

## CHLORAMPHENICOL EYE DROPS 0.5% m/V

500 mg
350 mg
1500 mg
0.5 ml
100 ml

Chloramphenicol  
Sodium tetraborate (borax)  
Boric acid  
Stock solution benzalkonium chloride 2%  
Distilled water to total of:

2500 mg
1750 mg
7500 mg
2.5 ml
500 ml

*If chloramphenicol powder is unobtainable,  
the use of ampoules of injectable chloramphenicol is permitted.*

### Method

- Complete production record sheet.
- Weigh borax and boric acid and dissolve in distilled water. Add benzalkonium stock solution, and then add chloramphenicol.
- Place in hot waterbath and heat until chloramphenicol is completely dissolved. Allow mixture to cool completely and make up to volume with freshly distilled water.
- Filter - sintered glass filter with hand vacuum pump preferable.
- Transfer filtrate into beaker and dispense in 5-10 ml portions into PRE-STERILIZED bottles.
- Seal bottles with PRE-STERILIZED caps and pipettes, using hand press.
- View and label after sterilization and cooling are complete.

### Sterilization

- By heating in waterbath at 100°C for 30 minutes. DO NOT AUTOCLAVE because of decomposition.

### Shelf-life and storage

- If kept protected from light below 25°C, use within 4 months. Refrigerator storage preferred.
- Once opened, use within 2 weeks.
- If drops become discoloured - DISCARD.

### Label

..... Hospital
Chloramphenicol eye drops 0.5%
TOPICAL ANTIBIOTIC
Manufactured on:

World Health Organization



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## PREPARATION OF FLUORESCEIN STRIPS FOR STAINING OF CORNEA

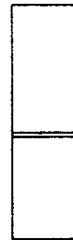
Prepare fluorescein eye drop 20% solution as follows:

Fluorescein sodium	2000 mg
Benzalkonium chloride 2%	0.5 ml
Distilled water to total of:	10 ml

Now prepare fluorescein strips, wetting ends of No. 15 Whatman filter-papers and allowing to dry under clean conditions. Discard the remaining solution.

Then autoclave in a suitable container at 121-124°C for 15 minutes at 200 kPa (15 psi or 1 atmosphere above atmospheric pressure).

Section dipped in 20% fluorescein →



## ZINC SULFATE EYE DROPS 0.25% m/V

250 mg  
0.5 ml  
100 ml

Zinc sulfate  
Stock solution benzalkonium chloride 2%  
Distilled water to total of:

1250 mg  
2.5 ml  
500 ml

### Method

- Complete production record sheet.
- Weigh out zinc sulfate and dissolve in some freshly distilled water.
- Add benzalkonium stock solution and make up to volume with freshly distilled water.
- Filter by whichever method is available.
- Transfer filtrate into beaker and dispense in 5-10 ml portions into PRE-STERILIZED bottles.
- Seal bottles with PRE-STERILIZED caps and pipettes, using a hand press.
- View and label after sterilization and cooling are complete.

### Sterilization

- Autoclaving at 121-124°C for 15 minutes at 200 kPa (15 psi or 1 atmosphere above atmospheric pressure).

### Shelf-life and storage

- Use within 6 months from date of sterilization.
- Store below 25°C, preferably in refrigerator (2°C-8°C).
- Once opened, use within 1 month.

### Label

..... Hospital  
Zinc sulfate eye drops 0.25%  
TOPICAL ASTRINGENT  
Manufactured on:

Note: If preferred, or required by national regulations, an option to the above formulation is to add sodium chloride 0.9% (normal saline), to obtain isotonicity. However, in this case PMN stock solution must not be used.

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# METHYLCELLULOSE EYE DROPS 1% m/V, 2% m/V

1%
5000 mg
4500 mg
2.5 ml
500 ml

Methylcellulose or hypromellose (15-25 mPa·s)  
Sodium chloride  
Stock solution benzalkonium chloride 2%  
Distilled water to total of:

2%
10 000 mg
4 500 mg
2.5 ml
500 ml

## Method

- Complete production record sheet.
- Weigh sodium chloride 900 mg, dissolve in 100 ml distilled water and heat this mixture in beaker in a waterbath; now weigh methylcellulose 5 g or 10 g and place in mortar, adding some of hot solution, fully hydrating methylcellulose by mixing well. Transfer to a measuring cylinder and rinse out mortar with remaining hot solution. Add benzalkonium stock solution and mix well. Make up to volume with distilled water, making sure that methylcellulose is completely hydrated. The mixture should be opalescent and viscous (sticky).
- Transfer mixture into PRE-STERILIZED bottles (10 ml/bottle).
- Seal bottles with caps and pipettes using hand press.
- View and label after sterilization and cooling are complete.

## Sterilization

- Autoclaving at 121-124°C for 15 minutes at 200 kPa (15 psi or 1 atmosphere above atmospheric pressure).
- After sterilization, shake bottles every 15 minutes until cool, to remix methylcellulose.

## Shelf-life and storage

- Use within 12 months from date of sterilization.
- Store in a cool place, preferably in a refrigerator.
- Once opened, use within 1 month.

## Label

..... Hospital
Methylcellulose eye drops 1%
PROTECTIVE EYE DROPS
Manufactured on:

Note: The 2% eye drop is for diagnostic use in contact lens examination.

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# CHLORAMPHENICOL EYE DROPS 0.5% m/V

500 mg
350 mg
1500 mg
0.5 ml
100 ml

Chloramphenicol  
Sodium tetraborate (borax)  
Boric acid  
Stock solution benzalkonium chloride 2%  
Distilled water to total of:

2500 mg
1750 mg
7500 mg
2.5 ml
500 ml

*If chloramphenicol powder is unobtainable,  
the use of ampoules of injectable chloramphenicol is permitted.*

### Method

- Complete production record sheet.
- Weigh borax and boric acid and dissolve in distilled water. Add benzalkonium stock solution, and then add chloramphenicol.
- Place in hot waterbath and heat until chloramphenicol is completely dissolved. Allow mixture to cool completely and make up to volume with freshly distilled water.
- Filter - sintered glass filter with hand vacuum pump preferable.
- Transfer filtrate into beaker and dispense in 5-10 ml portions into PRE-STERILIZED bottles.
- Seal bottles with PRE-STERILIZED caps and pipettes, using hand press.
- View and label after sterilization and cooling are complete.

### Sterilization

- By heating in waterbath at 100°C for 30 minutes. DO NOT AUTOCLAVE because of decomposition.

### Shelf-life and storage

- If kept protected from light below 25°C, use within 4 months. Refrigerator storage preferred.
- Once opened, use within 2 weeks.
- If drops become discoloured - DISCARD.

### Label

..... Hospital
Chloramphenicol eye drops 0.5%
TOPICAL ANTIBIOTIC
Manufactured on:

World Health Organization



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# STOCK SOLUTION PHENYLMERCURIC NITRATE 0.04% (PMN) (for use only when particularly indicated)

Phenylmercuric nitrate (PMN)  
Distilled water to total of:

40 mg
100 ml

## Method

- Complete production record sheet.
- Weigh out 40 mg of PMN - taking great care, as this substance is both irritant and poisonous.
- Dissolve PMN in hot freshly distilled water, and filter. Make up to volume using suitable size of measuring cylinder.
- Transfer into suitable storage bottle with glass stopper.
- Label after sterilization - mark POISON.

[The acetate PMA is an alternative salt to the nitrate PMN.]

## Sterilization

Autoclaving at 121-124°C for 15 minutes at 200 kPa (15 psi or 1 atmosphere above atmospheric pressure).

When bottle is opened and some solution used, it is recommended that the remainder be used within 1 month.

## Shelf-life

Suggested date of expiry: 12 months from initial sterilization.

## Label

P O I S O N
..... Hospital
Phenylmercuric nitrate 0.04%
STOCK SOLUTION
Manufactured on:

This stock solution may be used for:<sup>1</sup>

Tetracaine eye drops  
Lidocaine eye drops  
Chloramphenicol eye drops  
Atropine eye drops  
Pilocarpine eye drops  
Methylcellulose eye drops  
Zinc sulfate eye drops  
Fluorescein strips

<sup>1</sup> If used, the volume of PMN has to be 10 times that of benzalkonium chloride, e.g., 5 ml instead of 0.5 ml for 100 ml of eye drops.

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# STOCK SOLUTION BENZALKONIUM CHLORIDE 2% m/V

Benzalkonium chloride solution 50% m/V  
Distilled water to total of:

4 ml
100 ml

## Method

- Complete production record sheet.
- Measure 4 ml benzalkonium chloride solution 50% m/V and dilute in freshly distilled water. Make up volume to 100 ml.
- Transfer into suitable storage bottle with glass stopper.
- Label after sterilization.

## Sterilization

Autoclaving at 121-124°C for 15 minutes at 200 kPa (15 psi or 1 atmosphere above atmospheric pressure).

When stock solution bottle is opened and some solution used, it is recommended that the remainder be used within 1 month.

## Shelf-life

Suggested date of expiry: 12 months from initial sterilization.

## Label

..... Hospital
Benzalkonium chloride 2% m/V
STOCK SOLUTION
Manufactured on:

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\* The official term of mass per volume (m/V) is equivalent to the commonly used weight per volume (w/V).

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## GENTAMICIN EYE DROPS 0.3% m/V

300 mg
7.5 ml
0.5 ml
100 ml

Gentamicin sulfate (base 300 mg)  
OR Gentamicin injection 40 mg/ml base  
Stock solution benzalkonium chloride 2%  
Distilled water to total of:

1500 mg
37.5 ml
2.5 ml
500 ml

### Method

- Complete production record sheet.
- Weigh gentamicin sulfate (or draw up gentamicin injection in syringe), and dissolve in half volume of water, adding benzalkonium stock solution.
- Mix well with glass rod and make up to volume with freshly distilled water.
- Filter by whichever method is available.
- Transfer filtrate into beaker and dispense in 5-10 ml portions into PRE-STERILIZED bottles.
- Seal bottles with PRE-STERILIZED caps and pipettes, using hand press.
- View and label after sterilization and cooling are complete.

### Sterilization

- Autoclaving at 121-124°C for 15 minutes at 200 kPa (15 psi or 1 atmosphere above atmospheric pressure).

### Shelf-life and storage

- If kept at room temperature (below 25°C), use within 3 months.
- If kept in refrigerator (2°C-8°C): 12 months.
- Once opened, use within 1 month.
- If drops become discoloured - DISCARD.

### Label

..... Hospital
Gentamicin eye drops 0.3%
TOPICAL ANTIBIOTIC
Manufactured on:

Note. If preferred, or required by national regulations, an option to the above formulation is to add sodium chloride 0.9% (normal saline) to obtain isotonicity.

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## TETRACAINE (AMETHOCAINE) EYE DROPS 0.5% m/V

500 mg
800 mg
0.5 ml
100 ml

Tetracaine (amethocaine) hydrochloride  
Sodium chloride  
Stock solution benzalkonium chloride 2%  
Distilled water to total of:

2500 mg
4000 mg
2.5 ml
500 ml

### Method

- Complete production record sheet.
- Weigh tetracaine HCl and sodium chloride and dissolve in distilled water in measuring cylinder.
- Measure out benzalkonium stock solution, add contents of measuring cylinder and make up to volume with freshly distilled water.
- Filter by whichever method is available.
- Transfer filtrate into beaker and dispense in 5-10 ml portions into PRE-STERILIZED bottles.
- Seal bottles with caps and pipettes, using hand press.
- View and label after sterilization and cooling are complete.

### Sterilization

- Autoclaving at 121-124°C for 15 minutes at 200 kPa (15 psi or 1 atmosphere above atmospheric pressure).

### Shelf-life and storage

- Use within 12 months from date of sterilization.
- Once opened, use within 1 month.
- Store protected from light - IF SOLUTION BECOMES CLOUDY DISCARD.

### Label

..... Hospital
Tetracaine eye drops 0.5%
TOPICAL ANAESTHETIC
Manufactured on:

World Health Organization



Christoffel-Blindenmission

## LIDOCAINE EYE DROPS 4% m/V

4000 mg
0.5 ml
100 ml

Lidocaine hydrochloride  
Stock solution benzalkonium chloride 2%  
Distilled water to total of:

20 000 mg
2.5 ml
500 ml

### Method

- Complete production record sheet.
- Weigh lidocaine HCl and dissolve in distilled water in measuring cylinder.
- Measure out benzalkonium stock solution, add contents of measuring cylinder and make up to volume with freshly distilled water.
- Filter by whichever method is available.
- Transfer filtrate into beaker and dispense in 5-10 ml portions into PRE-STERILIZED bottles.
- Seal bottles with PRE-STERILIZED caps and pipettes, using hand press.
- View and label after sterilization and cooling are complete.

### Sterilization

- Autoclaving at 121-124°C for 15 minutes at 200 kPa (15 psi or 1 atmosphere above atmospheric pressure).

### Shelf-life and storage

- Use within 6 months from date of sterilization.
- Store in cool, dry and dark place.
- Once opened, use within 1 month.

### Label

..... Hospital
Lidocaine eye drops 4%
TOPICAL ANAESTHETIC
Manufactured on:

Note: This drop is an alternative to tetracaine.

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# PREDNISOLONE EYE DROPS 0.1% m/V, 0.5% m/V, 1.0% m/V

"Weak" 0.1%	"Normal" 0.5%		"Strong" 1.0%
500 mg	2500 mg	Prednisolone sodium phosphate Disodium edetate Sodium dihydrogen phosphate dihydrate Sodium chloride Stock solution benzalkonium chloride 2% Sodium hydroxide 4% m/v solution Distilled water to total of:	5000 mg
50 mg	50 mg		50 mg
1500 mg	1500 mg		1500 mg
2500 mg	2500 mg		2500 mg
2.5 ml	2.5 ml		2.5 ml
qs to pH 8	qs to pH 8		qs to pH 8
500 ml	500 ml		500 ml

Method

- Complete production record sheet.
- Weigh sodium acid phosphate, prednisolone sodium phosphate, sodium chloride and disodium edetate.
- Dissolve all in 50 ml freshly distilled water in a measuring cylinder.
- Adjust pH using freshly prepared sodium hydroxide 4% m/V solution drop by drop. Use pH paper or pH meter.
- Measure 2.5 ml stock solution benzalkonium chloride 2% into a separate measuring cylinder containing 50 ml distilled water; mix well and NOW add to the first measuring cylinder, and ONCE MORE adjust the pH to pH 8 by adding drops of the sodium hydroxide solution as necessary. NOW make up to 500 ml with freshly distilled water and mix well.
- Filter by whichever method is available.
- Transfer filtrate to beaker and dispense in 5-10 ml portions into PRE-STERILIZED bottles.
- Seal bottles with PRE-STERILIZED caps and pipettes, using hand press.
- View and label after sterilization and cooling are complete.

Sterilization

- By STEAMING in waterbath at 100°C for 30 minutes. Decomposition will occur at higher temperatures.

Shelf-life and storage

- Use within 6 months from date of sterilization.
- STORE IN REFRIGERATOR.
- Once opened, use within 1 week.

Label

<p>..... Hospital</p> <p>Prednisolone eye drops 0.5%</p> <p>TOPICAL STEROID</p> <p>Manufactured on:</p>
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Note: If possible, use different colour code or print to avoid confusing the various strengths of this drop.

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## PILOCARPINE EYE DROPS 2% m/V, 4% m/V

2%	
2000 mg	10 000 mg
0.5 ml	2.5 ml
100 ml	500 ml

Pilocarpine hydrochloride/nitrate<sup>1</sup>  
 Stock solution benzalkonium chloride 2%  
 Distilled water to total of:

4%	
4000 mg	20 000 mg
0.5 ml	2.5 ml
100 ml	500 ml

Method

- Complete production record sheet.
- Weigh out pilocarpine HCl or nitrate, taking care as pilocarpine is poisonous, and dissolve in 80 ml of distilled water - add appropriate amount of benzalkonium stock solution and make up to volume, mixing thoroughly.
- Filter by whichever method is available.
- Transfer filtrate into beaker and dispense in 5-10 ml portions into PRE-STERILIZED bottles.
- Seal bottles with PRE-STERILIZED caps and pipettes, using a hand press.
- View and label after sterilization and cooling are complete, discard if particles seen.

Sterilization

- Autoclaving at 121-124°C for 15 minutes at 200 kPa (15 psi or 1 atmosphere above atmospheric pressure).

Shelf-life and storage

- Use within 12 months from date of sterilization.
- Store protected from light, preferably in refrigerator.
- Once opened, use within 1 month.

Label

..... Hospital

Pilocarpine eye drops 2%

MIOTIC AND IOP LOWERING DROP

Manufactured on:

Note: If pilocarpine nitrate is used, PMN stock solution must be used to the same amount (see further p. 22).

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Mydriatic

# TROPICAMIDE EYE DROPS 0.5% m/V, 1.0% m/V

0.5%	1%		0.5%	1%
500 mg	1000 mg	Tropicamide	2500 mg	5000 mg
50 mg	50 mg	Disodium edetate	250 mg	250 mg
300 mg	300 mg	Sodium chloride	4000 mg	4000 mg
0.5 ml	0.5 ml	Stock solution benzalkonium chloride 2%	2.5 ml	2.5 ml
100 ml	100 ml	Distilled water to total of:	500 ml	500 ml

0.1 molar hydrochloric acid) for adjustment of pH  
0.1 molar sodium hydroxide )

### Method

- Complete production record sheet.
- Weigh tropicamide, disodium edetate and sodium chloride.
- Make up 0.1 molar hydrochloric acid using 1 ml of dilute HCl (10% hydrochloric acid) to 30 ml distilled water. Then make up 0.1 molar sodium hydroxide (approximately) by using 400 mg sodium hydroxide to 100 ml of distilled water.
- Dissolve tropicamide, disodium edetate and sodium chloride in 80 ml (400 ml) of distilled water, adding 0.1 molar hydrochloric acid until tropicamide is completely dissolved.
- Adjust pH by adding 0.1 molar sodium hydroxide, drop by drop, until between pH 4.0 and pH 5.0.
- Add benzalkonium chloride 2% solution, and make up to volume with freshly distilled water.
- Filter by whichever method is available.
- Transfer the filtrate into beaker and dispense in 5-10 ml portions into PRE-STERILIZED bottles.
- Seal bottles with PRE-STERILIZED caps and pipettes, using a hand press.
- View and label after sterilization and cooling are complete.

### Sterilization

- Autoclaving at 121-124°C for 15 minutes at 200 kPa (15 psi or 1 atmosphere above atmospheric pressure).

### Shelf-life and storage

- THESE DROPS MUST NOT BE KEPT IN A REFRIGERATOR, but stored preferably at 15°C-20°C, and used within 12 months from date of sterilization.
- Once opened, use within 1 week.

### Label

..... Hospital  
Tropicamide eye drops 0.5%  
DIAGNOSTIC MYDRIATIC DROP  
Manufactured on:

World Health Organization



Christoffel-Blindenmission

Mydriatic

# CYCLOPENTOLATE EYE DROPS 1% m/V

1000 mg
1000 mg
50 mg
0.5 ml
100 ml

Cyclopentolate hydrochloride  
Sodium metabisulfite  
Disodium edetate  
Stock solution benzalkonium chloride 2%  
Distilled water to total of:

5000 mg
5000 mg
250 mg
2.5 ml
500 ml

Method

- Complete production record sheet.
- Weigh cyclopentolate hydrochloride, sodium metabisulfite (which should be handled with care) and disodium edetate, and dissolve in half the volume of distilled water.
- Measure benzalkonium chloride solution and add to above mixture, stirring well, and make up to volume with freshly distilled water.
- Filter by whichever method is available.
- Transfer filtrate into beaker and dispense in 5-10 ml portions into PRE-STERILIZED bottles.
- Seal bottles with PRE-STERILIZED caps and pipettes, using hand press.
- View and label after sterilization and cooling are complete.

Sterilization

- By STEAMING in waterbath at 100°C for 30 minutes. AUTOCLAVING IS NOT RECOMMENDED, as the higher temperature will cause decomposition.

Shelf-life and storage

- Suggested shelf-life - 6 months from date of sterilization if stored in refrigerator.
- Once opened, use within 1 month.

Label

..... Hospital
Cyclopentolate eye drops 1%
MYDRIATIC
Manufactured on:

World Health Organization



Christoffel-Blindenmission

## POLYVIDONE IODINE EYE DROPS 0.5% v/v

Polyvidone iodine solution 10%  
Sodium chloride solution 0.9% (normal saline) to total of:

5.0 ml
100 ml

### Method

- Complete production record sheet.
- Mix 5.0 ml of polyvidone iodine 10% solution, making it up to 100 ml with sterile sodium chloride 0.9% solution from an intravenous solution pack.
- Transfer into a sterile beaker and dispense into the bottles which should, as normally, have been PRE-STERILIZED.
- Seal bottles, as usual, with PRE-STERILIZED caps and pipettes, using a hand press.

### Sterilization

- Not required, if prepared as above, as povidone-iodine is a strong antiseptic with a wide antimicrobial spectrum.

### Shelf-life and storage

- If kept in refrigerator (2°C-8°C): 6 months.
- If kept at ambient temperatures, prepare freshly each month.
- Once opened, use within 1 month.

### Label

..... Hospital
Polyvidone iodine eye drops 0.5%
TOPICAL ANTIMICROBIAL EYE DROP
Manufactured on:

Note: Polyvidone iodine may also be used in a 1.5% solution pre-operatively, for prophylaxis and treatment of infections.

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Mydriatic

# ATROPINE EYE DROPS 1% m/V

1000 mg
0.5 ml
100 ml

Atropine sulfate  
Stock solution benzalkonium chloride 2%  
Distilled water to total of:

5000 mg
2.5 ml
500 ml

Method

- Complete production record sheet.
- Weigh atropine sulfate and dissolve in distilled water in measuring cylinder.
- Add stock solution benzalkonium and make up to volume with freshly distilled water.
- Filter by whichever method is available.
- Transfer filtrate into beaker and dispense in 5-10 ml portions into PRE-STERILIZED bottles.
- Seal bottles with PRE-STERILIZED caps and pipettes, using a hand press.
- View and label when sterilization and cooling are complete.

Sterilization

- Autoclaving at 121-124°C for 15 minutes at 200 kPa (15 psi or 1 atmosphere above atmospheric pressure).

Shelf-life and storage

- Use within 12 months from date of sterilization.
- Stable at ambient temperatures (20°C-25°C).
- Once opened, use within 1 month.

Label

..... Hospital
Atropine eye drops 1%
<u>Not for use in children</u>
POWERFUL MYDRIATIC
Manufactured on:

Note:

1. Alternatively, atropine drops of 0.1% and 0.5% may be prepared for use in children following the same procedure as above.
2. If preferred, or required by national regulations, an option to the above formulation is to add sodium chloride 0.9% (normal saline), to obtain isotonicity. However, in this case do not use PMN stock solution.

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