TABLET COATING

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TABLET COATING

- Tablet coating is the last critical step in the tablet production cycle.
- It is the phenomenon of application of coating to the tablet.

OBJECTIVES OF TABLET COATING

- Mask the odour, taste or color of the drug.
- Provides physical and chemical protection for drug.
- Controls the release of drug from the tablet.
- Protects the drug from gastric environment of stomach in case of acid sensitive drug.
- Avoids chemical incompatibility.
- Improves pharmaceutical elegance by using colors and contrasting printing.

COMPONENTS CONSIDERED IN TABLET COATING

- **Tablet Properties- Shape, tolerance, Surface area**

- **Coating process -**

A. **Coating equipment**
B. **Coating parameters**
C. **Facility & ancillary equipment**
D. **Automation of coating process**

- **Coating composition which involves polymers, color ,plasticizer ,solvent.**

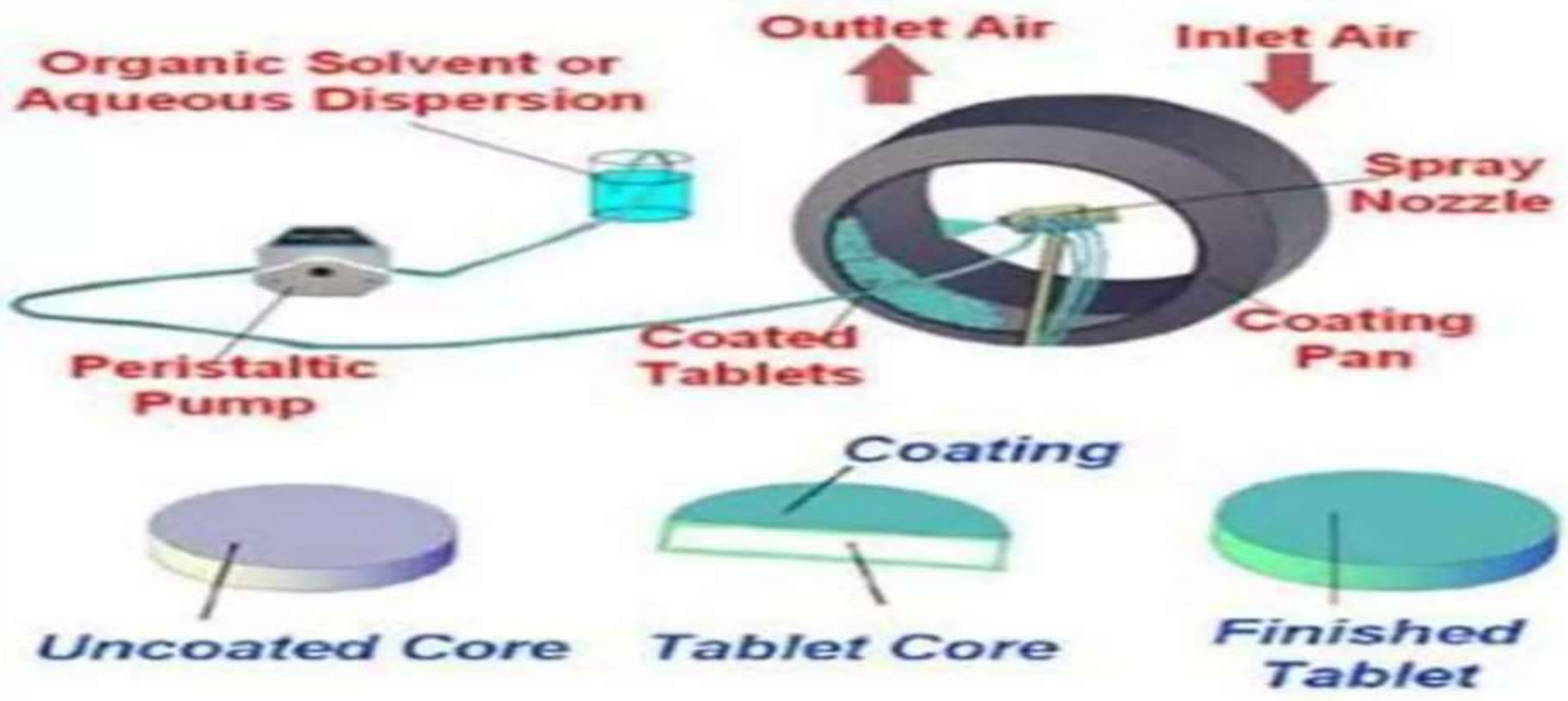
TABLET PROPERTIES

- Tablet to be coated must posses the proper physical characteristics like spherical shape and uniform surface.

- To tolerate attrition of tablets during coating process they must be resistant to abrasion and chipping.

- As the tablet surfaces that are brittle and soften in presence of heat or effected by coating composition and tend to become rough in the early stages of coating process are unacceptable for film coating.

TABLET COATING PROCESS



COATING PROCESS

Tablet coating is accomplished by the movement of tablets in Perpendicular or vertical direction to the application of the coating composition

COATING COMPOSITION

IS APPLIED TO

MOVING BED OF TABLETS

HEATED AIR IS INTRODUCED

EVAPORATION OF THE SOLVENT

Introduction

- **Advantages**

- Cover the unpleasant taste, odor and color.
- Physical and chemical protection in medicine from environment (light, moisture, and air).
- Control of drug release in the GIT
- increase the tablet strength

Introduction

- **Advantages**

- To protect drug from the gastric environment of the stomach with an acid-resistant enteric coating.
- Improve the appearance of tablets.
- Assist and facilitate the identification of drug.
- Easing the process of blistering.

Introduction

- **Advantages**

- improve patient compliance
- Increase shelf life of the dosage form

- **Limitations**

- _time taking process
- _wt. of tablet is increased
- _expensive production cost

Coating materials

1. Solvent
2. Plasticizer
3. Colorant
4. Opaquant-extender
5. Film former

Coating materials

1. Solvent

- It is to dissolve or disperse the polymers and other additives and convey them to the substrate surface.
- It should be -
- Colorless, tasteless, odorless, Inexpensive
- nontoxic, inert and Noninflammable.
- It should have rapid drying Rate.

Coating materials

1. Solvent

- Water, Ethanol, Methanol, Isopropanol,
- Chloroform, Acetone, Methylene chloride
- Methylene ethyl ketone.

Coating materials

2. plasticizer

- It is used to modify the quality of the film
- Plasticizing techniques involve internal plasticizers and external plasticizers.

I. Internal plasticizers involves chemical modification of the basic polymer that alters the physical properties of the polymers.

Coating materials

2. plasticizer

- Glycerol, propylene glycol, PEG 200 6000 grades.

II. External plasticizers are used to achieve the desire effect of the film (flexibility tensile Strength, adhesive properties)

- Diethyl phthalate (DEP), Dibutyl phthalate (DBP), Tributyl citrate (TBC)

Coating materials

3. Colorant

- It provides the characteristic color and
- appearance to the dosage form.
- The concentration of colorants in the coating solution depends on the color shade, intended type of dye and the concentration of the opaquant extenders.
- Usually fine powdered colorant(less than 10 μ) is employed

Coating materials

3. Colorant

- In order to achieve uniform distribution of suspended colorants in the coating solution.
- For very light shade conc. of less than 0.01% may be used
- For dark shade Conc. more than 2.0% may be used.

Coating materials

3. Colorant

- Inorganic colorant eg. Iron oxide, titanium dioxide
- Natural colorant eg. Caramel, anthocyanin, Carotenoid, Chlorophyll, indigo,
- Flavones,
- Turmeric and carminic acid.

Coating materials

4. Opaquant- extender

- These are very fine inorganic powders used in the coating solution formulation
- to provide several tints of colors and propagate film coverage.
- Titaniundioxide
- Talc, Aluminium silicate
- Magnesium carbonate,
- Calcium sulphate.

Coating materials

5. Film former

- Such materials are used to regulate the release of API from the dosage form.
- Film formers are used to design enteric coating.
- Hydroxy propyl methyl cellulose (HPMC)
- Methyl hydroxy ethyl cellulose (MHEC)

Types of Coating

- Mainly 4 types
- Sugar coating
- Film coating
- Enteric coating
- Compression coating

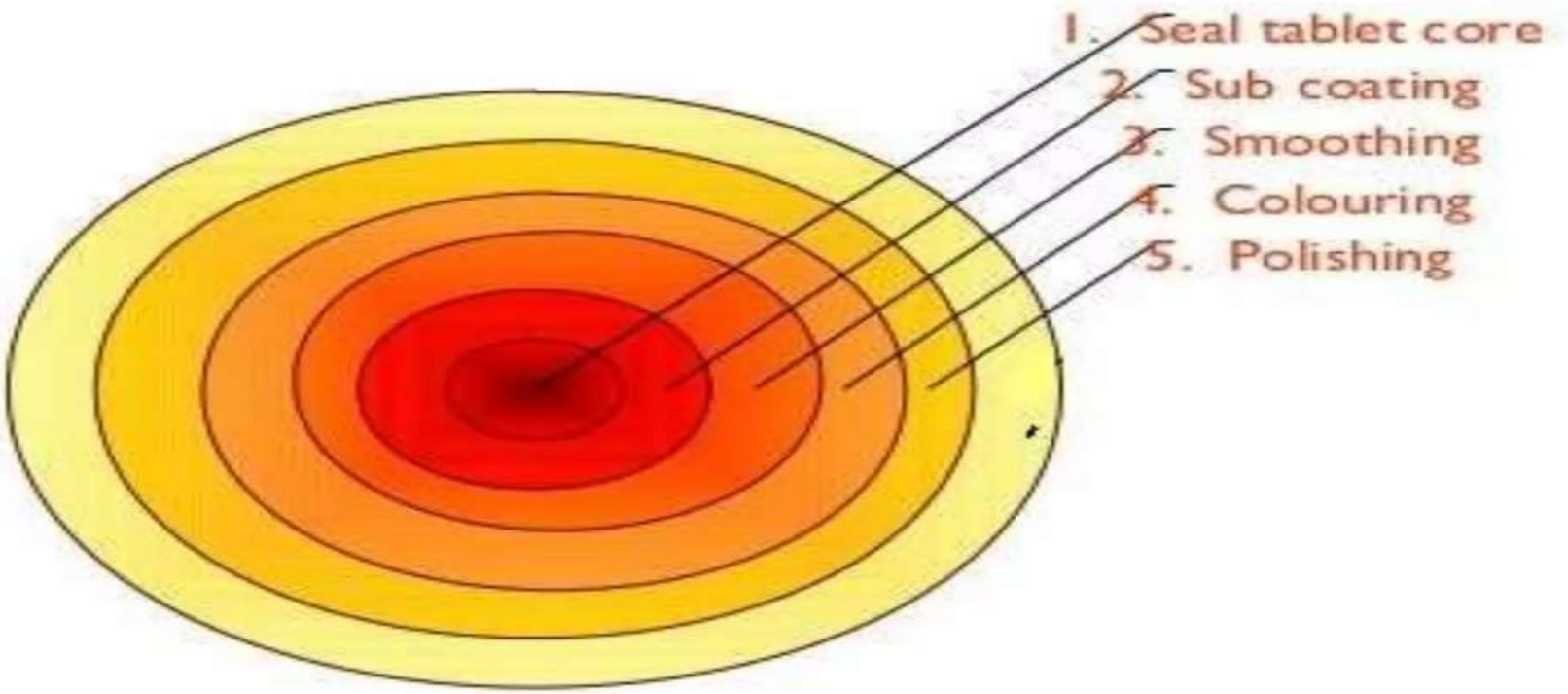
Types of Coating

- **Sugar coating (oldest method)**

- It uses multiple sucrose based solution over the tablet.
- Preliminary evaluation such as hardness and friability should be done before coating.
- Sugar coating process involves 5 separate steps:

Types of Coating

- **Sugar coating**



Types of Coating

- **Sugar coating**

1. Sealing:- it is done for water proofing to minimize the probability of aqueous solution of sucrose to penetrate inside the tablet.

- Sealing materials are shellac, oleic acid, PEG, methylene chloride, alcohol etc.
- Shellac is more effective because of polymerization feature on the other hand bring about delayed disintegration rate.

Types of Coating

- **Sugar coating**

2. Sub- coating:- it is done for rounding- off the tablet edges and to build up tablet size.

- Large amount of syrup is employed
- As a result tablet volume is increased about 50- 100 % more than its initial volume
- Generally two methods are used for sub-coating:

Types of Coating

- **Sugar coating**

2. Sub- coating:-

I. The application of gum based solution followed by dusting with powder and then drying. This routine is repeated until the desired shape is achieved.

II. The application of a suspension of dry powder in gum/sucrose solution followed by drying.

Types of Coating

- **Sugar coating**

2. Sub- coating:-

- eg. Acacia, gelatin, sugar powder, corn syrup, dist. Water.

3. Smoothing / Grossing:-

- It is done to cover the roughness caused during sub- coating operation.

Types of Coating

- **Sugar coating**

3. Smoothing / Grossing:-

- It increases tablet size.
- In this step little amount of color is sometimes added to syrup solution
- To develop tinted base that helps uniform coating in upcoming step.
- Eg. Ca cabonate, corn starch, sugar powder, color, dist. water

Types of Coating

- **Sugar coating**

4. Coloring:-

- It is done to flourish desired color to the tablet by coating with colored syrup
- Until uniform color shade is obtained
- Eg. Iron oxide, titanium dioxide, Caramel, anthocyanin, Carotenoid, Chlorophyll, indigo, Flavones, Turmeric and carminic acid, syrup

Types of Coating

- **Sugar coating**

5. Polishing:-

- In this step, coat of polishing solution is applied to achieve intended luster.
- Polishing solution is comprised of waxy materials and suitable volatile solvent.
- Eg. Carnauba, bees & paraffin wax, denatured spirit.

Types of Coating

- **Film coating**

- It involves, spraying/ pouring of film coating material on to tablet bed.
- In pan pouring tech. coating material is poured over the rolling tablets
- Whereas, in pan spray tech. coating solution is sprayed onto the rolling tablets with the aid of automated spray gun

Types of Coating

- **Film coating**

- film coating process needs keen observation and expertise personnel.
- Because any sort of minute deviation may lead to improper coating.
- Film coating gives a tablet with less Weight and small size features as compare to sugar coating.

Types of Coating

- **Film coating**

- Provide better mechanical strength and glossy appearance.
- Film coating materials are hypromellose
- Cellulose-
- caboxymethyl, hydroxyethyl, hydroxyethylmethyl, hydroxypropyl, ethyl
- PEG

Types of Coating

- **Enteric coating**

- This technique is used to protect the tablet core from disintegration in the acid environment of the stomach for one or more of the following reasons:
- Prevention of acid attack on API which is unstable at low pH.
- To protect the stomach from the irritant effect of certain drugs.

Types of Coating

- **Enteric coating**

- To facilitate absorption of a drug that is preferentially absorbed distal to the stomach.
- To deliver drugs intended for local Action in the intestines, e.g. Intestinal antibiotics.
- To deliver drugs that are optimally Absorbed in the small intestine to their primary absorption site.

Types of Coating

- **Enteric coating**

- To provide a delayed-release component for repeat-action tablets.
- Eg. Hypromellose phthalate
- polyvinyl acetate phthalate
- cellulose acetate phthalate
- polymethacrylates

Types of Coating

- **Compression coating**

- Use of compression to form coat around a pre-formed core.
- Used mainly to separate chemically incompatible materials.
- Also dual release patterns possible
- Compression coating is a dry process.

Types of Coating

- **Compression coating**

- process involves compaction of coating material around a preformed core. The technique differs from sugar and film coating process.
- This process enables incompatible materials to be formulated together, such that one chemical or more is placed in the core and the other (s) in the coating material.