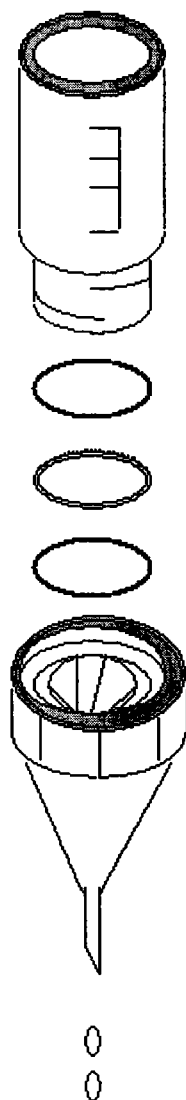


THE LOCAL SMALL-SCALE PREPARATION OF EYE DROPS

EYE DROP UPDATE 2002



World Health Organization

Geneva, Switzerland



CBM
International

Bensheim, Germany

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THE LOCAL SMALL-SCALE PREPARATION OF EYE DROPS

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THE LOCAL SMALL-SCALE PREPARATION OF EYE DROPS

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INTRODUCTION

Since WHO published the "The local small-scale preparation of eye drops" in 1990, there have been several developments, both in the number of preparations that can be made, and in the development of additional equipment to help make preparation easier.

In visits to eye drop units, it has been noted that some difficulties in methodology have arisen, so we seek now to explain how these may be overcome or simplified. The names and addresses of suggested suppliers have been updated. It is advised that before starting a new eye drop unit it is useful to have hands-on experience in a functioning eye drop unit for at least one month.

I have had help from several pharmaceutical colleagues, all of whom have been involved in the running, or setting-up, of units. I would particularly like to mention:

Dr Otto Lindner, the first pharmacist at the Kilimanjaro Christian Medical Centre in United Republic of Tanzania, who helped to systematize the first and second editions of the "pre-WHO" manual;

Mrs Susan Spoerer, who has made many helpful practical suggestions whilst working in Kenya;

Mr Alistair Bolt, who ran a successful unit at Mvumi Hospital in United Republic of Tanzania, where the original local small-scale preparation of eye drops unit had been started in the 1960s, and has helped to set up units across the world. He has continued to provide expert advice and suggest innovative methods.

I thank them all.

Joseph Taylor, Medical Consultant, Christoffel-Blindenmission (CBM)
(prepared by the late Dr Taylor in 1997)



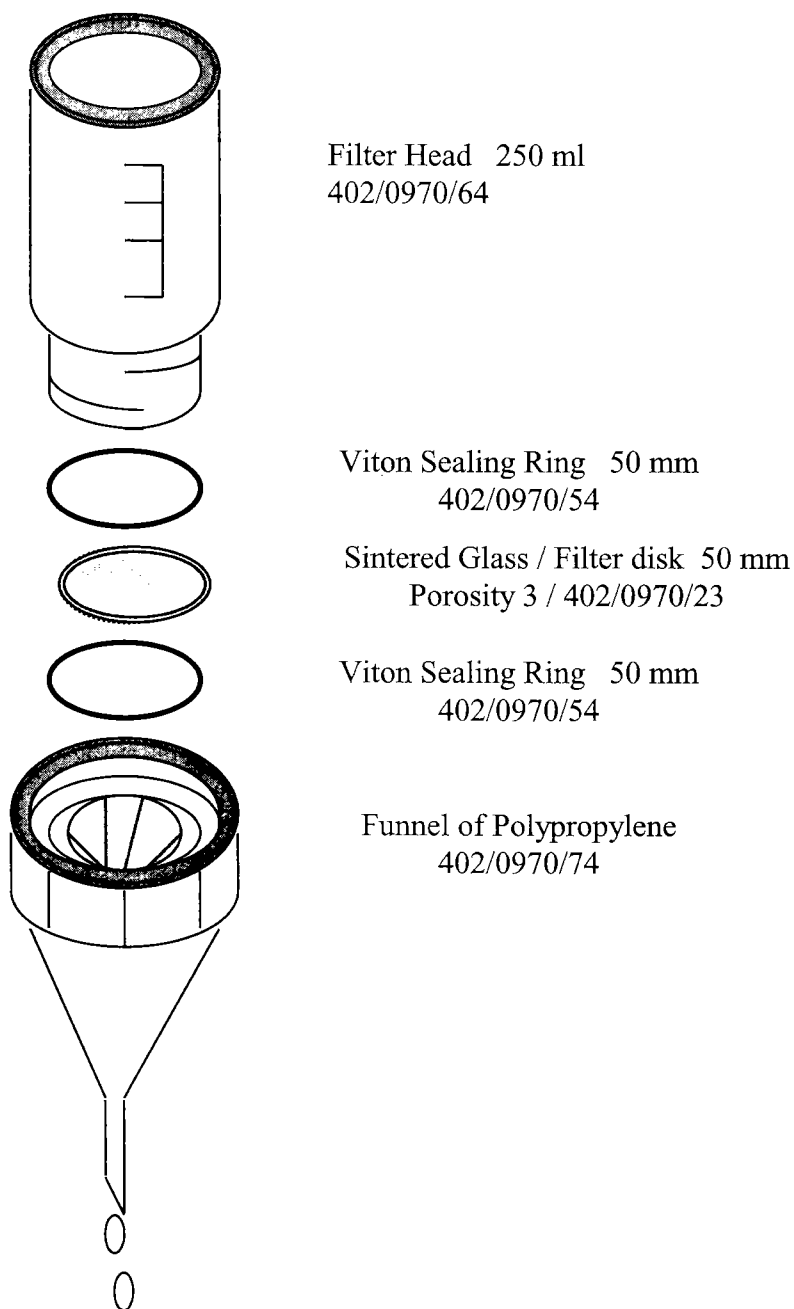
Joseph Taylor OBE; FRCS; FRCOphth.
(18 February 1929 – 21 November 1997)

EQUIPMENT UPDATE

FILTRATION

The sintered glass filter is the best for small-scale production of eye drops, and it is easily operated with the help of a manual vacuum pump. However, it is difficult to clean the sintered glass disk adequately when it is a fixture in the funnel head. The alternative is a unit which can be easily assembled from its various components, with a separate filter disk. This is easier to manage and clean.

Full details and specifications follow.

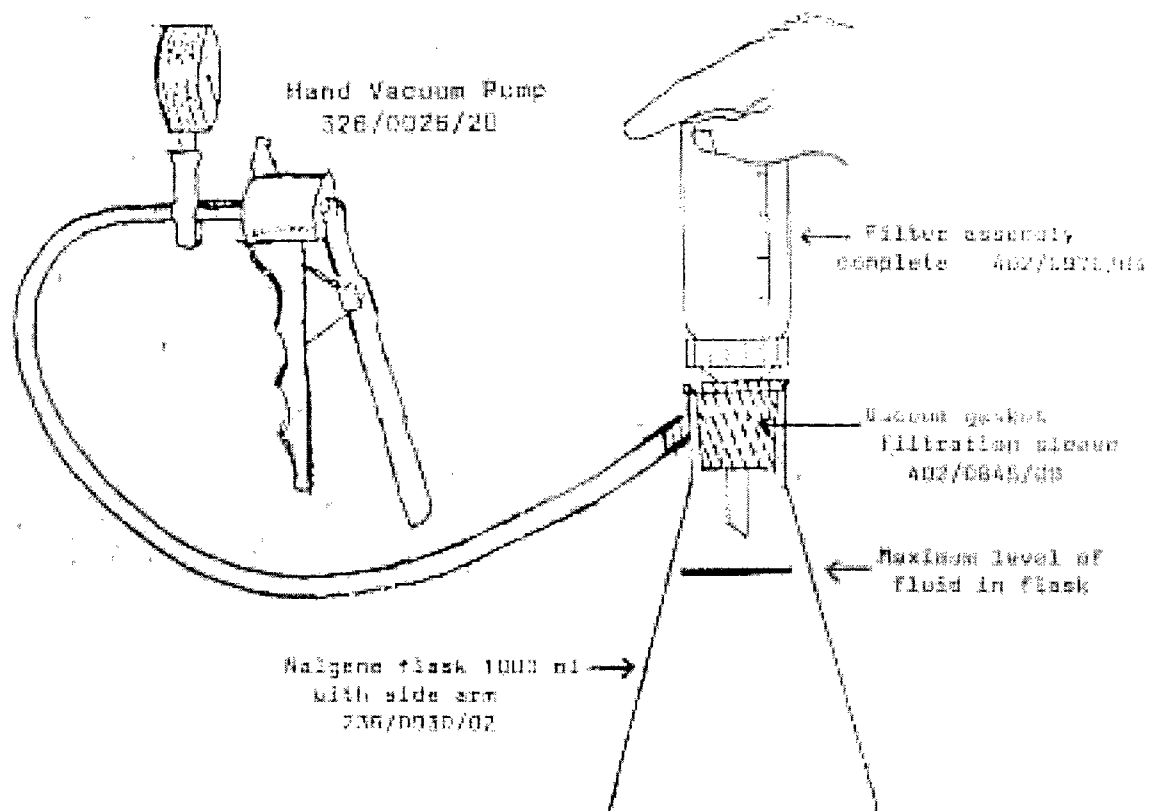


ASSEMBLING THE FILTER FUNNEL UNIT

- Rinse all parts thoroughly with distilled water.
- Place the first black Viton sealing ring inside the polypropylene funnel.
- Check that the seal is lying flat on the inside edge of the funnel.
- Place the sintered glass filter disk centrally on top of the black seal.
- Put the second Viton seal on top of the sintered glass filter disk.
- Screw the filter head into the funnel on top of the rubber seal.
- Fill the filter head with distilled water to check for leaks.
- If the unit leaks, tighten the filter head a little and recheck for leaks.
- Rinse the unit by filtering about 100 ml of hot distilled water before filtering any eye drops.

USING THE FILTRATION UNIT

- The assembled unit has to be fixed to the filtration flask, using a vacuum gasket filtration sleeve.
- The flask is then connected to the hand-held vacuum pump, and the solution poured into the filter head.



- Now start pumping the vacuum pump.
- Press gently with the hand on top of the filter head, as shown, until the solution starts to filter.
- The vacuum gauge should show between 20 and 30 mm. Pump a few more times if the vacuum falls below this pressure.
- When filtration is finished, wait until the vacuum falls, then remove the filter assembly from the filter flask.

CLEANING THE SINTERED GLASS FILTER DISK

When you have finished filtering one type of drop, the sintered glass disk has to be cleaned.

- (i) Fill the filter head with HOT distilled water and filter using the vacuum pump. Repeat this THREE times.
- (ii) Now take the unit apart. Turn filter disk over, and reassemble the unit. Filter through again with HOT distilled water. Again repeat this THREE times. (This is known as "back washing".)
- (iii) Reassemble the filter again, but with the disk the same way up as when you started. Mark the disk rim so that you know which side you are using as "TOP".

The unit is now ready for filtering another type of drop.

Always store the disk in a clean, labelled, plastic bag.

Ideally, a separate sintered glass filter disk should be used for each class or type of drop. However, the most important thing is to wash and "back wash" the sintered disk after filtration of each batch of eye drops is completed, so that only clean disks are stored, and they are always ready for further use.

All filtration unit parts are available from:-

Sterling Projects Limited
P.O. Box 893
Brentwood
Essex
CM13 2TX
England
UK

Telephone : +44- (0)1277 228755
Fax : +44- (0)1277 231738

SPECIFICATIONS FOR FILTRATION UNIT FOR LOCAL PRODUCTION OF EYE DROPS

SUGGESTED INITIAL UNIT

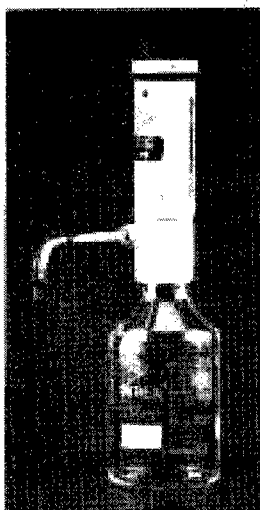
BDH Cat. No.	Description	No. of items	Approx Price in 1999
326/0026/20	Vacuum Pump with Gauge 36 ml	2	£ 125
236/0930/02	Filter Flask Nalgene 1000 ml	2	£ 25
402/0970/04	Filter Assembly Complete Comprising: Filter Head 250 ml, Funnel Polypropylene, 2 Viton Rings, 2 of 50-mm Filter Disks Porosity 3	2 sets	£ 50
402/0845/00	Vacuum Gasket Filtration Sleeve Packet of 6	1	£ 25
402/0970/54	Viton Sealing Ring for 50-mm disks Packet of 10	1	£ 25
402/0970/23	Filter Disk 50 mm Porosity 3	8	£ 150
	Complete Initial Unit		£ 400

ORDER SPARES AS NECESSARY

402/0970/64	Filter Head 250 ml	Each	£ 20
402/0970/74	Funnel Polypropylene 54 mm	Each	£ 5
402/0970/54	Viton Sealing Rings 50 mm Packet of 10	Pack	£ 20
402/0845/00	Vacuum Gasket Filtration Sleeve Packet of 6	Pack	£ 20
402/0970/23	Filter Disk 50 mm Porosity 3	Each	£ 20
236/0930/02	Filter Flask Nalgene 1000 ml	Each	£ 15
326/0026/20	Vacuum Pump with Gauge 36 ml	Each	£ 70

DISPENSER

Some of the larger units have requested a "dispenser" so that bottles may be filled more expeditiously with the exact volume of drops required. The "**PRESSMATIC 2000**" shown here is simple to operate. This dispenser is only necessary when large numbers of bottles are being dispensed. The simpler method of using a disposable syringe should continue to be the standard routine.



- ◆ Simple setting of required volume
- ◆ Durable, non-sticking piston operation
- ◆ Standard screw thread

"PRESSMATIC 2000" BIBBY DISPENSER

BDH Cat: No: 307/8162/04
Volume 2-10 ml

Price £ 175

Spares for "Pressmatic 2000"

1. Clear Reservoir Bottles for Dispenser

BDH Cat: No: 215/0150/03	500 ml	each	£ 6.00
Cat: No: 215/0150/04	1000 ml	each	£ 8.00

2. Suction Tube Assembly

Delivery Tube	BDH	Cat: No: 307/8163/11	Each	£ 25
Outlet Valve	BDH	Cat: No: 307/8163/13	Each	£ 25
Suction Valve	BDH	Cat: No: 307/8163/15	Each	£ 25
Suction Tube 310 mm (with screw cap)		Cat: No: 307/8163/17	Each	£ 20
Spanner		Cat: No: 307/8163/19	Each	£ 15

Suggested standard initial supply:

- 1 x Dispenser
- 1 x 500-ml Clear Reservoir Bottle
- 1 x 1000-ml Clear Reservoir Bottle
- 2 x Section Tube Assemblies

Suppliers are: Sterling Projects Limited (for address see page 4)

POLYPROPYLENE DROPPER BOTTLES

These are available as an alternative to glass vials, pipettes and caps.

They are for single use and available from DEEPAK:

Deepak Enterprises, 95A/1 Gautam Nagar, New Delhi 110049, India Fax +91-11 651 4675

The minimum quantity for orders is 5000 pieces.

GLASS BOTTLES

It is not always easy to get used bottles and vials. To send them from Europe:

- is very expensive;
- there are often difficulties of importation to be overcome;
- and in most countries the standard glass vial can be purchased locally.

One can often negotiate to buy used vials from some nearby general hospital, rather than let them be thrown away.

DECAPPER

Many eye drop units have found the decapping process rather tiresome, so special "decapping pliers" have been found. They make the task of decapping easier. Illustrated is a type obtainable from JENCONS Scientific Ltd.



DECAPPER PLIERS 20 mm CAT.NO.908-047

Supplied through: JENCONS Scientific Ltd
 Cherrycourt Way
 Stanbridge Road
 Leighton Buzzard
 Beds. LU7 8UA
 England, UK
 Fax: +44-1525-851-461
 Price: £60

Method of removal

- | | |
|----------|---|
| Method 1 | A. Insert vial squarely into open decapper jaws.
B. Squeeze firmly.
C. Holding vial upright, tip decapper to remove seal. |
| Method 2 | A. Same as above.
B. Squeeze until seal comes off. |

Use whichever method you find best for you.

A similar decapper can also be obtained through ECHO (see page 13) listed as:

Bottle decapper, vial style, 20 mm Ref. EK479 S Price: £ 40

THE NUISANCE OF PARTICULATE MATTER

Particles in the drops is the most common reason for discarding drops. The commonest cause for this trouble is dirty bottles, as the cleaning of used vials is often performed poorly by someone who does not realise how important it is to get the bottles **ABSOLUTELY CLEAN**. The simple instructions which follow will reduce particulate contamination.

Please **NEVER USE SOAP**, only use a **DETERGENT**.
Soap will precipitate and cause gross particulate contamination.

OTHER PRECAUTIONS AGAINST PARTICLES



If you use pipettes and caps they should always be washed under running tap water, then rinsed with filtered, distilled water, before sterilizing in a drum ready for use.



The room

- (i) All surfaces should be cleaned with a damp, clean cloth two hours before preparation of eye drops begins.
- (ii) Floor – should also be wiped over with a damp cloth.
- (iii) If at all possible, an extractor fan should be fitted high up on the wall and opposite to the bench where preparation work is done.
- (iv) If you are fortunate enough to have an air conditioner, this should be started up at least half an hour before preparation work begins.



Visitors and Disturbers!

All the above precautions seek to minimize "dust". Yet all this good work can be spoilt by visitors coming in with dusty shoes, etc., stirring up the air, and often leaving the door open.

We suggest you

- (i) put a notice on the outside of the door asking not to be disturbed;
- (ii) lock the door on the inside, thus making sure that you control anyone wishing to come in.

The eye drop preparation room should be:

CLEAN with MINIMAL DUST

QUIET with FEW PEOPLE



If you use bottles/pipettes and caps:

INSTRUCTIONS FOR CLEANING USED VIALS (bottles)

BEFORE USING FOR EYE DROPS

1. Soak in hot water until all labels can be removed – leave caps on to prevent label fragments from getting into vials.
2. Remove used covers and rubbers – with decapper if available.
3. Wash bottles, using hot water and detergent (see note below), cleaning **each** bottle with a bottle brush.
4. Boil bottles in hot water for 15 minutes. Discard the water.
5. Wash a second time with hot water and detergent, using a cleaned bottle brush. Discard the water.
6. Rinse under running tap water.
7. Rinse twice more with distilled and filtered water.
8. The bottles are now ready for filling, capping, and sterilization.

N.B. It is good practice to sterilize cleaned bottles by autoclaving and then to keep them stored in a drum, such as that supplied with the eye drop equipment.

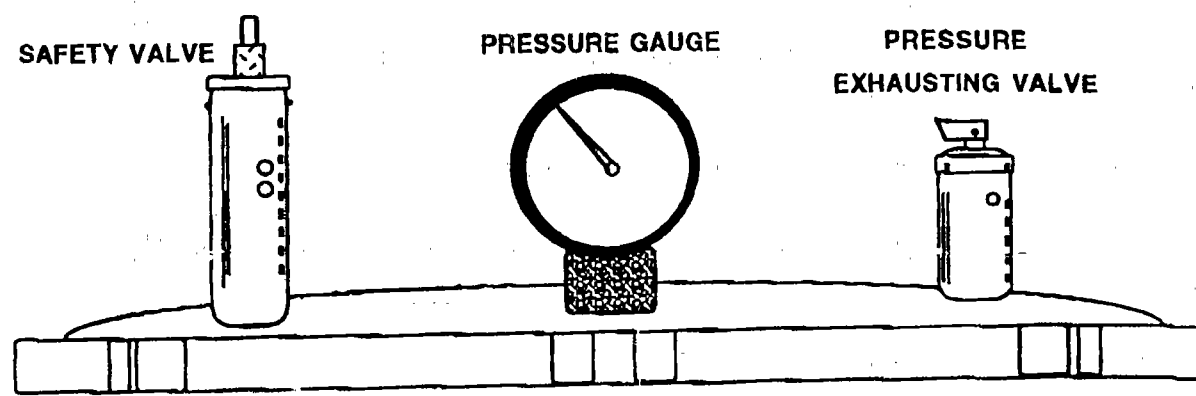
DETERGENT Many detergents are easily available – e.g. commercial washing-up fluids, detergent laundry powders or similar products. But the MOST SUITABLE detergent for cleaning vials would be Cetrimide BP or 'Cetavlon', which many hospitals already have in stock.

REMEMBER - SOAP or soap powder must NOT be used, as it will cause precipitation. This will result in 'particulate contamination'.

STERILIZATION

Two differing processes can be used to sterilize eye drops:

1. AUTOCLAVING – Heating with steam under PRESSURE.
2. STEAMING – Heating with steam in a "Water Bath".














AUTOCLAVING

Most eye drop units have some sort of a "portable autoclave" and there are THREE controls. The use of each needs to be clearly understood. These controls are:

- (1) AIR EXHAUST VALVE – to release all the air from the chamber of the autoclave;
- (2) A PRESSURE SAFETY VALVE – which sets the steam pressure at the level required;
- (3) A TEMPERATURE/PRESSURE GAUGE – which shows the temperature/pressure in the chamber.

PROCEDURE FOR AUTOCLAVING EYE DROPS

-  Put ENOUGH water into the base of the autoclave to make sure that it does not run dry during use. It is good practice to use rainwater or distilled water – this will prevent deposits forming.
-  Place the filled and sealed eye drop bottles in the autoclave, on a metal shelf above the water level, or in a sterilizer drum.
-  Close and seal down the lid of the autoclave.
-  BEFORE beginning to heat, make sure that the AIR EXHAUST valve is FULLY OPEN and the STEAM PRESSURE SAFETY VALVE is set to the desired pressure for sterilizing the drop – 15 psi is required.
(This is +1atmosphere 200 kPa.)
-  PUT the HEAT on FULLY.
-  Wait until air exhaust valve has been venting steam freely, for about 5 minutes. That means that all air has been pushed out of the sterilizer and only steam remains.
NOW CLOSE AIR EXHAUST VALVE.
-  Continue heating until the PRESSURE SAFETY VALVE is venting steam freely, and CHECK on the temperature/pressure gauge that the desired pressure has been reached.
-  Now REDUCE the heat and START TIMING the required 15 minutes for autoclaving.
-  IT IS MOST IMPORTANT NOT TO START TIMING until the desired pressure has been reached and is steady.
-  When the time for autoclaving has been completed,
TURN OFF ALL HEAT
and ALLOW AUTOCLAVE TO COOL SLOWLY.
-  When the autoclave has cooled, OPEN air exhaust valve and ONLY THEN open AUTOCLAVE LID.

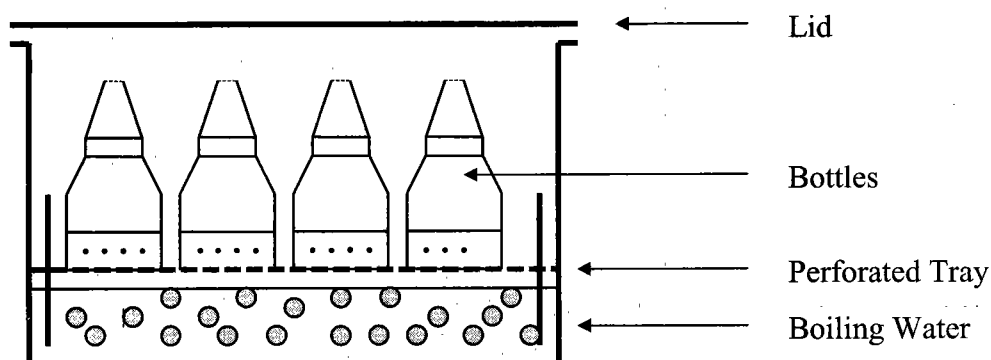
The most important points are:

- ◆ Get all the air out before closing air exhaust valve.
- ◆ Be sure that pressure and temperature are right before starting timing – and they must remain steady.
- ◆ Allow to cool slowly, before opening.

STEAMING with WATER BATH

The simplest way to sterilize the drops, once dispensed and sealed in the bottles, is by the use of a **WATER BATH** — which involves steaming the bottles at 100°C for 30 minutes (or as near this temperature as possible, depending on altitude). See table for adjustment of time for altitude.

This steaming can be done in any kind of vessel, even a large saucepan. The bottles should be stood on a "perforated tray" above the boiling water, and then the whole vessel should be covered to retain the steam.



A SIMPLE (HOME-MADE) WATER BATH

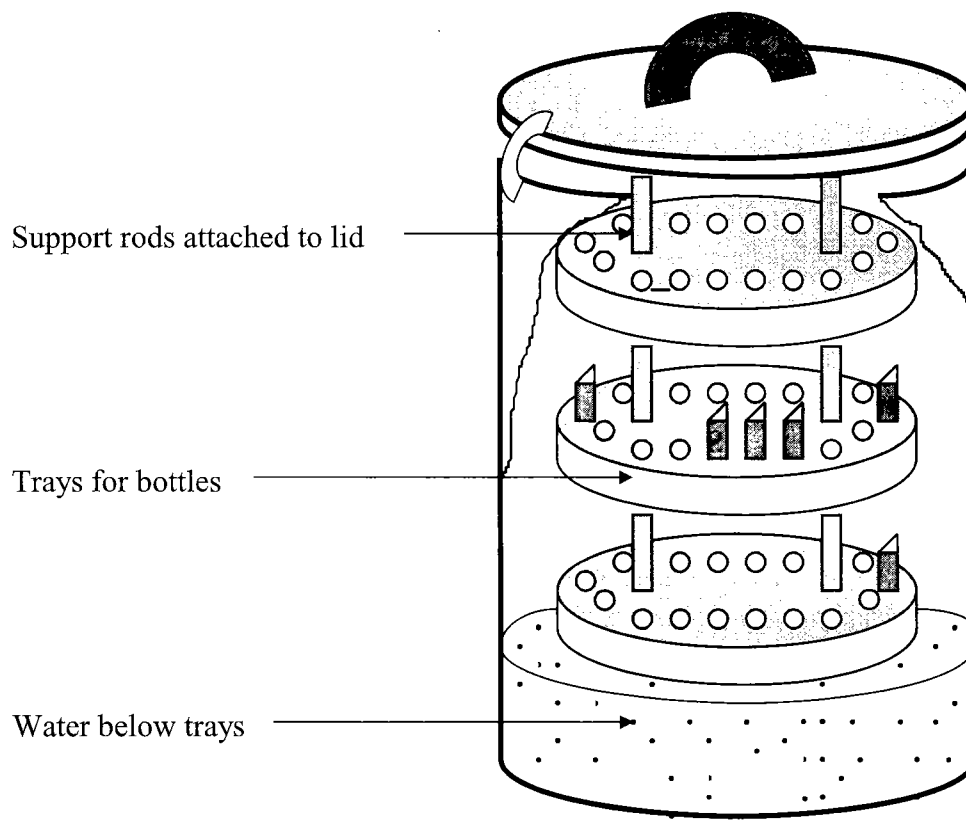
The cover should not be sealed in any way. The steam needs to be allowed to escape freely without any pressure being built up in the bath.

Having the bottles standing above the water, in the steam, prevents unnecessary agitation such as would be inevitable if they stood in the water.

There are many commercially available water baths with, or without, a heater incorporated.

EYE DROP STEAMER

A water bath has now been specifically designed for sterilizing eye drops by steaming, the bottles being held in a specially constructed tray which can be lowered into, and raised out of, the steamer without capsizing the bottles.



Eye Drop Steamers are available from :

ECHO International Health Services
Ullswater Crescent
Coulson
Surrey CR5 2HR
UK

Fax: +44 (0)20 8668 0751

EK109P Eye Drop Steamer with an Electric Heater of 230 volts A50

Price £ 350

A suitable **Autoclave**, also from ECHO:

EZ03601P Autoclave, portable, with stand
for heating with any external source
e.g. Primus, Gas Ring, Hot Plate

Price £ 600

ET143P Sterilizing Drum for above

Price £ 50

STERILIZING CYCLE FOR EYE DROPS AT HIGH ALTITUDE

Autoclaves and other sterilizers work because heat applied for a sufficient time kills bacteria.

In an autoclave, high temperatures are reached by the use of steam under pressure. But at high altitudes, since the atmospheric pressure is lower, the temperature reached by an autoclave or a steamer is reduced. So an adjustment to the length of time for sterilizing has to be made, to compensate for this lower operating temperature.

Most autoclaves have three settings – zero pressure (as in an open cooking pot), 0.5 bar (7.5 psi), and 1.0 bar (15 psi).

The table shows suitable settings for the autoclave at different altitudes, for both the standard sterilizing temperature, and for "steaming" for drops that are sensitive to heat.

Altitude in metres	Altitude in feet	Steaming cycle	Sterilizing cycle
1000	3300	30 min	15 min @ 15 psi(1 bar)
1500	5000	15 min @ 7.5 psi	20 min @ 15 psi(1 bar)
2000	6500	15 min @ 7.5 psi	20 min @ 15 psi(1 bar)
2500	8000	15 min @ 7.5 psi	30 min @ 15 psi(1 bar)
3000	10 000	20 min @ 7.5 psi	30 min @ 15 psi(1 bar)
3500	11 000	20 min @ 7.5 psi	30 min @ 15 psi(1 bar)
4000	13 000	20 min @ 7.5 psi	Not suitable
4500	15 000	30 min @ 7.5 psi	Not suitable

If in doubt, refer to an expert – a doctor or a pharmacist.

GOOD-QUALITY "FRESHLY" DISTILLED WATER

"FRESHLY" distilled water is, by definition, only fresh the day it is distilled. If left over to the next day after distillation, it can be used only for washing and rinsing glassware, bottles, pipettes, etc., but NOT in the preparation of the drops themselves.

This means that the water still has to be turned on TWO HOURS before eye drop preparation starts, or there will be no FRESHLY DISTILLED WATER available to make up the drops.

ADJUSTMENT OF THE STILL OR DISTILLATION

It is important that the water still be accurately adjusted:

1. Turn on the water supply so that the water overflow is running freely.
2. Then switch on the electric power to start the heating.
3. The distilled water should start to flow after approximately 10 minutes, and **MUST NOT BE SO HOT AS TO INCLUDE STEAM.**
4. If steam is coming out WITH the distilled water, increase the flow of cooling water until the steam stops.
5. The first distilled water is for rinsing the collecting bottle; after that, collection of water for drop preparation can start.
6. If the column of the still is HOT all the way up, **INCREASE** the water flow through the still. The valve to adjust the water flow is at the bottom of the column, where water enters the still. To increase the flow, turn the valve (or tap) a quarter turn anti-clockwise.
7. If the column is COLD most of the way up, reduce the flow of water by turning the valve clockwise.

When you wish to stop distillation:

FIRST – TURN OFF ELECTRICITY.

Only then **REMOVE BOTTLE COLLECTING DISTILLED WATER.**

In some parts of Africa, a "reversed osmosis" method for producing high-quality water for intravenous use has been introduced. This has proved to be of acceptable quality for the preparation of eye drops – as long as it is "FRESH", i.e. used on the day of preparation.

COOLING TANK

In some places, the supply of running water is limited. In these situations, it is good to collect the overflow water in some form of "cooling tank" so that it can be circulated and re-used.

METHODS OF PREPARATION – ADDITIONAL DROPS

PRESERVATIVES

Commercially, many preservatives are used in the preparation of eye drops, although this variety is not really necessary. Each preparation has its particular advantages and disadvantages. For instance, Phenyl Mercuric Nitrate is incompatible with some drops; 50% m/V Benzalkonium Chloride is difficult to transport and measure accurately. It is therefore suggested that a standard preservative be used for **all** the eye drops that are suitable for local preparation; one that is both easy to use, inexpensive and stable.

CETRIMIDE fits this description, and is already available in most hospitals as a general antiseptic.

The STANDARD CETRIMIDE PRESERVATIVE suggested is a 0.5% solution containing 10 mg Cetrimide in 2 ml of solution.

Benzalkonium Chloride can also be used if you wish.

In this Update, a new method is given for the Standard Cetrimide Preservative solution. This will now be applied to all Method Sheets.

Also note that there can be different terminology for the buffer solution sodium phosphates:

Sodium Dihydrogen Phosphate formula NaH_2PO_4 (Anhydrous)

This is also called:

Sodium Acid Phosphate
Monobasic Sodium Phosphate
Sodium Dihydrogen Orthophosphate
Monosodium Phosphate
Natrii Phosphoricum Monobasicum
This must be the ANHYDROUS form

Disodium Hydrogen Orthophosphate Dihydrate ($\text{Na}_2\text{HPO}_4 \cdot 2\text{H}_2\text{O}$)

This is also called:

Dibasic Sodium Phosphate Dihydrate
Disodium Phosphate Dihydrate
Disodium Hydrogen Phosphate Dihydrate
Natrii Phosphas Dihydrate
Sorensen's Salt

SOME EXTRA PREPARATIONS

ANTIMICROBIAL AGENTS

Chloramphenicol is technically difficult to prepare and often prepared incorrectly. In addition, it is heat labile, and therefore cannot be sterilized by autoclaving. Unless the drops are stored in a refrigerator ALL THE TIME, they deteriorate fast. It is therefore suggested that Chloramphenicol be no longer prepared.

The suggested list of **antimicrobial eye drops** is as follows:

Gentamicin	0.3% eye drops
Gentamicin FORTE	1.5% eye drops
Neomycin	0.5% eye drops
Povidone Iodine	1% eye drops
Povidone Iodine	5% preoperative eye drop (which is also useful for skin preparation)

GENTAMICIN FORTE 1.5%

It has been included for the treatment of severe conjunctivitis and corneal ulcer. It is recommended to be given hourly until the infection is brought under control. Investigations have shown that, given intensively, the concentration of Gentamicin in the anterior chamber is the same as when Gentamicin is given subconjunctivally.

POVIDONE IODINE

This is such a strong antiseptic that it DOES NOT REQUIRE STERILIZATION. It is prepared either from povidone powder or from the 10% **aqueous** solution widely available as '**Betadine**'. It has a wide antimicrobial spectrum, and can be made up at the village level, using a dropper bottle that has been cleaned and boiled.

It is very stable, and can be stored at ambient temperatures, even in the tropics. Povidone 1% is effective as a prophylactic against gonococcal and other types of ophthalmia neonatorum. It is also a good drop for the routine treatment of 'conjunctivitis'.

Povidone Iodine 5% Solution can be used as a preoperative drop, put into the eye **once only** after the local anaesthetic has been given. It can also be used as a **skin preparation**. It is made up with freshly distilled water, and without any preservative.

CHLORHEXIDINE

Chlorhexidine is an antiseptic like Povidone Iodine. It may have limited antifungal properties, if no other antifungal preparations are available.

ANTIFUNGAL PREPARATIONS

Natamycin (pimaricin) is available as an ointment and as a drop. This is a broad-spectrum antifungal, and is a suitable first choice if the sensitivity of the fungal organism is not known.

Econazole drops 1% are an effective antifungal agent. It is available from various producers in South Asia.

Amphotericin B can be made from the I.V. preparation. It is effective against some fungi, but is also toxic to the corneal epithelium.

STOCK PRESERVATIVE

**CETRIMIDE STANDARD PRESERVATIVE
STOCK SOLUTION
CETRIMIDE 0.5%**

100 ml	
500	mg
1.25	g
100	ml

Cetrimide
Disodium Edetate
Freshly distilled water to total of:

500 ml	
2.5	g
6.25	g
500	ml

This solution contains:

Cetrimide:	500	mg	in	100	ml
	100	mg	in	20	ml
	10	mg	in	2	ml

METHOD

- **Complete** production record sheet
- **Weigh** Disodium Edetate and Cetrimide
- **Measure** about 80 ml or 400 ml freshly distilled water into a beaker
- **Add** Disodium Edetate, and stir until dissolved
- **Add** Cetrimide and stir gently until dissolved, avoiding making bubbles
- **Make up** to 100 ml or 500 ml after transferring to a measuring cylinder
- **Filter** in usual way
- **Dispense** into Stock Bottle and **LABEL**

STERILIZATION

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

ONCE OPENED USE WITHIN ONE MONTH, THEN DISCARD

LABEL

<p>..... Hospital</p> <p>CETRIMIDE 0.5% PRESERVATIVE Stock Solution</p> <p><i>Manufactured on:</i></p>
--

STOCK PRESERVATIVE

**BENZALKONIUM CHLORIDE STANDARD PRESERVATIVE
STOCK SOLUTION
BENZALKONIUM CHLORIDE 0.5% m/V**

100 ml	
1	ml
1.25	g
100	ml

Benzalkonium Chloride Solution 50% m/V
Disodium Edetate
Freshly distilled water to total of:

500 ml	
5	ml
6.25	g
500	ml

METHOD

- **Complete** production record sheet
- **Weigh** Disodium Edetate
- **Measure** the quantity desired of Benzalkonium Chloride 50% m/V, using a clean syringe for accuracy
- **Measure** about 80 ml or 400 ml freshly distilled water into a beaker
- **Add** Disodium Edetate and stir until dissolved
- **Add** Benzalkonium Chloride Solution and stir gently until completely mixed, avoiding making bubbles
- **Make up** volume to 100 ml or 500 ml after transferring to a measuring cylinder
- **Filter** in usual way
- **Dispense** into Stock Bottle and **LABEL**

STERILIZATION

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

SHELF-LIFE AND STORAGE

- Suggested date of expiry: 12 months from initial sterilization
- When stock solution bottle is opened and some solution used, it is recommended that the remainder be used within 1 month, or be re-sterilized.

LABEL

<p>..... Hospital</p> <p>BENZALKONIUM CHLORIDE 0.5% m/V</p> <p>Preservative</p> <p><i>Manufactured on:</i></p>

This can be used in all drops instead of the Cetrimide 0.5% preservative.

ANAESTHETIC EYE DROPS

TETRACAINE (AMETHOCAINE) EYE DROPS

0.5% m/V

100 ml	
500 mg	Tetracaine (Amethocaine) Hydrochloride
4 ml	Stock Solution Cetrimide 0.5%
100 ml	Distilled water to total of:

500 ml	
2500 mg	
20 ml	
500 ml	

METHOD

- **Complete** production record sheet
- **Weigh** Tetracaine HCl
- **Add** Cetrimide 0.5% Stock Solution to half the volume of distilled water and stir gently
- **Add** Tetracaine HCl and stir gently until dissolved
- **Make up** to full volume with freshly distilled water, stirring gently
- **Filter** by whichever method is available
- **Transfer** filtrate into a beaker
- **Pour** the filtrate into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

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

VIEW and **LABEL** after sterilization and cooling is complete.

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

<p>..... Hospital</p> <p>TETRACAINE EYE DROPS 0.5%</p> <p>Topical Anaesthetic</p> <p><i>Manufactured on:</i></p>
--

ANAESTHETIC EYE DROPS**LIDOCAINE EYE DROPS**
4% m/V

100 ml
4000 mg
4 ml
100 ml

Lidocaine Hydrochloride
 Stock Solution Cetrimide 0.5%
 Distilled water to total of:

500 ml
20 000 mg
20 ml
500 ml

METHOD

- **Complete** production record sheet
- **Weigh** Lidocaine Hydrochloride
- **Add** Cetrimide 0.5% Stock Solution to half the volume of distilled water and stir gently
- **Add** Lidocaine Hydrochloride and stir gently until dissolved
- **Make up** to full volume with freshly distilled water, stirring gently
- **Filter** by whichever method is available
- **Transfer** filtrate into a beaker
- **Pour** the filtrate into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

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

VIEW and **LABEL** after sterilization and cooling is complete.

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

<p>..... Hospital</p> <p>LIDOCAINE EYE DROPS 4%</p> <p>Topical Anaesthetic</p> <p><i>Manufactured on:</i></p>

Note: This drop is an alternative to Tetracaine.

ANTIMICROBIAL EYE DROPS**GENTAMICIN EYE DROPS 0.3% m/V**

100 ml	
*544	mg
7.5	ml
4.0	ml
1	g
100	ml

OR

Gentamicin Sulfate
 Gentamicin Injection 40 mg/ml
 Stock Solution Cetrimide 0.5%
 Sodium Metabisulfite
 Distilled water to total of:

500 ml	
*2720	mg
37.5	ml
20	ml
5	g
500	ml

* equivalent to 300 mg Gentamicin base

*equivalent to 1500 mg Gentamicin base

METHOD

- **Complete** production record sheet
- **Weigh** Gentamicin Sulfate (or draw up Gentamicin Injection) and weigh the Sodium Metabisulfite
- **Add** Cetrimide 0.5% stock solution to half the volume of distilled water and stir gently. Now add Sodium Metabisulfite and stir gently until dissolved (**CAUTION** – Avoid inhaling the fumes)
- **Add** Gentamicin and stir gently until dissolved
- **Make up** to full volume with freshly distilled water, stirring gently
- **Filter** by whichever method is available
- **Transfer** filtrate into a beaker
- **Pour** the filtrate into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

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

VIEW and **LABEL** after sterilization and cooling is complete.

SHELF-LIFE AND STORAGE

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

LABEL

<p>..... Hospital</p> <p>GENTAMICIN EYE DROPS 0.3%</p> <p>Topical Antibiotic</p> <p>Manufactured on:</p>
--

ANTIMICROBIAL EYE DROPS**GENTAMICIN FORTE EYE DROPS
1.5% m/V**

100 ml			500 ml
2.72 g	OR	Gentamicin Sulfate	13.6 g
37.5 ml		Gentamicin Injection 40 mg/ml	187.5 ml
4.0 ml		Stock Solution Cetrimide 0.5%	20 ml
1 g		Sodium Metabisulfite	5 g
100 ml		Distilled water to total of:	500 ml

METHOD

- **Complete** production record sheet
- **Weigh** Gentamicin Sulfate (or measure Gentamicin Injection) and weigh the Sodium Metabisulfite
- **Add** Cetrimide 0.5% Stock Solution to half the volume of distilled water and stir gently
- **Now add** Sodium Metabisulfite and stir gently until dissolved (**CAUTION** – Avoid inhaling the fumes)
- **Add** Gentamicin and stir gently until dissolved
- **Make up** to full volume with freshly distilled water, stirring gently
- **Filter** by whichever method is available
- **Transfer** filtrate into a beaker
- **Pour** the filtrate into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

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

VIEW and **LABEL** after sterilization and cooling is complete.

SHELF-LIFE AND STORAGE

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

LABEL

<p>..... Hospital</p> <p>GENTAMICIN FORTE EYE DROPS 1.5%</p> <p>Strong Topical Antibiotic</p> <p>Manufactured on:</p>

TOPICAL ANTIBIOTIC

NEOMYCIN 0.5% EYE DROPS

100 ml	
500	mg
1	g
4	ml
100	ml

Neomycin Sulfate
Sodium Metabisulfite
Stock Solution Cetrimide 0.5%
Distilled water to total of:

500 ml	
2.5	g
5	g
20	ml
500	ml

METHOD

- **Complete** production record sheet
- **Weigh** Sodium Metabisulfite and Neomycin Sulfate.
- **Add** Cetrimide 0.5% Stock Solution to half the volume of distilled water and stir gently
- **Add** Sodium Metabisulfite and stir gently until dissolved. (CAUTION – Avoid inhaling the fumes)
- **Add** the Neomycin Sulfate and stir gently until dissolved
- **Make up** to full volume with freshly distilled water, stirring gently
- **Filter** by whichever method is available
- **Transfer** filtrate into a beaker
- **Pour** the filtrate into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

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

VIEW and **LABEL** after sterilization and cooling is complete.

SHELF-LIFE AND STORAGE

- Best kept in refrigerator (2°C-8°C). Use within 12 months of date of manufacture
- If kept at room temperature (below 25°C), use within 3 months
- Once opened, use within 1 month

LABEL

<p>..... Hospital</p> <p>NEOMYCIN 0.5% EYE DROPS Topical Antibiotic</p> <p><i>Manufactured on:</i></p>
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ANTIMICROBIAL EYE DROPS**POVIDONE IODINE EYE DROPS****1% m/V**

100 ml	
10	ml
1	g
100	ml

OR

Povidone Iodine solution 10%
Povidone Iodine powder
Sodium Chloride solution 0.9% (normal saline) to total of:

500 ml	
50	ml
5	g
500	ml

METHOD

- **Complete** production record sheet
- **Measure** required amount of Povidone Iodine 10% solution (or Povidone Iodine powder)
- **Make up** to full volume with Sodium Chloride 0.9% solution, using standard IV normal saline, if available
- **Transfer** into a beaker
- **Pour** into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

- NOT REQUIRED as Povidone-Iodine is a strong antiseptic with a wide antimicrobial spectrum

SHELF-LIFE AND STORAGE

- If kept at room temperature (below 25°C), prepare freshly each month
- If kept in refrigerator (2°C–8°C): 6 months
- Once opened, use within 1 month

LABEL

<p>..... Hospital</p> <p>POVIDONE IODINE EYE DROPS 1%</p> <p>Topical Antimicrobial Drop</p> <p><i>Manufactured on:</i></p>
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Note: This drop is suitable as a prophylactic antimicrobial agent for prevention of Ophthalmia Neonatorum.

ANTIMICROBIAL EYE DROPS

POVIDONE IODINE EYE DROPS

5% m/V

FOR PREOPERATIVE USE

100 ml	
50	ml
5	g
100	ml

OR

Povidone Iodine solution 10%
Povidone Iodine powder
Sodium Chloride solution 0.9% (normal saline) to total of:

500 ml	
250	ml
25	g
500	ml

METHOD

- **Complete** production record sheet
- **Weigh** Povidone Iodine powder OR **Measure** required amount of Povidone Iodine 10% solution
- **Measure** about half the volume of Sodium Chloride solution 0.9% into a sterilized beaker
- **Add** the Povidone Iodine powder (or solution) and stir well until dissolved
- **Pour** the solution into a measuring cylinder and make up to full volume with distilled water
- **Filter** by whichever method is available
- **Transfer** filtrate into a beaker
- **Pour** the filtrate into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

- NOT REQUIRED, as povidone iodine is a strong antiseptic with a wide antimicrobial spectrum
- But it is important that all the equipment and bottles are as clean as possible, and sterilized just before use.

SHELF-LIFE AND STORAGE

- Expiry date: 6 months after date of manufacture.
- Once opened, use within 1 month

LABEL

<p>..... Hospital</p> <p>POVIDONE IODINE EYE DROPS 5%</p> <p>Preoperative Drop</p> <p><i>Manufactured on:</i></p>

Note: It is recommended that this drop be used as a preoperative skin preparation on the eye lids, and also as an eye drop before surgery.

STRONG TOPICAL STEROID**DEXAMETHASONE SODIUM PHOSPHATE EYE DROPS****0.1% m/V**

Prepared from Dexamethasone Sodium Phosphate Injection 5 mg/ml Ampoule
Dexamethasone 4 mg/ml

100 ml			500 ml
25 ml	Dexamethasone Sodium Phosphate Injection	125 ml	
1 g	Sodium Metabisulfite	5 g	
300 mg	Sodium Dihydrogen Phosphate	1.5 g	
4 ml	Stock Solution Cetrimide 0.5%	20 ml	
100 ml	Freshly distilled water to total of:	500 ml	

METHOD

- **Complete** production record sheet
- **Measure** required amount of Cetrimide 0.5% stock solution and add half the volume of distilled water, stirring gently
- **Weigh** Sodium Dihydrogen Phosphate and Sodium Metabisulfite (which should be handled with care) and dissolve, stirring gently
- **Draw up** required amount of Dexamethasone Sodium Phosphate Injection from ampoules and add to solution
- **Make up** to full volume with freshly distilled water in a measuring cylinder, stirring gently
- **Filter** by whichever method is available
- **Transfer** filtrate into a beaker
- **Pour** the filtrate into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

- **Steaming** in water bath at 100°C for 30 minutes.
AUTOCLAVING IS NOT RECOMMENDED. Excessive heat destroys Dexamethasone.

VIEW and **LABEL** after sterilization and cooling is complete.

SHELF-LIFE AND STORAGE

- Use within 6 months from date of sterilization
- **STORE IN REFRIGERATOR** in the **DARK**
- Once opened, use within 1 week

LABEL

<p>..... Hospital</p> <p>DEXAMETHASONE 0.1% EYE DROPS</p> <p>Strong Topical Steroid</p> <p>Manufactured on:</p>
--

USE WITH CAUTION

COMBINED TOPICAL ANTIBIOTIC/STEROID**DEXAMETHASONE SODIUM PHOSPHATE 0.1% m/V
combined with GENTAMICIN 0.3% m/V****EYE DROPS**

Prepared from Dexamethasone Sodium Phosphate Injection 4 mg/ml 2 ml Ampoules
and Gentamicin Injection 40 mg/ml 2 ml Ampoules

100 ml		500 ml
25 ml	Dexamethasone Sodium Phosphate Injection 4 mg/ml	125 ml
7.5 ml	Gentamicin Injection 40 mg/ml	37.5 ml
1 g	Sodium Metabisulfite	5 g
50 mg	Sodium Dihydrogen Phosphate	250 mg
2.25 g	Disodium Hydrogen Orthophosphate 2H ₂ O	11.25 g
4 ml	Stock Solution Cetrimide 0.5%	20 ml
100 ml	Freshly distilled water to total of:	500 ml

METHOD

- **Complete** production record sheet
- **Measure** the Cetrimide 0.5% stock solution and add to about half the volume of distilled water, stirring gently
- **Weigh** Sodium Dihydrogen Phosphate, Disodium Hydrogen Orthophosphate and Sodium Metabisulfite (which should be handled with care) and dissolve completely in the solution, stirring gently
- **Draw up** Dexamethasone Sodium Phosphate Injection and Gentamicin Injection from ampoules and add
- **Make up** to full volume with freshly distilled water in a measuring cylinder, stirring gently
- **Filter** by whichever method is available
- **Transfer** filtrate into a beaker
- **Pour** the filtrate into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

- **Steaming** in water bath at 100°C for 30 minutes.
AUTOCLAVING IS NOT RECOMMENDED. Excessive heat destroys Dexamethasone.

VIEW and **LABEL** after sterilization and cooling is complete.

SHELF-LIFE AND STORAGE

- Use within 6 months from date of sterilization
- **STORE IN REFRIGERATOR** in the **DARK**
- Once opened, use within 1 week

LABEL

<p>..... Hospital</p> <p>DEXAMETHASONE 0.1% with GENTAMICIN 0.3% - EYE DROPS Topical Steroid / Antibiotic</p> <p>Manufactured on:</p>

STEROID EYE DROPS**PREDNISOLONE EYE DROPS****0.1% 0.5% 1% m/V**

"Weak" 0.1%	
500	mg
1000	mg
1700	mg
20	ml
500	ml

"Normal" 0.5%	
2500	mg
1000	mg
1700	mg
20	ml
500	ml

Prednisolone Sodium Phosphate
 Dihydrogen Sodium Phosphate
 Disodium Hydrogen Orthophosphate 2H₂O
 Stock Solution Cetrimide 0.5%
 Distilled water to total of:

"Strong" 1.0%	
5000	mg
1000	mg
1700	mg
20	ml
500	ml

METHOD

- **Complete** production record sheet
- **Weigh** Dihydrogen Sodium Phosphate, Disodium Hydrogen Orthophosphate and the Prednisolone Sodium Phosphate
- **Measure** about 400 ml freshly distilled water into a beaker and add the Cetrimide 0.5% preservative stock solution, stirring gently
- **Add** the Dihydrogen Sodium Phosphate and Disodium Hydrogen Orthophosphate, stirring until dissolved
- **Add** the Prednisolone Sodium Phosphate and stir gently until dissolved
- **Pour** the solution into a measuring cylinder and make up to 500 ml with freshly distilled water
- **Filter** by whichever method is available
- **Transfer** filtrate into a beaker
- **Pour** the filtrate into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

- **Steaming** in water bath at 100°C for 35 minutes. **AUTOCLAVING MUST NOT BE USED.** Prednisolone decomposes at high temperatures.

VIEW and **LABEL** after sterilization and cooling is complete.

SHELF-LIFE AND STORAGE

- Keep in refrigerator (2°C–8°C), and use within 6 months from date of manufacture
- Once opened, use within 1 month

LABEL

<p>..... Hospital</p> <p>PREDNISOLONE EYE DROPS 0.5%</p> <p>Topical Steroid</p> <p>Manufactured on:</p>

Note: If possible, use different colour code or print to avoid confusing the various strengths of this drop. Of course it is always best to use the weakest effective strength of eye drop. For maintaining the anti-inflammatory effect, always try to use the 0.1% (weak) drop.

MYDRIATIC**ATROPINE EYE DROPS****1% m/V**

100 ml
1000 mg
4 ml
100 ml

Atropine Sulfate
 Stock Solution Cetrimide 0.5%
 Distilled water to total of:

500 ml
5000 mg
20 ml
500 ml

METHOD

- **Complete** production record sheet
- **Weigh** Atropine Sulfate
- **Add** Cetrimide 0.5% Stock Solution to half the volume of distilled water and stir gently
- **Add** Atropine Sulfate and stir gently until dissolved
- **Make up** to full volume with freshly distilled water, stirring gently
- **Filter** by whichever method is available
- **Transfer** filtrate into a beaker
- **Pour** the filtrate into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

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

VIEW and **LABEL** after sterilization and cooling is complete.

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

<p>..... Hospital</p> <p>ATROPINE EYE DROPS 1%</p> <p>Not for use in children</p> <p>Powerful Mydriatic</p> <p><i>Manufactured on:</i></p>

Note: Alternatively, atropine drops at 0.1% and 0.5% may be prepared for use in children, following the same procedure as above.

MYDRIATIC

CYCLOPENTOLATE EYE DROPS
1% m/V

100 ml		500 ml
1000 mg	Cyclopentolate Hydrochloride	5000 mg
1000 mg	Sodium Metabisulfite	5000 mg
400 mg	Disodium Hydrogen Orthophosphate 2H ₂ O (Dihydrate)	2000 mg
1 g	Citric Acid Anhydrous	5 g
4 ml	Stock Solution Cetrimide 0.5%	20 ml
100 ml	Distilled water to total of:	500 ml

METHOD

- **Complete** production record sheet
- **Weigh** Cyclopentolate Hydrochloride, Sodium Metabisulfite (which should be handled with care), Disodium Hydrogen Orthophosphate and the Citric Acid
- **Measure** Cetrimide 0.5% Stock Solution and add to half the volume of distilled water, stirring gently
- **Add** Sodium Metabisulfite, Disodium Hydrogen Orthophosphate and Citric Acid, stirring well
- **Add** Cyclopentolate Hydrochloride and stir gently until dissolved
- **Make up** to full volume with freshly distilled water, stirring gently
- **Filter** by whichever method is available
- **Transfer** filtrate into a beaker
- **Pour** the filtrate into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

- **Steaming** in water bath at 100°C For 30 minutes. **AUTOCLAVING IS NOT RECOMMENDED**, as the higher temperature will cause decomposition.

VIEW and **LABEL** after sterilization and cooling is complete.

SHELF-LIFE AND STORAGE

- If kept in refrigerator (2°C – 8°C), use within 6 months from date of sterilization
- Once opened, use within 1 month

LABEL

<p>..... Hospital</p> <p>CYCLOPENTOLATE EYE DROPS 1%</p> <p>Mydriatic</p> <p><i>Manufactured on:</i></p>

STRONG MYDRIATIC**PHENYLEPHRINE HYDROCHLORIDE EYE DROPS 10%**

100 ml		500 ml
10 g	Phenylephrine Hydrochloride	50 g
500 mg	Sodium Metabisulfite	2.5 g
200 mg	Sodium Dihydrogen Phosphate	1 g
4 ml	Stock Solution Cetrimide 0.5%	20 ml
100 ml	Freshly distilled water to total of:	500 ml

METHOD

- **Complete** production record sheet
- **Weigh** Phenylephrine Hydrochloride, Sodium Metabisulfite and Sodium Dihydrogen Phosphate
- **Add** Cetrimide 0.5% stock solution to half the volume of distilled water and stir gently with glass rod
- **Next add** Sodium Dihydrogen Phosphate and stir, then the Sodium Metabisulfite, stirring gently until dissolved (**CAUTION** – avoid inhaling the fumes)
- **Finally add** Phenylephrine Hydrochloride, and stir till dissolved
- **Make up** to full volume with freshly distilled water, still stirring gently
- **Filter** by whichever method is available
- **Transfer** filtrate into a beaker
- **Pour** the filtrate into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

- **Steaming** in water bath at 100°C for 30 minutes. **AUTOCLAVING IS NOT RECOMMENDED** as Phenylephrine has tendency to decompose on heating.

VIEW and **LABEL** after sterilization and cooling is complete.

SHELF-LIFE AND STORAGE

- Suggested expiry – 6 months from date of sterilization
- **STORE IN DARK** in refrigerator
- If a **RED** discoloration develops, **DISCARD**
- Once **OPENED**, use within 1 month

LABEL

<p>..... Hospital</p> <p>PHENYLEPHRINE HCl 10% EYE DROPS</p> <p>Strong Mydriatic</p> <p><i>Manufactured on:</i></p>

POWERFUL MYDRIATIC

MYDRIATIC COCKTAIL
CYCLOPENTOLATE 1% with PHENYLEPHRINE 10% EYE DROPS

100 ml		500 ml
1000 mg	Cyclopentolate Hydrochloride	5000 mg
10 g	Phenylephrine Hydrochloride	50 g
1000 mg	Sodium Metabisulfite	5000 mg
400 mg	Disodium Hydrogen Orthophosphate 2H ₂ O	2000 mg
1 g	Citric Acid Anhydrous	5 g
4 ml	Stock Solution Cetrimide 0.5%	20 ml
100 ml	Freshly distilled water to total of:	500 ml

METHOD

- **Complete** production record sheet
- **Measure** preservative solution and add half the volume of distilled water
- **Weigh** Citric Acid, Disodium Hydrogen Orthophosphate and Sodium Metabisulfite (which should be handled with care) and dissolve in the above solution
- **Weigh** Cyclopentolate and Phenylephrine and dissolve in the above
- **Make up** to full volume with freshly distilled water, stirring gently
- **Filter** by whichever method is available
- **Transfer** filtrate into a beaker
- **Pour** the filtrate into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

- **Steaming** in water bath at 100°C for 30 minutes
 AUTOCLAVING IS NOT RECOMMENDED as the higher temperature will cause decomposition.

VIEW and **LABEL** after sterilization and cooling is complete.

SHELF-LIFE AND STORAGE

- Suggested expiry – 6 months from date of sterilization
- **STORE IN REFRIGERATOR** in the **DARK**
- If a reddish colour develops, **DISCARD**
- Once opened, use within 1 month

LABEL

<p>..... Hospital</p> <p>CYCLOPENTOLATE 1% with PHENYLEPHRINE HCl 10% EYE DROPS Powerful Mydriatic</p> <p><i>Manufactured on:</i></p>
--

MIOTICS / ANTI-GLAUCOMA DROPS

PILOCARPINE EYE DROPS

2% m/V and 4% m/V

100 ml	2%	500 ml
2 g		10 g
4 ml		20 ml
100 ml		500 ml

Pilocarpine Hydrochloride
 Stock Solution Cetrimide 0.5%
 Freshly distilled water to total of:

100 ml	4%	500 ml
4 g		20 g
4 ml		20 ml
100 ml		500 ml

METHOD

- **Complete** production record sheet
- **Weigh** out Pilocarpine Hydrochloride, taking care – as Pilocarpine is poisonous
- **Add** Cetrimide 0.5% Stock Solution to half the volume of distilled water and stir gently
- **Add** Pilocarpine HCl and stir thoroughly until dissolved
- **Make up** to full volume with freshly distilled water, stirring gently
- **Filter** by whichever method is available
- **Transfer** filtrate into a beaker
- **Pour** the filtrate into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

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

VIEW and **LABEL** after sterilization and cooling is complete.

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

<p>..... Hospital</p> <p>PILOCARPINE EYE DROPS 2%</p> <p>Miotic and IOP Lowering Drop</p> <p><i>Manufactured on:</i></p>
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REMEMBER:

Filtration Surgery has been proved to be the most effective treatment in **Primary Open Angle Glaucoma**.
 Timolol drops are more effective than Pilocarpine in reducing IOP.
 Timolol drops are cheaper than 4% Pilocarpine.

BETA BLOCKER**TIMOLOL MALEATE 0.5% m/V EYE DROPS**

100 ml	
500	mg
400	mg
1.4	g
4	ml
100	ml

Timolol Maleate 0.5%
 Dihydrogen Sodium Phosphate
 Disodium Hydrogen Orthophosphate 2H₂O
 Stock Solution Cetrimide 0.5%
 Freshly distilled water to total of:

500 ml	
2.5	g
2.0	g
7.0	g
20	ml
500	ml

METHOD

- **Complete** production record sheet
- **Weigh** Timolol Maleate, Dihydrogen Sodium Phosphate and Disodium Hydrogen Orthophosphate
- **Add** required quantity of Cetrimide 0.5% Stock Solution to half the volume of distilled water and stir gently
- **Dissolve** Dihydrogen Sodium Phosphate and Disodium Hydrogen Orthophosphate in the solution
- **Add** the Timolol Maleate and dissolve
- **Make up** to full volume with freshly distilled water
- **Filter** by whichever method is available – sintered glass filter preferred
- **Transfer** filtrate into a beaker
- **Pour** the filtrate into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

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

VIEW and **LABEL** after sterilization and cooling is complete.

SHELF-LIFE AND STORAGE

- If kept at room temperature (below 25°C), use within 3 months from date of sterilization
- If kept in refrigerator at 2°C–8°C, use within 6 months
- Once opened, use within 1 month

LABEL

<p>..... Hospital</p> <p>TIMOLOL EYE DROPS 0.5%</p> <p>IOP Lowering Drop (Beta Blocker)</p> <p>Manufactured on:</p>

REMEMBER:

Filtration Surgery has been proved to be the most effective treatment in **Primary Open Angle Glaucoma**.

TOPICAL ASTRINGENT**ZINC SULFATE EYE DROPS
0.25% m/V**

100 ml	
250	mg
4	ml
100	ml

Zinc Sulfate
 Stock Solution Cetrimide 0.5%
 Freshly distilled water to total of:

500 ml	
1250	mg
20	ml
500	ml

METHOD

- **Complete** production record sheet
- **Weigh** out the Zinc Sulfate
- **Add** Cetrimide 0.5% Stock Solution to half the volume of distilled water and stir gently
- **Add** Zinc Sulfate to the solution
- **Make up** to full volume with freshly distilled water, stirring gently
- **Filter** by whichever method is available
- **Transfer** filtrate into a beaker
- **Pour** the filtrate into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

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

VIEW and **LABEL** after sterilization and cooling is complete.

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

<p>..... Hospital</p> <p>ZINC SULFATE EYE DROPS 0.25%</p> <p>Topical Astringent</p> <p><i>Manufactured on:</i></p>
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PROTECTIVE EYE DROPS**METHYLCELLULOSE EYE DROPS 1% m/V and 2% m/V**

100 ml	1%	500 ml
1 g		5 g
900 mg		4.5 g
4 ml		20 ml
100 ml		500 ml

Methylcellulose or Hypromellose (15-25mPas)
Sodium Chloride
Stock Solution Cetrimide 0.5%
Freshly distilled water to total of:

100 ml	2%	500 ml
2 g		10 g
900 mg		4.5 g
4 ml		20 ml
100 ml		500 ml

METHOD

- **Complete** production record sheet
- **Weigh** Sodium Chloride and Methylcellulose
- **Add** Cetrimide 0.5% Stock Solution to half the volume of distilled water and stir gently
- **Dissolve** the Sodium Chloride in the solution and heat this mixture in a beaker in a water bath
- **Place** Methylcellulose in a mortar, adding some of the hot solution, fully hydrating the Methylcellulose by stirring well
- **Transfer** the mixture to a measuring cylinder and rinse out the mortar with the remaining hot solution
- **Make up** to full volume with freshly distilled water, making sure that the Methylcellulose is completely hydrated. The mixture should be opalescent and viscous (sticky)
- **Allow** the solution to cool, stir thoroughly to mix. The solution thickens on cooling. The solution may need to be refrigerated overnight for the Methylcellulose to dissolve
- **Filtration** This mixture **CANNOT BE FILTERED** by methods available to you, so filtration should be OMITTED
- **Transfer** mixture into beaker
- **Pour** mixture into **PRE-STERILIZED** bottles up to the shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

- **Autoclaving** at 121–124°C for 15 minutes at 200 kPa (15 psi or 1 atmosphere above atmospheric pressure)
- After sterilization, **shake the bottles every 15 minutes** until cool, to make sure Methylcellulose stays fully mixed and hydrated.

VIEW and **LABEL** after sterilization and cooling is complete.

- FIBRES are likely to be visible, but can be ignored.

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

<p>..... Hospital</p> <p>METHYLCELLULOSE EYE DROPS 1%</p> <p>Protective Eye Drops</p> <p>Manufactured on:</p>

Note: The 2% drop is suitable for Gonioscopy and other "contact lens" examinations.

DIAGNOSTIC CORNEAL STAINS

FLUORESCEIN STRIPS FOR STAINING OF CORNEA

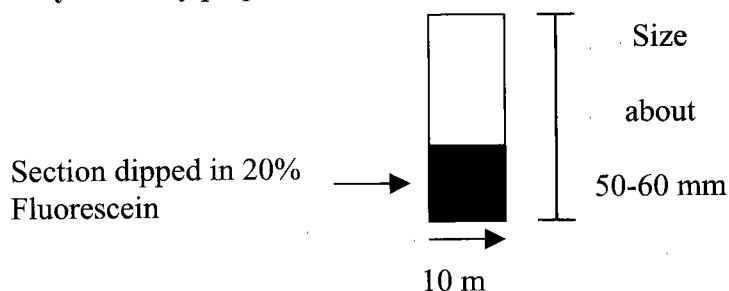
1. **Prepare Fluorescein Eye Drop 20% solution** as follows:

Fluorescein Sodium	2000 mg
Distilled water to total of:	10 ml

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

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

Autoclaving is not necessary if freshly prepared, dried, and stored in a **closed** container.



LABEL

..... Hospital
FLUORESCEIN STRIPS
<i>Manufactured on:</i>

ROSE BENGAL STRIPS

Rose Bengal Sodium can be substituted for Fluorescein Sodium to prepare **Rose Bengal Strips**.

Rose Bengal stains "devitalized" and "dried" conjunctival and corneal epithelial cells in "dry eye syndrome" etc.

MAST CELL INHIBITOR – ANTI-ALLERGIC**SODIUM CROMOGLYCATE EYE DROPS
2% m/V**

100 ml	
2	g
4	ml
100	ml

Sodium Cromoglycate
Stock Solution Cetrimide 0.5%
Distilled water to total of:

500 ml	
10	g
20	ml
500	ml

METHOD

- **Complete** production record sheet
- **Weigh** Sodium Cromoglycate
- **Add** Cetrimide 0.5% Stock Solution to half the volume of distilled water and stir gently
- **Add** Sodium Cromoglycate and stir gently until dissolved
- **Make up** to full volume with freshly distilled water, stirring gently
- **Filter** by whichever method is available
- **Transfer** filtrate into a beaker
- **Pour** the filtrate into **PRE-STERILIZED** bottles up to the bottle shoulder
- **Insert** the dropper
- **Screw** the caps on tightly by hand

STERILIZATION

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

VIEW and **LABEL** after sterilization and cooling is complete.

SHELF-LIFE AND STORAGE

- If kept at room temperature (below 25°C) use within 3 months
- If kept in refrigerator at 2°C–8°C, use within 12 months
- Once opened, use within 1 month

LABEL

<p>..... Hospital</p> <p>SODIUM CROMOGLYCATE EYE DROPS 2%</p> <p>Mast Cell Inhibitor Anti-Allergic</p> <p><i>Manufactured on:</i></p>
