



Tablet Coating

Mohmad Issa¹, Dr.Sarita Sharma², Dr.Gaurav Kumar Sharma³, Dr.Kaushal Kishore Chandrul⁴

Student of B.Pharma 4th Year¹, Councillor², Hod³, Principal⁴,
Department of Pharmacy, Mewar University, Chittorgarh, Rajasthan India.

ABSTRACT

Tablet coating is a not unusual pharmaceutical technique of applying a thin polymer-based film to a tablet or a granule containing Active Pharmaceutical Ingredients (APIs). Stable dosage paperwork are lined for some of reasons, the maximum crucial of that's controlling the discharge profiles. The amount of coating at the surface of a tablet is vital to the effectiveness of the oral dosage shape. Capsules are typically coated in horizontal rotating pans with the coating answer sprayed onto the unfastened surface of the tablet mattress. The blessings of tablet coating are flavor covering, smell overlaying, bodily and chemical protection, protects the drug from the gastric surroundings and so on. There are various strategies for tablet coating which include sugar coating, film coating, and enteric coating. Latest trends in pharmaceutical technology are the development of coating techniques which overcomes the various risks associated with solvent based coatings. In those ultra-modern technologies coating substances are at once lined onto the surface of stable dosage bureaucracy without the use of any solvent. Numerous solvent less coatings are available inclusive of electrostatic dry coating, magnetically assisted impaction coating, compression coating, warm soften coating, powder coating, and supercritical fluid coating. Supercell Coating generation is a innovative tablet coating that appropriately deposits managed quantities of coating substances on capsules despite the fact that they may be extraordinarily hygroscopic or friable. Magnetically assisted impaction coating, electrostatic dry coating in solvent less coatings, aqueous film coating and Supercell coating technology also are available latest technique of coating. An ideal tablet ought to be free from any visual illness or functional defect. The improvements and innovations in tablet manufacture have now not reduced the issues, often encountered in the production, instead have accelerated the troubles, in particular due to the complexities of tablet presses; and/or the extra needs of high-quality. This review deal in detail approximately records, recent tablet coating technique and remedies associated with the tablet coating.

KEYWORDS: History Of Coating Techniques, Traditional Coating Techniques, Recent Trends In Tablet Coating Techniques

Introduction

Tablet is a pharmaceutical solid dosage form, comprising a mixture of active substances and excipients, commonly in powder form, pressed or compacted right into a stable. Capsules Dosage form is one of a most desired dosage form everywhere in the world. Almost all drug molecules may be formulated in a tablet and procedure of producing of drugs is very simple, and may be very bendy. Coating is a manner by using which a basically dry, outer layer of coating material is implemented to the surface of a dosage shape to achieve precise benefits. Coating may be implemented to a wide range of oral solid dosage shape, along with capsules, capsules, multi particulates and drug crystals [1-3]. While coating composition is carried out to a batch of capsules in a coating pan, the tablet surfaces grow to be protected with a tacky polymeric film. Before the tablet floor dries, the carried out coating adjustments from a sticky liquid to tacky semisolid and sooner or later to a non-sticky dry surface pans. Many stable pharmaceutical dosage forms are produced with coatings, both on the external surface of the tablet, or on substances dispensed inside gelatin tablets. The tablet ought to launch the medicament steadily and the drug should be to be had for digestion. The coating procedure can be in particular formulated to adjust how speedy the tablet dissolves and in which the lively tablets are to be absorbed into the body after ingestion. The complete coating system is conducted in a chain of routinely operated acorn-formed coating pans of galvanized iron stainless-steel or copper [4-6]. The smaller pans are used for experimental, developmental, and pilot plant operations, the larger pan for industrial production.

History of Coating Technique

“Panning” turned into the unique word for the manner of adding a coating to a tablet. The word panning remains a commonplace time period that's used in the confectionary enterprise. In past years coating carries out essentially using a rotating drum on a stand. A coating answer turned into brought, while the rotation of the pan allotted the solution during the

mattress of tablets. The primary drawback of this technology was gradual looking ahead to the coating technique to dry; and the trick turned into to get it to dry evenly. With the advent of movie coating a movie or skinny membrane, normally representing 1-3 % of the whole tablet weight, became sprayed on the use of a perforated pan. To lower the overall manner time, holes had been made through the pan in order that handled air warm or cold will be pulled via the pan, just like a garments dryer, permitting the tablets to dry speedier. With this advent of stepped forward drying came the potential to replace the movie coating solution from a solvent primarily based option to a water primarily based solution [7-10].

Traditional Coating Techniques

Generally three methods are used for tablet coating:

- a) Sugar Coating
- b) Film Coating

Sugar coating

Steps in sugar coating:

- Seal coatingSub coating
- Syrup coating/SmoothingColor coating
- Polishing

Sealing (Waterproofing):

This involved the application of one or more coats of a water proofing substance in the form of alcoholic spray, such as pharmaceutical Shellac or synthetic polymers, such as CAP.

Sugar-coatings are aqueous formulations which allow water to penetrate directly into the tablet core and thus potentially affecting product stability and possibly causing premature tablet disintegration.

Sub coating:

Large quantities of sugar-coatings are usually applied to the tablet core, typically increasing the tablet weight by 50- 100%.

Smoothing/syrup coating:

To cover and fill in the imperfections in tablet surface caused by subcoating.

To impart desired color

The first syrup coat contains some suspended powders and are called "grossing syrups"

Dilute colorants can be added to provide tinted base that facilitates uniform coating in later steps.

Syrup solutions containing the dye are applied until final size and color are achieved.

Finishing:

Final syrup coating step

Few clear coats of syrup may be applied.

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.

Film coating

Film coating and sugar coating shares the same equipments and process parameters.

Two methods,

Pan-Pour method:

Same as that of pan-pour sugar coating

Method is relatively slow and relies heavily on skill and technique of operator

Aqueous based film coating is not suitable due to localized over-wetting.

Pan-Spray method:

Use of automated spraying system

Types of film coating:

Immediate release Modified release

Film coating formulation (Composition of the coating liquid)

Polymer/Film Former: A film former capable of producing smooth thin films reproducible under the prescribed coating conditions.

Classified as

1. Non enteric materials

E.g. HPMC, MHEC, EC, HPC, Povidone, SCMC, PEG, Acrylate Polymers

2. Enteric materials

E.g. CAP, Acrylate Polymers, HPMCP, PVAP.

Recent Trends in Tablet Coating Techniques

Different methods of coating

Compression coating

These sorts of tablet have elements like, inner core and surrounding coat. The core is small porous tablet and organized on one turret. For preparing final tablet, a bigger die hollow space in every other turret is used wherein first the coat cloth is crammed to half of after which center tablet is robotically transferred, again the last space is filled with coat fabric and ultimately compression force is applied. Often, the coat is water soluble and disintegrates without difficulty after swallowing.

Preparation of the compression-coated: A carefully weighed quantity of powder mixture was positioned inside the die and compressed on a

Carver Press (Wabash, IN) at a acknowledged force with the tooling proven to produce a cup-fashioned tablet.

Electrostatic dry coating: An electrostatic dry powder coating method for tablets become evolved for the first time with the aid of electrostatic dry powder coating in a pan coater gadget. The optimized dry powder coating method produces capsules with smooth surface, correct coating uniformity and release profile that are corresponding to that of the tablet cores. This novel electrostatic dry powder coating technique is an opportunity to aqueous or solvent based coating technique for pharmaceutical products.

According to the charging mechanism, there are two types of spraying units:

a) Corona charging

b) Tribo charging.

a. Mechanism of corona charging: On this mechanism, the electrical breakdown and ionization of air with the aid of enforcing high voltage on a sharp pointed needle like electrode at the hole of the gun. The powder debris picks up the negative ions on their manner from the gun to the substrate. The movement of particles between the substrate and the charging gun is performed by way of the

b. Mechanism of tribo charging: In the tribo charging, it makes using the principle of friction charging associated with the dielectric properties of solid substances and so that no loose ions and electric area might be present between the spray gun and levelheaded substance. For tribo charging guns, the electric forces are only regarded to the repulsive forces among the charged particles. After spraying, charged particles come into the distance adjoining to the substrate and the attractive forces among the grounded substrate and the charged particles makes the particle to deposit on the substrate.

Mechanism of coating in the MAIC process:

Stage-I: Excitation of magnetic particles. Stage-II: De-agglomeration of guest particles.

Stage-III: Shearing and spreading of guest particles on the surface of the host particles.

Stage-V: Magnetic-host-host particle interaction. Stage-VI: Magnetic-host-wall interaction

and Stage-VI: Formation of coated products

Blends of GIT-insoluble and GIT-soluble polymers: Ethyl cellulose is a frequently used GIT-insoluble polymer in controlled drug delivery systems. But, if carried out as a film coating material flawlessly shaped membranes result in very low drug launch rates because ethyl cellulose is poorly permeable for maximum drugs. To triumph over this restriction, water-soluble polymers can be added to ethyl cellulose coatings.

Blends of GIT-insoluble and enteric polymers: Blends of GIT-insoluble and enteric polymers are specifically exciting for the coating of solid dosage bureaucracy, because they could offer drug release profiles which might be triggered by using the pH of the surrounding surroundings alongside the GIT. Inside the stomach, each polymer is insoluble, while within the gut, the enteric polymer is soluble and can leach out from the coatings. This could result in large, dynamic changes in the physicochemical houses of the films at some point of the GIT transit and, as a result, to altered drug release kinetics.

Vacuum film coating: (Fluid Bed Coating)

Spray coating can be used for all fluid bed systems, be it in batch or continuous operation or if the film is applied from a sprayed solution, suspension or hot melt. For this processing option the parameters have to be chosen to avoid agglomeration, i.e. liquid bridges between the air suspended particles. If spraying a solution or suspension the liquid only serves as a vehicle to deliver the coating material to the surface of the substrate. For hot melt coating the droplets must be small enough not to form solid bridges in Figure 7 represents vacuum film coating process.

Top spray coating process

Despite the fact that the top spray fluid mattress system is extensively used for granulation its use for coating is restrained. Top spraying is the most effective method and gives the best capability and lowest capital cost. It could be used for numerous manipulations of taste covering and many others. This method alternative is often used in the food, feed and chemical industries as the characteristic of the film mainly serves to enhance the general managing situations. An ideal film is typically no longer required for this function, however care should be taken that the droplets do not emerge as too viscous before touching the substrate, so that you can hold accurate spread ability.

Bottom spray coating process

The maximum normally recognized fluid-bed system for coating inside the pharmaceutical industry is bottom-spray technique. The precise functions of bottom-spraying are an air distributes plate and a partition that arrange fluidization of particles of debris via the partition. The nozzle is installed at the bottom of the product box and is focused in the coating zone. The quick distance between the coating materials and particles at some point of the coating technique minimizes spray drying and contributes to excessive uniformity and coating performance may be seen in Figure 9 represents bottom spray coating process.

1. Uniform statistical residence time is warranted by defined rotor revolution speed.
2. The coating material is sprayed simultaneously within the rotating product.
3. The rolling movement of the particles affords an even higher separation force, assuch preventing agglomeration.

Tablet Coating Defects

An ideal tablet should be free from any visual defect/ functional defect. The improvements and innovations in tablet manufacture have now not reduced the troubles, often encountered inside the production, rather have elevated the issues, in particular due to the complexities of tablet presses. During manufacturing an industrial pharmacist usually encounters number of problems. Majority of visual defects are due to inadequate fines, inadequate moisture in the granules ready for compression and due to faulty machine setting. Due to faulty formulation there are functional defects.

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