26 for a purchase order.

| PRODUCT NAME & QUANTITY | CHEMICAL NAME | CAS# | ITEM# | LOT# | MOLECULAR FORMULA | MOLECULAR WEIGHT | PRICE (USD) |
|---|---|------------|----------|-----------|--|------------------|-------------|
| Caffeine, 200 mg | 1,3,7-trimethyl-1 <i>H</i> -purine-2,6(3 <i>H</i> ,7 <i>H</i>)-dione | 58-08-2 | RS1-0009 | 11S004-00 | C ₈ H ₁₀ N ₄ O ₂ | 194.19 g/mol | \$119 |
| Caffeine Melting Point Standard, 1 g | 1,3,7-trimethyl-1 <i>H</i> -purine-2,6(3 <i>H</i> ,7 <i>H</i>)-dione | 58-08-2 | RS1-0064 | 12S020-00 | C ₈ H ₁₀ N ₄ O ₂ | 194.19 g/mol | \$89 |
| Carbamazepine, 150 mg | 5 <i>H</i> -Dibenz [<i>b,f</i>] azepine-5-carboxamide | 298-46-4 | RS1-0056 | 11S037-00 | C ₁₅ H ₁₂ N ₂ O | 236.27 g/mol | \$119 |
| Chlorpheniramine Maleate, 125 mg | 3-(4-chlorophenyl)- <i>N,N</i> -dimethyl-3-pyridin-2-ylpropan-1-amine | 113-92-8 | RS1-0010 | 11S007-00 | C ₁₆ H ₁₉ ClN ₂ •C ₄ H ₄ O ₄ | 390.86 g/mol | \$119 |
| Citric acid, anhydrous, 200 mg | 2-hydroxypropane-1,2,3-tricarboxylic acid | 77-92-9 | RS1-0039 | 11S019-00 | C ₆ H ₈ O ₇ | 192.13 g/mol | \$119 |
| Dextrose, 500 mg | (2 <i>R</i> ,3 <i>S</i> ,4 <i>R</i> ,5 <i>R</i>)-2,3,5,4,6-Pentahydroxyhexanal | 50-99-7 | RS1-0012 | 11S006-00 | C ₆ H ₁₂ O ₆ | 180.16 g/mol | \$119 |
| Diclofenac Sodium, 200 mg | 2-[(2,6-dichlorophenyl)amino] benzene acetic acid, monosodium | 15307-79-6 | RS1-0038 | 11S015-00 | C ₁₄ H ₁₀ Cl ₂ NNaO ₂ | 318.13 g/mol | \$119 |
| Diphenhydramine HCl, 250 mg | 2-(diphenylmethoxy)- <i>N,N</i> -dimethylethanamine hydrochloride | 147-24-0 | RS1-0079 | 12S015-00 | C ₁₇ H ₂₁ NO•HCl | 291.82 g/mol | \$119 |

| MOLECULAR STRUCTURE | PRODUCT DETAIL |
|---|---|
|  | <p>Caffeine is a white crystalline xanthine alkaloid. Caffeine is very soluble in hot water and generally less soluble in organic solvents.</p> |
|  | <p>Caffeine has diuretic properties when administered in sufficient doses to subjects who do not have a tolerance for it.</p> |
|  | <p>Carbamazepine (CBZ) is an anticonvulsant and mood-stabilizing drug used primarily in the treatment of epilepsy and bipolar disorder, as well as trigeminal neuralgia.</p> |
|  | <p>Chlorpheniramine maleate is a propylamine antihistaminic agent occurring as a white crystalline powder.</p> |
|  | <p>Citric acid is a weak organic acid whose conjugate base (citrate) is an important intermediate in the citric acid cycle.</p> |
|  | <p>The term Dextrose is derived from dextrorotatory glucose. Dextrose is a monosaccharide whose five hydroxyl groups are arranged in a specific sequence along its six-carbon backbone.</p> |
|  | <p>The term diclofenac is derived from its chemical name. It is an NSAID thought to act through inhibition of prostaglandin synthesis by cyclooxygenase (COX) inhibition.</p> |
|  | <p>Diphenhydramine HCl is a first-generation antihistamine possessing anticholinergic, antitussive, antiemetic, and sedative properties which is mainly used to treat allergies.</p> |

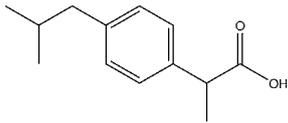
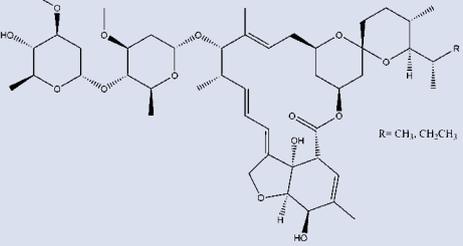
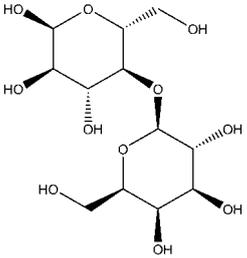
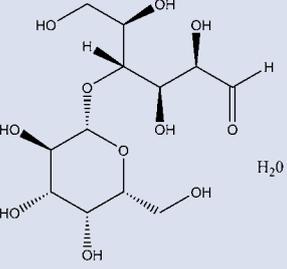
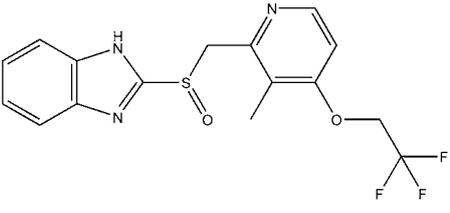
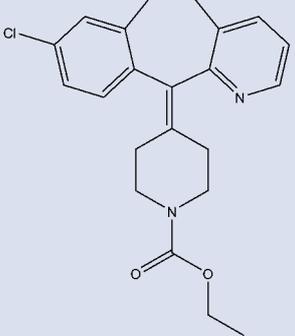
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| PRODUCT NAME & QUANTITY | CHEMICAL NAME | CAS# | ITEM# | LOT# | MOLECULAR FORMULA | MOLECULAR WEIGHT | PRICE (USD) |
|---------------------------------|--|------------|----------|-----------|--|------------------|-------------|
| Edetate Disodium, 200 mg | 2,2',2",2'''-(Ethane-1,2-diyldinitriilo)tetraacetic acid | 6381-92-6 | RS1-0037 | 11S014-00 | $C_{10}H_{14}N_2Na_2O_8 \cdot 2H_2O$ | 372.24 g/mol | \$119 |
| Ethylcellulose, 1 g | Cellulose Ethyl Ether | 9004-57-3 | RS1-0065 | 12S016-00 | $[C_{12}H_{(20-k)}O_{10} \cdot kC_2H_5]_n$ | NA | \$119 |
| Famotidine, 125 mg | 3-([2-(diaminomethyleneamino)thiazol-4-yl]methylthio)-N'-sulfa-moylpropanimidamide | 76824-35-6 | RS1-0023 | 11S022-00 | $C_8H_{15}N_7O_2S_3$ | 337.45 g/mol | \$119 |
| Fructose, 125 mg | Fructose | 57-48-7 | RS1-0035 | 11S016-00 | $C_6H_{12}O_6$ | 180.16 g/mol | \$119 |
| Gabapentin, 250 mg | 2-[1-(aminomethyl)cyclohexyl]acetic acid | 60142-96-3 | RS1-0082 | 12S017-00 | $C_9H_{17}NO_2$ | 171.24 g/mol | \$119 |
| Glucosamine HCl, 250 mg | 2-Amino-D-glucose hydrochloride | 66-84-2 | RS1-0052 | 11S036-00 | $C_6H_{13}NO_5 \cdot HCl$ | 215.64 g/mol | \$119 |
| Guaifenesin, 200 mg | (RS)-3-(2-methoxyphenoxy)propane-1,2-diol | 93-14-1 | RS1-0042 | 11S012-00 | $C_{10}H_{14}O_4$ | 198.22 g/mol | \$119 |
| Hydrocortisone, 200 mg | (11 β)-11,17,21-trihydroxypregn-4-ene-3,20-dione | 50-23-7 | RS1-0013 | 11S009-00 | $C_{21}H_{30}O_5$ | 362.46 g/mol | \$119 |

| MOLECULAR STRUCTURE | PRODUCT DETAIL |
|---|--|
|  | <p>Edetate disodium is a colorless, water soluble polyamino carboxylic acid.</p> |
|  | <p>Ethyl cellulose is a derivative of cellulose. Ethyl cellulose is used as a food additive as an emulsifier.</p> |
|  | <p>Famotidine is a histamine H2 receptor antagonist. Famotidine is the result of a replacement of the imidazole ring on Cimetadine with a 2-guanidinothiazole ring.</p> |
|  | <p>Fructose is a simple monosaccharide found in many foods.</p> |
|  | <p>Gabapentin is used primarily for the treatment of seizures, neuropathic pain, and hot flashes.</p> |
|  | <p>Glucosamine is the most abundant naturally occurring amino sugar in which one or more nonglycosidic hydroxyl groups are replaced by an amino or substituted amino group.</p> |
|  | <p>Pure guaifenesin appears as a white crystalline powder and acts as an expectorant by increasing the volume and decreasing the viscosity of secretions in the trachea and bronchi.</p> |
|  | <p>Hydrocortisone is a steroid hormone synthesized in the adrenal gland from cholesterol. The synthetic counterparts are used in the treatment of allergies and inflammation.</p> |

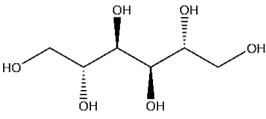
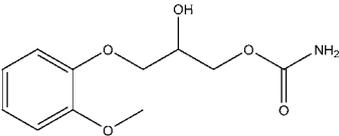
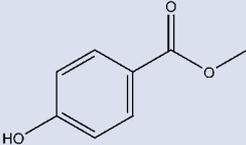
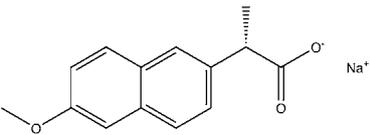
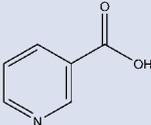
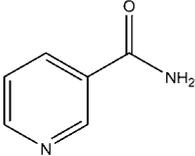
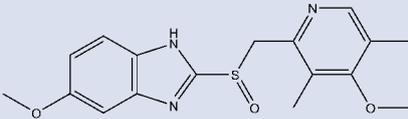
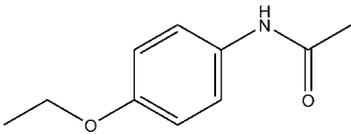
HOW TO BUY? See page 26 for a purchase order.

| PRODUCT NAME & QUANTITY | CHEMICAL NAME | CAS# | ITEM# | LOT# | MOLECULAR FORMULA | MOLECULAR WEIGHT | PRICE (USD) |
|--|--|-------------|----------|-----------|--|---|-------------|
| Ibuprofen, 750 mg | (<i>RS</i>)-2-(4-(2-methylpropyl)phenyl)propanoic acid | 15687-27-1 | RS1-0003 | 10S004-00 | C ₁₃ H ₁₈ O ₂ | 206.29 g/mol | \$119 |
| Ivermectin, 200 mg | 22,23-dihydroavermectin B _{1a} + 22,23-dihydroavermectin B _{1b} | 70288-86-7 | RS1-0058 | 11S041-00 | C ₄₈ H ₇₄ O ₁₄ + C ₄₇ H ₇₂ O ₁₄ | 875.10 g/mol and 861.07 g/mol | \$119 |
| Lactose Anhydrous, 150 mg | β-D-galactopyranosyl-(1→4)-D-glucose | 63-42-3 | RS1-0053 | 11S034-00 | C ₁₂ H ₂₂ O ₁₁ | 342.30 g/mol | \$119 |
| Lactose Monohydrate, 550 mg | 4-O-beta-Galactopyranosyl-D-glucose | 64044-51-5 | RS1-0047 | 11S026-00 | C ₁₂ H ₂₂ O ₁₁ • H ₂ O | 360.32 g/mol | \$119 |
| Lansoprazole, 200 mg | (<i>RS</i>)-2-([3-methyl-4-(2,2,2-trifluoroethoxy)pyridin-2-yl]methylsulfinyl)-1H-benzo[<i>d</i>]imidazole | 103577-45-3 | RS1-0020 | 12S008-00 | C ₁₆ H ₁₄ F ₃ N ₃ O ₂ S | 369.36 g/mol | \$119 |
| Loratadine, 250 mg | Ethyl 4-(8-chloro-5,6-dihydro-11H-benzo[5,6]cyclohepta[1,2-b]pyridin-11-ylidene)-1-piperidinecarboxylate | 79794-75-5 | RS1-0028 | 12S004-00 | C ₂₂ H ₂₃ ClN ₂ O ₂ | 382.88 g/mol | \$159 |

| MOLECULAR STRUCTURE | PRODUCT DETAIL |
|---|---|
|  | <p>Ibuprofen is a white powder belonging to the propionic acid derivatives. It is only slightly soluble in water but readily soluble in organic solvents. Ibuprofen is a chiral compound.</p> |
|  | <p>Ivermectin is a member of the avermectin class of broad-spectrum antiparasitic agents.</p> |
|  | <p>Anhydrous Lactose is often found as an inactive ingredient in medication. It is used as a coating for its mildly sweet taste.</p> |
|  | <p>Lactose is a disaccharide sugar that is found most notably in milk and is formed from galactose and glucose.</p> |
|  | <p>Lansoprazole is a racemate consisting of a 1:1 mixture of the enantiomers dexlansoprazole and levlansoprazole.</p> |
|  | <p>Loratadine is a tricyclic antihistamine acting as a selective inverse agonist of peripheral histamine H-1 receptors.</p> |

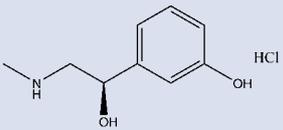
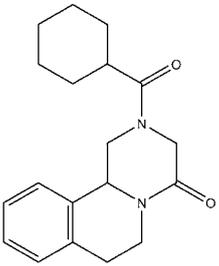
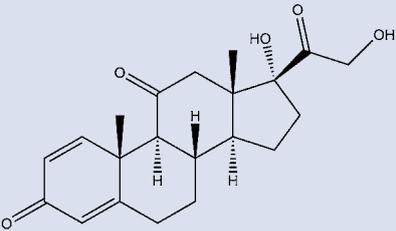
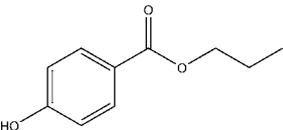
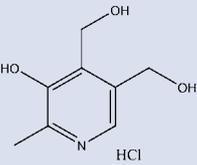
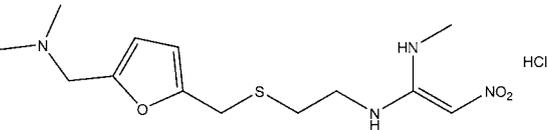
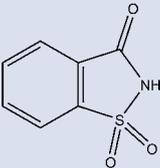
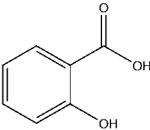
HOW TO BUY? See page 26 for a purchase order.

| PRODUCT NAME & QUANTITY | CHEMICAL NAME | CAS# | ITEM# | LOT# | MOLECULAR FORMULA | MOLECULAR WEIGHT | PRICE (USD) |
|--|--|------------|----------|-----------|---|------------------|-------------|
| Mannitol, 200 mg | (2 <i>R</i> ,3 <i>R</i> ,4 <i>R</i> ,5 <i>R</i>)-Hexane-1,2,3,4,5,6-hexol | 69-65-8 | RS1-0014 | 11S003-00 | C ₆ H ₁₄ O ₆ | 182.17 g/mol | \$119 |
| Metformin HCl, 250 mg | N,N-dimethylimidodicarbonimidic diamide hydrochloride | 1115-70-4 | RS1-0021 | 12S009-00 | C ₄ H ₁₁ N ₅ •HCl | 165.63 g/mol | \$119 |
| Methocarbamol, 250 mg | 2-hydroxy-3-(2-methoxyphenoxy)propyl carbamate | 532-03-6 | RS1-0051 | 11S035-00 | C ₁₁ H ₁₅ NO ₅ | 241.24 g/mol | \$119 |
| Methylparaben, 125 mg | Methyl 4-hydroxybenzoate | 99-76-3 | RS1-0004 | 11S021-00 | C ₈ H ₈ O ₃ | 152.15 g/mol | \$119 |
| Naproxen Sodium, 250 mg | sodium (2 <i>S</i>)-2-(6-methoxynaphthalen-2-yl)propanoate | 26159-34-2 | RS1-0029 | 12S005-00 | C ₁₄ H ₁₃ NaO ₃ | 252.24 g/mol | \$119 |
| Niacin, 200 mg | nicotinic acid | 59-67-6 | RS1-0032 | 11S024-00 | C ₆ H ₅ NO ₂ | 123.11 g/mol | \$119 |
| Niacinamide, 500 mg | Nicotinamide | 98-92-0 | RS1-0054 | 11S040-00 | C ₆ H ₆ N ₂ O | 122.12 g/mol | \$119 |
| Omeprazole, 200 mg | (<i>RS</i>)-6-methoxy-2-((4-methoxy-3,5-dimethylpyridin-2-yl) methylsulfinyl)-1 <i>H</i> -benzo[<i>d</i>]imidazole | 73590-58-6 | RS1-0019 | 11S008-00 | C ₁₇ H ₁₉ N ₃ O ₃ S | 345.42 g/mol | \$119 |
| Phenacetin Melting Point Standard, 500 mg | <i>N</i> -(4-Ethoxyphenyl) acetamide | 62-44-2 | RS1-0060 | 11S046-00 | C ₁₀ H ₁₃ NO ₂ | 179.22 g/mol | \$89 |

| MOLECULAR STRUCTURE | PRODUCT DETAIL |
|---|---|
|  | <p>Mannitol is a white crystalline sugar alcohol and is an isomer of sorbitol. Aqueous solutions of mannitol are slightly acidic.</p> |
|  | <p>Metformin is the synthesis product of equimolar amounts of dimethylamine and 2-cyanoguanidine dissolved in toluene and adding equimolar amounts of hydrogen chloride after cooling.</p> |
|  | <p>Methocarbamol is a central muscle relaxant used to treat skeletal muscle spasms.</p> |
|  | <p>Methylparaben is the methyl ester of p-hydroxybenzoic acid and is a crystalline compound that is commonly used as an antifungal in pharmaceuticals and cosmetics.</p> |
|  | <p>Naproxen is a 2-arylpropionic acid NSAID. The free acid form of naproxen is an odorless, white to off white crystalline substance that is water insoluble and lipid soluble.</p> |
|  | <p>Niacin is a colorless, water soluble derivative of pyridine containing a carboxyl group at the 3 position.</p> |
|  | <p>Niacinamide is the amide of nicotinic acid (vitamin B3 / niacin), is a water-soluble vitamin, and is part of the vitamin B group.</p> |
|  | <p>Omeprazole is a racemate containing a tri-coordinated sulfur in a pyramidal structure, existing in equal amounts of both the S and R enantiomers.</p> |
|  | <p>Phenacetin, introduced in 1887, is used principally as an analgesic painkiller. The painkiller was initially banned from general use in 1968 after it was linked to bladder and kidney cancer. The ban was later revoked - but its legal use is highly restricted because of the dangers it poses.</p> |

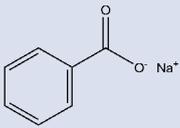
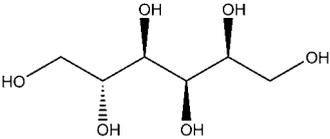
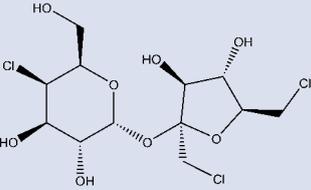
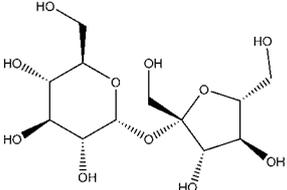
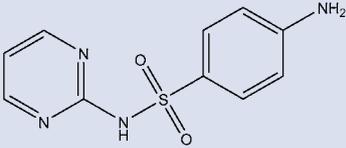
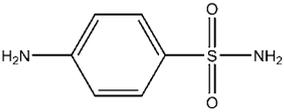
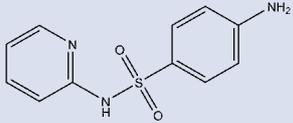
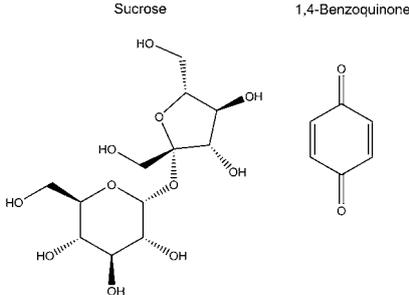
HOW TO BUY? See page 26 for a purchase order.

| PRODUCT NAME & QUANTITY | CHEMICAL NAME | CAS# | ITEM# | LOT# | MOLECULAR FORMULA | MOLECULAR WEIGHT | PRICE (USD) |
|----------------------------------|---|------------|----------|-----------|--|------------------|-------------|
| Phenylephrine HCl, 125 mg | (R)-(-)-1-(3-Hydroxyphenyl)-2-methylaminoethanol hydrochloride | 61-76-7 | RS1-0030 | 11S010-00 | C ₉ H ₁₃ NO ₂ •HCl | 203.67 g/mol | \$119 |
| Praziquantel, 250 mg | (RS)-2-(Cyclohexylcarbonyl)-1,2,3,6,7,11b-hexahydro-4H-pyrazino[2,1-a]isoquinolin-4-one | 55268-74-1 | RS1-0073 | 12S010-00 | C ₁₉ H ₂₄ N ₂ O ₂ | 312.41 g/mol | \$119 |
| Prednisone, 250 mg | (8S,9S,10R,13S,14S,17R)-17-hydroxy-17-(2-hydroxyacetyl)-10,13-dimethyl-7,8,9,10,12,13,14,15,16,17-decahydro-3H-cyclopenta[a]phenanthrene-3,11(6H)-dione | 53-03-2 | RS1-0022 | 12S018-00 | C ₂₁ H ₂₆ O ₅ | 358.43 g/mol | \$119 |
| Propylparaben, 200 mg | propyl 4-hydroxybenzoate | 94-13-3 | RS1-0005 | 10S003-00 | C ₁₀ H ₁₂ O ₃ | 180.20 g/mol | \$119 |
| Pyridoxine HCl, 200 mg | 4,5-Bis(hydroxymethyl)-2-methylpyridin-3-ol | 58-56-0 | RS1-0041 | 11S017-00 | C ₈ H ₁₁ NO ₃ •HCl | 205.64 g/mol | \$119 |
| Ranitidine HCl, 250 mg | N-[2-[[5-[Dimethylamino)methyl]furfuryl]thio]ethyl]-N'-methyl-2-nitrovinylidenediamine hydrochloride | 66357-35-5 | RS1-0069 | 12S001-00 | C ₁₃ H ₂₂ N ₄ O ₃ •HCl | 350.87 g/mol | \$119 |
| Saccharin, 250 mg | 1,2-Benzisothiazol-3(2H)-one 1,1-dioxide | 81-07-2 | RS1-0066 | 11S047-00 | C ₇ H ₅ NO ₃ S | 183.18 g/mol | \$119 |
| Salicylic Acid, 125 mg | 2-Hydroxybenzoic acid | 69-72-7 | RS1-0017 | 11S020-00 | C ₇ H ₆ O ₃ | 138.12 g/mol | \$119 |

| MOLECULAR STRUCTURE | PRODUCT DETAIL |
|---|--|
|  | <p>Phenylephrine is an alpha-adrenergic receptor agonist.</p> |
|  | <p>Praziquantel is used to treat diseases in humans and other mammals that are caused by infection with several types of internal/ gastrointestinal parasites.</p> |
|  | <p>Prednisone is a synthetic corticosteroid. Glucocorticoid analog drugs such as prednisone down regulate the natural synthesis of glucocorticoids.</p> |
|  | <p>Propylparaben is the propyl ester of p-hydroxybenzoic acid.</p> |
|  | <p>Pyridoxine is based on a pyridine ring with hydroxyl, methyl and hydroxymethyl substituents. The biologically active form is pyridoxal 5 phosphate.</p> |
|  | <p>Ranitidine is commonly used in treatment of peptic ulcer disease (PUD) and gastroesophageal. Ranitidine is a histamine H2-receptor that inhibits stomach acid production.</p> |
|  | <p>Saccharin is an artificial sweetener. It is used to sweeten products such as drinks, candies, biscuits, medicines, and toothpaste.</p> |
|  | <p>Salicylic acid is a monohydroxybenzoic acid. Salicylic acid is a colorless crystalline organic acid that is derived from the metabolism of salicin.</p> |

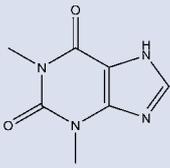
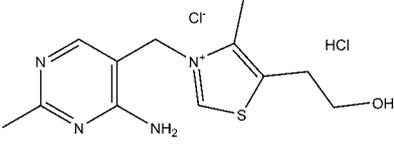
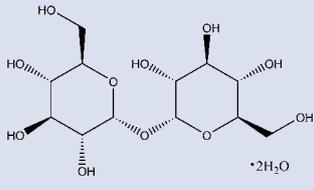
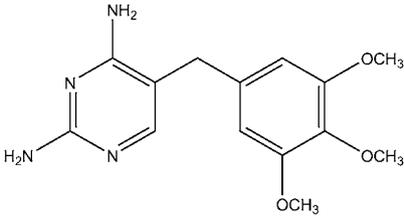
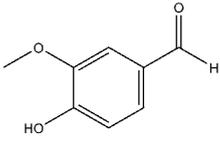
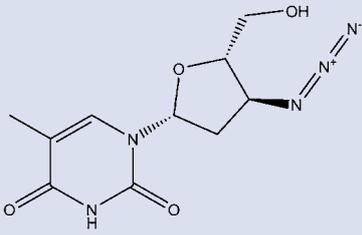
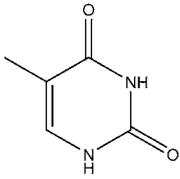
HOW TO BUY? See page 26 for a purchase order.

| PRODUCT NAME & QUANTITY | CHEMICAL NAME | CAS# | ITEM# | LOT# | MOLECULAR FORMULA | MOLECULAR WEIGHT | PRICE (USD) |
|---|---|------------|----------|-----------|---|------------------|-------------|
| Sodium Benzoate, 1 g | Sodium Benzoate | 532-32-1 | RS1-0046 | 11S029-00 | C ₇ H ₅ O ₂ Na | 144.10 g/mol | \$119 |
| Sorbitol, 150 mg | (2S,3R,4R,5R)-Hexane-1,2,3,4,5,6-hexol | 50-70-4 | RS1-0016 | 11S033-00 | C ₆ H ₁₄ O ₆ | 182.17 g/mol | \$119 |
| Sucralose, 400 mg | 1,6-Dichloro-1,6-dideoxy-β-D-fructofuranosyl-4-chloro-4-deoxy-α-D-galactopyranoside | 56038-13-2 | RS1-0048 | 11S030-00 | C ₁₂ H ₁₉ Cl ₃ O ₈ | 397.64 g/mol | \$119 |
| Sucrose, 100 mg | (2R,3R,4S,5S,6R)-2-[(2S,3S,4S,5R)-3,4-dihydroxy-2,5-bis(hydroxymethyl)oxolan-2-yl]oxy-6-(hydroxymethyl)oxane-3,4,5-triol | 57-50-1 | RS1-0006 | 11S023-00 | C ₁₂ H ₂₂ O ₁₁ | 342.30 g/mol | \$99 |
| Sulfadiazine, 250 mg | 4-amino-N-pyrimidin-2-yl-benzenesulfonamide | 68-35-9 | RS1-0057 | 11S038-00 | C ₁₀ H ₁₀ N ₄ O ₂ P | 250.28 g/mol | \$119 |
| Sulfanilamide Melting Point Standard, 500 mg | 4-Aminobenzenesulfonamide | 63-74-1 | RS1-0061 | 11S049-00 | C ₆ H ₈ N ₂ O ₂ S | 172.20 g/mol | \$89 |
| Sulfapyridine Melting Point Standard, 1 g (2 x 500 mg) | 4-Amino-N-2-pyridinylbenzenesulfonamide | 144-83-2 | RS1-0062 | 11S044-00 | C ₁₁ H ₁₁ N ₃ O ₂ S | 249.29 g/mol | \$89 |
| System Suitability Kit for TOC | Cyclohexa-2,5-diene-1,4-dione and (2R,3R,4S,5S,6R)-2-[(2S,3S,4S,5R)-3,4-dihydroxy-2,5-bis(hydroxymethyl)oxolan-2-yl]oxy-6-hydroxymethyl)oxane-3,4,5-triol | NA | RS1-0068 | NA | NA | NA | \$159 |

| MOLECULAR STRUCTURE | PRODUCT DETAIL |
|---|---|
|  | <p>Sodium benzoate is the sodium salt of benzoic acid that is produced by reacting sodium hydroxide with benzoic acid.</p> |
|  | <p>Sorbitol is a sugar alcohol obtained by the reduction of glucose.</p> |
|  | <p>Sucralose belongs to a class of compounds known as organochlorides. Sucralose is a non-caloric sweetener said to be approximately 600 times as sweet as sucrose.</p> |
|  | <p>Sucrose is a white crystalline powder with a sweet taste. Sucrose is a disaccharide derived from glucose and fructose.</p> |
|  | <p>Sulfadiazine eliminates bacteria that cause infections by stopping the production of Vitamin M inside the bacterial cell, and is commonly used to treat urinary tract infections (UTIs).</p> |
|  | <p>Chemically, it is a molecule containing the sulfonamide functional group attached to an aniline.</p> |
|  | <p>Sulfapyridine, original UK spelling Sulphapyridine, is a sulfonamide antibacterial. It is no longer prescribed for treatment in humans.</p> |
|  | <p>This Kit contains 1 vial of 1,4 Benzoquinone(RS1-0002) and 1 vial of Sucrose (RS1-0006).</p> |

HOW TO BUY? See page 26 for a purchase order.

| PRODUCT NAME & QUANTITY | CHEMICAL NAME | CAS# | ITEM# | LOT# | MOLECULAR FORMULA | MOLECULAR WEIGHT | PRICE (USD) |
|--|--|------------|----------|-----------|--|------------------|-------------|
| Theophylline, 200 mg | 1,3-dimethyl-7H-purine-2,6-dione | 58-55-9 | RS1-0034 | 11S013-00 | C ₇ H ₈ N ₄ O ₂ | 180.17 g/mol | \$119 |
| Thiamine HCl, 500 mg | 3-((4-amino-2-methylpyrimidin-5-yl)methyl)-5-(2-hydroxyethyl)-4-methylthiazol-3-ium chloride hydrochloride | 67-03-8 | RS1-0033 | 11S018-00 | C ₁₂ H ₁₇ ClN ₄ OS•HCl | 337.27 g/mol | \$119 |
| Trehalose, 500 mg | α-D-glucopyranosyl-α-D-glucopyranoside | 6138-23-4 | RS1-0059 | 11S048-00 | C ₁₂ H ₂₂ O ₁₁ •2H ₂ O | 378.33 g/mol | \$119 |
| Trimethoprim, 400 mg | 5-(3,4,5-trimethoxybenzyl)pyrimidine-2,4-diamine | 738-70-5 | RS1-0045 | 11S031-00 | C ₁₄ H ₁₈ N ₄ O ₃ | 290.32 g/mol | \$119 |
| USP <741> Melting Point Standard Kit | NA | NA | RS1-0098 | NA | NA | NA | \$349 |
| Vanillin Melting Point Standard, 1 g | 4-Hydroxy-3-methoxybenzaldehyde | 121-33-5 | RS1-0063 | 11S045-00 | C ₈ H ₈ O ₃ | 152.15 g/mol | \$89 |
| Zidovudine, 500 mg | 3'-azido-3'-deoxythymidine | 30516-87-1 | RS1-0070 | 12S002-00 | C ₁₀ H ₁₃ N ₅ O ₄ | 267.24 g/mol | \$119 |
| Zidovudine Related Compound C (Thymine), 150 mg | 5-Methylpyrimidine-2,4(1H,3H)-dione | 65-71-4 | RS1-0071 | 11S050-00 | C ₅ H ₆ N ₂ O ₂ | 126.12 g/mol | \$299 |

| MOLECULAR STRUCTURE | PRODUCT DETAIL |
|---|---|
|  | <p>Theophylline is a methylated xanthine derivative that acts as a competitive, non-selective phosphodiesterase inhibitor and a non-selective adenosine receptor antagonist.</p> |
|  | <p>All living organisms use thiamine in their biochemistry; however, thiamine is not synthesized in animals. Thiamine is a colorless compound with an aminopyrimidine ring and a thiazole ring with methyl and hydroxyl side chains linked by a methylene bridge.</p> |
|  | <p>Trehalose, also known as mycose or tremalose, is a natural alpha-linked disaccharide formed by an α,α-1,1-glucoside bond between two α-glucose units.</p> |
|  | <p>Trimethoprim is a dihydrofolate reductase inhibitor.</p> |
| <p>NA</p> | <p>This Kit contains 1 vial of Caffeine MPS (RS1-0064), 1 vial of Phenacetin MPS (RS1-0060), 1 vial of Sulfanilamide (RS1-0061), 2 vials of Sulfapyridine (RS1-0062), and 1 vial of Vanillin MPS (RS1-0063).</p> |
|  | <p>Vanillin is the primary component of the extract of the vanilla bean. Its functional groups include aldehyde, ether, and phenol.</p> |
|  | <p>Zidovudine is a therapeutic analog of thymidine. Zidovudine (INN) or azidothymidine (AZT) (also called ZDV) is a nucleoside analog reverse-transcriptase inhibitor (NRTI), a type of antiretroviral drug used for the successful treatment of HIV/AIDS infectiousness.</p> |
|  | <p>Zidovudine Rel Cpd C (Thymine) is also known as 5-methyluracil, a pyrimidine nucleobase.</p> |

HOW TO BUY? See page 26 for a purchase order.

FREQUENTLY ASKED QUESTIONS (FAQS)

DOES NSF PROVIDE A MATERIAL SAFETY DATA SHEET (MSDS)?

Yes, an MSDS is available and sent with every Reference Standard shipped. It also can be downloaded online from our website at www.nsf-rs.org.

DOES NSF PROVIDE CERTIFICATES OF ANALYSIS (COA) FOR NSF REFERENCE STANDARDS?

Yes. CoAs will be available and shipped with each individual NSF Reference Standard. Customers also can download them from nsf-rs.org. The certificates include all data, including the spectra used to ascertain the suitability of the Reference Standard for its intended use, as well as the methods used to determine the traceability factor (calculation value) for each pharmacopeial compendium (EP, USP).

WHAT IS THE "TRACEABILITY FACTOR" FOUND ON THE CERTIFICATE OF ANALYSIS ACCOMPANYING AN NSF REFERENCE STANDARD?

This is a factor, similar to the "Calculation Value" on a USP reference standard, to be applied when the NSF standard is used for a quantitative purpose. The amount weighed during a quantitative analysis is multiplied by this factor.

WHY ARE THERE TWO TRACEABILITY FACTORS LISTED?

These show the quantitative traceability of the NSF reference standard to the USP and EP standards, respectively.

WHICH TRACEABILITY FACTOR SHOULD I USE?

If you are using a USP method, or would otherwise be using a USP reference standard, you should use the traceability factor vs. USP standard. Similarly, if you are using an EP method or would otherwise be using an EP standard, you should use the traceability factor vs. EP standard.

WHY IS PROOF OF TRACEABILITY IMPORTANT?

Regulations enforced by the U.S. FDA and other worldwide regulatory agencies require that a secondary standard be demonstrated, through chemical testing, to be traceable to the primary reference standard.

ARE NSF REFERENCE MATERIALS SUITABLE FOR USE AS HUMAN OR ANIMAL DRUGS OR MEDICINES?

No. NSF Reference Standards are intended for test and assay use only. They are never intended for use as a drug or medicine for humans or animals.

CAN I USE NSF REFERENCE STANDARDS FOR NON-COMPENDIAL USES?

NSF Reference Standards are traceable to both the European Pharmacopoeia (EP) and United States Pharmacopoeia (USP) reference standards. Extensive testing protocols in a minimum of three collaborating laboratories using USP and EP methods were used for this traceability determination. NSF Reference Standards are intended for use in USP and EP monograph testing. The suitability of NSF Reference Standards for non-compendial uses has not been established.

ARE ANY SPECIAL PREPARATIONS REQUIRED PRIOR TO USE OF NSF REFERENCE STANDARDS?

Storage and directions for use are provided on both the product label and the Certificate of Analysis for each individual lot of NSF Reference Standards. For example, some standards simply state "use as-is,"

and others may require drying or titrimetric determination of water content prior to use in quantitative applications. Please follow the specific preparation directions provided for each individual Reference Standard.

WHY DO MY SHIPPING CONDITIONS DIFFER FROM THE LABELED STORAGE CONDITIONS?

NSF Reference Standards, with few exceptions, are shipped using methods suitable for short-term storage and not typically shipped with ice packs or dry ice. The long-term storage conditions provided are intended to maintain the labeled traceability factor and sustain the suitability for use during long-term storage. (If the potency of a specific chemical entity may be affected by such short-term exposure, NSF will ship it in alternative packaging.)

HOW SHOULD I STORE NSF REFERENCE STANDARDS?

NSF Reference Standards should be stored under the prescribed conditions indicated on the label and the Certificate of Analysis. The conditions for storage vary depending on the individual Reference Standard. However, all must be stored in their original containers, tightly closed and away from direct light.

WHAT IF THERE IS NOT YET AN NSF REFERENCE STANDARD AVAILABLE FOR A PRODUCT I MANUFACTURE?

NSF is scheduled to introduce hundreds of new items to its reference standard portfolio throughout 2011 and 2012. Products listed in the NSF Reference Standard Catalog currently are available for sale and will be immediately shipped upon order confirmation. The catalog is updated monthly. If you are interested in an item not yet in the catalog, please contact your Account Manager or Customer Service and we'll seek to bring that item to market.

In the unusual event a listed Reference Standard is not in stock, you may still place an order for it. You'll be notified as soon as the Reference Standard is released and given an estimated shipment date.

DOES NSF PROVIDE AN EXPIRATION DATE FOR REFERENCE STANDARDS?

Yes. Expiration dates can be located on the Certificate of Analysis.

CAN I REUSE AN NSF REFERENCE STANDARD ONCE IT HAS BEEN OPENED?

All NSF Reference Standards are provided with enough quantity to perform multiple assays for the prescribed use. Once opened, they must be stored carefully, according to good laboratory practices (following instructions provided) under proper storage conditions. It is recommended that each vial be used in the same series of analyses. However, NSF cannot guarantee the continued suitability of use for testing once opened, due to varying conditions of use outside of NSF's control.

NSF REFERENCE STANDARDS CAN BE ORDERED ONLINE ANYTIME AT WWW.NSF-RS.ORG.

You can also fax or mail your order using the order form in the catalog or via e-mail by contacting one of our regional customer service locations. NSF Reference Standards can be ordered through your local, authorized distributor if one is available.

DO YOU HAVE ADDITIONAL QUESTIONS? PLEASE CONTACT US VIA E-MAIL AT RSINFO@NSF.ORG FOR A PROMPT RESPONSE OR CALL CUSTOMER SERVICE @ +1.734.214.6234

NSF INTERNATIONAL – APPLICATION FOR CREDIT TERMS

BUSINESS CONTACT INFORMATION

| | | |
|--|----------------|--------------|
| Title: | | |
| Company: | | |
| Phone: | Fax: | E-mail: |
| Registered company address: | | |
| City: | State/Country: | Postal Code: |
| Date business commenced: | | |
| [] Sole proprietorship [] Partnership [] Corporation [] Other: | | |
| Estimated Annual Purchase from NSF (US\$): | | |
| Accounts Payable Contact: | Phone: | E-mail: |

BUSINESS AND CREDIT INFORMATION

| | | |
|------------------------------|-----------------|---------------|
| Primary business address: | | |
| City: | State/Country: | Postal Code: |
| How long at current address? | | |
| Phone: | Fax: | E-mail: |
| Bank name: | | |
| Bank address: | Phone: | |
| City: | State/Country: | Postal Code: |
| Type of account: | Contact Person: | Phone Number: |

BUSINESS/TRADE REFERENCES

| | | |
|---------------|----------------|--------------|
| Company name: | | |
| Address: | | |
| City: | State/Country: | Postal Code: |
| Phone: | Fax: | E-mail: |
| Company name: | | |
| Address: | | |
| City: | State/Country: | Postal Code: |
| Phone: | Fax: | E-mail: |
| Company name: | | |
| Address: | | |
| City: | State/Country: | Postal Code: |
| Phone: | Fax: | E-mail: |

AGREEMENT

1. All invoices are to be paid 30 days from the date of the invoice.
2. Claims arising from invoices must be made within seven working days.
3. By submitting this application, you authorize NSF International to make inquiries into the banking and business/trade references that you have supplied.

SIGNATURES

| | |
|------------------|------------------|
| Signature: _____ | Signature: _____ |
| Name: _____ | Name: _____ |
| Title: _____ | Title: _____ |
| Date: _____ | Date: _____ |

To contact NSF Reference Standards: USA: RSinfo@nsf.org | +1.734.214.6234
 Europe: RSeurope@nsf.org
 Asia: RSasia@nsf.org
 South America: RSsa@nsf.org

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Buyer’s purchase of NSF Reference Standards online or through an authorized NSF Distributor constitutes Buyer’s acceptance of NSF’s website terms of use, which can be found at <http://www.nsf-rs.org/index.php/terms-of-use/>.

INTENDED USE OF NSF REFERENCE STANDARDS

- NSF Reference Standards are highly characterized samples of drug substances (API’s), excipients, impurities and degradation products and performance calibrators.
- All Reference Standards are intended to be used in tests and assays carried out in accordance with the respective monographs listed in the official pharmacopeial compendiums such as the European Pharmacopoeia and the United States Pharmacopoeia.
- Buyer acknowledges and agrees that all NSF Reference Standards will be purchased for test and assay use only in accordance with laws that regulate drugs — NSF Reference Standards are never intended for use as a drug or medicine for humans or animals. Buyer shall assume full responsibility and sole risk if it intends to use any NSF Reference Standards for any other purpose, including, without limitation, any non-compendial use.
- Buyer agrees that the selection of the NSF Reference Standards, the use of the NSF Reference Standards and the results obtained therefrom, as well as the use of other products or services used in conjunction with the NSF Reference Standards to achieve Buyer’s intended results, shall be the sole responsibility of Buyer.
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 - (ii) use of the NSF Reference Standards that infringe patents of the United States or other countries.
- Buyer shall be solely responsible for the proper storage and proper use of NSF Reference Standards after delivery thereof.
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- Listed prices for individual Reference Standards are exclusive of any shipping costs, additional insurance, taxes, custom import duties, Value Added Tax (VAT) or any other charges that may apply. Buyer shall bear the full responsibility and liability of any such charges.
- If NSF provides Buyer with a sales quotation, the prices listed in such quote shall be valid until the expiration date set forth therein. If the sales quotation does not have a stated expiration date, then the quoted prices shall be valid for a period of ten (10) days after the date of the sales quotation.
- In general, NSF does not offer discounts for NSF Reference Standards. However, you may periodically check our website for special offers on pricing for products or shipping at www.nsf-rs.org or contact our Customer Service at RSinfo@nsf.org.

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- Unless evidence is provided to NSF that Buyer is duly exempt therefrom, all orders shipped to an address within the state of Michigan shall be subject to applicable Michigan state sales tax.

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- NSF shall ship the NSF Reference Standards F.O.B. NSF's plant. Risk of loss to the products shall transfer to Buyer upon delivery of the products to the carrier at NSF's shipping dock.
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 - ▶ Order directly from the online NSF Store at www.nsf-rs.org/store
 - ▶ Order by E-mail by contacting RSinfo@nsf.org
 - ▶ Order by Fax at +1.734.827.7792
 - ▶ Order through your authorized NSF Reference Standards Distributor
- Buyer shall have the responsibility to ensure there is no duplication of orders. Should duplicate orders be shipped as a result of Buyer placing duplicate orders with NSF, the Buyer shall be responsible for full payment of both orders.
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- All damaged product requires written authorization from NSF prior to return. Buyer will ship the product to NSF freight prepaid, and NSF will return to Buyer the replacement or repaired product freight prepaid. NSF will, at NSF's option, replace the product or give Buyer a credit based on the actual price paid for the product. All replaced products will be subject to these Terms. This paragraph sets forth Buyer's sole and exclusive remedy.
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JPMorgan Chase
NSF International
Dept Lockbox #771380
PO Box 77000
Detroit, MI 48277-1380
USA

Account #: 790465173
SWIFT/ABA #: 021000021

- **COMPANY CHECK** drawn on a United States chartered bank acceptable to NSF. Make your check payable to "NSF International" and place your invoice number stated in your Order Confirmation on your check. Mail your check to:

NSF International
Dept Lockbox #771380
PO Box 77000
Detroit, MI 48277-1380
USA

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- Should any products provided to Buyer be for the US Government, Buyer is solely and exclusively responsible for compliance with all statutes and regulations governing sales to the US Government.
- Delay in shipment or failure of Seller to fulfill or perform any order or agreement shall be excused by any cause beyond Seller's control, including, but not limited to: sabotage, fire, fuel shortage, flood, differences with workers, riot, insurrection, war, terrorism, acts, regulations or requests of any governmental authority or agency, compliance with any law, contract disputes, inability to obtain raw materials, inability to meet current product demand or delays in transit or delivery. In the event that the occurrence of such a contingency prevents or interferes with Seller's performance of its obligations, (a) Buyer shall accept as full and complete fulfillment of its order such portion of the order as Seller is able, under the circumstances, to procure and deliver in accordance with its obligations, and (b) Seller may, as its option, cancel this contract or any part thereof without any liability to Buyer resulting therefrom.

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The following additional terms and conditions apply to export shipments only:

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- Seller reserves the right to place in storage for Buyer's account and at Buyer's expense any NSF Reference Standards not timely shipped in accordance with the terms hereof if such delay is not the fault of Seller.
- Payment of the invoice price shall be either prepaid or secured by a confirmed, irrevocable letter of credit in favor of Seller and confirmed by a US chartered bank acceptable to Seller in amount sufficient to cover the total price, net of any advance deposit or such other security acceptable to Seller.

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The NSF Reference Standards Program is part of NSF International's Health Sciences Division (www.nsf.org/info/healthsciences). Our scientists and technical experts offer analytical method development and testing to Good Manufacturing Practices (GMP), Good Laboratory Practices (GLP) and GMP consultancy, auditing, certification and training for pharmaceuticals, dietary supplements and medical devices globally. Visit www.nsf.org for more information.

Visit NSF-DBA (www.nsf-dba.com) and NSF Pharmalytica (www.nsf-pharmalytica.com) to learn more.

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NSF Health Sciences

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