

Definitions



- **Traditional**

Ointment– “Semisolid preparations intended for external application to the skin or mucous membranes”

Cream – “Semisolid dosage forms containing one or more drug substances dissolved or dispersed in a suitable base”

Confusion!

- ✦ The word “ointment” has a general meaning, which applies to any *semisolid* dosage form (e.g., oleaginous ointments, creams, gels, etc.)

- **Revised**

Ointment – “A viscous oleaginous or polymeric semisolid dosage form”

- ✦ primarily drug substances incorporated into hydrocarbon bases

Cream – “A dosage form comprising a viscous semisolid emulsion”

- ✦ primarily o/w emulsion bases but can apply to any semisolid emulsion

Uses for Semisolid Dosage Forms



- To provide a vehicle for applying a medication either for local or systemic effect.
- Semisolid bases have their own properties as well:
 - Emollient
 - Protective
 - Occlusive
 - Practical Considerations

Choice of Semisolid Base



- The choice of a base depends on:
 - The nature of the incorporated medication
 - ✦ Bioavailability, Stability, Compatibility
 - The action or effect desired of the base
 - ✦ Emollient, Protective, Occulsive
 - The area of application
- Because bases have their own properties, if a prescription order specifies a particular semisolid base and a change of base is necessary for compatibility or stability reasons, the prescriber should be consulted.

Semisolid Bases



**Oil-in
Water
(Hydrophilic
Ointment)**

**Water-in
Oil
(Eucerin)**

**Anhydrous
Absorption
(Aquaphor)**

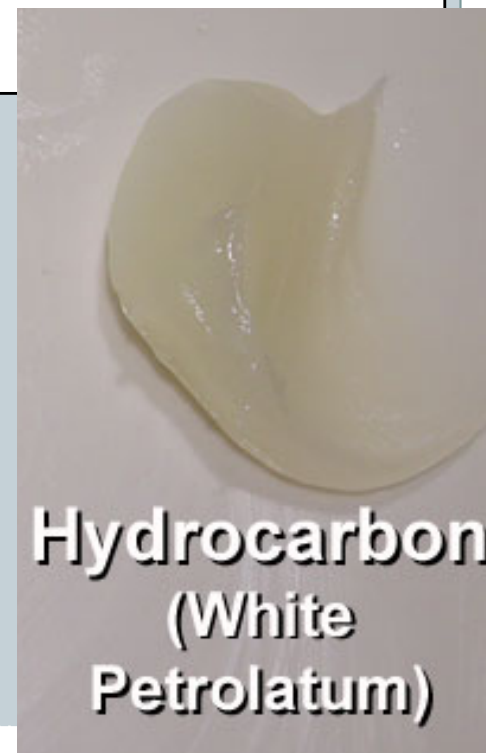
**Hydrocarbon
(White
Petrolatum)**

Base Type	Characteristics	Examples
Hydrocarbon (Oleaginous)	Insoluble in water Not water-washable Anhydrous Will not absorb water Emollient Occlusive Greasy	White Petrolatum White Ointment Vaseline®
Anhydrous Absorption	Insoluble in water Not water-washable Anhydrous Can absorb water Emollient Occlusive Greasy	Hydrophilic Petrolatum Lanolin Aquaphor® Aquabase® Polysorb®
Water-in-Oil Emulsion Absorption	Insoluble in water Not water-washable Contains water Can absorb water (limited) Emollient Occlusive Greasy	Hydrous Lanolin Cold Cream Eucerin® Hydrocream® Rose Water Ointment Nivea
Water-Removable (Oil-in-Water Emulsion)	Insoluble in water Water washable Contains water Can absorb water Non-occlusive Non-greasy	Aquaphilic (or Hydrophilic) Ointment Vanishing Cream Dermabase® Velvachol®
Water-Soluble	Water soluble Water washable May contain water Can absorb water (limited) Non-occlusive Non-greasy Lipid-free	Polyethylene Glycol Ointment Polybase

Hydrocarbon Bases



Base Type	Characteristics	Examples
Hydrocarbon (Oleaginous)	Insoluble in water Not water-washable Anhydrous Will not absorb water Emollient Occlusive Greasy	White Petrolatum White Ointment Vaseline®



Absorption Bases



Base Type	Characteristics	Examples
Anhydrous Absorption	Insoluble in water Not water-washable Anhydrous Can absorb water Emollient Occlusive Greasy	Hydrophilic Petrolatum Lanolin Aquaphor® Aquabase® Polysorb®

Base Type	Characteristics	Examples
Water-in-Oil Emulsion Absorption	Insoluble in water Not water-washable Contains water Can absorb water (limited) Emollient Occlusive Greasy	Hydrous Lanolin Cold Cream Eucerin® Hydrocream® Rose Water Ointment Nivea



Water-Removable (o/w) Bases



Base Type	Characteristics	Examples
Water-Removable (Oil-in-Water Emulsion)	Insoluble in water Water washable Contains water Can absorb water Non-occlusive Non-greasy	Aquaphilic (or Hydrophilic) Ointment Vanishing Cream Dermabase® Velvachol®



**Oil-in
Water
(Hydrophilic
Ointment)**

Water-Soluble Bases



Base Type	Characteristics	Examples
Water-Soluble	Water soluble Water washable May contain water Can absorb water (limited) Non-occlusive Non-greasy Lipid-free	Polyethylene Glycol Ointment Polybase

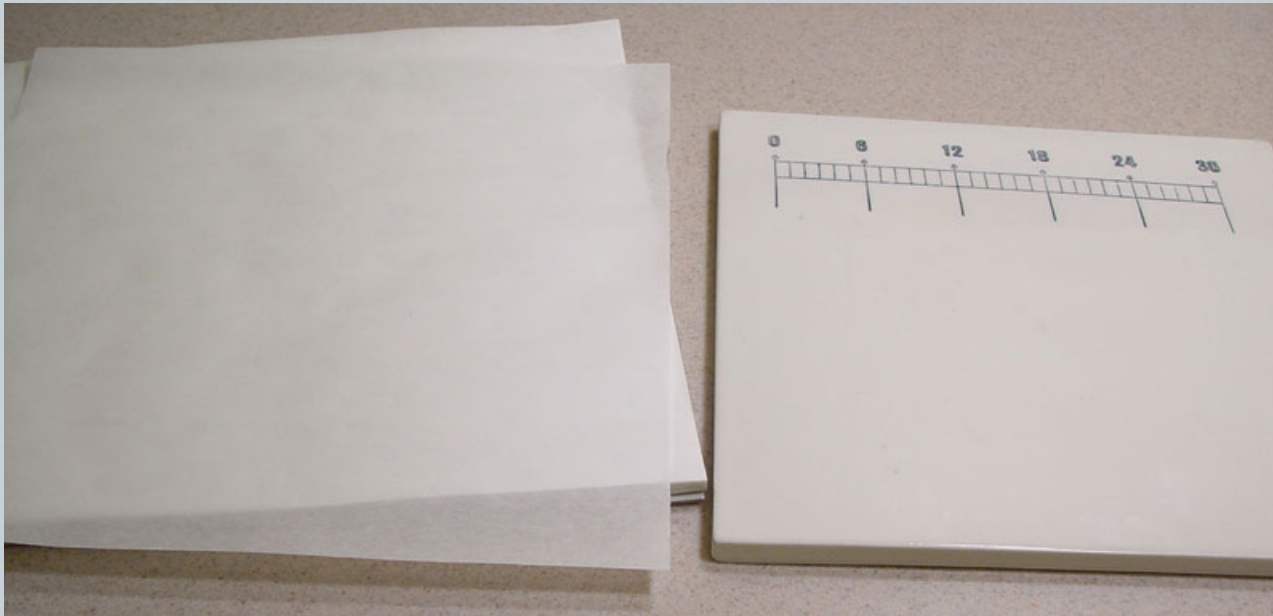
Compounding Goals



- **Homogenous (well blended)**

- Equipment

- ✦ Ointment slabs or pads
- ✦ Spatulas



Compounding Equipment

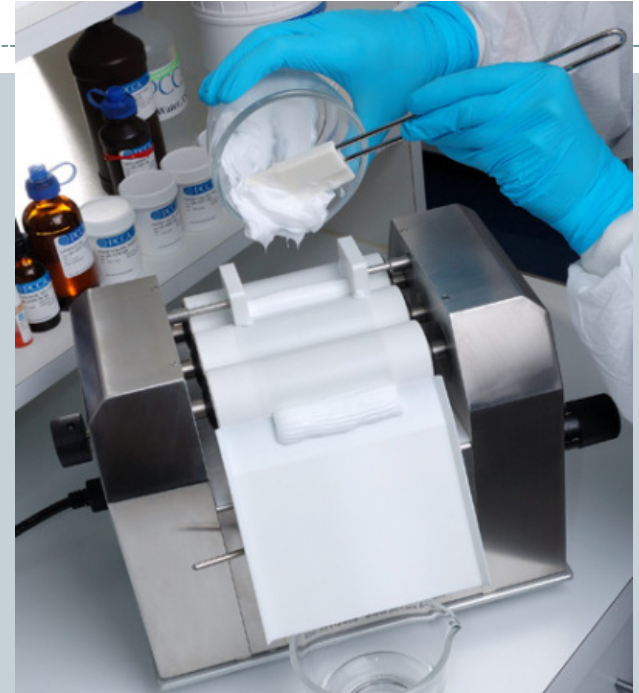
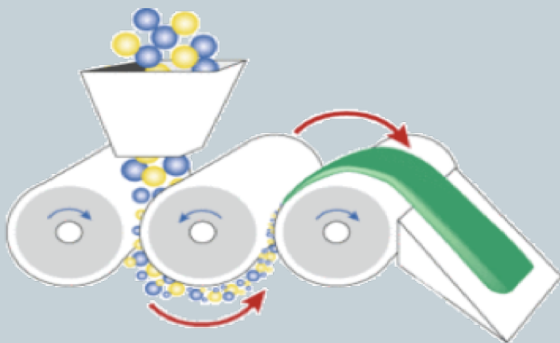
- **Ointment Mill**

- Advantages

- ✦ homogenization
- ✦ particle size reduction
- ✦ deaeration

- Rolls formulation between three ceramic rollers

- ✦ gap between rollers can be adjusted
- ✦ speed can be controlled



Compounding Procedure – Ointment Mill



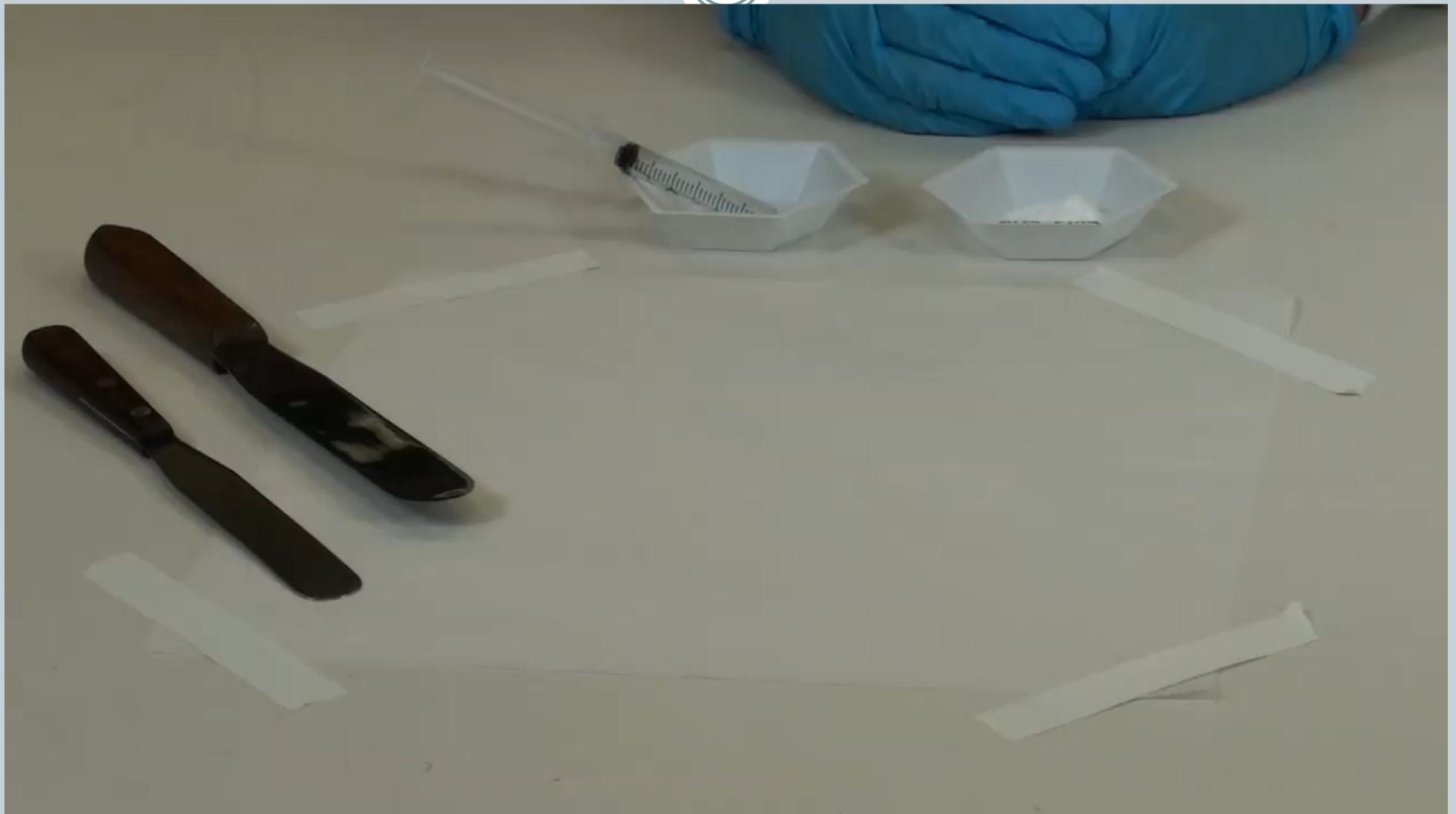
Ointment Mill, Shankar Lanke
<http://www.youtube.com/watch?v=i35IC8aCjXE>

Compounding Goals



- **Smooth and non-gritty**
 - Fine particle size
 - ✦ Drug selection
 - ✦ Trituration
- **Levigation**
 - ✦ “process of reducing particle size of a solid by triturating it with a small amount of liquid or melted base in which the solid is not soluble.”
 - ✦ Facilitates incorporation of solids into bases.
 - ✦ If possible use an ingredient to levigate, otherwise an auxiliary agent can be used.

Compounding Procedure – Levigation



Levigating Agent Selection



- If the formulation already contains an ingredient that can function as a levigating agent, that liquid should be used.
 - Melted ointment base may also be used.
- **Auxiliary Levigating Agent Selection**
 - Agent must be chemically similar and/or compatible with the **base** you are using.
 - If dealing with emulsion bases, the levigating agent should be compatible with the external phase.
 - ✦ Hydrocarbon, anhydrous absorption bases and w/o emulsions – use **Mineral Oil**
 - ✦ o/w emulsion and water-soluble bases – use **Glycerin**

Selecting a Levigating Agent



**Mineral
Oil**

Base Type	Examples
Hydrocarbon (Oleaginous)	White Petrolatum White Ointment Vaseline®
Anhydrous Absorption	Hydrophilic Petrolatum Lanolin Aquaphor® Aquabase® Polysorb®
Water-in-Oil Emulsion Absorption	Hydrous Lanolin Cold Cream Eucerin® Hydrocream® Rose Water Ointment Nivea
Water-Removable (Oil-in-Water Emulsion)	Aquaphilic (or Hydrophilic) Ointment Vanishing Cream Dermabase® Velvachol®
Water-Soluble	Polyethylene Glycol Ointment Polybase

Glycerin

Levigating Agents



- **How much do levigating agent do you use?**
 - GENERAL RULE: Unless volume specified in prescription, use the minimum amount necessary to lubricate (wet) the solids.
 - Factors that determine the amount of levigating agent needed include:
 - ✦ The quantity and properties of the solids to be incorporated
 - ✦ The properties of the ointment base
 - IMPORTANT not to use too much!
 - ✦ May change properties of base (e.g. change the desired spreading consistency or crack an emulsion base)
 - Keep track and record volume used!

Weights of Levigating Agents



- **Need to account for the weight of levigating agent used**
 - The amount of levigating agent used should be measured in a syringe or graduate.
 - The weight of the levigating agent that is used should be calculated from the volume incorporated using the agent's specific gravity.
 - There should be a corresponding decrease in the weight of the ointment base to bring the preparation to the desired final weight.

Specific Gravity of Common Levigating Agents



Levigating Agents	Specific Gravity	Miscibility	Uses
Mineral Oil	Heavy: 0.88	Miscible with fixed oils except castor oil Immiscible with water, alcohol, glycerin, propylene glycol, PEG 400, and castor oil	Oleaginous Bases Absorption Bases Water-in-Oil Emulsion Bases
Glycerin	1.26	Miscible with water, alcohol, propylene glycol, and PEG 400 Immiscible with mineral oil, and fixed oils	Oil-in-Water Emulsion Bases Water Soluble Bases
Propylene Glycol	1.04	Miscible with water, alcohol, glycerin, and PEG 400 Immiscible with mineral oil and fixed oils	Oil-in-Water Emulsion Bases Water Soluble Bases
Cottonseed Oil	0.92	Miscible with mineral oil and other fixed oils, including castor oil Immiscible with water, alcohol, glycerin, propylene glycol, and PEG 400	Cottonseed or any other vegetable oil can be used as a substitute for mineral oil when a vegetable oil is preferred or when the solid to be incorporated is more soluble or mixes more smoothly with a vegetable oil than with mineral oil

Example Levigation Calculation



- Zinc Oxide 10% in Polysorb, 30 g
 - Calculate for 10% excess = $30\text{ g} \times 110\% = 33\text{ g}$
 - Required amount of Zinc Oxide = $33\text{ g} \times 10\% = 3.3\text{ g}$
 - Levigating Agent to use = Mineral Oil
 - Volume of Levigating Agent used = 2 mL
 - Weigh of Levigating Agent = $2\text{ mL} \times 0.88\text{ g/mL} = 1.76\text{ g}$
 - Required amount of Polysorb = $33\text{ g} - 3.3\text{ g} - 1.76\text{ g} = 27.94\text{ g}$

- Zinc Oxide 10% in Velvachol, 30 g
 - Calculate for 10% excess = $30\text{ g} \times 110\% = 33\text{ g}$
 - Required amount of Zinc Oxide = $33\text{ g} \times 10\% = 3.3\text{ g}$
 - Levigating Agent to use = Glycerin
 - Volume of Levigating Agent used = 1.5 mL
 - Weigh of Levigating Agent = $1.5\text{ mL} \times 1.26\text{ g/mL} = 1.89\text{ g}$
 - Required amount of Velvachol = $33\text{ g} - 3.3\text{ g} - 1.89\text{ g} = 27.81\text{ g}$

Incorporation of Liquids



- Formulations that include liquids require semisolid bases that will absorb the liquid.
 - The prescriber should be consulted about base changes.
- Use care when incorporating water or alcohol
 - They have a low surface tension and can splash
 - They soak into the paper of ointment pads. Ointment slabs are the preferred equipment for these preparations.
- Semisolid bases do not immediately absorb liquid; the liquid must be carefully spatulated into the base.

Preparation Guidelines



- **USP Chapter 795** – semisolid dosage forms

“prepare an excess amount of the total formulation to allow the prescribed quantity to be accurately dispensed”

- Practically

- ✦ Loss is common, **always prepare excess** – **10%**

Preparation Guidelines



- **Beyond Use Dating (BUD)**
 - Stability
 - ✦ Physical
 - ✦ Chemical
 - ✦ Microbiological
- In the absence of stability information, use USP chapter 795 recommendation:
 - “For Water-Containing Topical/Dermal and Mucosal Liquid and Semisolid Formulations - The BUD is not later than 30 days.”

Preparation Guidelines

- **Packaging**

- Container types: tubes, jars, applicators, syringes, patches and pump dispensers
 - ✦ Match container to route of administration or product characteristics
- Ointment Jar
 - ✦ Remove air pockets
 - ✦ Dress ointment to give a “finished” appearance
 - ✦ Avoid getting product on the lid



Compounding Procedure – Filling Jar



Compounding Procedure – Dressing Product



Preparation Guidelines



- **Quality Control**

- Check and document the following on the compounding record:
 - ✦ final weight, visual appearance, color, odor, viscosity, and texture

- **Labeling**

- Name of all active drugs and amount expressed as percent w/w (%) concentration, e.g. “Zinc Oxide 10%, Calamine 5%”
- Name of commercial base used, e.g. “in Eucerin”
- Name of route, e.g. topical, rectal, vaginal, etc.
- Name of dosage form, e.g. cream, ointment, paste, etc.

Zinc Oxide 10%, Calamine 5% in Eucerin Topical Cream

- **Auxiliary Labels**

- Include common auxiliary labels such as “For External Use Only” and “Keep away from Children”

