Tablets

Introduction to Tablet

- Tablets are solid dosage forms containing active pharmaceutical ingredients (APIs) and excipients, intended for oral administration.
- They are the most commonly used form of drug delivery due to their ease of administration, accurate dosing, stability, and cost-effectiveness.



Definition

- A tablet is a compressed unit dose of medication prepared by compressing powders or granules into a solid form.

Advantages of Tablets

- **Convenient**: Easy to store, carry, and use.
- **Accurate Dosage**: Ensures consistent drug delivery.
- **Stable**: Longer shelf-life than liquids.
- **Cost-Effective**: Economical to manufacture.
- **Versatile**: Allows immediate, delayed, or controlled release.

Disadvantages of Tablets

- **Swallowing Difficulty:** May not be suitable for children or elderly patients.
- **Absorption Issues:** Delayed onset of action compared to liquid or injectable forms.
- **Processing Challenges:** Requires specialized equipment and conditions.

Ideal Characteristics of Tablets

1. **Physical**: Uniform size/weight, smooth and crack-free, with adequate hardness.
2. **Chemical**: Stable, non-degradable, and excipient-compatible.

3. **Biopharmaceutical**: Fast disintegration/dissolution and reliable bioavailability.
4. **Functional**: Contaminant-free, easy to swallow, and palatable.

Packaging Requirements

- Protection from:
  - Moisture (especially for hygroscopic or effervescent tablets)
  - Light (photosensitive drugs)
  - Mechanical stress (coating damage, chipping)
- Common Materials:
  - **Blister Packs**: PVC/PVDC/aluminium foil; unit-dose protection
  - **Strip Packs**: Aluminium-aluminium or paper-aluminium
  - **HDPE Bottles**: For bulk dispensing (e.g., in hospitals)
  - **Desiccants** may be added for moisture-sensitive products
- Sealing is critical to prevent exposure to air/humidity.

Labelling Requirements

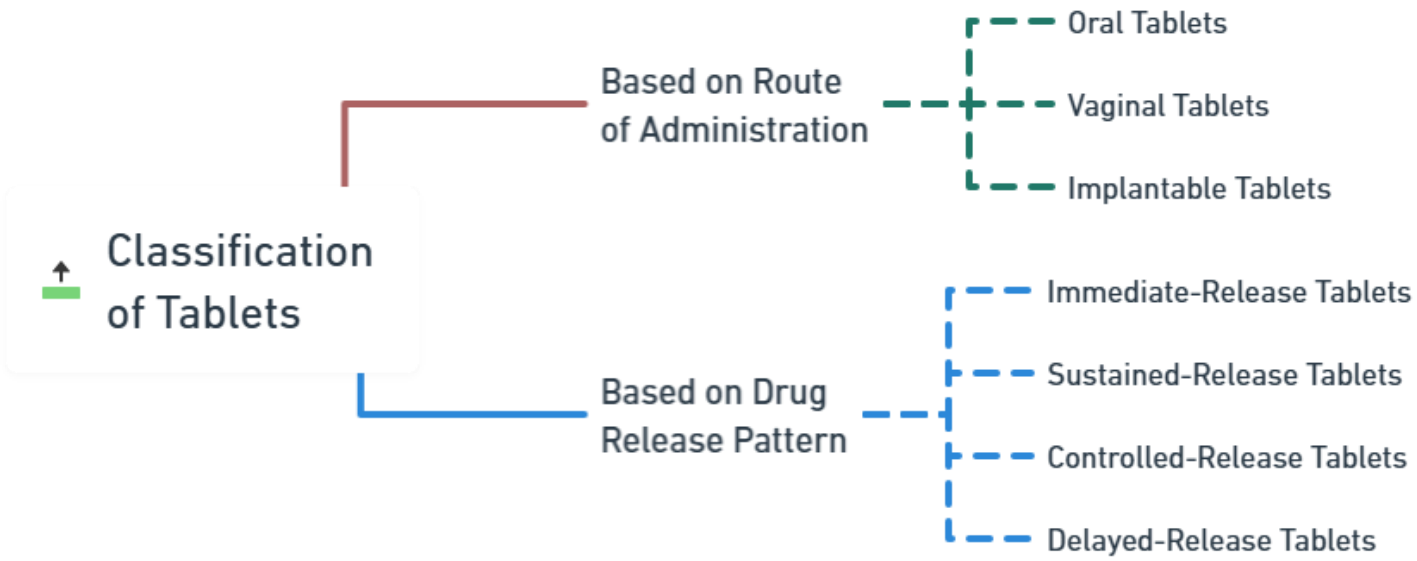
- Generic and brand name
- Strength and dosage form
- Batch number, Mfg. & Exp. dates
- Route of administration (usually oral)
- Storage instructions
- Manufacturer details
- Regulatory information (license number, barcodes)
- Special warnings (e.g., "Do not crush or chew" for modified-release)

Tablet Evaluation

1. **Appearance**: Check shape, size, color, and surface.
2. **Weight Variation**: Ensure uniform weight by comparing individual tablets to the average.
3. **Hardness**: Measure force needed to break a tablet for durability.
4. **Friability**: Assess resistance to abrasion via weight loss after rotation.
5. **Disintegration**: Measure time to break into particles in liquid.
6. **Dissolution**: Evaluate drug release rate and extent in a medium.

7. **Content Uniformity**: Confirm consistent drug amount in each tablet.
8. **Moisture Content** *(if required)*: Check to prevent degradation or sticking.

Classification of Tablets



A. Based on Route of Administration:

1. Oral Tablets:

- **Conventional Tablets:** Disintegrate and dissolve in the gastrointestinal tract (e.g., Paracetamol).
- **Chewable Tablets:** Meant to be chewed before swallowing (e.g., Antacids).
- **Effervescent Tablets:** Dissolve in water before administration (e.g., Vitamin C).
- **Sublingual Tablets:** Dissolve under the tongue for rapid absorption (e.g., Nitroglycerin).
- **Buccal Tablets:** Dissolve in the buccal pouch for slow absorption (e.g., Fentanyl).

2. Vaginal Tablets:

- Inserted into the vagina for localized treatment (e.g., Clotrimazole).

3. Implantable Tablets:

- Placed under the skin for long-term drug release (e.g., Hormonal implants).

B. Based on Drug Release Pattern:

1. **Immediate-Release Tablets:** Quickly disintegrate and release the drug.
2. **Sustained-Release Tablets:** Gradual release over time.
3. **Controlled-Release Tablets:** Precisely control the drug release rate.

4. **Delayed-Release Tablets:** Release drugs at a specific site in the GIT (e.g., Enteric-coated tablets).

Coated Tablets

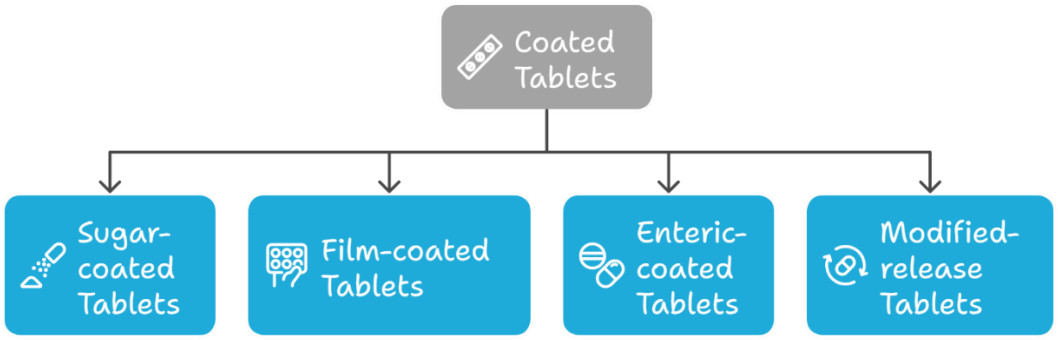
Definition:

- Coated tablets are compressed tablets covered with one or more layers of coating material to protect the drug, enhance appearance, mask taste or odor, or control the site and rate of drug release.

Purpose of Coating:

- Protect drug from moisture, air, or light.
- Mask unpleasant taste or odor.
- Improve swallowability.
- Modify drug release profile (e.g., enteric coating or sustained release).
- Improve mechanical strength and durability.

Types of Coated Tablets:



1. Sugar-coated Tablets (SCTs):

- Coated with a sugar layer.
- Smooth, colored, and glossy.
- Mask taste and odor.
- Increases tablet weight and size.
- Time-consuming process.

2. Film-coated Tablets (FCTs):

- Coated with a thin layer of a polymer.
- More modern than sugar-coating.

- Less weight increase and more durable.
- Allows for functional coatings (e.g., pH-sensitive polymers for enteric effect).

3. Enteric-coated Tablets:

- Coated with polymers that resist dissolution in stomach acid.
- Dissolve only in the alkaline environment of the intestine.
- Protects drugs that are acid-labile or irritant to stomach lining (e.g., omeprazole, aspirin).

4. Modified-release Tablets:

- Coatings designed to release the drug in a controlled manner.
- Includes sustained-release, controlled-release, and extended-release formulations.

Advantages:

- Enhanced stability and shelf-life.
- Improved patient compliance due to better appearance and taste-masking.
- Ability to target drug release to specific regions of the GI tract.
- Reduced side effects and dosing frequency.

Disadvantages:

- More complex and costly manufacturing.
- Requires specialized equipment and quality control.
- Risk of dose dumping if the coating is compromised.

Formulation of Coating Composition

- The coating formulation includes:
  - **Polymer**: Provides the structural matrix.
  - **Plasticizer**: Adds flexibility to the coating.
  - **Solvent**: Usually water (aqueous coatings) or organic solvents (non-aqueous coatings).
  - **Colorants**: For aesthetic purposes.
  - **Additives**: Such as preservatives or stabilizers.

Example of a Film Coating Formulation:

- **Hydroxypropyl Methylcellulose (HPMC)**: 10-20%
- **Triethyl Citrate (Plasticizer)**: 5-10%
- **Titanium Dioxide (Colorant)**: 2-5%

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