Soft gelatin capsules (Cap3, lect.10)

- Soft gelatin capsules are made of gelatin to which glycerin or a polyhydric alcohol such as sorbitol has been added as plasticizers (plastic property).
- Soft gelatin capsules, which contain more moisture than hard capsules, may have a preservative, such as methylparaben and/or propylparaben to retard microbial growth.
- Soft gelatin capsules may be oblong, oval, or round.
- They may be single colored or two-toned and may be imprinted with identifying markings.
- As with hard gelatin capsules, they may be prepared with opaquants to reduce transparency and render characteristic features to the capsule shell.
- Soft gelatin capsules are used to encapsulate and hermetically seal liquids, suspensions, pasty materials, dry powders, and even preformed tablets. Soft gelatin capsules are pharmaceutically elegant and are easily swallowed.

Preparation of soft gelatin capsules

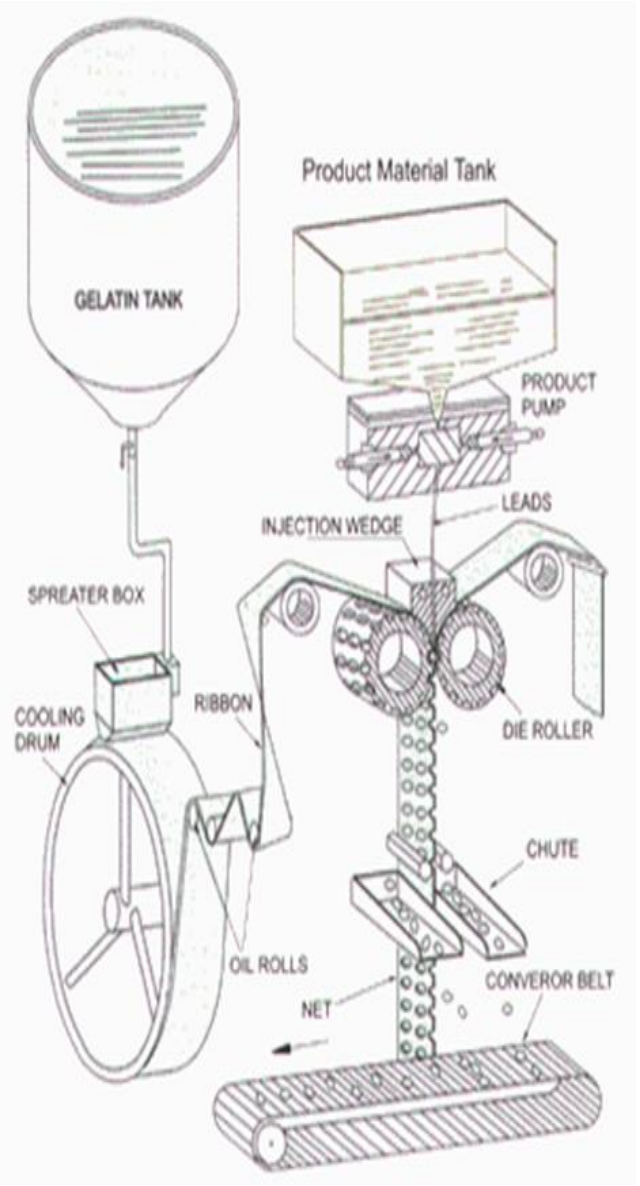
Soft gelatin capsules may be prepared by the plate process, using a set of molds to form the capsules, or by the more efficient and productive rotary or reciprocating die processes by which they are produced, filled, and sealed in a continuous operation

A - Plate Process

- By the plate process, a warm sheet of plain or colored gelatin is placed on the bottom plate of the mold and the medication-containing liquid is evenly poured on it. Then a second sheet of gelatin is carefully placed on top of the medication and the top plate of the mold is put into place. Pressure is then applied to the mold to form, fill, and seal the capsules simultaneously. The capsules are removed and washed with a solvent harmless to the capsules.

B- Rotatory Die Process

- By this method, liquid gelatin flowing from an overhead tank is formed into two continuous ribbons by the rotary die machine and brought together between twin rotating dies
- At the same time, metered fill material is injected between the ribbons precisely at the moment that the dies form pockets of the gelatin ribbons. These pockets of fill-containing gelatin are sealed by pressure and heat and then severed from the ribbon. Use of ribbons of two different colors results in bicolored capsules.
- The reciprocating die process is similar to the rotary process in that ribbons of gelatin are formed and used to encapsulate the fill, but it differs in the actual encapsulating process. The gelatin ribbons are fed between a set of vertical dies that continually open and close to form rows of pockets in the gelatin ribbons. These pockets are filled with the medication and are sealed, shaped, and cut out of the film as they progress through the machinery. As the capsules are cut from the ribbons, they fall into refrigerated tanks that prevent the capsules from adhering to one another.



Use of soft gelatin capsules

- Soft gelatin capsules are prepared to contain a variety of liquid, paste, and dry fills. Liquids that may be encapsulated into soft gelatin capsules include the following

1. Water-immiscible volatile and nonvolatile liquids such as vegetable and aromatic oils, aromatic and aliphatic hydrocarbons, chlorinated hydrocarbons, ethers, esters, alcohols, and organic acids.
2. Water-miscible nonvolatile liquids, such as polyethylene glycols, and nonionic surface active agents, such as polysorbate 80.
3. Water-miscible and relatively nonvolatile compounds such as propylene glycol and isopropyl alcohol, depending on factors such as concentration used and packaging conditions.
4. Drugs may be encapsulated into soft gelatin capsules as solutions in a suitable liquid solvent, suspensions, dry powders, granules, pellets, or small tablets.

Soft gelatin capsule contents contraindication

- **Liquids that can easily migrate through the capsule shell are not suitable for soft gelatin capsules.**
- **These materials include water above 5% and**
- **low-molecular-weight water-soluble and**
- **volatile organic compounds such as alcohols, ketones, acids, amines, and esters.**

Compendial requirements for capsules added substances

- **Substances added to official preparations, including capsules, to enhance their stability, usefulness, or elegance or to facilitate their manufacture may be used only if they**

1. **Are harmless in the quantities used**
2. **Do not exceed the minimum amounts required to provide their intended effect**
3. **Do not impair the product's bioavailability, therapeutic efficacy, or safety**
4. **Do not interfere with requisite compendial assays and tests**

Enteric coated capsules

- **Capsules that have been coated or otherwise treated to resist dissolution in gastric fluids but release their contents in the intestine are said to be enteric. Such delayed release of medication may be desired if the drug is inactivated in gastric fluids or if the drug is irritating to the gastric mucosa. In other instances, a high local concentration of the drug may be especially desirable in the intestine, as in the case of anthelmentices.**
- **Typical of materials used for enteric coating are shellac, cellulose acetate phthalate, and fatty waxy materials such as bees wax, carnauba wax and stearic acid.**
- **One approach for rendering gelatin capsules enteric that has met with only limited success is treatment with formaldehyde. The gelatin is hardened as the formaldehyde reacts with the gelatin to form methylene bridges and cross links.**
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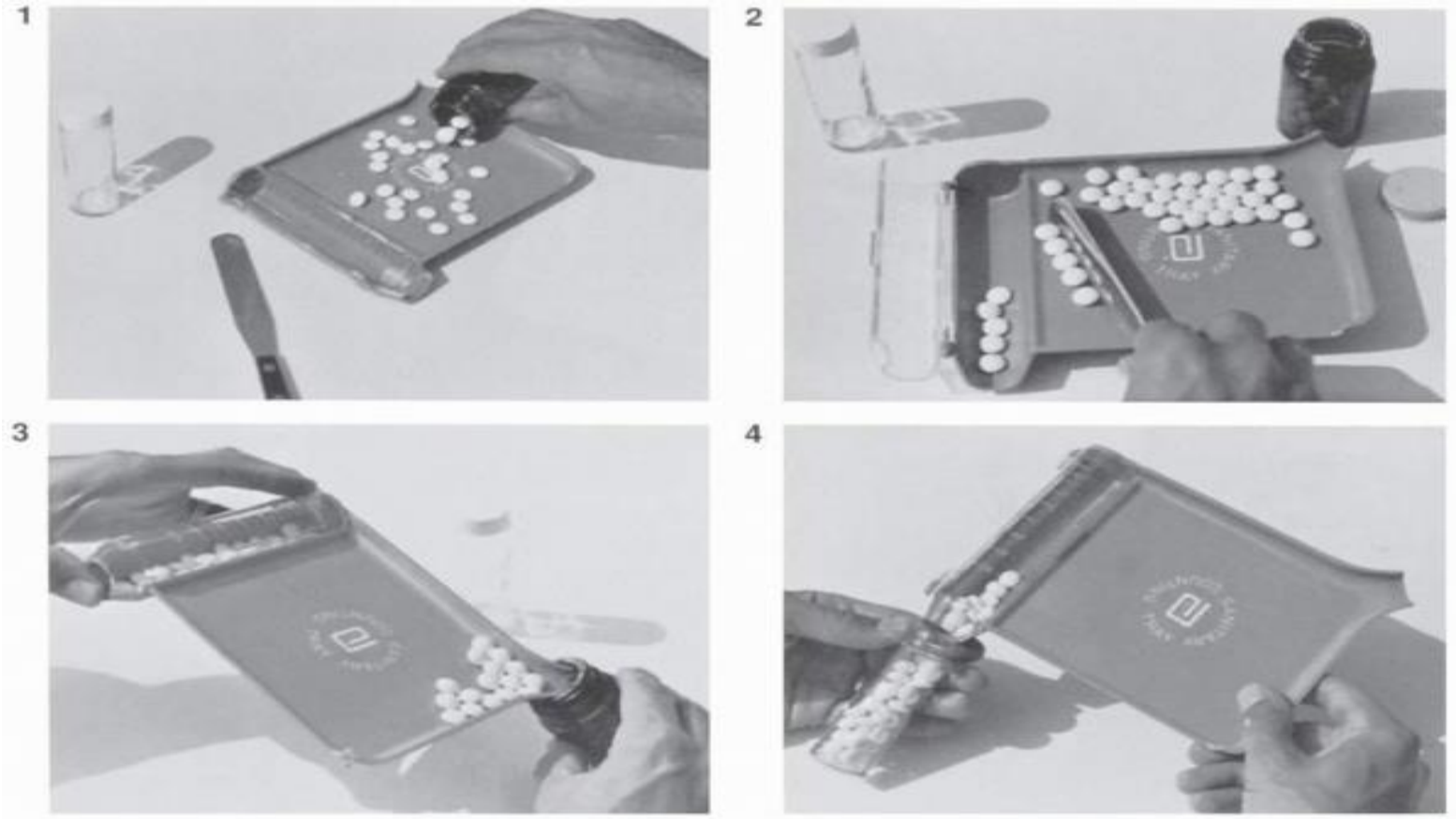
Counting capsules

- In the pharmacy, capsules may be counted manually or by automated equipment. Specially designed trays are used for counting small numbers of solid dosage units.
- In using this tray, the pharmacist pours a supply of capsules or tablets from the bulk source onto the clean tray .
- Using the spatula, counts and sweeps the dosage units into the trough until the desired number is reached.
- Then the pharmacist closes the trough cover, picks up the tray, returns the uncounted dosage units to the bulk container by means of the lip at the back of the tray.
- Places the prescription container at the opening of the trough, and carefully transfers the capsules or tablets into the container.
- With this method, the dosage units remain untouched by the pharmacist. To prevent batch-to-batch contamination, the tray must be wiped clean after each use because powder, particularly from uncoated tablets, may remain



Steps in counting solid dosage units with the Abbott Sanitary Counting Tray.

1. Transferring units from stock package to tray.
2. Counting and transferring units to trough.
3. Returning excess units to stock container.
4. Placing the counted units in prescription container.

- **Storage of capsules**
- **Capsules should be stored in tightly closed containers protected from dust and extremes of humidity and temperature. Capsules normally contain from 10 to 15% of moisture. However, when, stored under conditions of high humidity, sufficient moisture may be absorbed to soften the gelatin and make it tacky. On the other hand, when stored under conditions of low humidity, the capsules may dehydrate and become brittle.**
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Examples of some official capsules

OFFICIAL CAPSULE	REPRESENTATIVE COMMERCIAL CAPSULES	STRENGTH	CATEGORY
Amoxicillin	Wymox (Wyeth-Ayerst)	250, 500 mg	Antibacterial
Cephalexin	Keflex (Dista)	250, 333, 500, 750 mg	Antibacterial
Doxycycline Hyclate	Vibramycin (Pfizer)	100 mg	Antibacterial
Erythromycin Estolate	Ilosone (Dista)	250 mg	Antibacterial
Fluoxetine HCl	Prozac (Dista)	10, 20, 40 mg	Antidepressant
Indomethacin	Indocin (Merck)	25, 50 mg	Anti-inflammatory, antipyretic, analgesic

Evaluation of capsules

1. Weight variation
2. Content uniformity
3. Disintegration test for capsules
4. Dissolution test for capsules
5. Stability testing
6. Moisture permeation test

6. Moisture permeation test

The USP requires determination of the moisture permeation characteristics of single-unit and unit-dose containers to ensure their suitability for packaging capsules.

The degree and rate of moisture penetration are determined by:

1. **Packaging the dosage unit together with a color-revealing desiccant pellet,**
2. **Exposing the packaged unit to known relative humidity over a specified time,**
3. **Observing the desiccant pellet for color change (indicating the absorption of moisture), and**
4. **Comparing the pretest and posttest weight of the packaged unit.**

THANK YOU