



Suggested Formula	Hydromorphone Hydrochloride 2 mg/mL Intravenous Injection (Solution, 50 mL)	FIN	F 005 004v3
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### SUGGESTED FORMULATION

Ingredient Listing	Qty.	Unit	NDC #	Supplier	Lot Number	Expiry Date
Hydromorphone Hydrochloride, USP	0.100	g				
Sodium Citrate, USP	0.10	g				
Sodium Chloride, USP	0.29	g				
Citric Acid, USP	0.10	g				
Benzyl Alcohol (Parenteral Application), NF	0.5	mL				
Sterile Water for Injection, USP	40.0	mL				
Sterile Water for Injection, USP	q.s. to 50.0	mL				
Hydrochloric Acid 10% Solution	As required					
Sodium Hydroxide 10% Solution	As required					

### SPECIAL PREPARATORY CONSIDERATIONS

#### Ingredient-Specific Information

**Controlled Substance** (adhere to proper handling and documentation procedures):

*Hydromorphone Hydrochloride*

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

*Hydromorphone Hydrochloride, Benzyl Alcohol*

**Moisture Sensitive** (protect from humidity whenever possible):

*Citric Acid*



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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, pH testing, sterility and endotoxin testing considerations during preparation, it is suggested to measure an additional **10 to 12%** 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).

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 50 mL)**

Weigh and / or measure the following ingredients when appropriate:

Ingredient Listing	Qty.	Unit	Multiplication factor (*): _____	Processing Error	Qty. to measure
Hydromorphone Hydrochloride, USP §	0.100	g			
Sodium Citrate, USP §	0.10	g			
Sodium Chloride, USP §	0.29	g			
Citric Acid, USP §	0.10	g			
Benzyl Alcohol (Parenteral Application), NF §	0.5	mL			
Sterile Water for Injection, USP §	40.0	mL			
Sterile Water for Injection, USP §	q.s. to 50.0	mL			
Hydrochloric Acid 10% Solution §	As required				
Sodium Hydroxide 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**

1.	<p><b><u>Equipment sterilization:</u></b></p> <p>Following the manufacturer's specifications, sterilize and depyrogenate all heat stable, reusable materials and equipment, then return to ambient temperature.</p>
2.	<p><b><u>Powder-liquid preparation:</u></b></p> <p>A. In the given order, sequentially add the following ingredients to the Sterile Water for Injection (40.0 mL <i>plus</i> processing error adjustments).</p> <ul style="list-style-type: none"> <li>-Benzyl Alcohol (Parenteral Application)</li> <li>-Sodium Citrate</li> <li>-Sodium Chloride</li> <li>-Citric Acid</li> <li>-Hydromorphone Hydrochloride</li> </ul> <p><u>Specifications:</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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3.	<p><b><u>pH testing:</u></b></p> <p>Draw an appropriate amount of the mixture (Step 2A).</p> <p>Test the pH of the sample. It should lie between 3.5 and 5.5.</p> <p>C. <u>If the pH &lt;3.5, 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 3.5 and 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 3.5 and 5.5 is obtained.</li></ol> <p>IMPORTANT: Do not allow the pH to fall below 3.5</p>		
4.	<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 (50.0 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>		
5.	<p><b><u>Filtering and transferring:</u></b></p> <p>Aseptically filter the required amount of solution through a 0.22-µm sterile filter into the recommended dispensing containers (see Packaging requirements) and sample containers for sterility and endotoxin testing.</p>		
6.	<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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7.	<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 specifications.</p>
8.	<p><b><u>Sterility and Endotoxin testing:</u></b></p> <p>Validate the Test samples 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 unit-dose, injection vials.	
Auxiliary Labels	1	Use as directed. Do not exceed prescribed dose.	8	Do not used if product changes color.
	2	Keep out of reach of children.	9	Protect from light.
	3	Keep at controlled room temperature, (20°C – 25°C), refrigerated (2°C – 8°C) or frozen (-25°C to -10°C).	10	Discard container after use.
	4	Do not take with alcohol, sleep aids, tranquilizers or other CNS depressants.	11	May produce psychological and/or physical dependence.
	5	May impair mental and/or physical ability. Use care when operating a car or machinery.	12	Controlled substance. Dangerous unless used as directed.
	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.	13	For medical office use only.
	7	Discard in the presence of particulate matter.	14	Equilibrate to room temperature before use.
Pharmacist Instructions	Add any auxiliary labels specific to the active ingredients to the dispensing container as deemed necessary. <b>IMPORTANT: TO BE ADMINISTERED ONLY BY THE PRESCRIBING PHYSICIAN.</b>			
Patient Instructions	Contact your pharmacist in the event of adverse reactions.			



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## REFERENCES

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2.	Benzyl Alcohol. In: Rowe RC. <i>Handbook of Pharmaceutical Excipients, 6<sup>th</sup> Edition</i> . American Pharmaceutical Association; 2009: 64.
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4.	Hydromorphone (Monograph). In: O'Neil MJ. <i>The Merck Index 14<sup>th</sup> Edition</i> . Whitehouse Station, NJ: Merck & Co, Inc.; 2006: Monograph #4803.
5.	Hydromorphone Hydrochloride. In: Trissel LA. <i>Trissel's Stability of Compounded Formulations, 3<sup>rd</sup> Edition</i> . American Pharmaceutical Association; 2005: 216.
6.	Hydromorphone Hydrochloride (Monograph). <i>United States Pharmacopeia XXXIV / National Formulary 29</i> . Rockville, MD. US Pharmacopeial Convention, Inc. 2011: 3076.
7.	USP <797>. <i>United States Pharmacopeia XXXIV / National Formulary 29</i> . Rockville, MD. US Pharmacopeial Convention, Inc. 2011: 336.

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