FILTRATION

Unwanted particulate matter may be removed from solutions by the process of filtration. Filtration may be either fine or coarse. Whilst fine filtration is applicable for removing small particulate matter, coarse filtration is more suitable for the removal of larger particles. In coarse filtration, trace amounts of particulate matter are tolerable (for example in solutions for use on intact skin or solutions of disinfectants not intended for use on or in the body). Coarse filtration can easily be carried out using a cotton wool plug or gauze, well rinsed to remove loose fibres.

Fine filtration

For oral solutions and solutions for application to mucous membranes or broken skin, a higher degree of filtration is necessary. This fine filtration can be achieved with either filter papers or sintered glass filters. Many grades of filter papers are available: in the Whatmann® series range, three of the most useful filter types are number 1 (suitable for general filtration purposes for removal of medium particles), 50 (better if a particularly clean filtrate is required as it removes fine particles) and 54 (suitable for acid and alkaline solutions and removes coarse particles).

Sintered glass filters are rather expensive and require special cleaning and therefore are not universally available in practice. They are normally reserved for substances that attack filter paper such as potassium permanganate (due to oxidation) and zinc chloride (due to dissolution).

Adjustment to volume after filtration

It is preferable to add the solutions that are used to adjust the final volume through the filter. A suitable procedure is as follows:

- Wash through the filter with a little of the vehicle and discard
- Make the solution almost to volume and pass through the filter into a measure
- Rinse through the filter with sufficient vehicle to make the final volume
EPHEDRINE NASAL DROPS

Consider the following prescription:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Formula</th>
<th>Calculate amounts required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ephedrine hydrochloride</td>
<td>0.5 g</td>
<td></td>
</tr>
<tr>
<td>Chlorbutol powder</td>
<td>0.5 g</td>
<td></td>
</tr>
<tr>
<td>Sodium chloride powder</td>
<td>0.5 g</td>
<td></td>
</tr>
<tr>
<td>Purified water up to</td>
<td>100 mL</td>
<td></td>
</tr>
</tbody>
</table>

Prepare 100 mL of ‘Solution A’ (1 solution to be prepared between 4 students):

- Weigh 500 mg of chlorbutol powder on the balance
- Grind the chlorbutol powder in the mortar using the pestle
- Select a small conical flask with a suitable stopper
- Heat 100 mL of purified water to 60°C in an open conical flask. It is HIGHLY IMPORTANT to REMOVE the stopper BEFORE heating.
- Add the finely ground chlorbutol powder to the hot water.
• Quickly insert the stopper and swirl until dissolution is complete – examine the solution and make sure it is clear.
• Allow to cool and label the flask as ‘Solution A’.

Preparation of drops (every student must prepare the drops):

• Weigh the required amounts of ephedrine hydrochloride powder and sodium chloride powder.
• Grind these powders separately to a fine powder in the mortar using the pestle.
• Dissolve these fine powders in 5 mL of the ‘Solution A’ (ensure that ‘Solution A’ is cool). This is carried out by transferring the powders to the same mortar and adding the solution slowly, grinding with each addition.
• Continue grinding until dissolution is effected and transfer to a 10 mL measuring cylinder.
• Adjust to the required volume with the remainder of solution A. Use aliquots of the solution to rinse any remaining particles in the mortar.
• Filter the solution into the appropriate container using a filter paper within a funnel.
• Examine the solution for clarity, cap and label with a shelf-life of 14 days.

Attach copy of label here:

--------------------------------- 
--------------------------------- 
--------------------------------- 

Describe the container used for the final preparation

What is the indication for this preparation?
Why are the following included in the formulation?

i. Ephedrine hydrochloride

ii. Chlorbutol

iii. Sodium Chloride

Why was water heated to produce ‘Solution A’?

Why was it advantageous to use a conical flask with a stopper when preparing ‘Solution A’?

If you had to dispense the preparation in a different approved container, what would you have to ascertain (apart from stability issues)?

What is meant by the suffix ‘B.P.C. 1973’ after formula name?
What advice would you give to the patient when dispensing this prescription?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

What other ingredient can be considered if chlorbutol was not available?
________________________________________________________________________
________________________________________________________________________

What is the main factor affecting the preservative function in a solution and how would you check this?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Why is it so important that glassware is thoroughly cleaned before use? Apart from cleaning, what is also VERY important to ensure before using glassware?
________________________________________________________________________
________________________________________________________________________
Consider the following prescription:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Formula</th>
<th>Calculate amounts required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorinated Lime</td>
<td>12.5 g</td>
<td></td>
</tr>
<tr>
<td>Boric Acid powder</td>
<td>12.5 g</td>
<td></td>
</tr>
<tr>
<td>Purified water up to</td>
<td>1000 mL</td>
<td></td>
</tr>
</tbody>
</table>

Preparation:

1. Weigh the required amount of chlorinated lime and boric acid powder
2. Reduce the chlorinated lime to a fine powder using and mortar and pestle and triturate it with sufficient water to form a paste, then add a further portion of the water
3. Grind the boric acid powder to a fine powder using a clean mortar and pestle
4. Add the boric acid to the solution, triturate well, and add some more water
5. Transfer the contents to a measuring cylinder and make up to the required volume with water. Add the water in aliquots, using each aliquot to rinse the mortar of any residue prior to addition to the measuring cylinder.

6. Allow the solution to stand and filter the solution prior to bottling.

7. Examine the solution for clarity, cap and label with a shelf-life of 14 days.

**Attach copy of label here:**

What is the use of the preparation?
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

What storage conditions are most appropriate for the preparation and why?
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

What advice would you give to the patient when dispensing the preparation?
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
GENERAL QUESTIONS ON COMPOUNDING OF SOLUTIONS

1. Mention three compounding techniques that could be used to aid dissolution of powders?
   ___________________________________________________ _____________________
   ___________________________________________________ _____________________
   ___________________________________________________ _____________________

2. Mention two principles of good practice that are of crucial importance towards minimising microbial contamination of solutions?
   ___________________________________________________ _____________________
   ___________________________________________________ _____________________
   ___________________________________________________ _____________________
   ___________________________________________________ _____________________

3. Extemporaneous compounding requires a thorough examination of the resulting solution prior to signing off the release. What suitable parameters would you check for?
   ___________________________________________________ _____________________
   ___________________________________________________ _____________________
   ___________________________________________________ _____________________
   ___________________________________________________ _____________________
   ___________________________________________________ _____________________

4. List three stability parameters that must be considered when determining stability of a preparation?
   ___________________________________________________ _____________________
   ___________________________________________________ _____________________
   ___________________________________________________ _____________________

5. Why are plastic bottles nowadays being used more (than they were used in the past) for pharmaceutical solutions?
   ___________________________________________________ _____________________
   ___________________________________________________ _____________________
6. Water is the most common vehicle found in pharmaceutical solutions. Give 3 other vehicles commonly used in pharmaceutical solutions

___________________________________________________ _____________________
___________________________________________________ _____________________
___________________________________________________ _____________________

7. Which routes are commonly identified with the administration of solutions?

___________________________________________________ _____________________
___________________________________________________ _____________________
___________________________________________________ _____________________

8. Glucose is used as a 5% w/v solution in water for intravenous fluids. What amount of glucose has been administered to a patient who has received 2 litres of this i.v. fluid?

Calculations:

9. Pholcodine Linctus contains pholcodine 5 mg/5 mL and citric acid monohydrate 1% w/v in a suitable flavoured vehicle.
   i. What is the percentage of pholcodine in this product?
   ii. What amount of citric acid monohydrate would be administered to the patient with each 5 mL dose?

Calculations:

<table>
<thead>
<tr>
<th>Demonstrator Name</th>
<th>Signature</th>
<th>Mark</th>
</tr>
</thead>
</table>