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Review Article

Excipients Updates for Orally Disintegrating Dosage Forms

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ABSTRACT

ODTs orally disintegrating tablets are the dosage form which will disintegrate in mouth within seconds without need of water. This type of property in dosage form can be attained by addition of different varieties of excipients. But the number of fillers/binders/disintegrant which can be used for ODT formulations is limited because these bulk excipients have to fulfill special requirements, such as being soluble in water, pleasant taste, mouth feel, sweetness, and rapid dispersibility. Compared with existing excipients, the improved physical, mechanical, and/or chemical properties of such excipients have helped in solving formulation problems such as flowability, compressibility, hygroscopicity, palatability, dissolution, disintegration, sticking, and dust generation. So to fulfill this requirement coprocessed excipients are available like Ludiflash, Pharmaburst, F-melt, Modified chitosan with silicon dioxide. In excipients mannitols are used as diluents but now a day's modified mannitol are available which give extensive flow, compression and rapid dispersibility to the tablet e.g. like Orocell, Mannogem EZ, and Pearlitol 200 SD.

Keywords: Fast disintegrating dosage forms; Coprocessed excipients; Mannitol.

INTRODUCTION

ODTs orally disintegrating tablets are the dosage form which will disintegrate in mouth within seconds without need of water. This type of property in dosage form can be attained by addition of different varieties of excipients. The demand for ODTs has been increasing day by day. But the number of fillers/binders /disintegrant which can be used for ODT formulations is limited because these bulk excipients have to fulfill special requirements, such as being soluble in water, pleasant taste, mouth feel, sweetness, and rapid dispersibility (Shangraw, 1988). Tablets and capsules are preferred for drug delivery because they can be accurately dosed, easily manufactured and give good patient compliance. Since from last many years there is more development in the manufacturing processes of oral solid dosage forms including changing the process of tablet preparation by wet granulation to direct compression. It requires the development of various added functionality excipients, which are used to achieve formulations with desired end effects, is equally important (Puri V, 2001). The majority of excipients used in the manufacture of solid oral dosage forms have existed for the past two to three decades; many of them continue to be used today for large-scale tablet and capsule manufacturing. Obtaining regulatory approval for the use of new excipients and breaking the tradition of conventional formulation development have been two major hurdles in convincing formulators to incorporate new excipients into their formulations. Despite these challenges, many new excipients have been successfully introduced and are used in the pharmaceutical industry to date (Gohel MC, 2005).

Compared with existing excipients, the improved physical, mechanical, and/or chemical properties of such excipients have helped in solving formulation problems such as flowability, compressibility, hygroscopicity, palatability, dissolution, disintegration, sticking, and dust generation

An ideal bulk excipient for orally disintegrating dosage forms should have the following properties: (Bansal AK, 2003)

- Disperses and dissolves in the mouth within a few seconds without leaving any residue
- Masks the drug's offensive taste and offers a pleasant mouth feel
- Enables sufficient drug loading and remains relatively unaffected by changes in humidity or temperature

ODTs are manufactured using a wide variety of technologies such as lyophilization, direct compression,

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Table 1: Composition and characteristics of excipients

Excipient	Composition and Characteristics
Ludiflash	Coprocesed blend of 90% Mannitol, 5% Kollidon® CL-SF(Crospovidone) 5% Kollicoat SR 30 D (polyvinyl Acetate)
F-MELT	Coprocesed blend of carbohydrates, disintegrant and inorganic ingredients F-melt are commercially available Type C &Type M
Modified chitosan with silicon dioxide	Co precipitation of chitosan and silica, It acts as superdisintegrant and filler
Orocell 200 & OroCell 400	Spheronised mannitol with a binder, filler and carrier property Orocell 200 with 90% mannitol (<315µm) Orocell 400 with 90% mannitol (<500µm).
Mannogem EZ	Spray dried Mannitol Sweet taste (50%) as sweet as sucrose
Pearlitol SD	Spheronised granulated mannitol Pearlitol® 100SD, Mean diameter: 100 µm Pearlitol® 200SD Mean diameter 180 µm Sweetening power about 40% that of sucrose
Advantose	Spray dried disaccharide carbohydrate maltose powder
Glucidex IT	Agglomerated spray dried range of maltodextrins.
GalenIQ	Isomalt, a disaccharide alcohol Act as Fillers and binders
Polacrilin Potassium	Potassium salt of a cross linked polymer derived from methacrylic acid and divinyl benzene

granulation, spray-drying, molding, and the cotton candy process (Maj-Britt Babbel, 2009).

This dosage form requires many excipients like superdisintegrants, sugars, sweeteners, lubricants, diluents etc. A tablet rapid dispersion on the surface of the tongue also is facilitated by the use of a superdisintegrant such as crospovidone, sodium starch glycolate (SSG), or croscarmellose sodium (Joshi V, 2002). Until now only superdisintegrants are available to prepare the dosage forms, but now a day different blend of excipients are available which can give disintegration property. Some novel disintegrants, modified sugar, modified sweeteners and some co-processed excipients blend are also developed which satisfying need of more than one excipient (Joshi AA, 2004).

1) Coprocesed blends of excipients

It involves the mixture blend of more than two excipients to satisfy the required quality using different technique like spray drying and freeze drying etc (Nachaegari, SK, 2004) .

Ludiflash

This is the one of the novel excipients for Fast dissolving drug delivery which disintegrant rapidly within seconds with soft, creamy consistency. It is specially designed for direct compression on standard high speed tablet machine for hard tablet with very low friability. Ludiflash have good flowability, less water absorption, and no segregation of the active ingredients. As a result, it can be easily processed. Ludiflash decreases our costs because it acts as All-in-one system like filler, binder and disintegrant and it give faster product development. It gives extremely fast release rate. It has neutral to mildly sweet, pleasant taste and sugar free composition **(**Sandra, 2007)

Pharmaburst

Pharmaburst is a Quick Dissolving delivery system in which there is addition of active drug in a dry blend with Pharmaburst excipients and compress by tablet machine. The main advantage of the Pharmaburst system is that we can develop our own robust "Quick Dissolve "formulations at lab scale within reasonable cost. Pharmaburst is a co-processed excipient system with specific excipients, which allows rapid disintegration and low adhesion to punches. Pharmaburst is smooth and creamy and helps to mask taste and grittiness of the actives. Main advantages Pharmaburst is highly compatible, rapid disintegration and cost effective. The Quantity of Pharmaburst required in a formulation will depend on the type of active and the quantity per tablet. (Excipient Fest, 2008)

F-melt

It was developed by combined fast-dissolving excipient system with spray-drying. This system is suitable for direct compression manufacturing of fast-dissolving oral tablets containing APIs and lubricants. F-MELT exhibits excellent tabletting properties and facilitates rapid water-penetration for a fast disintegration time. It has advantages of highly flowable with spherically dense particles, disintegration time within 30 seconds, time-saving and cost-effective, less sticking or capping,

Table 2: Literature reviews on application of excipients

Excipients	Drug	Approach used	Result
Ludiflash (Sandra, 2007)	Risperidone	Direct compression	Disintegration time of 27 sec.
Pharmaburst (Cecil WP 2007)	Famotidine	Taste masking microsphere for orally disintegrating tablets using Eudragit EPO and quick dissolving excipient Pharma-burst by spray drying	Disintegration in 30 seconds with improved taste.
F-MELT (Fuji health science, 2008)	Acetaminophen	Direct compression using 10 % to 65% w/w	Good mouth feel and excellent oral disintegration time below 30 sec.
Orocell 200 & OroCell 400 (Grassano A, 2001)	Ibuprofen	Direct compressible	Disintegration time of 5 sec.
Pearlitol SD (Ashutosh Mo-hapatra, 2008)	Metformin	Wet granulation	Disintegration time of 85 s. 100% drug release in 10 min.
GalenIQ 720 and 721 (Yousef, 2005)	Placebo	Direct compression	Even without superdisintegrants, tablets containing both isomalt grades disintegrated quickly, within 200–500 s
Polacrilin potas-sium (Baker, 2005)	Sumatriptan	Direct compression	Disintegration time of 45 s. 100% drug release in 10 min.

pleasant mouth-feel, and neutral pH, excellent tablet hardness and low friability, high API Loads, suitable for Pharmaceutical medicine and nutritional supplements (Robertson MI,1999).

Modified chitosan with silicon dioxide (Iyad Rashid, 2008)

This is the new excipients based on co precipitation of chitosan and silica. The physical interaction between chitosan and silica create an insoluble, hydrophilic highly absorbent material, resulting in superiority in water uptake, water saturation for gelling formation. It has water wicking and swelling properties. It is superdi-sintegrant with improved flow and compaction proper-ties. It acts as superdisintegrant and filler both (El-Barghouthi M, 2008).

2) Modified Mannitols

Generally in orally disintegrating dosage forms manni-tol is used as sweeteners. It will also give good mouth feel. It is generally used in sublimation techniques. So, now day mannitols are highly modified so that they can perform more than one function of excipients.

Orocell

Orocell is a spheronised mannitol compound with dif-ferent characteristics as a binder, filler and carrier in immediate release oral dispersible tablet (ODT) prepa-rations. Due to its spherical technologies Orocell has exceptional processing features. Different product cha-racteristics like excellent flow, Superior strength, out-standing disintegration performance, leaving taste with cooling sensation (Pharmaceuticaltechnlogy.com 2008)

Mannogem EZ

Mannogem EZ is specially design for direct compres-sion tablet. It has advantages of highly compatible, smooth mouth feel, non hygroscopic, chemically inert, narrow particle size distribution help to reduce segre-gation, non friable, free flowing and mainly rapid disin-tegration property benefits quick dissolve application. It has excellent compressibility due to its open crystal-line structure. They have an increased capacity for binding actives and flavors by allowing a higher dosage formulation (Yourong Fu, 2008)

Pearlitol 200 SD

These are the granulated mannitol white, odourless, slightly sweet tasting, crystalline powder. It has a unique blend of exceptional physical and chemical sta-bility, with great organoleptic, non-carcinogenic, sugar-free properties. Together with its versatile powder properties, it can be use in different processes wet or dry granulation, direct compression, compaction or freeze-drying. It has properties like flowable, excellent compressibility, non-hygroscopic, excellent chemical stability. Pearlitol SD dissolves very rapidly because of its porous crystalline particles. Main application is ex-

cellent excipient for direct compression especially for chewable and effervescent tablets. It is excipient for chemically unstable or moisture sensitive actives, diluent for capsules and sachets (Chaudhari, 2006).

3) Modified sugars

Advantose 100

Advantose 100 are spray-dried particles are spherical and the combination of fine and coarse particles of sugars contributes to superior flow. The safety and mouth feel qualities of maltose are well known. By spray drying, the flow and tabletting properties are greatly improved. It could be said that maltose has the flow properties due to spherical shape, improve compressibility lower density materials and a better solubility than lactose. These It has good disintegration by itself and improves disintegration of other excipients such as mannitol, lactose, cellulose (Technical Bulletin, SPI pharma).

Glucidex IT

It is developed by Roquette. It is micro granulated form enables almost instantaneous dispersal and dissolution in water. Different range of Glucidex IT products is available. It has properties like free-flowing due to fewer fine particles, quick dispersion, and quick dissolution. Main applications as diluent for tablet, capsule, sachets, Spray drying carrier, direct compression maltodextrin which would be used for directly compressible formulation of vitamins and supplement tablet (Francesco, 2008).

GalenIQ

It is a novel multifunctional sugar-free excipient. GalenIQ is white, odourless, water soluble, crystalline substance derived from sucrose. It has very low hygroscopic nature, excellent chemical stability. The direct compressible grades of GalenIQ have high tableting properties due to their excellent compactability. The main properties of direct compressible GalenIQ in tableting are excellent flow, unique morphology of GalenIQ ensures homogeneity of the mixture and content uniformity, function of binder and filler, very low compression of other binders is not required Moreover, the outstanding organoleptic and non-carcinogenic properties make it ideal for buccal applications, like chewable tablets or swallowable lozenges. (GalenIQ™ 721, 2010)

4) Modified resins

Polacrilin Potassium

Polacrilin Potassium is weakly acidic cation exchange resin. Upon hydration it gives tablet disintegration by swelling of resin and it also having taste masking application. Tablet disintegration property is due to its extremely large swelling capacity in aqueous solutions. Water can exert force between particles within tablet pores, but this force is low. This is used effectively at 1-2% of solid dosage forms. This resin adsorbs water rapidly due to its hydrophilic nature. Most widely used cellulose containing disintegrant like Cross carmellose sodium, Sodium carboxy methyl cellulose have more adhesive nature. During disintegration, bonding between particles in compressed tablets must be overcome for release of drug. So, due to adhesive nature they are ineffective in overcoming particle bonding in some cases. So, Amberlite IPR 88 is more effective as a disintegrant due to non adhesive nature (Purolite, 2004).

CONCLUSION

All coprocesed and modified excipients are playing very important role in the development of easy dosage form which are resistant to atmosphere. Compared with existing excipients, the improved physical, mechanical, and chemical properties of such excipients have helped in solving formulation problems such as flowability, compressibility, hygroscopicity, palatability, dissolution, disintegration, sticking, and dust generation.

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