Compounding Alcohol-Based Hand Sanitizer During COVID-19 Pandemic

Updated: March 25, 2020

This document is for informational purposes only for healthcare practitioners and scientific professionals, and is intended to address shortages of alcohol-based hand sanitizers associated with the COVID-19 pandemic. This does not reflect the Compounding Expert Committee's opinions on future development or revisions to official text of the *USP-NF*. USP is actively monitoring the evolving situation and will update this document accordingly. Parties relying on the information in this document bear independent responsibility for awareness of, and compliance with, any applicable federal, state, or local laws and requirements.

Summary of updates:

- **March 25, 2020.** Recommendations were added to respond to stakeholder questions about substitutions in light of shortages of ingredients. Formulation 3 was revised due to inherent variability in the raw materials and volatility to ensure that the isopropyl alcohol concentration exceeds the recommendations by the Centers for Disease Control (CDC).

Background and Introduction

In light of the rapidly evolving COVID-19 pandemic, there is an expected shortage of alcohol-based hand sanitizers. The CDC recommends washing hands with soap and water whenever possible because handwashing reduces the amounts of all types of germs and chemicals on hands.[1] If soap and water are not available, using a hand sanitizer with a **final concentration of at least 60% ethanol or 70% isopropyl alcohol** inactivates viruses that are genetically related to, and with similar physical properties as, the COVID-19 virus.[2] Noting that consumers are experiencing difficulties in accessing alcohol-based hand sanitizers, on March 14, 2020, FDA released an Immediately in Effect Guidance titled, "Policy for Temporary Compounding of Certain Alcohol-Based Hand Sanitizer Products During the Public Health Emergency."

During this pandemic, USP supports State Boards and other regulators using **risk-based enforcement discretion** related to the compounding of alcohol-based hand sanitizers for consumer use.

The USP Compounding Expert Committee (CMP EC) provides the following recommendations for compounding alcohol-based hand sanitizers for use during shortages associated with the COVID-19 pandemic. In light of the public health emergency posed by COVID-19, this document was developed without a public comment period. This document is not a USP compendial standard; rather, it reflects considerations developed by the USP CMP EC, based on their scientific and professional expertise, and with input from regulatory agencies at the federal and state level.

If implementing the provisions in this document, the expectation is that compounders follow USP General Chapter <795> *Pharmaceutical Compounding – Nonsterile Preparations*, including the following:[3]

- Personnel trained in the compounding procedures

[1] https://www.cdc.gov/handwashing/show-me-the-science-hand-sanitizer.html

[2] https://www.cdc.gov/coronavirus/2019-ncov/infection-control/hcp-hand-sanitizer.html

[3] Free digital access to <795>: https://www.usp.org/compounding/general-chapter-795

- *USP, NF or Food Chemicals Codex (FCC)* grade ingredients should be used as the recommended source of ingredients
  - When components meeting compendial quality standards are not obtainable, components of equivalent quality – such as those that are chemically pure, analytical reagent grade or American Chemical Society-certified – may be used.
- All equipment to be clean, properly maintained, and used appropriately
- A Master Formulation Record and Compounding Record to be prepared
- A Beyond-Use Date to be assigned
- The preparation to be appropriately labeled
  - Label to note the final concentration of ethanol or isopropyl alcohol

The following are three formulations for compounding alcohol-based hand sanitizers. Formulation 1 and 2 were developed based on WHO recommendations.[4]

Formulation 1: Ethanol Antiseptic 80% Topical Solution

Prepare Ethanol Antiseptic Topical Solution containing ethanol 80% (v/v) as follows (see *Pharmaceutical Compounding—Nonsterile Preparations* <795>).

Ethanol 96%	8333 mL
Hydrogen Peroxide 3%	417 mL
Glycerol 98%	145 mL
Water,[a] a sufficient quantity to make	10000 mL

[a] *Water may be distilled water, cold boiled potable water, reverse osmosis water, or filtered water.*

Measure the quantities of *Ethanol, Hydrogen Peroxide,* and *Glycerol* in suitable containers. Transfer the *Ethanol* and *Hydrogen Peroxide* into a suitable calibrated container and mix gently. Transfer the *Glycerol* stepwise and quantitatively into the calibrated container and mix gently after each addition. Rinse the container containing glycerol several times with *Water* and add the contents to the calibrated container. Add sufficient *Water* to bring to final volume. Mix well. Transfer the solution into suitable containers.

- **Packaging and Storage:** Package in well-closed, suitable containers and store at controlled room temperature.
- **Labeling:** Label to state for external use only, the percentage of ethanol, and the *Beyond-Use Date*.
- **Beyond-Use Date:** NMT 30 days after the date on which it was compounded, when stored at controlled room temperature.

Formulation 2: Isopropyl Alcohol Antiseptic 75% Topical Solution

Prepare Isopropyl Alcohol Antiseptic Topical Solution containing isopropyl alcohol 75% (v/v) as follows (see *Pharmaceutical Compounding—Nonsterile Preparations* <795>)

Isopropyl Alcohol 99%	7576 mL
Hydrogen Peroxide 3%	417 mL
Glycerol 98%	75 mL
Water,[a] a sufficient quantity to make	10000 mL

[a] *Water may be distilled water, cold boiled potable water, reverse osmosis water, or filtered water.*

Measure the quantities of *Isopropyl Alcohol*, *Hydrogen Peroxide*, and *Glycerol* in suitable containers. Transfer the *Isopropyl Alcohol* and *Hydrogen Peroxide* into a suitable calibrated container and mix gently. Transfer the *Glycerol* stepwise and quantitatively into the calibrated container. Mix gently after each addition. Rinse the container containing glycerol several times with *Water* and add the contents to the calibrated container. Add sufficient *Water* to bring to final volume. Mix well. Transfer the solution into suitable containers.

[4] https://www.who.int/gpsc/5may/Guide_to_Local_Production.pdf

- **Packaging and Storage:** Package in well-closed, suitable containers and store at controlled room temperature.
- **Labeling:** Label to state for external use only, the percentage of isopropyl alcohol, and the *Beyond-Use Date*.
- **Beyond-Use Date:** NMT 30 days after the date on which it was compounded, when stored at controlled room temperature.

Formulation 3: Isopropyl Alcohol Antiseptic 75% Topical Solution

Prepare Isopropyl Alcohol Antiseptic Topical Solution containing isopropyl alcohol 75% (v/v) as follows (see *Pharmaceutical Compounding—Nonsterile Preparations* <795>).

Isopropyl Alcohol 91%	8242 mL
Hydrogen Peroxide 3%	417 mL
Glycerol 98%	75 mL
Water,[a] a sufficient quantity to make	10000 mL

[a] *Water may be distilled water, cold boiled potable water, reverse osmosis water, or filtered water.*

Measure the quantities of *Isopropyl Alcohol, Hydrogen Peroxide,* and *Glycerol* in suitable containers. Transfer the *Isopropyl Alcohol* and *Hydrogen Peroxide* into a suitable calibrated container and mix gently. Transfer the *Glycerol* stepwise and quantitatively into the calibrated container. Mix gently after each addition. Rinse the container containing glycerol several times with *Water* and add the contents to the calibrated container. Add sufficient *Water* to bring to final volume. Mix well. Transfer the solution into suitable containers.

- **Packaging and Storage:** Package in well-closed, suitable containers and store at controlled room temperature.
- **Labeling:** Label to state for external use only, the percentage of isopropyl alcohol, and the *Beyond-Use Date*.
- **Beyond-Use Date:** NMT 30 days after the date on which it was compounded, when stored at controlled room temperature.

Substitutions

Understanding that there may be shortages of ingredients used to compound these formulations of alcohol-based sanitizers, the USP CMP EC provides the following notes on substitution.

- Both General Chapter <795> and this document note that *USP, NF* or *FCC* grade ingredients should be used as the recommended source of ingredients. When components meeting compendial quality standards are not obtainable, components of equivalent quality – such as those that are chemically pure, analytical reagent grade, or American Chemical Society-certified – may be used.
- Use denatured alcohol over nondenatured alcohol because there have been reports of adverse events, including deaths, from unintentional ingestion of hand sanitizer, particularly in young children.
- Glycerin and glycerol are synonymous and may be interchanged.
- Glycerin or glycerol are added as a humectant, and not to enhance viscosity.
- No ingredients should be added to enhance viscosity as they may decrease the effectiveness of the final preparation.
- Calculate the amount of ethanol or isopropyl alcohol needed by using the following equation:

$$\frac{(\text{final \% alcohol}) \times (\text{final volume of preparation})}{(\text{starting \% alcohol})} = \text{volume of starting ingredient required}$$

  - When the concentration of alcohol (e.g., ethanol or isopropyl alcohol) in the starting ingredient is not exact, the calculation should be adjusted accordingly to ensure a final concentration of at least 80% ethanol or 75% isopropyl alcohol.
- EPA-registered disinfectants are not recommended as components for compounding hand sanitizers as they may not be safe for use on skin (i.e., may cause burns).