



An Overview on Film Coating Tablet

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ABSTRACT

Tablet dosage form is a common Pharmaceutical dosage form. Tablet coating advantages is masking taste, odour, and colour of the drug, Providing Physical, chemical Protection and bioavailability of active ingredient. In coating process polymer sprayed onto the free surface deposition of a thin, uniform film on the tablet. But that process required a skilled operation, various types of tablet coating include enteric coating, sugar coating and film coating. Development of film coated tablet has based on different types of polymer in various organic solvent system, aqueous system or hydro alcoholic system to prepare pharmaceutical solid dosage form. Film coating are dry blend of polymer, plasticizer and surfactants. A polymer used for film coating of tablets has great importance. This review focus on the basic concept tablet coating, coating techniques and various aspect on tablet coating.

Keywords: Aqueous Film coating, organic solvent film coating, Polymer.

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INTRODUCTION

Coating is process in which dry the outer layer of coating material is applied to the surface of the tablets to gain the specific benefits on dosage form identification to modifying drug release from the dosage form after making a good tablet. Coating is applied to a wide range of oral solid dosage forms likes tablets, capsule, and drug crystals.

A study says the sugar-coating process is very time consuming so this technique has been replaced by film coating technology, the process solvent spraying onto a tablets bad to form a thin, uniform film on the tablet surface. film coating performs by two types of techniques non aqueous (generally organic solvent used) and aqueous film coating (water solvent used), there are used different types of polymer used in film coated tablets-cellulose ethers, polymers, silicones, polysaccharides, vinyl polymer etc. ¹⁻⁵

Non-aqueous (organic solvent) film coating

The most common technique for coating solid dosage form in the liquid coating, mixture of polymer, pigments and excipients is dissolved in an organic solution, and then sprayed onto the dosage form in a pan coater and dry to providing heat, until a coating film is formed. Organic solvent based coating provides a useful polymer. Most of

the polymer are soluble in the wide range of organic solvents. ⁶⁻⁸

Aqueous film coating

Aqueous based coating has highly used compare to organic based coating. Disadvantages of organic solvent need to shift on water based solvent. Its coating process more economical and need to less upgrade coating facility. ^{7,8}

Importance of Film Coating ⁹

- To protect against environmental factor like sunlight, temperature, moisture and air.
- To ease to swallow.
- To mask taste and odour.
- To increase shelf life.
- To enhance the image of brand.
- To ease in formulation.
- To strength of the dosage form.
- To protect drug for GIT environment.
- To control in release of drug.

Disadvantage of Film Coating ⁹

- Coating generates various coating defeats.
- Change in surface smoothers.
- Increase cost of dosage form.
- In few case change in properties of formulation.



Coating Composition¹⁻⁴

Materials used in film coating are-

1. Film formers
2. Solvents
3. Plasticizers
4. Colourants
5. Opaquant-extenders

1. Film Former Materials

Ideal requirement of film coating material

- Solubility in solvent of choice for coating preparation
- Solubility requirement for the intended use e.g. free water-solubility, slow water solubility and pH- dependent solubility.
- Capacity to produce an elegant looking product.
- High stability against heat, light, moisture, air and the substrate being coated.
- Nontoxic with no pharmacological activity.
- High resistance to cracking.
- Film former should not give bridging or filling of the debossed tablets.

Various types of film Former material

1. Hydroxy propyl methyl cellulose (HPMC)
2. Ethyl cellulose (EC)
3. Povidone
4. Polyethylene glycols (PEG)
5. Hydroxy carboxy cellulose (HPC)

2. Solvents¹⁹⁻²¹

Solvent are used to dissolve or disperse the polymer and other additives and convey them to substrate surface.

- It dissolve/disperse polymer system.
- Easily disperse other additives into solvent system
- It should be colourless, tasteless. Odourless, inexpensive. Inert, nontoxic and non-flammable
- Rapid drying rate.
- No environmental pollution.

3. Plasticizers**4. Colorants****5. Opaquant extender****Types of Tablets Coating**¹⁸**1. Sugar coating**

Main purpose of sugar coating to mask bitter taste of tablets, it also provides a good appearance to tablets brand.

Several steps of sugar coating

- **Sealing:** A seal coat is applied on the tablets to prevent penetration of moisture into the tablets core.
- **Sub coating:** To cover the round edge and increase the tablet weight.
- **Syrup coating:** To imperfections in tablets surface to an achieved perfect size.
- **Colouring:** For the final colour.
- **Polishing:** Powdered wax is applied to provide a desired lustre.^{17,18}

2. Dip coating

Coating on tablets by dip technique by dipping tablets into coating liquid then wet tablets are dried in conventional coating pans and this process repeated several times to achieved desired coating.

3. Press coating

Compression is used to form coat around a pre-formed core.

4. Enteric coating

An enteric coating is providing a barrier like coating which can control the release of oral medication in the digestive system. Enteric mean is small intestine so this coating prevent drug to release in stomach before it reaches the small intestine.¹⁶⁻¹⁷

Coating Process Design and Control

Most of coating process, the coating solution are sprayed onto the tablets as the tablets are being rotated in a pan, fluid bed, etc. the solution is being sprayed, a thin film is formed that adheres directly to each tablet. The coating is formed by a single cycle or multiple cycles of spraying. Rotating coating pans are often used in coating uncoated tablets are placed in the pan, which is tilted at an angle form a horizontal and liquid coating solution is introduced into the pan while tablets are tumbling. The coating solution is evaporated by passing air over the surface of the tumbling tablets, a fluid bed coater operates by passing air through a bed of tablets to support and separate the tablets as individual units.

The tablets coating process consisting of the following steps:

- Dispensing/loading (accurate dosing of all raw materials)
- Warming



- Spraying (apply and rolling simultaneously)
- Drying
- Cooling
- Unloading

Some important point should be addressed:

- Process Air supply for the volume of the pan during coating.
- Maintain temperature within the range of 30-70°C
- Maintain dew point within a range of 10-20°C
- Pan and spray system designed to easily clean/sanitizes.
- Sprayed system fluid path should have a minimum of dead spaces, since May coating formulation are dispersion or suspension.
- Spray systems atomization and fun air are easily controlled, preferably form the exterior of the pan.
- Treatment of inlet and exhaust as required by GMP and environment regulations.

Coating Parameters ^{9, 19-21}

To monitored and controlled condition of process an equipment with appropriate sensors:

1. Pan rotation
2. Inlet air temperature
3. Inlet air dew point
4. Inlet air flow rate
5. Spray system atomization and fun air flow rate
6. Coating liquid spray rate
7. Exhaust air temperature
8. Product temperature

Process of Film Coating Technique

In film coating the coating composition is sprayed on the batch of tablets on rotate moving platform and heated air are evaporate the solvent, In industry perspective film solvent applied using a spray- atomization the polymer dissolved in aqueous solvent and dispersed into small droplets, which are delivered to the preheated surface of subtract and the solvent may penetrate into the core then surface dissolution and physical mixing at film forming surface as solvent evaporate, the polymer particle densely pack on the surface of the solid further solvent evaporate and particle combined together due to the cohesive force between polymer and surface of solid, heat is generally added on the coating equipment to facilitate solvent evaporate and film formation. ¹⁰⁻¹²

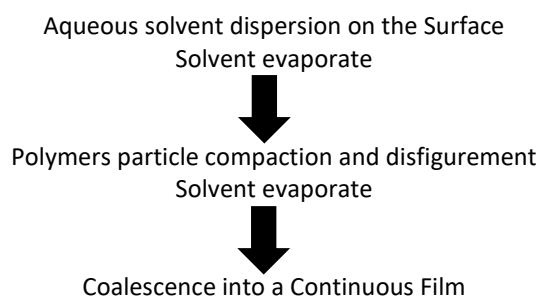


Figure 1: Film Formation Form Aqueous Polymeric Dispersion ¹⁰⁻¹²

Mechanisms of Film Formation

Film formation form the polymer solution occurs through a series of phases, when the polymer solution is applied to the surface of the tablet, cohesion forces form a bond between the coating polymer molecules. To obtain high cohesion, the cohesive strength of the polymer molecules must be relatively high and continuous surface of the film material must coalesce. Coalescence of adjacent polymer molecular layers or surfaces occurs through diffusion. When most of the water evaporate, the viscosity of the solution increases and leaves the polymer chain in close proximity to each other and deposit over a previous polymer layer, if there is adequate cohesive attraction between the molecules and sufficient diffusion and coalescence upon the more complete evaporation of water, the individual polymer chains align and form a cohesive film. ^{11, 12}

Tablets Coating Defects

1. Picking and sticking ¹³

Cause: it creates overly wet bed where adjacent tablets stick together and break apart

Remedies: Increase in the dying air temperature in the preheating stage.

2. Blistering

Cause: Entrapment of gases in the film due to overheating during spraying

Remedies: Milder dying condition are warranted in this case.

3. Mottling ¹³

Cause: Degradation of the product

Remedies: Prepare coating solution properly

4. Orange peel effect ¹⁴

Cause: Inadequate spreading of the coating solution.

Remedies: Thinning the solution with additional solvent.

5. Blooming

Cause: Mostly due to plasticizer Coating becomes dull immediately or long time.

6. Chipping¹⁰**Cause:** Decrease in fluidizing air**Remedies:** Careful not to over dry the tablets in the preheating stage.**7. Twining****Cause** common problem**Remedies:** increase the pan speed**8. Pitting****Cause:** Temperature of the tablet core is greater than the melting point of the material used in the formulation**Remedies:** Control of temperature of tablets core.**9. Colour variation****Cause:** Variation alteration of the frequency and duration of the spray zone**Remedies:** Reformulate with different plasticizers.¹³⁻¹⁸**CONCLUSION**

On the basis of the study that the film coating as solvent based or aqueous based improve the tablets formulation, Physical and chemical aspects, during process arise a various types of defects in coating, these defect reducing the effectiveness of the product. In the study types of film coating, importance, principle of film formation, coating defect have been discussed and the aqueous based give the more benefits over the organic coating, which leads to non-toxicity, cost effectiveness.

REFERENCES

- Kamble ND, Chaudhari PS, Oswal RJ, kshirsager SS, Antre R V. Innovations in tablets coating technology: A Review Department of Pharmaceutics ISSN 097. Int J Appl Biol Pharma Technol. 2(1), 2011, 21-8.
- Lachman L, Liberman HA, Joseph LK. The theory and practice of Industrial Pharmacy; Varghese Publishing House; Mumbai; Third edition; 297-321.
- Lachman L, Liberman H, and Kanig J. The Theory and Practice of industrial pharmacy; Third edition: 293-345, 346-373.
- Aulton M. Pharmaceutics: The Science of Dosage Form Design; International Student edition: 304-321, 347-668.
- Basu A, De A, Dey S. Techniques of tablet coating: concepts and advancement: A Comprehensive review. Res Rev J Pharma Pharma Sci. 2(4), 203, 1-6.
- Remington's the science and practice of pharmacy. Volume-I. 21st ed. Indian Edition Lippincott Williams and Wilkins. 2005, 929-938.
- Cole G, Hogan J, Aulton M. pharmaceutical coating technology. Taylor and Francis, London, 1995, 1-5.
- Thomas M. Solvent film coating aqueous Vs organic. Midwest regional meeting, academy of pharmaceutical science. Industrial pharmaceutical technology section.1978 April 10.
- Sharma PH, Kalasare SN, Kamble RA. Review on polymers used for film coating. Asian journal of pharmaceutical technology and innovation. ISSN: 234-8810. 01(02), 2013, 01-16.
- Obara S, Ginity JW. Influence of free films prepared form spray techniques. Int. J. Pharm. 126, 1995, 1-10.
- Harris MR and Ghebre-Sellassie I. Aqueous polymeric coating for modified release oral dosage forms. In Aqueous Polymeric Coating for Pharmaceutical Dosage Forms. Marcel Dekker Inc., New York, 2, 1997, 81-100.
- Parmar KD, Bhatt NM, Pathak N, Chauhan Vijay V, Patel LD, Kela AN, Nathani HS. An Overview: Aqueous Film Coating Technology on tablets. Int J Pharm. and chem. science ISSN: 2277-5006 Vol.1 (3), 2012, 06-07.
- Pole S, Maurya S, Hanale P. Rathod N, Bendale S, Khutle NM. A detail understanding of enteric coated tablet: manufacturing and evaluation. Eur J Pharma Med Res. 3(4), 2016, 13-44.
- Om Bagadde, R Pujari, NA Nemlekar, PP Kharat AS and MV. Appraisal On: Tablets Coating and its outcome with complementary Sprouting technology. Res J Pharm Biol Chem Sci Apprais. 5(5), 2014, 298-315.
- Sharma P, Khinchi MP, Chetan Dubey PS, Recent advancement in tablet coating technology. World J Pharm Pharm Sci. 6(4), 2017, 2189-204.
- P. Mounica, S Pavani, P Mounica R. a review on recent advances in enteric coating and enteric polymers. World J Pharm Res. 7(2), 2018, 475-95.
- Ankit G, Ajay B, Kumar KM, Neetu K. tablet coating techniques: concept and recent trends Gupta Int. Res J Pharm 4(2), 2014, 50-8.
- Himaja V, Sai Koushik O, Srinivasa Babu P, Karthikeyan R, a Comprehensive Review on tablets coating, Austin Pharmacol Pharm 1(1), 2016, 1-8.
- Ansal H, Allen L, Jr Popovich N. Ansel's Pharmaceutical Dosage Form and Drug Delivery System; Eighth Edition: 227-259.
- American Pharmaceutical review; 4(3), 2001, 28-35.
- Vyas S, Khar R. Controlled Drug Delivery Concept and Advances; First Edition: 219-256.

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