



Suggested Formula	Gentamicin 50 mg/ mL Intramuscular, Intravenous Injection (Solution, 100 mL)	FIN	F 000 975v4
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### SUGGESTED FORMULATION

Ingredient Listing	Qty.	Unit	NDC #	Supplier	Lot Number	Expiry Date
Gentamicin Sulfate, USP	TBD					
Sodium Chloride, USP	0.31	g				
Benzyl Alcohol (Parenteral Application), NF	1.0	mL				
Sterile Water for Injection, USP	80.0	mL				
Sterile Water for Injection, USP	q.s. to 100.0	mL				
Sodium Hydroxide 10% Solution	As required					
Hydrochloric Acid 10% Solution	As required					

### SPECIAL PREPARATORY CONSIDERATIONS

#### Ingredient-Specific Information

**Light Sensitive** (protect from light whenever possible): Benzyl Alcohol

**Hygroscopic** (protect from moisture whenever possible): Gentamicin Sulfate

**Narrow Therapeutic Index:** Gentamicin Sulfate



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### SPECIAL PREPARATORY CONSIDERATIONS (CONTINUED)

#### Suggested Preparatory Guidelines

Non-Sterile Preparation     Sterile Preparation

Processing Error / Testing Considerations: To account for processing error, sterility, pH and endotoxin testing considerations during preparation, it is suggested to measure an additional **5 to 9%** of the required quantities of ingredients.

Special Instruction: This formula may contain one or more Active Pharmaceutical Ingredients (APIs) that may be classified as hazardous, please refer & verify the current NIOSH list of Antineoplastic and Other Hazardous Drugs in Healthcare Settings. At this time, **General Chapter <800> Hazardous Drugs – Handling in Healthcare Settings** is informational and not compendially applicable unless otherwise specified by regulators and enforcement bodies. For information on the scope, intended applicability, and implementation context for USP General Chapter <800>, see: <https://www.usp.org/compounding/general-chapter-hazardous-drugs-handling-healthcare>.

This formula must be prepared within the appropriate facilities under adequate environmental conditions, following the necessary guidelines and procedures as stated within *USP 797* and *USP 800*, when handling hazardous drugs. Only trained and qualified personnel must prepare this formula.

All heat stable, reusable materials and equipment must be sterilized and depyrogenated by dry heat sterilization at 250°C for 2 hours prior to use.

Compounder needs to verify as per USP, if every batch of final product compounded using this procedure must be sterility and endotoxin tested before being dispensed.

All required personal protective equipment (sterile and hazardous if applicable), such as but not limited to, gowns, aprons, sleeves, gloves both inner and outer if applicable, shoe covers, hairnet, head cap, beard cover, eyewear, appropriate face mask, respirator and face shield, etc., where applicable must be worn at all times. In addition, proper personnel cleansing must be done before entering the buffer or clean area.

If applicable, follow all required procedures for hazardous drug handling including but not limited to procurement, transport, storage, preparation, dispensing, administration, clean up (spills) & disposal.

Filter integrity must be validated by performing a filter stress test. If the test demonstrates that the filter might be defective, the solution must be discarded and remade.

If you are a registered 503B facility, please refer to all relevant guidance documents including but not limited to the Code of Federal Regulations (CFR), Guidance for Industry (GFI) and Compliance Policy Guides (CPGs).

**Gentamicin Sulfate has a Narrow Therapeutic Index.**

This procedure requires the use of very small quantities of ingredients. All calculations and preparation techniques must be verified before dispensing the final product.



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**SUGGESTED PREPARATION (for 100 mL)**

Weigh and / or measure the following ingredients when appropriate:

Ingredient Listing	Qty.	Unit	Multiplication factor (*): ____	Processing Error	Qty. to measure
Gentamicin Sulfate, USP §	TBD				
Sodium Chloride, USP §	0.31	g			
Benzyl Alcohol (Parenteral Application), NF §	1.0	mL			
Sterile Water for Injection, USP §	80.0	mL			
Sterile Water for Injection, USP §	q.s. to 100.0	mL			
Sodium Hydroxide 10% Solution §	As required				
Hydrochloric Acid 10% Solution §	As required				

\* Takes into account increased batch size conversions and density conversions, if required.

§ Weigh / measure just prior to use.

Preparatory Instruction

**IMPORTANT: All preparatory procedures must be performed using proper Aseptic Technique**

- Equipment sterilization:**  
Following the manufacturer's specifications, sterilize and depyrogenate all heat stable, reusable materials and equipment, then return to ambient temperature.



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2. **Ingredient quantification:**

A. Determine the potency of Gentamicin Sulfate based on the certificate of analysis:

MINUS	100%
Loss on drying (from certificate of analysis)	_____ %
DIVIDED BY	100
EQUALS	
Quantity of dried Gentamicin Sulfate, in decimal	_____
MULTIPLIED BY	
Assay (base equivalent) on dried basis result (from certificate of analysis)	_____ µg/mg
MULTIPLIED BY (Multiplication factor – µg to grams /mg to grams)	0.001
EQUALS	
<b>i. Potency of Gentamicin Sulfate (Base equivalent) in g/g</b>	_____



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<b>3.</b>	<p><b><u>Ingredient quantification:</u></b></p> <p>A. Determine the quantity (in g) of Gentamicin Sulfate required to make a <b><u>Gentamicin (Base)</u></b> 50 mg/mL Injection, batch size (100 mL):</p> <table border="1" style="width: 100%;"><tr><td>Quantity of Gentamicin needed for 100 mL</td><td style="text-align: right;">5.000 g</td></tr><tr><td colspan="2">DIVIDED BY</td></tr><tr><td>Potency of Gentamicin Sulfate (Base equivalent) g/g (Step 2Ai)</td><td style="text-align: right;">_____</td></tr><tr><td colspan="2">EQUALS</td></tr><tr><td><b>i. Quantity of Gentamicin needed for 100 mL</b></td><td style="text-align: right;">_____ g</td></tr><tr><td colspan="2">MULTIPLIED BY</td></tr><tr><td>Processing error adjustments (5 to 9%)</td><td style="text-align: right;">1.05 to 1.09</td></tr><tr><td colspan="2">EQUALS</td></tr><tr><td><b>ii. Total Quantity of Gentamicin Sulfate needed <i>plus</i> processing error adjustments</b></td><td style="text-align: right;">_____ g</td></tr></table>	Quantity of Gentamicin needed for 100 mL	5.000 g	DIVIDED BY		Potency of Gentamicin Sulfate (Base equivalent) g/g (Step 2Ai)	_____	EQUALS		<b>i. Quantity of Gentamicin needed for 100 mL</b>	_____ g	MULTIPLIED BY		Processing error adjustments (5 to 9%)	1.05 to 1.09	EQUALS		<b>ii. Total Quantity of Gentamicin Sulfate needed <i>plus</i> processing error adjustments</b>	_____ g
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<b>4.</b>	<p><b><u>Vehicle preparation:</u></b></p> <p>A Combine and mix the following ingredients together until homogeneously dispersed:</p> <ul style="list-style-type: none"><li>-Benzyl Alcohol (Parenteral Application)</li><li>-Sterile Water for Injection (80.0 mL <i>plus</i> processing error adjustments)</li></ul> <p><u>End result:</u> Homogeneous liquid-like solution.</p>																		
<b>5.</b>	<p><b><u>Powder-liquid integration:</u></b></p> <p>A. Incrementally add the following ingredients to the homogeneous liquid-like solution (Step 4A):</p> <ul style="list-style-type: none"><li>-Gentamicin Sulfate (amount determined in Step 3Aii)</li><li>-Sodium Chloride</li></ul> <p><u>Specification:</u> Continuously mix until all solid particles have completely dissolved.</p> <p><u>End result:</u> Homogeneous liquid-like solution.</p> <p><u>Note:</u> Add the next ingredient, once the previous one has been completely added and dissolved.</p>																		



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6.	<p><b><u>pH testing:</u></b></p> <p>A. Draw an appropriate amount of the mixture (Step 5A).</p> <p>B. Test the pH of the sample. It should lie between 3.0 and 5.5.</p> <p>C. <u>If the pH &lt; 3.0, carefully add, in a dropwise fashion, the Sodium Hydroxide 10% Solution to the mixture:</u></p> <ol style="list-style-type: none"><li>1. Draw and transfer 1 or 2 drops of the Sodium Hydroxide 10% Solution to the mixture.</li><li>2. Stir for at least 5 minutes to evenly disperse the Sodium Hydroxide 10% Solution.</li><li>3. Re-test the pH.</li><li>4. Continue to add the Sodium Hydroxide 10% Solution until the pH of 3.0 to 5.5 is obtained.</li></ol> <p>IMPORTANT: Do not allow the pH to rise above 5.5.</p> <p>D. <u>If the pH &gt; 5.5, carefully add, in a dropwise fashion, the Hydrochloric Acid 10% Solution to the mixture:</u></p> <ol style="list-style-type: none"><li>1. Draw and transfer 1 or 2 drops of the Hydrochloric Acid 10% Solution to the mixture.</li><li>2. Stir for at least 5 minutes to evenly disperse the Hydrochloric Acid 10% Solution.</li><li>3. Re-test the pH.</li><li>4. Continue to add the Hydrochloric Acid 10% Solution until the pH of 3.0 to 5.5 is obtained.</li></ol> <p>IMPORTANT: Do not allow the pH to fall below 3.0.</p>
7.	<p><b><u>Filling to volume:</u></b></p> <p>A. Add additional Sterile Water for Injection to the above mixture to fill to the required batch size (100.0 mL <i>plus</i> processing error adjustments).</p> <p><u>Specification:</u> Continuously mix.</p> <p><u>End result:</u> Homogeneous liquid-like solution.</p>
8.	<p><b><u>Filtering and transferring:</u></b></p> <p>Aseptically filter the solution through a 0.22-<math>\mu</math>m sterile filter into the recommended dispensing container (see Packaging requirements). Transfer the remainder into a separate dispensing container. This is to be used as the Test sample for sterility and endotoxin testing.</p>
9.	<p><b><u>Filter integrity test:</u></b></p> <p>Validate filter integrity by performing a filter stress test. If the test demonstrates that the filter might be defective, the solution must be discarded and remade.</p>



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10.	<p><b><u>Terminal Sterilization:</u></b></p> <p>In relation to the chemical composition of the formulation, final packaging, etc., select and validate an end-stage sterilization method and follow the manufacturer's specification.</p>
11.	<p><b><u>Sterility and Endotoxin testing:</u></b></p> <p>Validate the Test sample for sterility and endotoxins, in accordance to current USP 797 regulatory guidelines.</p>

**SUGGESTED PRESENTATION**

Estimated Beyond-Use Date	24 hours controlled room temperature, 3 days refrigerated, or 45 days frozen, as per USP 797. BUD based on successful endotoxin test result.	Packaging Requirements	Sterile, tightly closed, light-resistant injection vials.
Auxiliary Labels	1 Use as directed. Do not exceed prescribed dose.	6	Consult your health care practitioner if any other prescription or over-the-counter medications are currently being used or are prescribed for future use.
	2 Keep out of reach of children.	7	Do not use if discolored.
	3 For veterinary use only.	8	Discard container after use.
	4 Keep at controlled room temperature, (20°C – 25°C), refrigerated (2°C – 8°C) or frozen (-25°C to -10°C).	9	Protect from light.
	5 Discard in the presence of particulate matter.	10	Equilibrate to room temperature before use.
Pharmacist Instructions	<p>Add any auxiliary labels specific to the API to the dispensing container as deemed necessary.</p> <p><b>IMPORTANT: Using proper aseptic techniques, one must dilute the Gentamicin Sulfate to the appropriate concentrations with the appropriate sterile diluent prior to intravenous injection. Also it must be administered accordingly as determined by the prescribing physician.</b></p> <p><u>NOTE:</u> Once diluted it must be used immediately and any unused portion must be discarded.</p>		
Patient Instructions	Contact your pharmacist in the event of adverse reactions.		



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## REFERENCES

1.	USP <797> Pharmaceutical Compounding – Sterile Preparations. US Pharmacopeial Convention, Inc. <i>United States Pharmacopeia XXVII / National Formulary 22</i> . Rockville, MD: US Pharmacopeial Convention, Inc.
2.	Gentamicin (Monograph). In: O'Neil MJ. <i>The Merck Index 13<sup>th</sup> Edition</i> . Whitehouse Station, NJ: Merck & Co, Inc.; 2001: 780.
3.	Gentamicin Sulfate. In: Trissel LA. <i>Trissel's Stability of Compounded Formulations, 2<sup>nd</sup> Edition</i> . American Pharmaceutical Association; 2000: 169.
4.	Gentamicin Sulfate (Monograph). US Pharmacopeial Convention, Inc. <i>United States Pharmacopeia XXV / National Formulary 20</i> . Rockville, MD: US Pharmacopeial Convention, Inc; 2001: 792.
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