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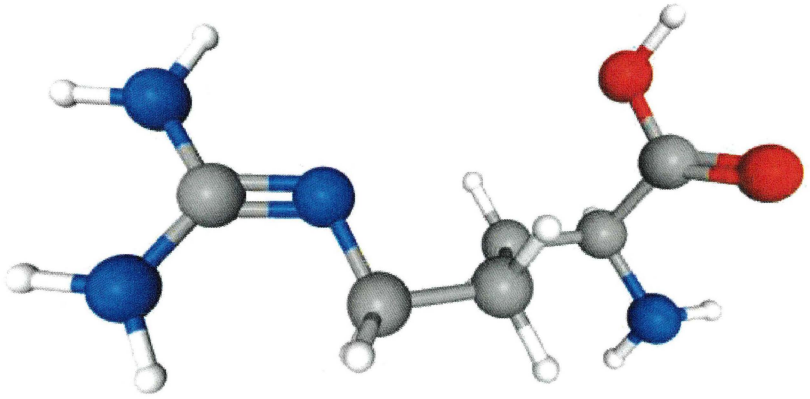
L-ARGININE HYDROCHLORIDE



BIO PHARMA GRADE FOR BIOBUFFER SOLUTIONS PRODUCT LINE REGULATORY PACKET

Signature/Date:	Cassie Baun 3/13/24

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1. L-ARGININE HYDROCHLORIDE BIO PHARMA GRADE FOR BIOBUFFER SOLUTIONS PRODUCT LINE:

1.1. General Product Information:

1.1.1. Product Name:
- 1.1.1.1. L-Arginine Hydrochloride

1.1.2. Product Code:
- 1.1.2.1. Current Code: LARH-4220

1.1.3. Scope:
- 1.1.3.1. This regulatory packet will provide the quality and regulatory information regarding the manufacturing, testing, packaging, storage, release, shipping and handling of Bio Pharma Grade for BioBuffer Solutions Product Line L-Arginine Hydrochloride supplied by BioSpectra.

1.1.4. Molecular Formula:
- 1.1.4.1. $C_6H_{14}N_4O_2 \cdot HCl$

1.1.5. Molecular Weight:
- 1.1.5.1. 210.66 g/mol

1.2. Manufacturing, Packaging, Release Site, and Supplier Information:

1.2.1. General Information:
- 1.2.1.1. L-Arginine Hydrochloride is manufactured and tested by BioSpectra's approved Supplier in India.
- 1.2.1.2. L-Arginine Hydrochloride is stored, tested in accordance with the BioBuffer Solutions Testing Program, BSI-SOP-0576, released, and shipped at BioSpectra's Bangor, PA facility.
- 1.2.1.3. L-Arginine Hydrochloride is additionally stored and shipped at BioSpectra's Supply Chain Center: 51 North 3rd Street, Stroudsburg, PA 18360.

1.2.2. Manufacturing:
- 1.2.2.1. The manufacturing of L-Arginine Hydrochloride is performed by BioSpectra's approved Supplier utilizing multiuse equipment.

1.2.3. Packaging:
- 1.2.3.1. The packaging of L-Arginine Hydrochloride occurs at BioSpectra's approved Supplier's facility. The final packaging is performed at the following BioSpectra site: BioSpectra Bangor, PA Facility: 100 Majestic Way, Bangor, PA 18013.

1.2.4. Testing for Release:
- 1.2.4.1. Testing for release of material is performed in accordance with the BioBuffer Solutions Testing Program BSI-SOP-0576.

1.2.5. GMP Compliance Statement:
- 1.2.5.1. L-Arginine Hydrochloride Bio Pharma Grade for BioBuffer Solutions Product Line is suitable for use as a process chemical. It is GMP manufactured by the approved supplier in accordance with the approved supplier's ISO 9001:2015 certified management system. This grade of L-Arginine Hydrochloride is not suitable to be used as an Active Pharmaceutical Ingredient, Drug, Drug Product or Household Item.

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1.3. Physico-Chemical Information:

1.3.1. CAS Number:

1.3.1.1. CAS# 1119-34-2

1.3.2. Origin:

1.3.2.1. The origin of L-Arginine Hydrochloride is through synthetic chemical manufacturing.

1.3.3. Synonyms:

1.3.3.1. (2*S*)-2-amino-5-(diaminomethylideneamino) pentanoic acid; hydrochloride

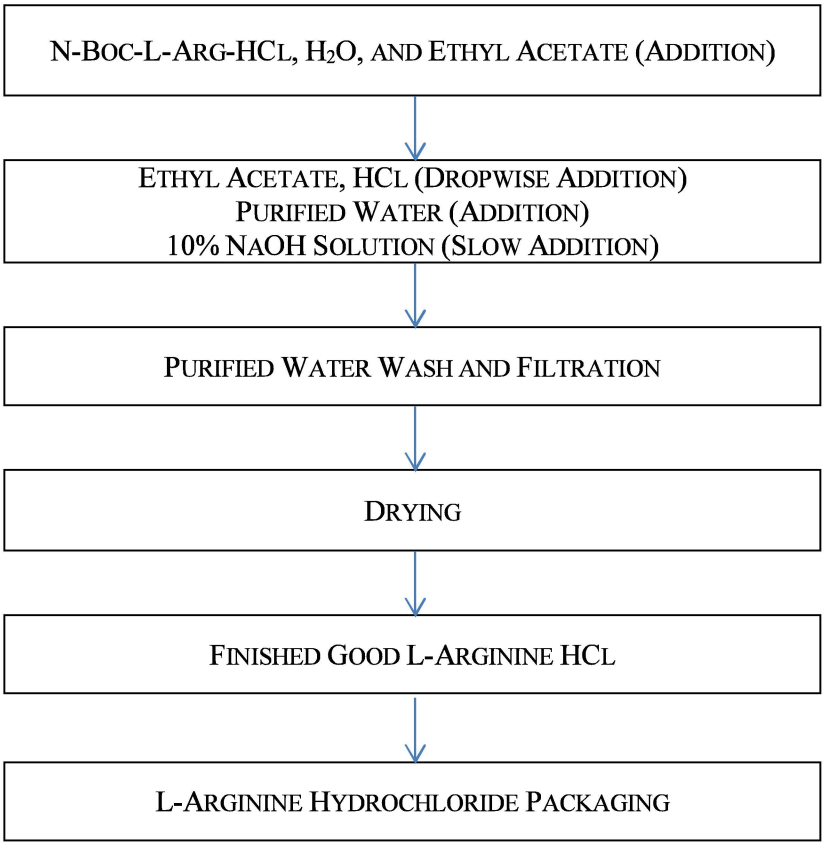
1.3.4. Morphological Form:

1.3.4.1. White or almost white crystalline powder or colourless crystals

1.3.5. Manufacturing Process:

1.3.5.1. The manufacturing process for L-Arginine Hydrochloride is performed by the following:

Approved Supplier Material Synthesis



1.3.6. Specifications:

1.3.6.1. Available upon request.

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1.4. Regulatory Information:

1.4.1. Compendial Compliance:

1.4.1.1. USP, EP, JP

1.4.2. Master File:

1.4.2.1. Drug Master File (DMF) is currently not available for this product.

1.4.2.2. EDQM Certificate of Suitability is currently not available for this product.

1.4.3. REACH:

1.4.3.1. Refer to the L-Arginine Hydrochloride Safety Data Sheet for the REACH Number or contact your Commercial Team Representative for further information.

1.4.4. BSE/TSE Statement:

1.4.4.1. L-Arginine Hydrochloride, Bio Pharma Grade for BioBuffer Solutions Product line is a synthetic chemical and has been evaluated for the source of the raw materials used in its production through the Supplier Qualification Program. BioSpectra can state that BSE/TSE is not a concern based on this evaluation.

1.4.5. Allergens Statement:

1.4.5.1. L-Arginine Hydrochloride, Bio Pharma Grade for BioBuffer Solutions Product line does not contain, and has not been derived from or commingled with the following allergens: Cereals containing gluten (i.e., wheat, rye, barley, oats, spelt, kamut or their hybridized strains) and products thereof, Crustaceans and products thereof, Eggs and products thereof, Fish and products thereof, Peanuts and products thereof, Soybeans and products thereof, Milk and products thereof (including lactose), Celery and products thereof, Mustard and products thereof, Sesame seeds and products thereof, Lupin and products thereof, Molluscs and products thereof, Sulphur dioxide and sulfites at >10 mg/kg as SO, Nuts, i.e., Almonds (*Amygdalus communis* L.), Hazelnuts (*Corylus avellana*), Walnuts (*Juglans regia*), Cashews (*Anacardium occidentale*), Pecan nuts (*Carya illinoinensis* (Wangenh.) K. Koch), Brazil nuts (*Bertholletia excelsa*), Pistachio nuts (*Pistacia vera*), Macadamia or Queensland nuts (*Macadamia ternifolia*) and products thereof, Beef, Chicken, Pork, Azo Dyes, Benzoic Acid, Tartrazine, Vanillin, Cocoa, Cinnamon, Coriander, Yeast, Glutamate, Legumes, and Corn. BioSpectra has evaluated the material supply through the Supplier Qualification Program.

1.4.6. Genetically Modified Organisms (GMO) Statement:

1.4.6.1. L-Arginine Hydrochloride, Bio Pharma Grade for BioBuffer Solutions Product line is a synthetic chemical and has been evaluated for the source of the raw materials used in its production through the Supplier Qualification Program. There are no genetically modified materials used in any stage of the manufacturing process. BioSpectra can state that genetic modification is not a concern based on this evaluation.

1.4.7. Residual Solvents Statement:

1.4.7.1. L-Arginine Hydrochloride, Bio Pharma Grade for BioBuffer Solutions Product line is manufactured using the solvent Ethyl acetate, and is stated to comply with the ICH Q3C required concentration limit of 5000ppm for a Class 3 residual solvent. BioSpectra has evaluated the material supply through the Supplier Qualification Program.

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1.4.8. Metal Catalyst and Metal Reagent Residues Statement:
1.4.8.1. L-Arginine Hydrochloride, Bio Pharma Grade for BioBuffer Solutions Product line is manufactured without the use of metal catalysts, metal reagents, or metal residues. BioSpectra has evaluated the material supply through the Supplier Qualification Program.
1.4.9. Pallet Statement:
1.4.9.1. BioSpectra can state that all pallets used in the packaging of L-Arginine Hydrochloride, Bio Pharma Grade for BioBuffer Solutions Product line are ISPM 15 compliant.
1.4.10. Elemental Impurities Statement:
1.4.10.1. BioSpectra has evaluated the material supply through the Supplier Qualification Program, and can state that none of the elemental impurities listed in ICH Q3D, USP <232>, and USP <233> are anticipated to be present in L-Arginine Hydrochloride, Bio Pharma Grade for BioBuffer Solutions Product line.
1.4.11. Melamine Statement:
1.4.11.1. BioSpectra has evaluated the material supply through the Supplier Qualification Program, and can state that L-Arginine Hydrochloride, Bio Pharma Grade for BioBuffer Solutions Product line does not contain Melamine based on this evaluation. BioSpectra has additionally analyzed L-Arginine Hydrochloride, Bio Pharma Grade for BioBuffer Solutions Product line for Melamine, with a specification of <2.5mg/kg.

1.5. Miscellaneous Product Information:

1.5.1. Description of Batch:
1.5.1.1. The L-Arginine Hydrochloride process is a batch process where each batch size is determined based on order requirements.
1.5.2. Lot/batch numbering system:
1.5.2.1. The lot numbering system at BioSpectra employs the following format per BSI-DGM-0009 BioSpectra Lot Number Identification:
1.5.2.2. A sample lot number would appear as:
1.5.2.2.1. QS6: **LARH-0124-00001**
1.5.2.2.1.1. The first four digits are alpha digits which indicate the material, where LARH represents L-Arginine Hydrochloride. The fifth and sixth digits are numeric digits which indicate the site of final packaging, where 01 represents the Bangor, PA facility. The seventh and eighth digits are numeric digits which indicate the year the batch record was issued, where 24 represents 2024. The final five digits are numeric digits which indicate the sequential batch number, where 00001 represents the first L-Arginine Hydrochloride batch of 2024 that is automatically generated by the ERP system. The sequential batch number automatically resets on the first of the new calendar year.

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1.5.2.2.2. QS7: **LARH-L02-0124-0001**

1.5.2.2.2.1. The first four digits are alpha digits which indicate the material, where LARH represents L-Arginine Hydrochloride. The fifth, sixth, and seventh digits are alphanumeric digits which indicate the final packaging location of the material. The eighth and ninth digits are numerical digits which indicate the month of work order issuance, where 01 represents January. The tenth and eleventh digits are numerical digits which indicate the year of work order issuance, where 24 represents 2024. The final four digits are numerical digits which indicate the sequential batch number, where 0001 represents the first L-Arginine Hydrochloride batch of 2024 that is automatically generated by the ERP system. The sequential batch number automatically resets on the first day of each calendar year.

1.5.3. Expiration date and/or recommended re-evaluation interval:

1.5.3.1. The current recommended Retest or Expiration Date for L-Arginine Hydrochloride, Bio Pharma Grade for BioBuffer Solutions Product line is available in the BioSpectra Product Retest and Expiration Date List, DCN: BSI-LST-0239, and is based on current available stability data in accordance with BioSpectra's Stability Testing Program. Additionally, the recommended Retest or Expiration Date will be available on the Product Specific Certificate of Analysis, as applicable.

1.5.4. Storage and shipping conditions:

1.5.4.1. Store in a dry, well-ventilated area away from incompatible substances. Keep containers tightly closed.

1.5.5. Packaging:

1.5.5.1. Packaging information is available through the following: https://Biospectra.us/packaging

1.6. Contact Information:

1.6.1. https://www.biospectra.us/about-us/commercial-marketing-team

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BioBuffer Solutions Quality Management System Regulatory Packet

Signature/Date: Cassie Baun 12/7/23

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1. MATERIAL HANDLING, RELEASE SITE, AND SUPPLIER INFORMATION:

1.1. Facility Overview:

1.1.1. BioSpectra Facilities handle materials from BioSpectra's Approved Suppliers and Manufacturers once received at a BioSpectra facility in accordance with the respective elements of the Quality Management System pertaining to Material Handling, Release, and Supplier Information.

Table 1. BioSpectra Facility Names and Addresses

Name	Address	Activity
Jacobsburg Road	1349 Jacobsburg Road Wind Gap, PA 18091	Commercial, IT, HR, & Finance Offices, Training Center, and Small Warehouse for applicable materials
Majestic Way	100 Majestic Way Bangor, PA 18013	Packaging and Release of Bio Ultra Grade and Bio Pharma Grade for BioBuffer Solutions Product Line Materials. Head Corporate Offices: Administration, Regulatory Affairs, Quality Assurance & Quality Control[1]
Rockdale Lane	1474 Rockdale Lane Stroudsburg, PA 18360	Packaging and Release of Bio Ultra Grade and Bio Pharma Grade for BioBuffer Solutions Product Line Materials. Quality Control and Assurance[1]
Supply Chain Center	51 North 3rd Street Stroudsburg, PA 18360	Shipping and Receiving & Security Headquarters
[1]BioSpectra additionally manufactures higher compliance grade materials at this site. Reference the BioSpectra Quality Management System Regulatory Packet DCN: BSI-RPT-1355 for further details.		

1.1.2. Customer Audit Policy:

1.1.2.1. BioSpectra allows for customer audits as required by the customer and as appropriate for the scope of materials purchased. Access to the raw material supply chain is also available. Each customer audit provides a general overview of processing information and facility operations.

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1.1.3. Site Details:

1.1.3.1. General Site Information

1.1.3.1.1. BioSpectra was founded in 1994 and was officially incorporated in the State of Pennsylvania in 1995. The first BioSpectra manufacturing facility was opened in Sciota, PA in March of 1996. This facility was created for the cGMP manufacturing of Biological Buffers. BioSpectra opened the Stroudsburg, PA facility in December of 2000. Between 2000 and 2003, BioSpectra moved its processes from the Sciota, PA facility to its Stroudsburg, PA facility. This site is registered with the US Food and Drug Administration. The processes were initially validated in the Stroudsburg facility throughout 2000 and 2003 and revalidated in accordance with BioSpectra's approved Manufacturing Process Validation Master Plan. The manufacturing operations at this site operate 24 hours per day 7 days per week.

1.1.3.1.2. BioSpectra purchased the Bangor, PA facility in December of 2012. This facility develops new processes, conducts research and development, and manufactures Active Pharmaceutical Ingredients, Excipients, and Life Science Intermediates, as well as Custom Buffers and Blends. This site is registered with the US Food and Drug Administration. The manufacturing operations at this site operate 24 hours per day 7 days per week.

1.1.3.1.3. In April of 2021 BioSpectra opened the Wind Gap Corporate Center which houses office and warehousing space. The warehouse consists of multiple push-back racking systems with a total of 252 rack positions and additional pallet positions designated on the warehouse floor. This facility is the Corporate Center with office locations for Commercial, IT, Human Development, and Finance. Additionally, this facility is the training center and Security Headquarters. The Corporate Center also includes warehousing space for storage of raw materials, components, manufacturing equipment (in storage), and facilities supplies in accordance with cGMP guidelines. There are no products currently manufactured at this site.

1.1.3.1.4. In 2023, BioSpectra opened the Supply Chain Center in Stroudsburg PA, which houses office and warehousing space for sampling and storage of raw materials and components as well as storage, release, and shipment of finished goods in accordance with cGMP guidelines. There are no products manufactured at this site.

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1.1.3.2. Facility Size and Composition

1.1.3.2.1. The BioSpectra Majestic Way facility is approximately 150,000 square feet in size and is comprised of various Zones. Each Zone represents a particular geographical portion of the facility. Any one zone may include multiple operational areas, which include manufacturing, packaging, storage, or further processing areas. The map of the facility contains details of each zone. Detailed site information is available in the BioSpectra Bangor Site Quality Overview DCN: BSI-SOP-0218.

1.1.3.2.2. There are multiple processing rooms, packaging rooms, and drying rooms within BioSpectra's Rockdale Lane 25,000 square foot facility, as well as a warehouse with a push-back racking system, and a Quality Control Laboratory. Detailed site information is available in the BioSpectra Stroudsburg Site Quality Overview DCN: BSI-SOP-0078.

1.1.3.2.3. The BioSpectra Jacobsburg Road facility is 25,000 square feet. Detailed site information is available in the BioSpectra Wind Gap Site Quality Overview DCN: BSI-SOP-0425.

1.1.3.2.4. The BioSpectra 3rd Street Supply Chain Center is approximately 52,000 square feet. Detailed site information is available in the BioSpectra Supply Chain Center Stroudsburg Site Quality Overview DCN: BSI-SOP-0557.

1.1.3.3. Site Activities Conducted

1.1.3.3.1. The activities conducted at BioSpectra for Bio Pharma Grade for BioBuffer Solutions Line and Bio Ultra Grade materials include the following:

1.1.3.3.1.1. Supplier and Manufacturer Qualification

1.1.3.3.1.2. Quality System Management of materials at BioSpectra

1.1.3.3.1.3. Quality Control Analysis, as applicable

1.1.4. Material Release:

1.1.4.1. Bio Ultra Grade and Bio Pharma Grade for BioBuffer Solutions Product line materials are manufactured by BioSpectra's Approved Suppliers and Manufacturers. Testing may be transcribed by BioSpectra or analyzed by BioSpectra's Quality Control Laboratory, as applicable, for the respective material. BioSpectra's Quality Assurance Department reviews available documentation in order to issue the Certificate of Analysis in accordance with the Certificate of Analysis Issuance Procedure.

1.1.5. Supplier Information:

1.1.5.1. BioSpectra has several approved suppliers and manufacturers managed in accordance with the Supplier, Manufacturer, and Service Provider Qualification Master Plan.

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1.2. **Compliance Details:**

1.2.1. BioSpectra is committed to the quality, safety, identity, and purity of each of our products. BioSpectra provides the intended end use statements for each grade of material with every certificate of analysis issued. The intended end use statements for the Bio Pharma Grade for BioBuffer Solutions Product line, and Bio Ultra Grade materials are stated below.

1.2.1.1. Bio Pharma Grade for BioBuffer Solutions Product line

1.2.1.1.1. Bio Pharma Grade for BioBuffer Solutions Product Line is suitable for use as a process chemical. It is GMP manufactured by the approved supplier in accordance with the approved supplier's Declared guidance or Standard stated by the supplier and accepted by BioSpectra as the certified management system. The Bio Pharma Grade for BioBuffer Solutions Product Line material is not suitable to be used as an Active Pharmaceutical Ingredient, Drug, Drug Product or Household Item.

1.2.1.2. Bio Ultra Grade

1.2.1.2.1. Bio Ultra Grade Material is suitable for use as a process chemical. Bio Ultra Grade material is not suitable to be used as an Excipient, Active Pharmaceutical Ingredient, Drug, Drug Product or Household Item.

2. CONTACT INFORMATION:

2.1. https://www.biospectra.us/about-us/commercial-marketing-team