Practical 7

• Compounding gels
  • Some gels are as clear as water in appearance and others are turbid – ingredients may not be molecularly dispersed or may form aggregates, which disperse light.
  • Concentration of gelling agent – generally < 10%, usually 0.5 to 5.0% w/w.

Carbomer Gel

• In water – wets very rapidly – tends to form clumps when added haphazardly to polar solvents.
• As the surface of clumps solvate a layer is formed which prevents rapid wetting of the interior of the clumps.

Prepare 20 g of an oral gel, using Carbomer as the base, containing chlorhexidine gluconate 1% w/w

• Use pre-weighed beaker
• Check solubility of chlorhexidine gluconate
• Dissolve chlorhexidine gluconate in water
  – First: figure out roughly how much water you will be using in total
• Add powder very slowly into the vortex of rapidly stir red liquid – prevent clumping by slowly sprinkling over rapidly agitated water.
• Place beaker in incubator at 37°C for 30 minutes to ensure complete hydration - Stir occasionally
• Add the neutralising agent as a 10% solution with slow stirring. The neutralizer results in thickening of the gel.
• Adjust to weight with water.
  – Note: Make an excess e.g. 5g excess (for 20g of gel)
• Transfer to final container.

Note: Neutralising agents

• Sodium hydroxide can be used in carbomer dispersions containing less than 20% alcohol:
  – 400mg per 1g of carbomer
• Triethanolamine will neutralise dispersions containing up to 50% ethanol
  1g triethanolamine ≡ 7ml 1M HCl ≡ 7ml 1M NaOH
  1M NaOH: 40g in 1000ml
  280mg in 7ml
  1g triethanolamine ≡ 280mg NaOH
  357mg triethanolamine ≡ 100mg NaOH

Cellulose Derivatives

To be used in today’s practical:

• Methylcellulose high viscosity
• Methylcellulose low viscosity
• Hypromellose (hydroxypropyl methylcellulose)
• Sodium carboxymethylcellulose high viscosity
• Sodium carboxymethylcellulose low viscosity

Each student will use one cellulose gelling agent at a particular concentration - as assigned

Method (1): for methylcellulose

• Use pre-weighed beaker
• Disperse the powdered gelling agent with high shear in about ⅓ the required amount of hot water (80-90°C): A
• Dissolve lignocaine hydrochloride and suitable preservative in minimum amount of water: B
• Add solution B to A and stir to ensure homogeneity
• Add most of the remainder of the water to A as cold water or ice with moderate stirring.
• Adjust to the required final weight (25 g) with water.
Method (2): for NaCMC and Hypromellose

- Use pre-weighed beaker
- Disperse the powdered gelling agent in about \( \frac{1}{3} \) to \( \frac{1}{2} \) the required amount of water (cold) with high shear (to prevent clumping): A
- Sit A on waterbath for 30 minutes, stirring regularly
- Dissolve lignocaine hydrochloride and suitable preservative in minimum amount of water: B
- Add solution B to A and stir to ensure homogeneity
- Adjust to the required final weight (25 g) with water.

Suitable Preservatives

- Benzalkonium chloride 0.01-0.02% w/w
- Chlorhexidine acetate 0.02% w/w
- Benzoic acid 0.1-0.2% w/w
- Sodium benzoate 0.1-0.2% w/w
- Chlorocresol 0.05-0.2% w/w
- Methylparaben 0.02-0.3% w/w
- Propylparaben 0.01-0.6% w/w

What to do with insoluble ingredients:

- Dissolve in co-solvent: ethanol, propylene glycol
- Mix with powdered gelling agent
- (The addition of alcohol to prepare carbomer gels may decrease their viscosity and clarity).
- If triturated required:
  Triturate with water, suitable solvent or gelling agent

Dithranol Paste containing 0.1% w/w dithranol Mitte 25 g

- N.B. Dithranol is a powerful irritant – keep away from eyes and tender parts of the skin
- Use the disposable gloves provided
- Dithranol stains skin, hair, fabrics, plastic and enamel

DEFINITION

- Dithranol Paste contains Dithranol in a suitable hydrophobic basis containing 24% w/w each of Zinc Oxide and Starch and 2% w/w of Salicylic Acid.

Extemporaneous preparation

- The following formula and directions apply.

<table>
<thead>
<tr>
<th>Material</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dithranol</td>
<td>1 g, or a sufficient quantity</td>
</tr>
<tr>
<td>Zinc and Salicylic Acid Paste</td>
<td>Sufficient to produce 1000 g</td>
</tr>
</tbody>
</table>

- Mix the Dithranol with a portion of the Zinc and Salicylic Acid Paste until a smooth, even dispersion is obtained and gradually incorporate the remainder of the Zinc and Salicylic Acid Paste

For 1000 g

- Dithranol 1 g, or a sufficient quantity
- Zinc and Salicylic Acid Paste Sufficient to produce 1000 g

For 30 g (5 g excess)

- Dithranol 30 mg (0.03 g)*
- Zinc and Salicylic Acid Paste Sufficient to produce 30 g (i.e. 29.97 g)

* Can’t weight less than 50 mg – triturated required
Suggested approach

- Make up 31 g of Zinc and Salicylic Acid Paste
- This will be used to make up your dithranol paste and for trituration of your dithranol
- Trituration:
  - Weigh 60 mg dithranol
  - Mix with 440 mg of Zinc and Salicylic Acid Paste
  - Take half of this mix, i.e. 250 mg (which will contain the required amount of dithranol, 30 mg)
- Add the 250 mg triturate to (30-0.25) g paste, i.e. 29.75 g of paste

Zinc and Salicylic Acid Paste B.P.

- DEFINITION
  - For 31 g
  - Zinc Oxide, finely sifted 240 g 7.44 g
  - Salicylic Acid, finely sifted 20 g 0.62 g
  - Starch, finely sifted 240 g 7.44 g
  - White Soft Paraffin 500 g 15.5 g

- Extemporaneous preparation
  - The following directions apply.
  - Melt the White Soft Paraffin, incorporate the Zinc Oxide, the Salicylic Acid and the Starch and stir until cold.
  
  Note: melt the WSP in an evaporating dish NOT in a beaker!

  - 0.44 g of the prepared paste will be used for your trituation and a further 29.75 g to make up the final dithranol paste.