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Tablet Coating: Not Only a Technical Work but also a Creative Art

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ABSTRACT

Tablet coating is technique which is use in different tablet formulation. It is well known technique to make a tablet protective and creative. Tablet coating is an art which develop creativity against different problems occurred in tablet manufacturing. Coating which was taken up towards its tablet formulation aim like controlled release, gastro retentive, gastro- resistance, delayed release profiles. It is a way of making use of a skinny polymer-primarily based totally movie to a tablet. The quantity of coating at the floor of pill is essential to the effectiveness of the oral dosage form. Tablet coating have range of benefits covering color, smell and flavor of drug additionally bodily and chemical protection, protects the drug from gastric environment. There are unique strategies for coating tablets, inclusive of sugar coating, film. In modern technology, coating materials are directly coated on the solid dosage type surface without using any solvent as different solvents with less Coating are available, together with electrostatic dry coating magnetically assisted impaction coating, compression coating, warm soften coating, powder. This review deals in detail recent tablet coating technique, materials and industry oriented.

KEYWORDS: *Coating, technique, modern technology, advantages, disadvantages*

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INTRODUCTION

A tablet is a pharmaceutical dosage form containing a mixture of active substance and excipients, mostly in the form of powders, pressed or compacted from to solids. In the excipients, gliders (flow aids), diluents, binders or granulating agents and lubricating are used to ensure effective tableting; disintegration are used to split a tablet in the digestive tract; sweeteners or taste enhancing flavours; and pigments are used to render tablets attractive. Coating is a process by which an essentially dry, outer layer of coating material is applied to the surface of a dosage form in order to consult specific benefits which facilitate broadly the identification of the product to modify the release of drug from the dosage form. When making a good tablet, one must often coat it. [1] Coating can be applied to several types of solid dosage form coating technique including parameters such as spray patterns, drop size and nozzles spacing (in addition to multiple other non spray related parameters), all of which must be precisely controlled to ensure uniform distribution of coating material. [2]

REASONS FOR TABLET COATING

- The core material has a bitter taste in the mouth or has as unpleasant odour
- Coating always protect the drug from the environments with a view to improve its stability
- Coating will increase the comfort by which a tablet can be ingested by the patient
- Coating will develop the mechanical integrity; means coated products are more resistant to miss handling (abrasion, attrition etc)
- The core includes an ingredient in itself. The active substance is coloured and easily migrates to stain the hands and clothing.
- The coated tablets are packed in high-speed packaging machine like tablets, pellets, pills, drug crystals, etc. After a coating solution is applied to a batch of tablets in a coating pan, the surfaces of the tablets get sealed by a tacky polymeric film.
- The tablet are then let to dry and the film ultimately form a non-sticky dry surface
- Coating reduces risk of friction and improves packaging rate
- Coating can modify the drug release profile, e.g., enteric coating, osmotic pump, pulsate delivery.[2]

The coating technique depends on the following parameters such as the spray patterns, size of droplets, and nozzle spacing etc. These are managed effectively to get a uniform layer of coating.

Definition of tablet coating: the purpose of tablet coating is as follows

- To hide unpleasant odour and taste of the tablet
- Protection of the drug to improve stability
- Overall protection of the drug

BRIEF HISTORY OF TABLET COATING

Coating process was started first in the ninth century. A variety of material was used to coat pill, such as talc, gelatin, and sugar. The first sugar coated pill produced in the United

States came out of Philadelphia in 1856. Coating resistant to enteric or gastric fluid was developed in the 1880. Film coated tablet was marketed in the year 1954 for the first time. Coating solution was distributed through the bed of tablets through rotating pan. The major drawback of this technology was that, drying time of tablet is long. [3]

LAST 40 YEARS

- Introduction of the side – vented tablet coating pans (with perforation)
- Innovation was required to incorporate aqueous film based coating polymers into the pharmaceutical industry
- Carbon steel construction except for pan
- Many screw, not welded in places
- Does not compiles GMP

LAST 30 YEARS

Introduction of reliable microprocessor based process control system required to insure process control and repeatability

Features

- Improved design spray nozzles for tablet coating.
- Specific application (all stainless steel).
- Improved air preparation system required for consistent aqueous process drying.
- Improved GMP coater style, all stainless steel more clean.
- Improved tablet handling.
- All necessary to optimize the process of coating aqueous film.

LAST 20 YEARS

- Potable water storage tank.
- Washing nozzles (coatermounted).
- Cleaning of the areas, that is difficult to access.
- Conservation of cleaning solution.
- Standardization of the cleaning process.
- Energy conservation.[4]

BASIC PRINCIPLE INVOLVE IN TABLET COATING

- Tablet coating is the application of the composition of the coating to moving tablet beds with simultaneous use of heated air to promote solvent evaporation
- Solution in which the release pattern influence as little as possible, and does not change the appearance significantly
- Modified release with specific requirements and release mechanism adapted to the digestive tract function of the body; color coating providing insulation. Include another adjuvant drug or formula in the coating to prevent chemical incompatibilities or to provide concurrent drug release. Use of different color and contrasting printing to enhance pharmaceutical beauty.[5]The coating solutions are sprayed onto the tablets in most coating methods, while the tablet are agitated in a pan, fluid bed, etc. As the solution is sprayed a thin film is formed that directly adheres to each tablet. The coating may be formed by a single application or may be constructed in layers using multiple spraying cycles. In the pharmaceutical industry rotating coating pans are often used. Uncoated tablets are positioned inside the pan, which is usually angled at a horizontal angle, and the liquid coating solution is poured into the pan as the tablets tumble. Then the liquid part of the coating solution evaporated by passing air over the tumbling tablet sheet. A fluid bed coater, by contrast, operates at a speed sufficient to support and separate the tablet as individual unit by passing air through a tablet bed. Once separated, spray the tablets with the composition of the coating.[5]

The coating process is normally a batch driven activity consisting of the following phases:

- Batch recognition and product collection (film or sugar coating)
- Loading / dispensing (precise dosing of all raw materials required
- Warm up
- Spraying (simultaneously application and rolling)
- Drying
- Cooling
- Unloading[5]

OBJECTIVE TO COAT A TABLET:

THERAPY

- To avoid irritation of esophagus and stomach
- To avoid inactivation of drug in the stomach
- To modify the drug release
- To improve patient compliance
- To mask the bitter taste

TECHNOLOGY:

- To reduce moisture and atmospheric influence.
- Reduces the risk of interaction between incompatible material
- Improve the drug stability
- To prolong the shelf life of the drug

MARKETING:

- To avoid bitter taste
- To improve product identity
- To improve the appearance and acceptability
- In improving product robustness[6]

KEY FACTORS

1. **Tablet properties**
   - Shape
   - Tolerance
   - Surface area
2. **Coating process**
   - Equipment's
   - Parameters
   - Facility and ancillary equipment
   - Automation
3. **Coating composition**
   - Polymers
   - Solvents
   - Plasticizers
   - Colorants[6]

TABLET PROPERTIES AND DEFECTS

Properties

A. The tablet must be chip and abrasion resistant.
B. The harness of the tablet should be less than 5 kg/cm2.
C. The tablets must have god friability.
D. Tablets must have good flow.
E. Tablets to be coated must have the correct physical properties

F. The ideal tablet coating shape is sphere that allows tablet to roll freely in a coating pan with minimum tablet contact. The more convex the surface, the less difficulty the agglomeration of the tablets may encounter.
G. The surface properties of the tablet depend on the chemical nature of the ingredients utilized in the formulator.[2][6]

The defect related to tableting process

- **Capping** : partial or total separation in the granular content of the top or bottom of the tablet is due to air-entrapment
- **Lamination** : The tablet is separated into two or more layers by means of air-trapping in the granular material
- **Cracking** : When using deep concave punches it is due to the rapid expansion of the tablets
- **Chipping** : It is because of very dry granules
- **Sticking** : The adhesion of the granulation material to the wall of the die
- **Picking** : It is the removal of the material from the tablet surface and its adhesion to the punch face
- **Binding** : These problems (v, vi, vii) are caused by more binders in granules or wet granulates
- **Mottling**: Attributable to either one or more of these factors: attributable to a colored substance with different (processrelated); debris in the granular material or on punch faces; oil spots using oily lubricants. Machine related defects.
- **Doubleimpression**: Due to the free rotation of the punches on the punch faces. Furthermore, each problem is described in this section along with its causes and remedies that may be to either the formulation (granulation) or the machine (dies, punches, and whole tablet press). [7]

DISADVANTAGE OF TABLET COATING

Tablet coating reduces formulation costs. Tablet coating can interfere with drug formulation pharmacodynamics properties. Something coating may result in various film defects like, mottling, capping, chipping, bridging. The process remained complicated. [8]

COATING PROCESS

THREE TYPES OF EQUIPMENT'S

A. Conventional pan systems

Improvements in conventional pan are pellegrini system which has a baffled pan and diffuser. The immersion sword system and the immersion tube system both have improved drying capacity in comparison with older version. The more recent versions are fully enclosed. The standard coating pan system is a circular metal pan, somewhat angularly mounted on a stand. The pan has a diameter of 8-60 inches, and a motor rotates on its horizontal axis. Heated air is directed into the pan and onto the tablet bed surface, and is exhausted by means of ducts positioned through the front of the pan [2].

I. Pellegrini system

- Has a baffled pan diffuser for uniform distribution of drying air
- It is enclosed and automated

II. Immersion-sword system

- Introduced drying air through a perforated metal sword immersed in the tablet bed. Dry air flows up through bed.
- Coating solution are distributed by an atomized spray device on the tablet bed surface

III. Immersion- tube system

- The tube immersed delivers heated air
- Coating solution is applied through spray nozzle built in tip of tub
- The drying air flows upward through the tablet bed and is exhausted by a conventional duct.[2]

B. Perforated pan system

I. Acela coata and hi- coata (same as a dri-coataer)

The drying air is directed towards the drum, passes through the bed is exhausted by drum perforation

II. Driacoater

- Introduce drying air through hollow perforated ribs located within the drum periphery
- Ribs fail into tablet bed as the coating plate rotates
- The drying air passes through the tablet bed and fluidized
- Exhaust is from the back of the pan

III. Glatt coater

- Drying air is directed through the tablet bed from the inside of the drum and the exhaust duct out.
- It consists of an optimal split chambered plenum, and drying air can be reversed by drum perforations to partially fluidized the tablet bed.
- Several air flow configuration are possible [6]

C. Fluid bed system

Fluidized bed technology has been used in the pharmaceutical industry for a long time. With this type of processing, the feed material is placed into a processing chamber and held in the flow, the main parts of a fluidized bed equipment can be named as: air/gas inlet chamber in general , the air/gas inlet chamber represents the lowest part of a fluidized bed equipment. According to the requirements and the construction of the whole device, this chamber is available in single or divided modification. In the case of a divided gas inlet chamber, different fluidization air flows can enter the equipment. These flow can be conditioned, for example, with temperature and flow rates which is of special importance in the case of continuous processing between the gas inlet chamber and the processing chamber, a distribution base plate is installed which distributes the air/gas flow across the whole cross-section of the processing chamber. Static or perforated distribution base plates are available. Conventional rotating plates are commonly used in combination with tangential spray system. In this case, the circular base plate is not permeable, and the fluidization air/gas enters the process chamber through a ring–shaped gap between the process chambers. Different processing methods are: top spray, bottom spray, wurster and rotor system. These methods have been developed in order to permit application of different processes such as granulation pelletization, drying, coating and layering [9]

TYPES OF COATING PROCESS

A. Sugar coating
B. Compression coating
C. Film coating

Sugar coating

- Involves the successive application of coating formulation based on sucrose to the tablet core, in appropriate coating equipment.
- Water evaporated from the syrup which leaves a thick layer of sugar around each tablet
- Sugar coats are also shiny and colorful
- Typically, tablet are coated with sugar by panning technique, using traditional rotations

Steps relating to sugar coating

1. **Seal coat**

- This included the application of one or more alcoholic spray waterproof coats such as pharmaceutical (traditional) shellac or synthetic polymer such as cap.
- Sugar coating are aqueous formulation that allows water to penetrate directly into the center of the tablet and thus potentially affect product stability and may cause premature disintegration of the tablet.

2. **Sub coating**

- Large amount of sugar coating are normally added to the tablet core, typically raising the tablet weight by 50-100 percent
- Why? – To round the edge of the tablet down. Most of this material buildup occurs at this stage and is accomplished by applying to the sucrose solution a bulking agent such as calcium carbonate. Anti-adherents may be added, e.g. talc after partial drying to prevent tablet from sticking together.

3. **Smoothing/ syrup coating**

- To cover and fill in tablet surface imperfections caused b y subcoating.
- Providing desired colour.
- The first coat of syrup contains some powders suspende d and is called the
- "Grossingsyrup."
- Dilute dyes may be applied to provide a tinted base that encourages uniform
- coating in subsequent phases.
- Dye coating syrup solution are applied until finishing size colour is achieved

4. **Finishing**

- Final step of coating with syrup.
- Few clear syrup coats could be used.

5. **Polishing**

- Desired luster is obtained in this final step
- Clean standard coating pan, canvas-lined coating pans
- Application of powdered wax or warm solution of waxes in suitable volatile solvent.[6]

COMPRESSION COATING

It involves compacting granular material around a perforated tablet core by means of specially built tablet devices. Coating against compression is a dry operation. In certain cases, it has advantage where the tablet core cannot withstand organic solvents or water and still needs to be for taste masking or to provide the drug with delayed or enteric properties.[8]

NEED OF COMPRESSION COATING

- Traditionally, separating two incompatible materials (one in core and the other in coat). There is an interface between two layers, thereby compromising the stability of the product. First, an inert placebo-coating layer, separating the core from the final coat, may be applied.
- Used to create modified product for release

Film coating

This technique has been replaced by film coating technology as the sugar coating process is very time consuming and depends on the skills of the coating operator. The process involves spraying a polymer, pigments, and plasticizer solution onto a rotating tablet bed to form a thin, even film on the tablet surface. The choice of polymer depends primarily on the desired drug release site, (stomach/ intestinal), or the desired release rate.

The choice of polymer mainly depends on the desired site of drug release (stomach/ intestinal), or the desired rate of release. examples of the non enteric coating polymers are hpmc, ethyl cellulose, povidone, etc, whilst the commonly used enteric coating polymers are cellulose acetate phthalate, acrylate polymer (eudragit 1 & eudragit s), hpmc phthalate, etc.[10]

The following characteristics would refer to an ideal film coating material

- It should be soluble in a choice solvent
- The core needs to be stylish
- It should be stable in sun, light or humidity
- It does not have bad color, taste or scent
- It should be non-toxic and pharmacologically inert
- It should be compatible with coating additives.[10]

Organic film coating

The most popular technology currently available for coating solid dosage form is the liquid coating technology (aqueousorganic based polymer solution). Organic solvents based coating offers a number of useful polymer alternatives, as most polymer soluble in the wide range of organic solvents. There are, however, other drawback such as being flammable, unsafe, and costly and having environmental issues. I often recommend for avoiding organic solvents in medication drug formulation, taking into account the health profile of drugs. In designing formulation with aqueous film coating, the pharmaceutical companies are now paying a lot of attention. [10]

Aqueous film coating

All of the above problems with organic solvents led to a shift use of water as the preferred solvent for the coating. Together with organic coating aqueous–based coating has been commonly used. The conversion from organic solvent based coating to aqueous-based coating make the coating process more cost effective, although initially it will require some investment to upgrade the coating facility. The need for this upgrade occurs due to the need for higher drying efficiency (latent water heat is 2200 kj compared to 550 kj for methylene chloride). This implies that one would require 4 times more energy as compared to organic solvent[10]

Advance technique of coating

Electrostatic coating

1. Electrostatic precipitator

2. Powder coating,
3. Ink jet devices,
4. Laser printer and copying machine in electro photography,
5. Application of plasma discharge devices,
6. Electrophoresis,
7. Cell sorting,
8. Electro spray and proteomics.

While the fundamental electrostatic processes involved in these and other applications have been addressed, there are still problems that remain to be solved. This article reviews some of these problems and possible solutions. The research needs are discussed with respect to the specific industrial and biomedical applications. [11]

The process of electrostatic coating is very useful in paint technology, food technology, metal coatings, finished industry and living cell coating. It is also in both tablet coating and capsule coating. The principle of electrostatic powder coating involves spraying a mixture of finely grounded particles and polymers onto a surface of the substratum without using any solvent, and then heating the substratum on the oven until the powder mixture is fused into film.

There are two types of spray units by charging mechanism

1. Corona charging
2. Tribo charging.

Mechanism of corona charging:

This is achieved characterized by the electrical breakdown and then air ionization by placing high voltage at the gun outlet on a sharp pointed needle like an electrode (i.e. charging pin). The powder particles pick up negative ions from the gun to the substratum on their way. Particle movements between the charging arm and the substratum is primarily controlled by the electrical and mechanical forces. The mechanical forces generated by the air blow the powder from the spray gun towards the substrate. The electrical forces are generated for the charging of the corona from the electrical field between the charging tip of the spray gun and the earthen surface and the repulsive forces between the charged particles. The electrical field can be adjusted to direct the powders flow, control pattern size, shape, and powder density as it is released from the gun. [12]

Mechanism of tribo charging:

For tribo charging arms, only the repulsive forces between the charged particles are known as the attraction forces. When charged particles and the grounded substratum make the particle deposited on the substratum. By virtue of mechanical forces and electrostatic attraction, charged particles are sprayed evenly onto the earthen substrate. Particles settle on the substratum until the deposited particles repulsive forces rise towards the coming particles, and exceed the electrostatic attraction. Finally, once the said repulsion becomes equivalent to the said attraction, the particles can no longer adhere to the substratum, and the thickness of the coating will no longer increase. [12]

Qtroltm

Qtroltm is phase's pharmaceuticals core technology platform, derived from electrostatic deposition the well proven technology behind photocopying. Qtroltm allows for the processing of solid oral dosage from such as tablet in a controlled and precise manner that can then be used to alter the way a drug is release into the body. Qtroltm technology enables oral drug development with a broad variety of release profiles. The way the drugs are packaged and /or coated within the tablet coating is applied will produce various release profile, including sustained release, rapid release, incremental release and delayed release.It also the developments of combination tablets. Promoting the release of one me dication, then a quiet period followed by the release of a second drug.

Magnetically assisted impaction coating (maic)

Dry coating techniques like compression coating electrostatic dry coating produce heat due to heavy mechanical forces. The magnetic particles particles are stimulated in the presence of magnetic field and move frequently inside the vessel, like a fluidized bed system. Mechanism: maic process is done in several stages, which are discussed below.

Stage I : initially magnetic particles are excited.
Stage II : guest particles or coating materials are de-agglomerated
Stage III : magnetic host wall particle interaction.
Stage IV : there is an interaction between particles and coating materials
Stage V : coated material is produced from the above mentioned steps. [3]

Super cell coating technology

In this technique coating material are deposited on tablet layer in a controlled manner very accurately, hygroscopic or friable tablet are also coated efficiently. This process is continued slowly to prevent sticking of two or more tablet together, known as 'twinning'.

Features coating super cell coating technology

- Continuous coating
- Processing time is very short
- Flexible modular design
- No scale up to parameters
- R & D batch scale (minimum batch size of 30 grams)
- Enhancing technology
- Multilayer coating
- Difficult to coat shapes
- Friable tablets
- Enabling technology

Laser assisted cold spray coating

It is generally used to deposit pure metals such as aluminium, copper, and tantalum and composite coating such as al_2O_3

Photo curable coating

Wherein the photo –curable coating composition includes an organic solvent like meth acryloyl monomer, and a diluted are the transmission to prevent discoloration of the optical product. The promoting agents, bubble removing agents, viscosity increasing agent are cured by coating process.

Supercritical coating: coating of thin film onto solid particle has been achieved by in-situ simultaneous nucleation and deposition of dissolved material out solid supercritical fluid,

resultant film formation on the solid particles suspended in supercritical material, and subsequent fluid, resultant film formation on the solid particles suspended in supercritical material, and subsequent thermal preparation of the particle coating.

Continuous coating

In present days batch type tablet coater have been now replaced advance continuous tablet coater where in- process evaluation of the coated tablet is being carried out along with coating of tablet core. The tablet moves the coater by natural migration, no baffles or vanes are used. The tablet uniformity is depends on adjustment to tablet rate, pan rpm and residence amount and time all effect, continuous coating equipment Thomas engineering (comp. coat).

O – hara technology

The latest coating equipment's equipment introduced is o-hara technology. It is divided two major zones such as four air zones. The typical start up and down process consist of: pan is filled with sufficient input to start spray sequence.

- As the product moves down the pan, each spray sequence is turned on.
- Once the pan is filled is the rest process moves in a continuous manner.
- Utilizing a sensor to initiate the shutdown sequence and the product feeding stops. [3]

Film coating

As the sugar coating process is very time consuming so this technique has been replaced by filmcoating technology.The process involves spraying a solution of polymer, pigment and plasticizer onto a rotating tablet bed to form a thin film, even on the tablet surface. The choice of polymer depends mainly on the desired site, it is of two types: compare formed tablet core includes the compaction of granular materials around apre-formed tablet core using specially build tablet devices. Compression coating is a dry process. It has advantages in which the tablet core cannot tolerate organic solvent or water and yet needs to be coated for taste masking, or to provide delayed or enteric properties to the product.[8]

Ideal requirements of coating materials are summarized below:

Solvent solubility of choice for the preparation of coatin gs.

- Solubility requirement for the intended use e.g. free water-solubility, slow water-solubility or pH – dependent. Solubility. Capacity to produce an elegant looking product.
- High stability against sun, light, humidity, air and the coa ted substrate.
- No inherent color, taste or odor
- High compatibility with other coating solution additives.
- Nontoxic with no pharmacological activity.
- High resistance to cracking.
- Film former should not give bridging or filling of the debossed tablet [5]

The printing technique compatible with widely used film formers is as follows

- Hydroxy propyl methyl cellulose (hpmc)
- Methyl hydroxy ethyl cellulose (mhec)
- Ethyl cellulose (ec)
- Hydroxy propyl cellulose (hpc)
- Povidone
- Sodium carboxy methyl cellulose
- Polyethylene glycols (peg) 8. Acrylate polymers[5]

ENTERIC COATING

An enteric coating is a barrier that controls where oral medication is taken up in the digestive system. The word 'enteric' indicates small intestine; thus enteric coating prevent medication from being released before it reaches the small intestine. At low pH, the enteric coated polymer remains unionised, and therefore remains insoluble. But as the pH increase in the git, ionization is capable of the four reasons for putting such a coating on a tablet or capsule ingredients.

- Protection of active pH
- A pharmaceutical ingredients, from the acidic environment of the stomach (e. g. enzymes and certain antibiotics)
- Preventing stomach distress or nausea from irritation (e. g. sodium salicylate) from the drug
- For the delivery in its most concentrated form of drugs which are optimally absorbed in the small intestine to their primary absorption site.
- To make a delayed-release portion available for repeat action.
- Required to minimize drug metabolism at first pass.
- The choice of the polymer and the thickness of the coated layer are essentials for controlling the physiological solubility profile of the entry coated dosage form.[1]

Ideal properties of enteric coating material

- Resistance to gastric fluids
- Susceptible/permeable to intestinal fluid
- Compatibility with most components of the coating solu tion and its drug substrate
- Formation of continuous film
- Nontoxic, cheap and ease of application
- Ability to be readily printed

Advantage of enteric coated tablet

- Enteric coating is employed for a number of therapeutic, safety, and medical reasons. Some drugs are procured when directly exposed to the mucosa, gastric, including aspirin and vigorous electrolytes such as NH4cl.
- Enteric coating is one method of reducing or eliminating vexation from such drugs. There are other drug that if abandonment in the stomach may create nausea and vomiting.
- Low ph of the stomach may kill other drugs, and thus ent eric coating may be a willingness to leave the drug undil uted and at the highest possible concentration in the intestine.
- In case of repeat action and other controlled release dosage form, the influence of altering the profile of the drug on total drug bioavailability, distribution, and pharmacokinetics must be investigated

Disadvantage

1. Limitations of sugar coating such as relatively high cost, long coating time and high bulk had led to the use of other coating materials.

2. However the process of coating is tedious and time consuming and it requires the expertise of highly skilled technician.

Different types of polymer used in enteric coating – polymers and dissolution pH

- Shellac (esters of allergic acid) -7.0 pH
- Cellulose acetate phthalate (cap) -6.2 pH
- Poly(meth acrylic acid-co-methyl methacrylate) 5.5-7.0 pH
- Cellulose acetate trimellitate (cat) -5.0 pH
- Poly(vinyl acetate phthalate) (pvap) -5.0 pH
- Hydroxypropyl methylcellulose phthalate (hpmcp) -4.5-5.5 pH

New materials used for tablet coating

zein, aqua-zein which is an aqueous zein formulation containing no alcohol. Amylose starch and starch derivatives and dextrin. [12]

DEFECTS OF COATING

Picking and sticking.

That is where the coating removes one component from the center of the tablet. It is caused by over wetting the tablet, under drying, or poor quality of the tablets.

Bridging

This occurs when the coating covers the lettering or logo on t he tablet and is usually caused by inadequate solution application, poor tablet embossing design, high coating viscosity, high percentage of solids in the solution, or excessive atomization pressure.

Capping

This is when laminar fashion separates the tablet. The problem arises from improper compression of the tablet, but it may not reveal itself until you start coating. However, how you use the coating system will make the problem even worse. At the preheating stage be careful not to over dry the tablets. This can render the tablet fragile and encourage capping.

Erosion

This can be the product of soft tablet, an additional charge tablet face, poor drying, or lack of strength on the tablet board.

Twinning

This is the team that stays together for two tablets, and a common issue with capsule-shaped tablet is. Assuming you don't want to change the shape of the tablet, this problem can be solved by balancing pan speed and spray rate. Try to reduce spray rate or increase pan velocity. In change is nearly impossible to see but it prevents the problems of twinning

Peeling and frosting

This is a defect where the coating in a sheet peels away from the surface of the tablet. Peeling means the coating solvent did not lock onto the surface of the surface of the tablet. This could be due to a defect in the tablet cores coating solution, over wetting or high content moisture.

Chipping

This is the product of the high pan speed, a friable tablet core or a missing coating solution good plasticizer, color mottled. This can happen if the coating solution is incorrectly prepared, the actual spray rate is different from the target rate, the tablet cores are cold or the drying rate is out spec.

Orange peel

This refers to a texture of the coating, which resembles an orange surface. It is usually the result of a high pressure atomization in combination with too high spray rates. [13]

EVALUATION OF COATING

Hardness

The crushing strength of the tablet was tested by a commonly used tablet type Monsanto hardness tester. A tablet is inserted between the anvils and the crushing force cause the tablet to break.

Friability test

Tablet strength was tested by Roche friabilator. Pre weighed tablets earned 100 revolutions in 4 minutes and have been dedusted. The weight loss rate was determined by measuring the tablets over again.

Uniformity of weight

Twenty randomly selected tablets were weighed in a single pan balance, individually and together. The mean weight was observed and the standard deviation calculated.

Stability studies

The stability studies were carried out at 25°C± 2°C/ 60% ± 5% RH, 35°C ± 2°C / 60% ± 5% RH and 40°C ± 2°C/ 75% ± 5% RH for selected formulations for 3 months.

Statistical evaluation

The data were statistically analyzed by one-way analysis of variance (anova) and student's t-test. [14]

CONCLUSION

Coating enhances the quality of product. It is well known technique to make a tablet protective and creative. There will be immense possibilities for potential developments in the area of the tablet coating to achieve specific benefits. Safety aspects of human advance coating are in infancy, so further research on health and safety aspects of these technologies will enable these technologies to be commercialized in the pharmaceutical industry and provide better alternatives to conventional coating. Improvements in particle motion, heat and energy transfer, film delivery, drying efficiency and continuous processing have significantly contributed to the advancement of this technology. In these review defects of coating, types of coating have been discussed.

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