

## Manner of Use

### Surgery

#### Preoperative disinfection of skin:

Tincture (stainless or tinted) or aqueous solution 1:750.

#### Surgeons' hand and arm soak:

Stainless tincture 1:750.

#### Minor wounds, lacerations, etc.:

Tincture 1:750.

#### Deep infected wounds:

Aqueous solution 1:3000 to 1:20,000.

#### Dog bites, rabies prophylaxis:

Aqueous solution 1:100 (1 part of 17 per cent concentrate to 16 parts of distilled water, 1 per cent).

#### Denuded skin and mucous membranes:\*

Aqueous solution 1:5000 to 1:10,000.

### Obstetrics and Gynecology

#### Preoperative disinfection of skin:

Tincture or aqueous solution 1:750.

#### Vaginal douche and irrigation:

Aqueous solution 1:2000 to 1:5000.

#### Postepisiotomy care:

Aqueous solution 1:5000 to 1:10,000.

#### Breast and nipple hygiene, shields, etc.:

Aqueous solution 1:1000 to 1:2000.

### Urology

#### Bladder and urethral irrigation:

Aqueous solution 1:5000 to 1:20,000.

#### Bladder retention lavage:

Aqueous solution 1:20,000 to 1:40,000.

### Dermatology

#### Oozing and open infections:

Aqueous solution 1:2000 to 1:5000.

#### Wet dressings:\*

Aqueous solution 1:5000 or less.

### Eye, Ear, Nose, and Throat

#### Eye irrigation:

Aqueous solution 1:5000 to 1:10,000.

#### Preservation of ophthalmic solutions:

Aqueous solution 1:5000 to 1:7500.

#### Ear and antrum irrigation:

Aqueous solution 1:1000 to 1:10,000.

\* Irrigation or open dressings. Use of occlusive dressings inadvisable.

### Storage of Instruments and Supplies

#### Catheters and other adsorbent articles:

Aqueous solution 1:500 (replenish frequently).

#### Metallic instruments, ampuls, and thermometers:

Aqueous solution 1:750 (replenish frequently).

#### Prevention of rust:

To protect metal instruments stored in Zephiran Chloride solution, add Anti-Rust Powder or Tablets (1 well-rounded spoon of powder or 4 tablets per quart) to the antiseptic solution. Change solution at least once a week.

### Hospital Disinfection

#### Utensils, floors, walls, bathtubs, furniture, operating tables, and other equipment:

Aqueous solution 1:2500.

### Sanitizing Soak

#### Surgical drapes, gowns, etc.:

Terminal rinse in aqueous solution 1:2500 to 1:5000.

#### Diaper rinse:

Terminal rinse in aqueous solution 1:3500 (1 teaspoon of 17 per cent concentrate to 1 gallon of water).

## ZEPHIRAN CHLORIDE CONCENTRATE 17% AQUEOUS SOLUTION

**MUST BE DILUTED**

Zephiran Chloride Concentrate 17 per cent Aqueous Solution (buffered) is supplied in bottles of 4 fluid ounces and 1 gallon. An inert buffer, ammonium acetate, has been added (which may give rise to a slight ammonia odor) to facilitate tinting dilutions with Zephiran Tint. *The concentrate must be diluted with distilled water, preferably freshly distilled, since stored water may contain many organisms.* (See Table 3 for dilution of concentrate and Table 4 for subdilutions.) *Deionized water should not be used* as the deionizing resins may be carried over into the water and, in addition to inactivating quaternary compounds, can support growth of certain gram-negative bacteria. The solution should be mixed in clean glassware rinsed free of soap or detergent. *Glass or plastic stoppers should be used instead of cork, since cork may become heavily contaminated with bacteria (particularly *Ps. aeruginosa*).*

TABLE 3  
Dilution of Zephiran Chloride 17% Concentrate\*  
to 1 Gallon

Final concentration	Concentrate 17%	Alcohol (USP or isopropyl)	Distilled water†
<b>AQUEOUS SOLUTION‡</b>			
1:500 (0.2%)	1½ fl. oz.	—	q.s. ad 1 gal.
1:750 (0.13%)	1 fl. oz.	—	q.s. ad 1 gal.
1:1000 (0.1%)	¾ fl. oz. (22 ml.)	—	q.s. ad 1 gal.
1:2000 (0.05%)	¾ fl. oz. (11 ml.)	—	q.s. ad 1 gal.
1:3000 (0.03%)	¼ fl. oz. (7.4 ml.)	—	q.s. ad 1 gal.
1:5000 (0.02%)	3/20 fl. oz. (4.5 ml.)	—	q.s. ad 1 gal.
1:10,000 (0.01%)	2/2 ml.	—	q.s. ad 1 gal.
1:20,000 (0.005%)	1.1 ml.	—	q.s. ad 1 gal.
1:40,000 (0.0025%)	0.6 ml.	—	q.s. ad 1 gal.
<b>TINCTURE‡</b>			
1:750 (0.13%)	1 fl. oz.	64 fl. oz. §	q.s. ad 1 gal.
1:1000 (0.1%)	¾ fl. oz. (22 ml.)	64 fl. oz.	q.s. ad 1 gal.

\* **CAUTION:** The concentrate is irritating to human and animal tissues. If it is accidentally spilled on the skin, wash immediately with water and apply soap solution freely. If Zephiran Chloride Concentrate gets into the eyes, wash them with water and bathe them with milk. If ingested accidentally, drink several glasses of milk or whites of eggs as an antidote.

† Freshly distilled water is preferable since stored water may contain many organisms. Chemically deionized water should not be used.

‡ To tint an aqueous solution or tincture, transfer 1/2 oz. (15 Gm.) of Zephiran Tint to a 1-gallon container and add a small quantity of Zephiran Chloride Concentrate to make a paste. Then, add other components for the desired formula and mix.

§ To prepare a tincture containing 10 per cent acetone, substitute 15 fluid ounces of acetone for the same volume of distilled water.

**CAUTION:** Because of its alcohol-acetone content, Zephiran Chloride Tincture is flammable and, therefore, should be kept away from open flame or cauters.

TABLE 4  
Subdilution Chart\*

Dilution	Zephiran Chloride Aqueous Solution 1:1000 (parts)	Distilled water (parts)	Zephiran Chloride Aqueous Solution 1:750 (parts)	Distilled water (parts)	Dilution
1:1000	1	—	3	1	1:1000
1:2000	1	1	3	5	1:2000
1:3000	1	2	3	9	1:3000
1:4000	1	3	3	13	1:4000
1:5000	1	4	3	17	1:5000
1:10,000	1	9	3	37	1:10,000
1:20,000	1	19	3	77	1:20,000
1:40,000	1	39	3	157	1:40,000

\* Using Zephiran Chloride Aqueous Solution 1:750 or 1:1000.

## ZEPHIRAN

As a tinting agent for Zephiran Chloride Aqueous Solution 1:750 (preg concentrate), an indicator dye No. 39, Winthrop). In acid it is maintained, but in alkaline it is a light yellow. The intensity of color with tinted solutions depends on the alkalinity of the skin. Herdicate whether soap (alkaline) is used on the skin before the antiseptic.

### How Supplied

Zephiran Chloride Concentrate 17% Aqueous Solution, buffered with ammonium acetate (Must be diluted with distilled water.)

Zephiran Chloride Aqueous Solution 1:750.

Zephiran Chloride Tinted Tincture 1:750 (flammable).

Zephiran Chloride Spray—Tinted Tincture 1:750 (flammable).

Zephiran Chloride Stainless Tincture 1:750 (flammable).

Zephiran Tint (D & C Red No. 39).

Anti-Rust Powder.

Anti-Rust Tablets.

Covers FSN 65  
BENZALKONIUM CHLORIDE  
10%, 4 fl. oz.

Covers FSN 65  
BENZALKONIUM CHLORIDE  
Tinted, 10%, 4 fl. oz.

WINTHROP LABORATORIES  
Division of Steril

## ements and Supplies

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## Disinfection

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1:5000 (0.02%)	3/20 fl. oz. (4.5 ml.)	—	q.s. ad 1 gal.
1:10,000 (0.01%)	2.2 ml.	—	q.s. ad 1 gal.
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† Freshly distilled water is preferable, since stored water may contain many organisms. Chemically deionized water should not be used.

‡ To tint an aqueous solution or tincture, transfer 1 vial (1.8 Gm.) of Zephiran Tint to a 1 gallon container and add a small quantity of Zephiran Chloride Concentrate to make a paste. Then, add other components for the desired formula and mix.

§ To prepare a tincture containing 10 per cent acetone, substitute 18 fluid ounces of acetone for the same volume of distilled water.

**CAUTION:** Because of its alcohol-acetone content, Zephiran Chloride Tincture is flammable and, therefore, should be kept away from open flame or cauterly.

TABLE 4  
Subdilution Chart\*

Dilution	Zephiran Chloride Aqueous Solution 1:1000 (parts)	Distilled water (parts)	Zephiran Chloride Aqueous Solution 1:750 (parts)	Distilled water (parts)	Dilution
1:1000	1	—	3	1	1:1000
1:2000	1	1	3	5	1:2000
1:3000	1	2	3	9	1:3000
1:4000	1	3	3	13	1:4000
1:5000	1	4	3	17	1:5000
1:10,000	1	9	3	37	1:10,000
1:20,000	1	19	3	77	1:20,000
1:40,000	1	39	3	157	1:40,000

\* Using Zephiran Chloride Aqueous Solution 1:750 or 1:1000.

## ZEPHIRAN TINT

As a tinting agent for Zephiran Chloride Tincture or Aqueous Solution 1:750 (prepared from the 17 per cent concentrate), an indicator dye is employed (D & C Red No. 39, Winthrop). In acid media, an orange-red hue is maintained, but in alkaline media, this rapidly fades to a light yellow. The intensity of the color of skin prepared with tinted solutions depends, therefore, on the acidity or alkalinity of the skin. Hence, the color will also indicate whether soap (alkaline) has been removed from the skin before the antiseptic is applied.

## How Supplied

Zephiran Chloride Concentrate 17% Aqueous Solution, buffered with ammonium acetate (*Must be diluted with distilled water.*) Bottles of 4 fluid ounces and 1 gallon.

Zephiran Chloride Aqueous Solution 1:750. Bottles of 8 fluid ounces and 1 gallon.

Zephiran Chloride Tinted Tincture 1:750 (*flammable*). Bottles of 8 fluid ounces and 1 gallon.

Zephiran Chloride Spray—Tinted Tincture 1:750 (*flammable*). Pressurized bottles of 1 and 6 ounces avoirdupois.

Zephiran Chloride Stainless Tincture 1:750 (*flammable*). Bottles of 1 gallon.

Zephiran Tint (D & C Red No. 39). Vials of 1.8 Gm. (28 grs.), boxes of 4.

Anti-Rust Powder. Jars of 200 Gm.

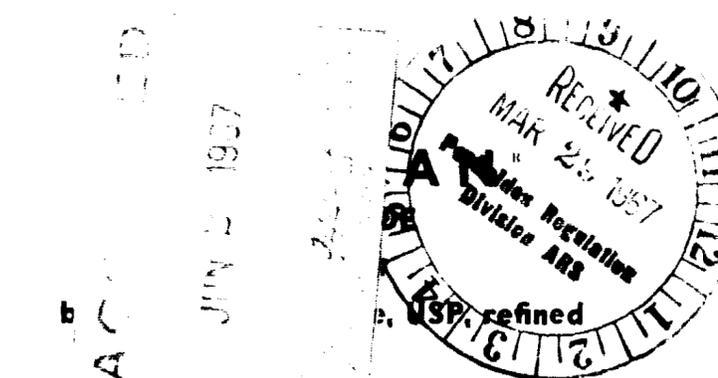
Anti-Rust Tablets. Bottles of 50 and 500.

Covers FSN 6505-149-8705  
BENZALKONIUM CHLORIDE SOLUTION, USP,  
10%, 4 fl. oz. (118 cc)

and  
Covers FSN 6505-149-8707  
BENZALKONIUM CHLORIDE TINCTURE,  
Tinted, 10%, 4 fl. oz. (118 cc)

WINTHROP LABORATORIES, New York, N. Y.  
Division of Sterling Drug Inc.

3-67 (7049A)



## Antiseptic and Germicide

**IMPORTANT**—Undoubtedly no modern antiseptic or germicide has been more extensively used throughout the world during the past three decades than Zephiran Chloride. Because of its wide range of action against gram-negative and gram-positive organisms, its rapidity of action, and its excellent tolerance by the skin and mucous membranes, Zephiran Chloride has become the preferred antiseptic in hospitals and clinics.

For most surgical applications, the standard concentration of Zephiran Chloride Tincture or Zephiran Chloride Aqueous Solution has been 1:1000 (0.1 per cent). In recent years, however, it has been shown that a 1:750 (0.13 per cent) concentration is as well tolerated as a 1:1000 aqueous solution and offers an appreciably greater antiseptic action. At the same time, it provides an excess to better compensate for any adsorption of Zephiran Chloride to the skin or other materials. Thus, solutions in common use at the Peter Bent Brigham Hospital (Boston) were modified to 1:750 rather than 1:1000 to allow a greater margin of safety (Ruth B. Kundsinn and C. W. Walter, *A.M.A. Arch. Surg.* 75:1036, Dec. 1957).

For these reasons the strength of Zephiran Chloride Aqueous Solution and Tincture has been increased to 1:750 (from 1:1000). Similarly, the strength of the Aqueous Concentrate has been increased to 17 per cent (from 12.8 per cent) so that one gallon of a 1:750 solution may be prepared simply by adding 1 fluid ounce of the concentrate to 127 fluid ounces of distilled water (or, equal parts of water and alcohol).

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## Description

Zephiran Chloride is a mixture of high molecular alkylmethylbenzylammonium chlorides in which the alkyl radicals are  $C_{15}H_{31}$ ,  $C_{17}H_{35}$ ,  $C_{19}H_{39}$ , and other related groups from  $C_{15}H_{31}$  to  $C_{19}H_{39}$ . It is freely soluble in water, alcohol, and acetone, forming a clear, colorless, almost odorless solution. The aqueous solution is slightly alkaline to litmus, has an aromatic odor, and when shaken foams like soap. It has an acrid taste which, however, is hardly noticeable in higher dilutions. Zephiran Chloride Tincture 1:750, both tinted and stainless, contains alcohol 50% and acetone 10% by volume. Because of its alcohol content, Zephiran Chloride Tincture is a flammable liquid.

## Phenol Coefficients

Tests carried out by the official A.O.A.C. method demonstrate that Zephiran Chloride has a high bactericidal action, as shown by its phenol coefficients for various pathogenic microorganisms.

The following table represents phenol coefficient values as determined by C. G. Dunn (*Proc. Soc. Exp. Biol. Med.* 35:427, Dec. 1936; *Amer. J. Hyg.* 26:46, July 1937), calculated to the pure anhydrous active ingredients.

TABLE 1  
Phenol Coefficients

Organisms	20 C.	37 C.
<i>Staphylococcus aureus</i> 209	279	407
<i>Salmonella typhosa</i>	250	429
<i>Escherichia coli</i>	160	558
<i>Streptococcus pyogenes</i>	455	579
<i>Streptococcus mitis</i>	384	454

## Definitely Germicidal in High Dilutions

Table 2 records the highest dilution (calculated to the pure anhydrous active ingredient) capable of destroying organisms in 10 but not in five minutes, as reported by Dunn.

TABLE 2  
Highest Dilution of Zephiran Chloride Destroying the Organism in 10 but Not in 5 Minutes.\*

Organisms	20 C.	37 C.
<i>Staphylococcus aureus</i> 209	1:20,000	1:35,000
<i>Salmonella typhosa</i>	1:20,000	1:70,000
<i>Escherichia coli</i>	1:12,000	1:40,000
<i>Streptococcus pyogenes</i>	1:40,000	1:95,000
<i>Streptococcus mitis</i>	1:35,000	1:65,000
<i>Cryptococcus neoformans</i>	1:24,000	1:70,000
<i>Candida albicans</i>	1:10,000	1:35,000

\* Average values.

When an antiseptic is applied to infected surfaces, the presence of serum may impair the bactericidal power of the preparation. However, Zephiran Chloride is affected less by the presence of organic matter than most other antiseptics.

Thus, in vitro tests of Zephiran Chloride mixed with normal horse serum have shown that *S. aureus* is killed within one minute when exposed to 1:1000 Zephiran Chloride diluted in 50 per cent serum. *P. aeruginosa* is somewhat more resistant but is killed within two minutes when exposed to 1:1000 Zephiran Chloride in 10 per cent serum and within one minute when exposed to 1:1000 Zephiran Chloride in 5 per cent serum (J. W. Klimck, Unpublished report from the files of Sterling-Winthrop Research Institute).

## Tolerance

In a study of skin irritation and sensitization, employing the patch-test method and 1:1000 Zephiran Chloride, on 200 unselected human subjects, no reactions were observed in 48 hours after the first application and none within five days after the second application.

Extensive clinical tests by many surgeons (data in the files of the Department of Medical Research, Winthrop Laboratories) have shown that Zephiran Chloride Aqueous Solution 1:750 and Tincture 1:750 are as well tolerated as concentrations of 1:1000; no difference in tolerance between the two strengths was demonstrable.

However, an occasional patient may be hypersensitive and contact with Zephiran Chloride in occlusive dressings, such as casts and anal packs, may produce irritation or chemical burns. Because of its alcohol content, Zephiran Chloride Spray should be kept away from the eyes or other mucous membranes.

## Stability

Many of the common antiseptic solutions deteriorate with age and lose their potency when subjected to repeated changes in temperature. The potency of Zephiran Chloride kept at room temperature was found to be unchanged after several years of storage. Further tests of stability were performed by freezing Zephiran Chloride in dry ice and storing in this state. Zephiran Chloride Aqueous Solution 1:750 may be boiled or autoclaved for 30 minutes without affecting its chemical or bacteriological properties, providing this is done in a suitable inactive container and closure, such as a sealed glass ampul or Erlenmeyer flask. It should be tested with any rubber stoppers that might be considered for use.

## Clinical Uses

Zephiran Chloride Aqueous Solution in appropriate dilutions is recommended for the antiseptic of skin and mucous membranes and for use as a germicide and disinfectant in deep wounds. It has been successfully employed, in proper dilutions, for irrigation of body cavities, bladder lavage, urethral irrigation, vaginal douche, sterile storage of instruments and hospital utensils, hand scrub, etc. It does not stain and has a pleasant odor.

Because Zephiran Chloride in low concentrations is capable of destroying pathogenic organisms, dilutions of from 1:10,000 to 1:100,000 have been shown to be effective and safe for irrigation of inflamed body cavities.

Zephiran Chloride Tincture 1:750 is recommended for use on intact skin and may also be used as a germicide and disinfectant on hands and arms of surgeons and nurses following the usual routine scrubbing with pHisoHex<sup>®</sup> and water.

In the preoperative preparation of the surgical field Zephiran Chloride is suggested for use on unbroken skin as a germicide and disinfectant. Its detergent action, particularly when used alternately with alcohol, is marked; the skin is left smooth, clean, and of a ruddy hue. When Zephiran Chloride is applied by friction—using several changes of sponges—dirt, skin fats, desquamating epithelium, and superficial bacteria are effectively removed, exposing the underlying skin to its germicidal activity.

The following procedure has been found satisfactory for preparation of the surgical field: The site of operation is shaved and then scrubbed with pHisoHex<sup>®</sup> and water or with Zephiran Chloride Aqueous Solution the day

<sup>®</sup> pHisoHex<sup>®</sup> an antibacterial detergent with 5 per cent hexachlorophene.

before the operation. As is the case with most antiseptics, *detergents should be thoroughly rinsed off before Zephiran Chloride is applied.* Either Zephiran Chloride Tincture or Aqueous Solution 1:750 (untinted) may then be applied in the usual manner.

For spray application, Zephiran Chloride Tincture 1:750 is available in pressurized bottles in 4 and 8 ounce sizes.

## Disinfection and Storage of Instruments and Supplies

**Metallic instruments and ampuls** that do not withstand sterilization by heat should be thoroughly cleaned with plain soap or a mild alkaline detergent, rinsed in water, and immersed in a 1:750 aqueous solution of Zephiran Chloride for 30 minutes for each instrument. For a 1:5000 aqueous solution of Zephiran Chloride for sterilization of instruments which are to be used for sterilization by heat and for apparatus such as bottles and ampuls.

To retard corrosion, Anti-Rust Tablets or Corrosion Inhibitors should be added to Zephiran Chloride solutions used for the storage of metal instruments. Instruments have been stored for months in Zephiran Chloride Tincture containing an anti-rust agent, with no corrosion and with little or no effect on the instruments. To each quart of Zephiran Chloride Aqueous Solution 1:750, 4 crushed tablets or 1 well rounded spoonful of powder should be added. The powder should be dissolved in the solution and the solution stirred well before use. The solution should be changed once a week.

As Anti-Rust Tablets contain an alkali, to neutralize the slight odor of ammonia of the solution, a few drops of acetic acid prepared from Zephiran Chloride Concentrate which is buffered with ammonium acetate.

**Clinical thermometers,** after being washed with plain soap and water, should be immersed in Zephiran Chloride Aqueous Solution 1:750 for 30 minutes. If tuberculo-cidal action is required, in 1:1000. The solution should be changed frequently. Cresol, formaldehyde, iodine, and hypochlorite solutions are more effective than Zephiran Chloride in recommended dilutions for disinfecting tissues.

**Absorbent articles (catheters, etc.)** should be immersed in Zephiran Chloride from the disinfectant thereby reducing the concentration in the liquid. Therefore, it is suggested that concentrations of Zephiran Chloride in recommended dilutions be made sufficiently great to allow for immersion of articles and to assure continu-

## Stability

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The following procedure has been found satisfactory for preparation of the surgical field. The site of operation is shaved and then scrubbed with pHisoHex<sup>®</sup> and water or with Zephiran Chloride Aqueous Solution—the day

before the operation. *As is the case with most antiseptics, detergents should be thoroughly rinsed from the skin before Zephiran Chloride is applied.* Either Zephiran Chloride Tincture or Aqueous Solution 1:750 (tinted or untinted) may then be applied in the usual manner.

For spray application, Zephiran Chloride Tinted Tincture 1:750 is available in pressurized bottles of 1 and 6 ounces avoirdupois.

## Disinfection and Storage of Instruments and Supplies

**Metallic instruments and ampuls** that do not withstand sterilization by heat should be thoroughly cleaned with plain soap or a mild alkaline detergent, rinsed completely in water, and immersed in a 1:750 aqueous solution of Zephiran Chloride for 30 minutes for disinfection. A 1:5000 aqueous solution of Zephiran Chloride suffices for sterile storage of instruments which have been sterilized by heat and for apparatus such as bacterial filters.

To retard corrosion, Anti-Rust Tablets or Powder should be added to Zephiran Chloride solutions that are to be used for the storage of metal instruments. Knife blades have been stored for months in Zephiran Chloride solution containing an anti-rust agent, with no evidence of corrosion and with little or no effect on the knife edge. To each quart of Zephiran Chloride Aqueous Solution, 4 crushed tablets or 1 well-rounded spoon of powder should be added. The powder should be added to the solution and the solution stirred well before instruments are immersed. The solution should be changed at least once a week.

As Anti-Rust Tablets contain an alkali, this may accentuate the slight odor of ammonia of dilute solutions prepared from Zephiran Chloride Concentrate 17%, which is buffered with ammonium acetate.

**Clinical thermometers**, after being washed clean or wiped downward toward the bulb, should be immersed in Zephiran Chloride Aqueous Solution 1:750 or, if specific tuberculocidal action is required, in Tincture 1:750. The solution should be changed frequently. Unlike phenol, cresol, formaldehyde, iodine, and hypochlorite solutions, Zephiran Chloride in recommended dilutions does not irritate tissues.

**Adsorbent articles (catheters, etc.)** adsorb some of the Zephiran Chloride from the disinfecting solution, thereby reducing the concentration in the surrounding liquid. Therefore, it is suggested that original concentrations of Zephiran Chloride in recommended dilutions be made sufficiently great to allow for adsorption on immersed articles and to assure continued bactericidal

activity in the residual solution (Kunzsin and Walter). A concentration of 1:500 or 1:750 should be employed and replenished every few days, depending on the load placed on the solution.

Catheters and polyethylene tubing may be disinfected by cleaning and immersion in Zephiran Chloride Aqueous Solution 1:500. The catheters should be thoroughly cleaned with plain soap or a mild alkaline detergent and then completely rinsed. The inner surface should be cleaned by flushing the solution through the lumen several times, using a needle and syringe. The catheter is then completely immersed in the germicide for a minimum of 30 minutes.

Boiling for five minutes in an aqueous quaternary solution will destroy vegetative organisms. If heat sterilization is not possible, nylon catheters can be disinfected by quaternaries.

Complete sterilization, including the destruction of all spores and viruses (e.g., the virus causing infectious hepatitis) is not possible merely by chemical means. Although storage for at least 30 minutes in a 1:750 aqueous solution of Zephiran Chloride will destroy practically all pathogenic bacteria in their vegetative form, this is not a guarantee of the destruction of all spores, viruses, or tubercle bacilli. However, Tincture of Zephiran Chloride destroys tubercle bacilli within 30 minutes.

The viruses of infectious canine hepatitis, herpes simplex, adenovirus type 7, Semliki Forest, yellow fever, eastern and Venezuelan equine encephalitides, Japanese B encephalitis, variola, vaccinia, influenza, Newcastle disease, measles, canine distemper, psittacosis, feline pneumonitis, meningopneumonitis, rabies, fowl laryngotracheitis, and lymphocytic choriomeningitis have been reported to be susceptible to Zephiran Chloride.

If cutting instruments for eye operations are disinfected in Zephiran Chloride Solution, all traces should be removed by thorough rinsing in sterile water before use to avoid introduction of the antiseptic into the anterior chamber.

Solutions of Zephiran Chloride containing sodium nitrite as the anti-rust agent should not be used for application to the skin or mucous membranes. Methemoglobinemia from absorption of the nitrite has been reported following such use in wet dressings over a large body area.

**Caution:** Zephiran Chloride solution should not be used for the sterile storage of instruments with lenses fastened by cement (such as cystoscopes or optical instruments), lacquered catheters, or synthetic rubber goods. Instruments containing zinc or aluminum should not be stored in Zephiran Chloride, as these metals may react with the alkali in Anti-Rust Tablets or Powder.

<sup>®</sup> pHisoHex<sup>®</sup>, an antibacterial detergent with 3 per cent hexachlorophene.

**FSN 6505-149-8705**  
**BENZALKONIUM CHLORIDE SOLUTION,**  
**U.S.P., 10%, 4 fl oz (118 cc)**

**ZEPHIRAN® Chloride Brand**

**CONCENTRATE**

Must be diluted before use

Active ingredient—alkyl dimethylbenzyl ammonium chlorides (benzalkonium chloride) 10%  
Inert ingredient—water 90%  
\*Cf. Certificate and other related data on page 10-1016

**CAUTION:** Keep out of the reach of children.  
See other cautions on side panel.

**WINTHROP LABORATORIES**

NEW YORK, N. Y. 10016

DIVISION OF STERLING DRUG INC.

MADE IN U. S. A.

**Caution: Concentrate is irritating. Avoid contamination of food. Harmful if swallowed. Avoid contact with skin and eyes. In case of contact, wash thoroughly with water. If eye irritation persists, consult physician promptly.**

**Do not permit to Freeze.**

Directions for Dilution  
to prepare 100 cc of Solution (ready for use):

1:1000 Dilution

10 cc Benzalkonium Chloride Solution 10%  
to 99 cc Distilled Water.

1:750 Dilution

Add 1.3 cc Benzalkonium Chloride Solution 10%  
to 98.7 cc Distilled Water.

Antiseptic and Germicide

Benzalkonium Chloride Aqueous Solution (1:1000 or 1:750) is used in surgical and obstetric procedures, disinfection of skin, hands, and as a first aid prophylactic in traumatic injuries.

Lot No.

**USDA Reg. No. 944-13**

*June 7 1967*  
*944-13*

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