

MYCOPROSAFE®

DECONTAMINATION AND CONCENTRATION KIT FOR MYCOBACTERIAL CULTURE, MICROSCOPY AND MOLECULAR METHODS

Cat. #: MPS120, MPS130, MPS140 **Instructions for Use** For General Laboratory Use

Product's name:

MYCOPROSAFE® (MPS®)

Product's intended use:

MPS® is a sample decontamination and concentration kit. It permits the processing of samples for microscopy, culture and molecular methods for identification and isolation of mycobacteria. It is intended for **general laboratory use**.

General information:

MPS® is a kit that contains all the materials needed to safely perform the "sodium hydroxide - N-acetyl-L-cysteine decontamination and concentration method".^{1,2,3} This method is recommended to increase efficiency in the recovery of mycobacteria from samples by selectively killing other microorganisms and liquefying samples like sputum for better sedimentation. Currently materials needed for this purpose are either prepared by the laboratories that process the samples, or are purchased. In any case, the buffers used in this procedure are stored in big containers and they are a prime source of contamination, since they themselves are frequently contaminated during multiple use. **MPS®** provides, in individual sets, all the materials needed for processing each sample. It eliminates the problem of cross-contamination while saving time and effort. It is designed to be disposed of safely, after processing biohazard material.

Limitations of the method:

Some organisms in samples other than mycobacteria, may survive the decontamination procedure.

MPS® is intended as a general-purpose device. No claim or representation is intended for its use to identify any specific organism or for clinical use (diagnostic, prognostic, therapeutic). It is the user's responsibility to validate the performance of **MPS®** for any particular use, since its performance characteristics have not been validated for any specific organism. **MPS®** may be used in clinical diagnostic laboratory systems after the laboratory has validated their complete system as required by CLIA '88 regulations in the U.S. or equivalents in other countries.

Principles of the procedure:

Clinical samples like sputum contain many microorganisms other than mycobacteria. Processing with sodium hydroxide - sodium citrate - N-acetyl-L-cysteine, decontaminates the samples by killing many microorganisms susceptible to sodium hydroxide while mycobacteria, that are resistant to alkaline pH, survive. N-acetyl-L-cysteine is a reducing substance that reduces the disulfide bonds of the mucus proteins which decreases viscosity of the sputum and thus liquefies the samples. This facilitates the sedimentation of bacilli during centrifugation.

Ingredients:

One box of **MPS®** contains:

- 25 units of N-Acetyl-L-cysteine, ~ 40 mg, 100%, in 50 mL polypropylene tube also containing glass beads (4 mm of diameter).
- 25 units of sodium hydroxide (2%, 3% and 4% in MPS120, MPS130 and MPS140, respectively) and

trisodium citrate·3H₂O 1.47% solution, 10 mL, in polypropylene tube.

- 25 units of 0.067 (1/15) M sterile phosphate buffer (Na₂HPO₄ + KH₂PO₄), pH = 6.8 - 7.0, 50 mL, in polypropylene bottle.
- 3 units of sodium hypo-chlorite (disinfectant solution), 2.5%, 125 mL, in polypropylene bottle.

Cautions and warnings:

FOR GENERAL LABORATORY USE.

Laboratory procedures involving mycobacteria require special equipment and techniques to minimize biohazards. Specimen preparation must be done in a biological safety cabinet.

MPS® has been designed to minimize risks associated with mycobacterial testing. However to further reduce the risks of accidental exposure to infectious agents, additional precautions should be taken. At a minimum, specimen manipulation should be done in a contained environment with controlled access, which has a tuberculosis exposure control plan. The locations should have surfaces which can be easily decontaminated using an appropriate topical disinfectant. Pathogenic microorganisms including Hepatitis B Virus and Human Immunodeficiency Virus (HIV) may be present in specimens. Universal precautions and local laboratory guidelines should be followed in handling all items contaminated with blood or body fluids. If a tube is found to be leaking or is accidentally broken during collection or transport, use the established procedures in your facility for dealing with mycobacterial spills. At a minimum, universal precautions should be employed.

General safety precautions:

- Always wear masks and gloves when working with potential biohazard material.
- Work in a laminary flow cabin, biosafety level II, when pipetting the samples.
- Never use mouth pipetting.
- A refrigerated centrifuge with airtight swinging buckets is recommended for sedimenting bacteria to minimize aerosols.
- Use only conical centrifuge holders adapted to the shape of the sampling tubes.
- If spills of the contaminated material occur, disinfect with 2.5% hypo-chloride solution.
- If sodium hydroxide - sodium citrate solution or disinfectant solution contacts skin, eyes or mucosal surfaces, wash immediately and thoroughly with water and seek immediate medical help.
- Never hold the sample collection tube toward the mouth, to avoid swallowing the glass beads.
- Do not give any part of the kit to children.
- Pathogenic microorganisms including Hepatitis B virus and Human Immunodeficiency Virus (HIV) may be present in specimens. Universal precautions and local laboratory guidelines should be followed in handling all items contaminated with blood or other body fluids. If a tube is found to be leaking or is accidentally broken during collection or transport, use the established procedures in your facility for dealing with mycobacterial spills.

MYCOPROSAFE®

- At a minimum, universal precautions should be employed.

- Tubes should be discarded in an appropriate manner.

Storage instructions:

Store at room temperature, in a dry place.

Indications of instability or deterioration:

MPS® kit should not be used if above indicated volumes are not present in each tube and if there is turbidity or sediments in the phosphate buffer solution. Sediments may sometimes form in sodium hydroxide - sodium citrate and disinfectant solutions. This does not alter the normal function of the kit.

List of materials provided:

List of materials for processing one sample:

- 50 mL polypropylene tube containing N-Acetyl-L-cysteine and glass beads.
- 10 mL sodium hydroxide - trisodium citrate solution in plastic tube.
- 50 mL sterile phosphate buffer in polypropylene bottle.

Each cardboard box contains 25 sets of the materials listed above and three polypropylene bottles containing 125 mL of sodium hypo-chlorite (disinfectant solution).

Instructions for use²:

Sputum and samples other than urine:

- 1-Transfer a maximum volume of 10 mL of samples like sputum, bronchoalveolar fluid, gastric lavage fluid, pleural, pericardial, or peritoneal fluids from the collection cup into the tube containing the glass beads.
- 2-Add sodium hydroxide - sodium citrate solution in a quantity approximately equal to that of the sample. Close the cap tightly.
- 3-Homogenize the sample by shaking with a vortex and let it stand at room temperature for 15 to 30 minutes according to the contamination rates.
- 4-Fill the tube to the "50 mL" line with phosphate buffer solution (save the left over buffer for further steps).
- 5-Spin the tubes for 15 minutes at 2000 x g (use a refrigerated centrifuge with airtight buckets if available to minimize aerosol formation).
- 6-Carefully discard the supernatant into a container with disinfectant solution (some of the disinfectant included in the box can be used for this purpose). Leave as little solution as possible on the beads (the fall of a few glass beads during this step will not create a problem since the sediment is collected at the bottom of the tube, below the glass beads. This sediment will contain mycobacteria if originally present in the sample).
- 7-Add a few milliliters of the remaining phosphate buffer but not above the 5 mL line. Resuspend the sediment left between the glass beads, by vortexing. This suspension can now be used for culture, microscopy and molecular diagnostic methods.
- 8-Once the procedure is complete, disinfect the sample tubes before discarding by putting approximately 10 mL of the disinfectant solution, closing the cap tightly and turning the tube around and upside down, making sure the solution contacts the whole internal surface.

Urine samples:

It is recommended to obtain early morning urine to increase the chance of recovery of mycobacteria.

1-Transfer the urine samples from the collection cup into the tube that contains the glass beads. The tube can be filled up to the 50 mL line.

2-Spin the tubes for 15 minutes at 2000 x g (use a refrigerated centrifuge with airtight buckets if available to minimize aerosol formation).

3-Discard the supernatant according to the safety rules of your laboratory. Add approximately 3 mL of sodium hydroxide - sodium citrate solution onto the glass beads. Close the cap securely.

4-Continue processing, by starting from step 3, described above for other types of samples.

List of materials that are not provided:

- Refrigerated centrifuge for 50 mL tubes
- Vortex
- Automatic pipettors
- Sterile pipette tips

Quality control:

Positive control: Respiratory secretions spiked with mycobacteria.

Negative control: Respiratory secretions spiked with *escherichia coli* and *staphylococcus aureus*.

Description of the amounts of reagents necessary, and the parameters of time and temperature:

The only reagents required are those included in the kit. The whole procedure takes between 20 to 40 minutes. The procedure is performed at room temperature. It is recommended to spin in a centrifuge at 4°C to minimize aerosol formation.

Time restrictions:

Decontamination time must be from 15 to 30 minutes.

Extension of decontamination time may kill mycobacteria.

Limitations of the procedure:

The pH of the processed sample may be too high if the supernatant is not completely eliminated after spinning with the phosphate buffer. This may inhibit the growth of mycobacteria in culture media.

Bibliography:

- 1-Kubica GP, Dye WE, Cohn ML, Middlebrook G. Sputum digestion and decontamination with N-acetyl-L-cysteine-sodium hydroxide for culture of mycobacteria. 1963. Am. Rev. Respir. Dis. 87:775-779.
- 2-N-acetyl-L-cysteine-sodium hydroxide method for liquefaction and decontamination of specimens. Bailey & Scott's Diagnostic Microbiology, Ninth Edition. Mosby-Year Book Inc. St. Louis, MO. USA. 1994, p:600.
- 3-Heifets LB, Good RC. Current laboratory methods for the diagnosis of tuberculosis. In "Tuberculosis" Ed. Bloom BR. ASM Press, Washington D.C. 1994. 85-110.

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