

Pharmaceutical Powder Dosage Forms: A Review

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ABSTRACT

A powder is a solid state fine dry bulk, composed of particle of varying shape, grain size, and flow properties. Despite the desirable properties of being in fine size, but it has manufacturing limitations such as difficulty in flowing and clumping together. Therefore, the granular course size is preferred to overcome such problems in manufacturing technologies. Powders have different classifications and different uses according to the route of administrations which will be covered in this review.

Keywords: pharmaceutical, powders, granules, classification, types and uses.

INTRODUCTION

Powder is a mixture of finely divided drug and / or chemicals in a dry form that may be intended for internal use (oral powders) or external use (topical or dusting powder).

Classification: Powders are subdivided solid which are classified in BP (British pharmacopeia) according to size of their constituent particles of range from 1.25 µg to 1.7 mm in diameter.

Another classification of powders is based on the manner of their dispensing. This review will cover different types and uses of powders.

Classification of powders according to the manner of their dispensing:

Divided powders.

Simple and compound powders for internal use.

Powders for reconstitution.

Bulk powders for internal use:

Oral bulk powders for internal use.

Antacid Oral bulk powders for reconstitution for internal use.

Injectable bulk powders for reconstitution for internal use.

Bulk powders for external use.

Dust.

Douches.

Dental

Insufflations

In snuff

Effervescent granules.

Divided powders

Definition:

These are powders used for potent drugs (drugs that are effective in low concentrations), it was used before in old

days but after development of other dosage forms it became obsolete.

They are diluted with lactose and dispensed in form of divided doses and are wrapped separately.

They have now been replaced by tablets and capsules.

They are intended for internal use only.

Packaging of divided powders:

Volatile or hygroscopic drugs are wrapped in aluminum foil or plastic bags.

Bulk powders

Definition:

These are powders used for less potent drugs.

These are powders supplied in bulk or large quantities.

They are intended for internal or external use.

Bulk powder for internal use

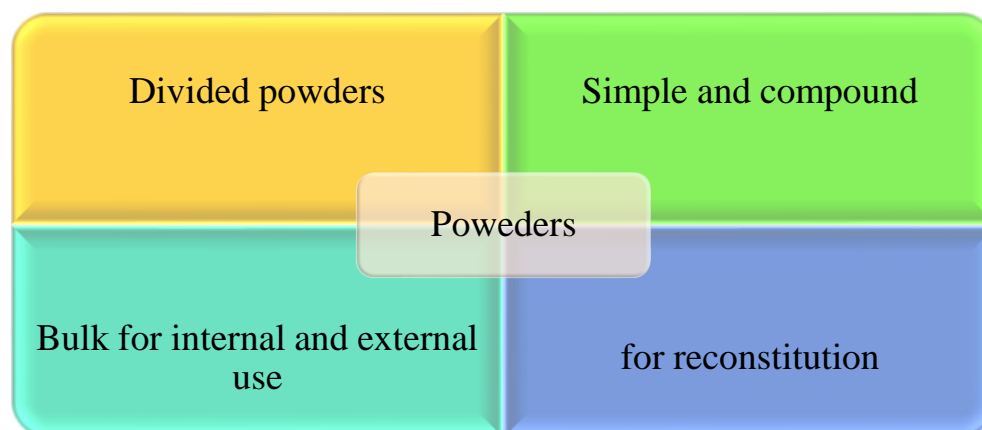
They are non-potent substances such as antacid. They are dispensed in a wide mouth container so that the teaspoon can easily remove the powder.

Simple and compound powders for internal use

They are packed into properly folded papers and dispensed in envelopes, metal foil, small heat-sealed plastic bags or other containers. The modern packaging has replaced the foil and plastic laminates by paper wrapping, due to the protective qualities and are able to be used on high speed packing machine.

The preparation of simple powder involving weighing of the ingredients correctly and blending them. The mixture is either divided into blocks of equal size or each dose is weighed separately and placed into a powder paper, the paper is then folded and placed in an envelope or powder box.

Powder for reconstitution



Classification of powders according to the manner of their dispensing:

These powders are intended to be reconstituted just before use. They are used to protect drugs against hydrolysis and enhance stability of the active constituents.

Reconstitution process: (for drugs instable in water)

They are usually prepared as dry powder in which the drug is mixed with suspending, sweetening, flavoring and coloring agents.

The label of such reconstituted suspensions should contain:

Specific amount of solvent/ water to be added at the time of dispensing by a pharmacist in case of oral route, or by a nurse at the time of administration in case of injectable route.

Storage conditions and time limit in which the suspension should be used during use.

Examples

Oral antacid preparations

Drugs effective in large concentrations: (bulky drugs) such as antacids (Compound Magnesium Trisilicate).

Oral bulk powder antibiotic for reconstitution: They are prepared in dry form to prevent stability problems, and then packed into sealed bottles, and just before using it the powder is added. Once it is reconstituted the patient should be warned of the short shelf life (1-2 weeks).

Powder bulk for reconstitution in injection

Powders for injection: They are sterile powders in ampoules are unstable in solution, so must be reconstituted just before use by using sterile water for injection.

Bulk powders for external use

External bulk powder contain non-potent substance for external application. These powders are dispensed in glass, plastic wide mouth bottles and also in cardboard with specific method of application. Bulk powders for external use are of five types:

Dust bulk powders

Definition

These are used externally on the skin.

They consist of protective, antiseptic, antipruritic, and absorbent agent.

Very fine state of subdivision (to avoid irritation).

Flow easily, spread uniformly and stick to the skin when applied.

Uses and ingredients

Dusting powders usually contain substance such as zinc oxide, starch and boric acid and as natural mineral substance such as kaolin or talc. These are used externally for local application not intended for systemic action. They are employed chiefly as lubricant, protective, absorbent, antiseptics, antipruritic, astringent, antiperspirants.

Packaging containers used for dusting powders

Dusting powders are usually dispensed in large glass; metal or plastic containers which are fitted with a porous or perforated lid or cover.

Example: Talc Dusting Powder (B.P.), they are used for (skin rashes)

Douche powder

These powders are intended to be used as antiseptics or cleansing agents for a body cavity; most commonly for vaginal use although they may be formulated for nasal, otic or ophthalmic use also. They usually are used after being dissolved in water.

These powders dissolved first in specific amount of water and then applied to the intended body cavities. They contain *antiseptic, cleansing, and, antiparasitic* e.g. Applied in vaginal cavity for trichomoniasis.

They are generally dispensed in wide-mouth bottles which are tightly closed to protect the ingredients from moisture.

Dental powder

Dental powders are rarely prescribed. This preparation is a type of dentifrice meant for cleaning the teeth.

Insufflations

Insufflations are a class of powders meant for application to the body cavities e.g., ear, nose, vagina etc.

Snuffs

These are finely divided solid dosage forms of medicaments dispensed in flat metal boxes with hinged lid. These powders are inhaled into nostrils for decongestion, antiseptic, and bronchodilator action.

Powders requiring special treatment or precautions:

Hygroscopic powders: absorb atmospheric moisture but still remain in solid state, e.g., potassium citrate.

Deliquescent powders: absorb moisture and become liquid, e.g., CaCl_2 .

Eutectic mixture powders:

Definition:

This is a mixture powder, when two solid substances are mixed together, they liquefy due to the formation of a

complex which has a lower melting point than room temperature.

Examples: Menthol, thymol, phenol, camphor, when two or more are mixed together.

How to avoid formation of eutectic mixtures:

Use adsorbent: MgCO₃, MgO or kaolin. Mix each eutectic substance separately with adsorbent and then mix the solid substances together.

Effervescent Granules

Definition:

These are granular solid dosage forms containing drug(s) mixed with citric acid tartaric acid and sodium bicarbonate.

When water is added to the effervescent granules, the acids will react with the sodium bicarbonate releasing CO₂ resulting in effervescence.

The released CO₂ will mask salty taste of ill-tasting drugs. Larger granules are preferred over smaller granules.

Reason: Larger granules react slowly and form a concentrated carbonated water.

Methods of preparation of effervescent granules

The citric acid used contains one molecule of water (monohydrate). When heated, this water of crystallization will be liberated and will act as a granulating agent.

Two methods are used

Heat fusion or dry method.

Wet method.

A. Heat fusion or Dry method

All ingredients are weighed and mixed together and then transferred to a hot porcelain dish heated in a boiling water bath.

The ingredients are gently stirred until a moist coherent mass is formed.

The coherent mass is quickly forced through a No. 6 sieve. Dry at 60 °C.

Pass through sieve No.16(bigger sieve no. means bigger particle size).

Package in a suitable, tightly closed container.

Wet method

Add non-aqueous solvent (e.g., alcohol) to ingredients and stir until coherent mass is formed.

Pass mass through sieve No. 16

Dry in an oven.

Pass through sieve No. 18.

Package.

Examples of effervescent granules:

- Potassium citrate effervescent granules.

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