



Suggested Formula	Acetylcysteine 20% Inhalation Liquid (Solution, 100 mL)	FIN	F 004 873v3
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SUGGESTED FORMULATION

Ingredient Listing	Qty.	Unit	NDC #	Supplier	Lot Number	Expiry Date
Acetylcysteine (N-Acetyl-L-Cysteine), USP	20.000	g				
Benzalkonium Chloride Solution (50%), NF	0.02	mL				
Edetate Disodium, USP	0.10	g				
Sterile Water for Injection, USP	50.0	mL				
Sterile Water for Injection, USP	q.s. to 100.0	mL				
Sodium Hydroxide 20% Solution	As required					

SPECIAL PREPARATORY CONSIDERATIONS

Ingredient-Specific Information

Light Sensitive (protect from light whenever possible):	Acetylcysteine, Benzalkonium Chloride Solution
Air Sensitive (protect from air whenever possible):	Benzalkonium Chloride Solution
Metal Reactive (do not allow to come into contact):	Benzalkonium Chloride Solution, Acetylcysteine
Hygroscopic (protect from moisture whenever possible):	Benzalkonium Chloride Solution, Edetate Disodium
Oxygen Sensitive (protect from oxygen whenever possible):	Acetylcysteine
Rubber Reactive (do not allow to come into contact):	Acetylcysteine



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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 and sterility 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).

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
Acetylcysteine (N-Acetyl-L-Cysteine), USP §	20.000	g			
Benzalkonium Chloride Solution (50%), NF§	0.02	mL			
Edetate Disodium, USP §	0.10	g			
Sterile Water for Injection, USP §	50.0	mL			
Sterile Water for Injection, USP §	q.s. to 100.0	mL			
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><u>Equipment sterilization:</u></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><u>Medium incorporation:</u></p> <p>A. In the given order, sequentially add the following ingredients to the Sterile Water for Injection (50.0 mL <i>plus</i> processing error adjustments):</p> <ul style="list-style-type: none"> -Acetylcysteine (N-Acetyl-L-Cysteine) -Benzalkonium Chloride Solution (50%) -Edetate Disodium <p><u>Specifications:</u> Continuously mix.</p> <p><u>End result:</u> Homogeneous liquid-like dispersion.</p> <p><u>Note:</u> Add the next ingredient, once the previous one has been completely added and dispersed.</p>



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3.	<p><u>pH testing:</u></p> <p>A. Draw an appropriate amount of the mixture (Step 2A).</p> <p>B. Test the pH of the sample. It should lie between 6.0 and 7.5.</p> <p>C. <u>If the pH < 6.0, carefully add in a dropwise manner the Sodium Hydroxide 10% Solution to the mixture:</u></p> <ol style="list-style-type: none">1. Draw and transfer 1 or 2 drops of the Sodium Hydroxide 10% Solution to the mixture.2. Stir for at least 5 minutes to evenly disperse the Sodium Hydroxide 10% Solution.3. Re-test the pH.4. Continue to add the Sodium Hydroxide 10% Solution until the pH of 6.0 to 7.5 is obtained. <p>IMPORTANT: Do not allow the pH to rise above 7.5.</p> <p><u>Note:</u> Continuously mix until all solid particles have completely dissolved.</p>		
4.	<p><u>Filling to volume:</u></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>Specifications:</u> Continuously mix.</p> <p><u>End result:</u> Homogeneous liquid-like solution.</p>		
5.	<p><u>Filtering and transferring:</u></p> <p>Aseptically filter the solution through a 0.22-µm 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 testing.</p>		
6.	<p><u>Filter integrity test:</u></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>		
7.	<p><u>Terminal Sterilization:</u></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><u>Sterility testing:</u></p> <p>Validate the Test sample for sterility, in accordance to current USP 797 regulatory guidelines.</p>		



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SUGGESTED PRESENTATION

Estimated Beyond-Use Date	24 hours controlled room temperature, 3 days refrigerated, or 45 days frozen, as per USP 797.	Packaging Requirements	Sterile, tightly closed, light-resistant inhalation bottle.	
Auxiliary Labels	1	Use as directed. Do not exceed prescribed dose.	7	May impair mental and/or physical ability. Use care when operating a car or machinery.
	2	Keep out of reach of children.	8	Not for use in infants.
	3	Keep at controlled room temperature, (20°C – 25°C), refrigerated (2°C – 8°C) or frozen (-25°C to -10°C).	9	Discard container after use.
	4	Consult your health care practitioner if any other prescription or over-the-counter medications are currently being used or are prescribed for future use.	10	Do not use if product changes color.
	5	Discard in the presence of particulate matter.	11	Do not take with alcohol, sleep aids, tranquilizers or other CNS depressants.
	6	For nebulizer use only.	12	Hypertonic solution; it may cause irritation.
Pharmacist Instructions	Add any auxiliary labels specific to the active ingredient to the dispensing container as deemed necessary.			
Patient Instructions	Contact your pharmacist in the event of adverse reactions. IMPORTANT: The quantity of API administered is directly dependent on the quantity of product applied.			



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REFERENCES

1.	Parenteral Preparations. In: Allen, LV, Jr. <i>The Art, Science and Technology of Pharmaceutical Compounding Third Edition</i> . American Pharmaceutical Association; 2008: 313.
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4.	Acetylcysteine. In: Sweetman SC, ed. <i>Martindale: The Complete Drug Reference, 36th Edition</i> . London, England: The Pharmaceutical Press; 2009: 1548.
5.	Acetylcysteine (Monograph). <i>United States Pharmacopeia XXXIV / National Formulary 29</i> . Rockville, MD. US Pharmacopeial Convention, Inc. 2011: 1759.
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