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PHARMACEUTICS

B. PHARMACY SEM-I

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UNIT : 3

- Monophasic liquids : Definitions, and preparation of Gargles , Mouthwashes , Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs , Liniments and Lotions .

- Biphasic Liquids :

Definition

- Suspensions : Definitions, advantages and disadvantages, classifications, Preparation of suspensions ; Flocculated and Deflocculated suspension and stability problems and methods to overcome .
- Emulsions : Definition , classification , emulsifying agent, test for the identification of type of Emulsion, methods of preparation and stability problems and methods to overcome .

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Monophasic Liquid

• Definitions and Preparations of

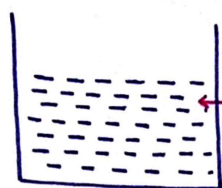
- Mouthwashes
- Gargles
- Elixirs
- Syrups
- Enemas
- Nasal Drops
- Eardrops
- Lotions
- Liniments
- Throat Paint

Q.WHAT ARE MONOPHASIC LIQUIDS?

- Monophasic liquids are liquids that consist of a single phase, meaning they are uniform throughout without any separation or distinction between different components.
- In a monophasic liquid, the components are dissolved or mixed together in such a way that they form one homogeneous phase.

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← consists of
single phase

OR They are
uniform

→ Here component
are dissolve
in such a way
that they form
a Homogenous
Phase.

• GARGLES

- Gargles are aqueous solutions used to prevent or treat infection.
- They are usually available in concentrated form with direction for dilution with warm water for use.
- They are brought into intimate contact with mucous membrane of throat and allowed to remain in contact with it for few seconds, before they are thrown out of mouth.
- They are used to relieve soreness in mild throat infection.
- Phenol or thymol is used as antibacterial agent in gargles. Phenol or thymol may be present in low concentrations which exert mild anesthetic effect.
- Gargling is used to treat or prevent throat infections, while mouthwash is used to freshen breath, prevent cavities, and fight gum disease.

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For example : Phenol gargle, $KClO_3$ gargles

- STORAGE : Gargles should be dispensed in clean, fluted glass bottles. Colored bottles are required to be used if gargles need protection from sunlight.

- Labelling :

For EXTERNAL USE ONLY , NOT TO BE SWALLOWED .

- Formula : Phenol gargle Rx

- Phenol glycerin - 5ml
- Amaranth solution - 1ml
- Purified water - q.s. to 100ml

- This gargle may be prepared by mixing amaranth solution (1% w/v in chloroform water) with a small quantity of water and adding Phenol glycerin (16% w/w phenol and 84% w/w glycerin) to it.

- The solution is stirred and made up to volume with purified water. The gargle is meant to be diluted with equal quantity of warm water before use.

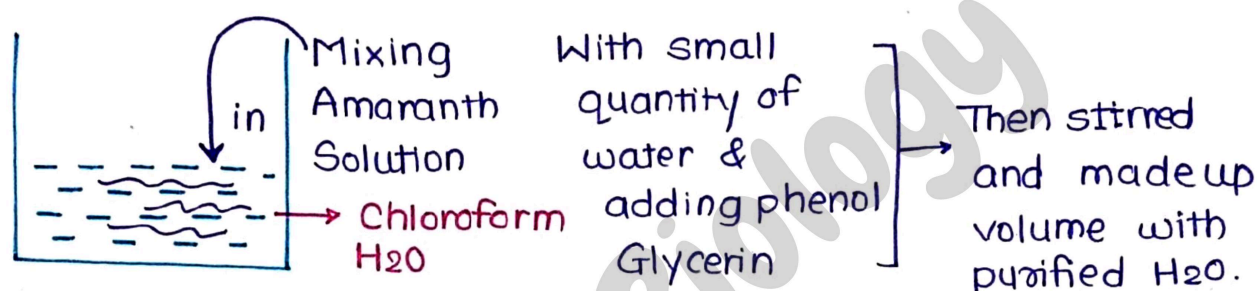
- USES : Antibacterial effect , astringent effect , mild anaesthetic effect.



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- Warning: Read the instructions on the label carefully.
Avoid contact with eyes, nose etc.
- Storage:
 - Store at room temperature.
 - Keep out of the reach of children.
 - Store away from direct sunlight, heat and moisture.



MOUTH WASH

- These are aqueous solutions with a pleasant taste to clean, deodorize the buccal cavity.
- Mouthwashes have refreshing, antiseptic and antibacterial activity and prevent Halitosis. [Bad odour from mouth].
- They may also contain alcohol, glycerin, synthetic sweeteners, surfactants, flavouring and coloring agents.
- For Example: Compound sodium chloride mouth wash, zinc chloride mouth wash, Fluoride mouth wash.
- Storage: Keep in cool and dry place, Dispense in clear, Fluted bottles.

Labeling: FOR EXTERNAL USE ONLY.

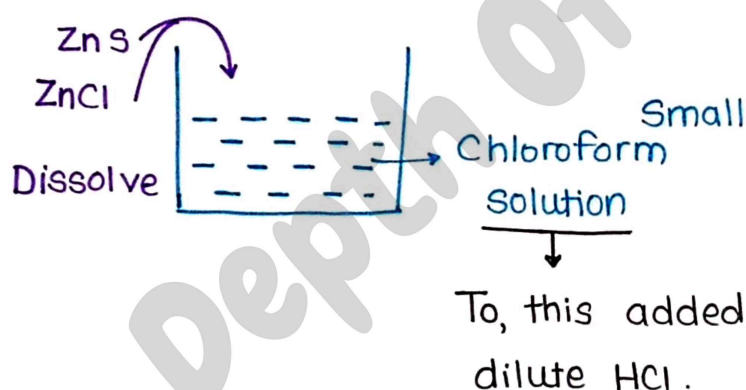
Proper prescription for diluting the mouthwash use.

Image

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- Formula : R_x
- Zinc sulphate and zinc chloride mouth wash →
- Zinc sulphate - 20 g
- Zinc chloride - 10 g
- Dilute hydrochloride acid - 10 ml
- Compound tartrazine solution - 10 ml
- Chloroform water to produce - 1000 ml
- The preparation may be made by dissolving zinc sulphate and zinc chloride in small quantity of Chloroform solution.




- To this is added dilute hydrochloric acid and compound tartrazine solution and the final volume is made up with water.
- Zinc sulphate and Zinc Chloride included in the preparation acts as astringents. Chloroform water acts as flavouring agent and preservative while tartrazine serves as the color.

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- Zinc sulphate usually contains a small quantity of oxychloride which may make the solution turbid. This however disappears on addition of dilute Hydrochloric acid.

THROAT PAINT

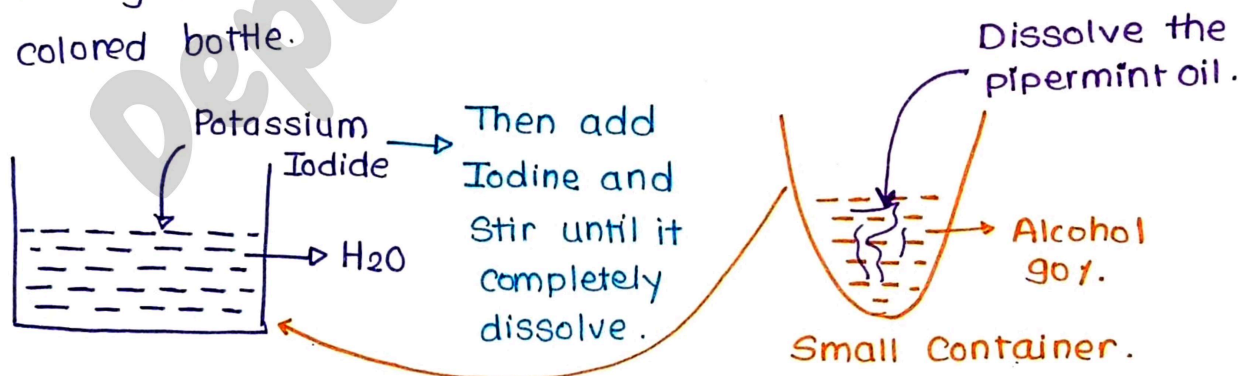
- Solution or dispersion of one or more active agents.
- Throat paints are "viscous liquid preparations used for mouth and throat infections."  one or more Active Agent.
- Glycerin is commonly used as a base because being viscous it adheres to mucous membrane for a long period.
- Glycerin prolongs the action of medicaments.
- Glycerin also provides sweet taste to preparation.
- FOR EXAMPLE : Boro-glycerin, Phenol glycerin throat paint.
- STORAGE : Throat paint should be stored in airtight container and in cool place.
- Labelling : For External USE ONLY.
- Not to be swallowed.
- Formula: R_x
- Potassium iodide - 2.5gm
- Iodine - 1.25gm



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- Alcohol - 4ml
- Water - 2.5 ml
- Peppermint oil - 0.4 ml
- Glycerine - 100 ml
- Dissolve the potassium iodide in water. Add the iodine and stir until completely dissolved.
- Dissolve peppermint oil in alcohol 90%. In a small container and transfer it into iodine solution.
- Transfer paint into a measuring cylinder and make up the volume to q.s. (Latin word) → Enough amount.
- Paint are applied with soft brush.
- **Packing**: A wide mouth, fluted, light resistant, screw cap glass bottle is used and dispensed in amber colored bottle.



• **EAR DROPS**

- Ear drops are liquid preparations meant for instillation into the ear. In these preparations, the drug is usually dissolved or suspended in a suitable solvent

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such as propylene glycol, polyethylene glycol, glycerol, alcohol and water or a mixture of these.

- Aqueous vehicle is generally not preferred because the secretions in the ear are fatty in nature and as such these do not easily mix with water.

- Ear drops are generally used for their cleansing, pain relieving and antiseptic actions. The main classes of drugs include analgesics like benzocaine, antibiotics like neomycin and chloramphenicol and anti-inflammatory agents such as cortisone and dexamethasone.

image.

- Wax softening agents include hydrogen peroxide and sodium bicarbonate. Ear drops are usually supplied in amber coloured, glass bottles with a treat and dropper closure or plastic squeeze bottles.
- Example: Chloramphenicol Ear Drops
- Chloramphenicol - 5g
- Propylene glycol q.s. to 100ml.
- Chloramphenicol ear drops may be prepared by dissolving Chloramphenicol in sufficient quantity of Propylene glycol and finally making up the final volume with it.

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NASAL DROPS

- Nasal drops are liquid preparations intended for instillations into the nostrils usually with the help of a dropper. Nasal drops are mostly based on aqueous vehicles although oily drops (containing liquid paraffin of suitable viscosity) are not uncommon.
- Oily vehicles are generally not preferred since the oil may retard the ciliary action of the mucosa and may even cause lipid pneumonia if drops of the oil enter the lungs. Nasal drops are generally formulated to resemble the nasal secretions as closely as possible.
- Thus, these are usually isotonic and slightly buffered to maintain a pH of 5.5 to 7.5. Additionally, the preparation is made slightly viscous with the help of thickening agents like methyl cellulose to match its viscosity with that of the nasal secretions.
- Commercial nasal preparations usually contain decongestants, antibiotics, anti-histamines and drugs for asthma prophylaxis. [Treatment for Prevention].
- Examples include Ephedrine Nasal drops,

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- Ephedrine Hydrochloride - 0.5g
- Chlorbutol - 0.5g
- Sodium Chloride - 0.5g
- Purified water q.s to 100ml
- The drops may be prepared by first dissolving Chlorobutol in small quantity of hot water followed by cooling the solution to room temperature.
- Other ingredients are then dissolved in the solution, which is filtered and the final volume is made up with water. These drops are used as decongestants with Ephedrine acting as the active medicament.
- Chlorobutol acts as the preservative while Sodium chloride is added to make the solution iso-osmotic with nasal secretions.

NASAL SPRAY

- Nasal sprays are suspensions or solution of drugs intended for spraying in to the nostrils.
- The chief uses of nasal sprays are to relieve nasal congestion and inflammation and to treat infections. They are intended to be retained in the nasal tract, they are usually viscous and coarse since fine

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droplets tend to penetrate further in to the respiratory tract.

- These preparations are usually supplied in pressurized containers or plastic squeeze bottles.

Image

ENEMAS

- Bowel movement stimulate [in case of constipation or before operation].
Softening the stool
- Enemas are liquid preparations meant to be introduced into the rectum for cleansing, therapeutic or diagnostic purposes.
- Evacuation enemas are rectal injections employed to evacuate the bowel in constipation or before an operation . e.g. Enema of soap , Sodium phosphate enema , Olive and arachis oil enema , etc.
- Enemas can be important for a number of reasons, including :
- Treating constipation : Enemas can soften stool and help relieve constipation , especially when lifestyle changes haven't worked.

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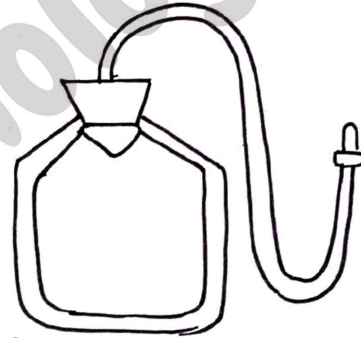
- Treating fecal impaction

Enemas can help remove large, hard lumps of stool that get stuck in the colon.

- Preparing for surgery or a colonoscopy

Enemas can help clear out stool before a colon or rectal surgery or a colonoscopy, which can reduce the risk of infection and help medical provider get a clear view.

- Large volume enemas are administered from a douche can and should be warmed to body temperature before use.



- Small volume enemas are available in polyethylene or polyvinylchloride bags sealed to a rectal nozzle and these are more convenient for personal administration since the patient has simply to insert the nozzle and squeeze the bag.

SYRUPS

- Syrups are sweet viscous concentrated aqueous solution of sucrose in purified water.
- ✓ Simple syrup I.P contains 66.7% w/w sucrose in purified water (100ml)

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- Simple syrup USP contains 85% w/v sucrose in purified water (100 m).
 - Medicated Syrup :
Contains a therapeutic or medicinal agent.
eg. Cough syrup.
 - Flavoured Syrup :
Contains flavouring agent but no medicinal substances
e.g. Cherry syrup.
1. Syrup retards oxidation because it is partly hydrolyzed into its reducing sugar such as laevulose & Dextrose.
 2. It prevents decomposition of vegetable substances. Syrup has high concentration of sugar having high osmotic pressure which prevents the growth of bacteria, fungi, microbes. It acts as a self preservative.
 3. They are palatable due to the sweetness of sugar. It is a valuable vehicle for the administration of nauseous and bitter substances.
 4. Syrups are good demulcents and soothing agents and hence they are of special value in cough syrup.
 5. Syrups have good patient compliance.

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- Concentration of sucrose in sugar based syrup is very important. A dilute solution may lead to growth of micro-organisms whereas saturated solution may lead to crystallization of some part of sucrose.
- Both syrup concentrations as per IP and USP gives stable syrup. Syrup containing various concentrations of sucrose needs antimicrobial preservative.

• **METHOD OF PREPARATION**

- The choice of particular method depends on the physical and chemical characteristics of the substance being used.

1. HOT PROCESS -

- This method is used when active constituents is neither volatile nor heat labile.

• PROCEDURE :

- Weighed sucrose is taken in beaker.
- Purified water is added.
- Heated on water bath (less than 70°C) till a solution is obtained.
- Product is filtered.
- Volume is made upto q.s.
- Excessive heat may leads to inversion of sucrose.

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2. PERCOLATION

- Sucrose is placed in percolator.
- Water is passed through sucrose slowly.
- Neck of percolator is packed with cotton.
- Rate of percolation regulates rate of dissolution.
- After complete dissolution final volume is made upto q.s.

3. AGITATION WITHOUT HEAT

- Procedure for heat labile constituents.
- Sucrose and other ingredients are weighed properly.
- Dissolved in purified water.
- Kept in a bottle of about twice the volume of syrup followed by continuous agitation.
- Prepared syrup volume is made upto q.s.

4. Addition of Medicating or Flavoring Liquid to Syrup.

- This method is used when fluid extracts, tinctures or the other liquids are to added to syrup.
- Alcohol is added to dissolve the resinous or oily substances.
- Alcohol acts as a preservative also.
- Formulation of Syrup.

1. Vehicle : Syrups are prepared by using purified water.

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2. Adjuncts: The following adjuncts are generally added to improve the formulation of syrup.
- Chemical Stabilizers: Glycerin, sorbitol, propylene glycol is added in small quantity to syrup to prevent the crystallization.
 - Coloring agent: Many Syrups are attractively coloured with coal tar dyes such as amaranth, compound tartazine and Greens.
 - Flavouring agents:
 - i. Tinctures: Lemon & ginger tincture.
 - ii. Fruit juice: Cherry, Raspberry.
 - iii. Essence: Vanilla, orange.
 - Preservatives: Syrups are self preservative. Generally, Benzoic acid, Sodium benzoate, Methyl paraben, etc.
 - Storage: Stored in well dried, completely filled & well stoppered bottle in a cool dark place. Store at a temperature not exceeding 25°C.

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ELIXIR

- Elixirs are defined as clear, aromatic, sweetened, hydro alcoholic liquids intended for oral use.
- They provide a palatable means of administering potent or nauseous drugs.
- Are less sweet and less viscous than syrup may contain less or no sucrose.
- More stable than syrups and hence preferred over syrup.
- Contain 4-40% of alcohol (ethanol).
- They may contain glycerin and syrup for increasing the solubility of medicaments or for sweetening purpose.
- Elixirs may also contain suitable flavouring and colouring agents.
- Preservatives are not needed in elixirs as alcohol content is sufficient to act as preservative.

TYPES

- Non-medicated: Does not contain medicament & used as flavouring agent.
For example: Aromatic elixir.

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- Medicated :

Which content has a potent drug such as antibiotics, antihistamines, sedatives.

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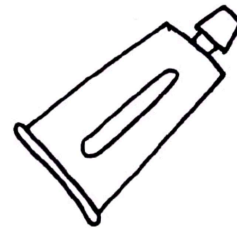
- **METHOD OF PREPARATION**

- Elixirs are prepared by simple dissolution with agitation or by mixing two or more liquids.
- Ingredients are dissolved in their respective solvents. For example alcohol soluble ingredients in alcohol and water soluble in water..
- Alcoholic strength is maintained by adding the aqueous solution to the alcoholic solution.
- The mixture is then made up to the desired volume (q.s).
- At this stage the product may not be clear due to separation of some of the flavouring agent because the alcoholic strength is reduced.
- Then elixir allowed to stand for some time here the oil globules starts precipitating.
- Then elixir is filtered.
- Talc can be added to absorb the excess of oils.
- Filtration gives clear product.

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FORMULATION OF ELIXIR



1. Vehicles :

The elixirs are usually prepared by using water, alcohol, glycerin, sorbitol, and propylene glycol. Certain oils are easily soluble in alcohol where alcohol is used as cosolvent. 30-40% of alcohol may be used to make a clear solution.

2. Adjuncts :

a) Chemical stabilizer : The various chemicals or special solvents are used in many elixirs to make suitable elixir.

Eg. For neomycin elixir- citric acid is added to adjust pH.

b) Colouring agent : Amaranth, compound tartrazine dyes are used for coloring purpose.

c) Flavouring agent : Black current syrup, raspberry Syrup, lemon Syrup, etc.

d) Preservatives : Alcohol 20% or more propylene glycol or glycerol as a vehicle is used as preservative. Chloroform desirable strength, benzoic acid may also be used.

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- Container: Elixirs are dispensed in well filled, well closed air tight or glass bottles having screw caps.
- Storage: Store in cool and dry place, protected from sunlight.
- Formula Rx

Lemon oil	0.025 ml
Syrup	375 ml
Talc	30 gm
Purified water	q.s to 1000 ml.

SYRUPS → Mainly used as a vehicle	ELIXIRS → Mainly used to formulate potent drug
1. Concentration aqueous solution of sucrose.	1. Clear, hydroalcoholic liquid.
2. Vehicle is mainly purified water.	2. Vehicle is mainly alcohol & water.
3. It is of 3 types - 1) medicated 2) Non-medicated 3) Flavoured.	3. It is of 2 types - 1) Medicated 2) Non-medicated.
4. More viscous than elixir.	4. Less viscous than syrups.
5. Not a clear solution	5. Brilliantly clear solution.
6. There is no need of preservative in simple syrup.	6. It requires preservatives.
7. Contain 66.7% w/w sucrose in simple syrup IP and 85% w/v in simple syrup USP. Mainly used as vehicle.	7. There is no conc. found in elixir. Mainly used to formulate potent drug.

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• **LINIMENT** → Balm → Not apply on Broken skin

- Liquid or semi-liquid preparation meant application to the skin.
- The liniments are usually applied to the skin with friction and rubbing of skin (on the affected area).
- The liniment may be alcoholic or oily solution or emulsion. In alcoholic preparation, alcohol helps in the penetration of medicament to the skin and also increases its counter irritant effect and rubefacient action.
 - irritation at site of action & produce relief.
 - Cause redness & felling warm
→ Due to cutaneous vasodilation.
- In oily liniments, arachis oil is commonly used which spreads more easily on the skin.
- Some lubricants may contain soap which helps in easy application of liniment on skin.
- Liniment should not be applied on broken skin because it may cause excessive irritation.
- Liniment contain medicament possessing analgesic action, rubefacient, counterirritant properties and applied in joint pain, muscle pain, etc.
- Should be dispensed in coloured fluted bottle.
- Labelling : FOR EXTERNAL USE ONLY
- Storage : Stored in tightly closed container.
- Formulation : Turpentine liniment.

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Soft soap	9 gm
Camphor	5 gm
Turpentine oil	65 ml
Purified water	q.s. to 100ml.

- Note : Rubefacient: Dilates blood vessels .
- Counter irritant : Causes superficial inflammation to cure deep inflammation.

LOTION

Skin care: Astringents can be used to remove excess oil from oily skin. However, they may not be enough to treat acne, which is caused by oil deeper in the pores.

- Lotions are liquid preparations meant for external use without friction.
- They are applied direct to the skin with the help of some absorbent material, such as cotton wool, gauze soaked in it.
- You should not apply lotion directly to broken skin:
- Preservatives: Lotions contain preservatives that can burn or cause an allergic reaction on broken skin.
- Lotions are applied for antiseptic action, astringent action, germicidal action.
Eg. Calamine lotion.

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- Alcohol is sometimes included in aqueous lotions for its cooling and soothing effect.

Eg. salicylic acid lotion.

Grind to fine
↑
particles

- Preparation: Lotions are prepared by trituration the ingredients to a smooth paste and then adding the remaining liquid phase with trituration.
- Storage: Lotions should be stored in well closed and in air tight container.
- Labeling: FOR EXTERNAL USE ONLY
- Formula:

Calamine	15 gm
Zinc oxide	5 gm
Bentonite	3 gm
Sodium citrate	0.5 gm
Glycerine	5 ml
Liquid phenol	0.5 ml
Rose water.	q.s to 100 ml

Calamine Lotion



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ASPECT	LINIMENTS	LOTIONS
Composition	• <u>Alcohol-based</u> (ethanol), oils (vegetable or essential), active ingredients like menthol, camphor, capsaicin.	• <u>Primarily water-based</u> , with emulsifiers and oils (eg. glycerin, mineral oil, shea butter, aloe vera).
Purpose	• <u>Pain relief for muscles, joints or bruises</u> ; sometimes for improving circulation or <u>reducing swelling</u> .	• <u>To moisturize, hydrate and soothe the skin</u> ; often used for general skincare or <u>treating skin dryness</u> .
Use	• Applied to <u>specific areas</u> (muscles, joints, bruises) for <u>temporary pain relief</u> .	• Applied to <u>larger body areas</u> (arms, legs, face) for <u>moisturizing & skin care</u> .
Application	• <u>Rubbed into targeted areas</u> , <u>massaged in</u> (eg. muscle pain)	• <u>Smoothed onto the skin</u> over <u>larger areas</u> for <u>hydration</u> or to <u>treat skin conditions</u> .
Sensation	• <u>Cooling or warming sensation</u> , may cause <u>tingling or slight irritation</u> (menthol or capsaicin)	• <u>Gentle, soothing, softening sensation</u> without <u>irritation</u> , <u>absorbs quickly</u> .
Texture	• <u>Thin, liquid or gel-like</u> , <u>fast-drying</u> .	• Creamy or lotion-like, <u>thicker than gels</u> , but <u>lighter than creams</u> .
Effect Duration	• <u>Short-term relief</u> (minutes to hours) for pain or stiffness	• <u>Long lasting hydration</u> (several hours), often used daily for skin nourishment.
Common Ingredients	• Menthol, camphor, eucalyptus, oil, methyl salicylate, capsaicin	• Glycerine, aloe vera, hyaluronic acid, shea butter, vitamin E, plant oils.
Skin impact	• Targets underlying tissues (muscles, joints) for pain relief, not for moisturizing skin.	• Primarily affects the skin's outer layers, improving hydration, texture and elasticity.

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• Types	• Available in liquid, gel or cream form.	• Available in body lotions, facial lotions, hand creams and therapeutic lotions.
• Examples	• Tiger balm, Icy Hot, Bengay	• Nivea, Eucerin, Aveeno, Cetaphil, Lubriderm.

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THANK YOU

Only you know how hard you have worked to travel through & achieve, in this pharmacy journey of yours.

Never burn your future for today's temporary comfort.

So convince your mind and keep studying.

~ Shubham Gupta



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