POEDERS

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INTRODUCTION

The term ‘Powder’ may be used to describe:

The physical form of a material, that is, a dry substance composed of finely divided particles.

Or, it may be used to describe a type of pharmaceutical preparation, that is, a medicated powder intended for: 1. internal (i.e., oral powder)

2. external (i.e., topical powder) use.

DEFINITION

Pharmaceutical Powders are intimate mixtures of dry, finely divided drugs and/ or chemicals that may be intended for internal (oral powders) or external (topical or dusting powder) use.

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Powders represent one of the oldest dosage forms. It is a preparation in which drug is blended with other powdered substances and used for internal or external purpose. Powder as a dosage form permits drugs to be reduced to a very fine state of division, which often enhances their therapeutic activity or efficacy by an increase of dissolution rate and/ or absorption. Divided powders are also found to be convenient for administering drugs that are excessively bitter, nauseous, or otherwise to the taste.

ADVANTAGES

- ✓ Powders being the solid preparation are more stable than liquid and semi-solid preparations.
- ✓ Convenient forms, to dispense large dose of drugs. They can be best administered in powder form by mixing them with food or drinks.
- ✓ Since powders are in the form of small particles they offer a large surface area and are rapidly dissolved in the gastrointestinal tract minimizing the problems of local irritation.

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- ✓ More convenient to swallow, faster dissolution and absorption than tablets or capsules.
- ✓ Powders offer a lot of flexibility in compounding or incompatible solids and possess good chemical stability .
- ✓ They are easy to apply.

DISADVANTAGES

- ✓Less convenient to carry especially for bulk powders are not suitable for administering potent drugs with a low dose.
- ✓ Difficult to mask the unpleasant taste of the drugs.
- ✓Light fluffy powders may be inhaled by infants leading to breathing difficulties.
- ✓Variable dose accuracy

CONT.

- ✓Not suitable form for drug inactivated in the stomach or cause damage to stomach these should be presented as enteric-coated tablets.
- ✓ Not suitable for bitter, nauseating and corrosive drugs, if are meant for oral administration.
- ✓ Difficulty of protecting hygroscopic , deliquescent or aromatic materials and not suitable for drugs which are unstable in normal atmospheric conditions.

CLASSIFICATION

They are broadly classified in three classes

1. Bulk powders for external use: (a) Dusting powders (b) Snuffs (c) Dental powder (d) Insufflations
2. Bulk powders for internal use.
3. Simple and compound powders for internal use.
4. Effervescent granules
5. Eutectic mixtures
6. Cachets

TABLET TRITURATES

Tablet trituates They are prepared by moulding powder into tablets. They are flat and circular disk shaped. Usually they are prepared for potent medicaments and highly toxic drugs by diluting the with diluents like lactose, dextrose sucrose etc. the drug and the diluents are mixed and the moistened with suitable dilution of alcohol (usually 50-60% alcohol is used) and mixed and then as to get a damp mass. This damp mass is filled in the perforations of the mould with a spatula. The excess amount damp mass is squeezed with the edge of the spatula.

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The filled perforated plate is superimposed on another plate having the same number of projecting pegs as that perforation. A little pressure is put over the upper plate which will allow the plate to go downward leaving the moulded tablets on the top of the pegs. These moulded tablets are carefully spread on the clean surface and dried either in open air or in oven at a controlled temperature.

METHOD OF PREPARATION

Official preparations-

Simple powders- Simple powders only one ingredient either in crystalline or amorphous form. These powders should preferable be reduced to fine powder, weighed properly and supplied in a single dose packet separately. The wrapping of powders may be single wrapped or double wrapped (lined with waxed paper) according to the properties of the drugs. If the drug is resistant to atmospheric conditions, it can be wrapped singly and if sensitive to those conditions, must be double wrapped

For example:

Rx

Paracetamol …500mg

Method: Weigh accurately the required amount of paracetamol powder which is already in its fine state. If not, then first reduce to fine powder and weigh. Wrap each dose in a white demy paper

Compound powders

Compound powders contain two or more ingredients supplied in the form of fine state of powder in divided dose, i.e. each dose is supplied in a single packet.

For example:

Rx

Aspirin	250mg
Paracetamol	150mg
Caffeine	50mg

Method: Powder each ingredient and weigh required quantities. Mix them in geometrical proportional and supply in divided doses. Wrap each dose in a doublewrapped paper.

Preparation of powders Step

Step (1) Particle size reduction:

- For the preparation of powder, each ingredient should be needed in finely ground form; hence manufacture must use a number of procedures and equipment to reduce the particle size of powder ingredients, this process is called as comminution.
- The most common method used for particle size reduction is powder formulation is trituration, which involves placing the solid in a mortar and continually grinding the chemical between the mortar and the pestle using a firm, downward pressure.

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- The powder must be frequently scraped from the sides of the mortar to ensure that all particles are evenly reduced and mixed.
- A levigating agent, such as glycerin, may be added to the solid and processed by either continued trituration or by placing the mixture on an ointment slab and using spatulation to wet the solid and further reduce the particle size of a powder after it has been triturated.

In laboratory scale

- Trituration,
- Pulverization and
- Levigation

In industrial scale

- Bowl chopper,
- Hammer mill,
- Roller mills,
- Attrition mill,
- Colloid mill,
- Ball mill etc
- Advance size reduction technologies
- Microfluidics particle reduction

Factors affecting size reduction of powder materials

Hardness or strength of the compound, the harder the material the more difficult it is reduce the size.

Toughness is more important than hardness; a soft but tough material may present more problems in size reduction than a hard or brittle substance. Toughness is encountered in many pharmaceutical materials, particularly in fibrous drugs and is often related to moisture content.

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Stickness is property that causes considerable difficulty in size reduction, for material may adhere to the grinding surfaces, or the meshes of the screen may become choked or if the material gummy or resinous may be troublesome to the size reduction process it can be overcome by addition of inert substances such as kaolin to sulphur.

Softening temperature during the process of size reduction heat is generated which cause some substances to soften like waxy compounds stearic acids, drugs containing oils or fats.

Overcome this problem

- To overcome this problem by
- cooling the mill,
- either by water jacket or
- by passing stream of air through the equipment's Material substance,

All substances are not homogeneous in character some show special structure like mineral substance may have lines of weakness along with material splits to form flake-like particles, while vegetables drugs have a cellular structure often leading to long fibrous particles Moisture content influences a number of properties that can affect size reduction, like hardness, toughness or stickness

Step (2) Preparing a homogenous mixture

The powders may be mixed by any one of the following methods:

- Spatulation,
- Trituration,
- Geometric dilution,
- Sifting and Tumbling

A. SPATULATION

In this method, mixing of powders is done by the movement of a spatula throughout the powders on a sheet of a paper or on a porcelain tile. The method is very useful in mixing a small amount of powder or solid substances that liquefy (eutectic mixtures)

B. TRITURATION:

It is used for both reduce particle size and mix powders. If the particle size reduction is desired along with mixing of powders, a porcelain mortar with a rough inner surface is preferred to glass mortar with a smooth working surface.

C. GEOMETRIC DILUTION

The method is used when potent substances are too mixed with a large amount of diluents. The potent drug is placed upon an approximately equal volume of the dilute in a mortar and the substances are slightly mixed by trituration.

A second portion of diluents equal in volume to the powder mixture in the mortar is added and trituration is repeated. The process is continued adding diluents equal in volume to the mixture in the mortar at each step until all the diluents is incorporated.

For example,

if 100mg of potent drug is required to be mixed with 900mg of lactose then according to geometric dilution, the following procedure should be followed:-

100mg of potent drug + 100mg of lactose = 200mg of mixture,

200mg of the mixture + 200 mg of lactose= 400 mg of mixture

400mg of the mixture + 400mg of lactose =800mg of mixture

800mg of the mixture + remaining portion = 1000mg of mixture of lactose

D. SIFTING:

The powders are mixed by passing through sifters. This process results in alight fluffy product and is generally not acceptable for incorporation of potent drugs into a diluent base.

E. TUMBLING:

Is the process of mixing powders in a large container rotated by an electric motor. These blenders are widely employed in industry as large volume powder mixers

Step (3) Packaging of powders

Bulk powders for external use are often dispensed in a shaker top container to facilitate topical application. They may also be dispensed in a wide mouth jar or a plastic container with flip-top lid. The jar or plastic container can be closed tightly to provide increased stability and protection from light and moisture, especially for compounds that contain volatile ingredients. Package should contain label as “For external use only”

Double- Wrapping:

Double-wrapping is essential for volatile or hygroscopic drugs like Menthol, thymal, citric acid, Pepsin etc. Double wrapping is also must for drugs those are sensitive to the atmospheric conditions For this purpose a wax paper is cut slightly smaller than the demy paper each way and fold both paper at once similar to the single wrapping method Labelling: Patient should be instructed that individual powder should be dispersed in a little water or placed on the back of the tongue before swallowing.

Dispensing of powders involving special problems

Dispensing of powders involving special problems/ problems encountered in powder formulation A number of problems arise while dispensing a powder containing volatile substances, hygroscopic and deliquescent powders, eutectic mixtures, efflorescent powders, liquids, explosive substance and potent drugs. So special consideration are done while dispensing such powders. Volatile substances Certain vegetable powders contain volatile oils. To prevent the loss of volatile oils, these vegetable drugs must be powdered lightly in a mortar.

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Similarly the volatilization of substances like menthol, camphor and essential oils may take place on incorporation in powders. This is prevented or at least minimized by the use of double wrapping. The inner wrapper should be of wax paper and outer wrapper may be of any thick paper.

Hygroscopic powders and deliquescent powder

The powders which absorb moisture from the atmosphere are called hygroscopic powders. But certain powders absorb moisture to such a great extent that they go into solution and are celled deliquescent powders. Examples of such substances include ammonium citrate, pepsin, phenobarbitone, sodium bromide, sodium iodide, potassium citrate, zinc chloride etc. Such substances are usually supplied in granular from in order to expose less surface area to the atmosphere.

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These powders should not be finely powdered. Such powders should be double wrapped. In humid weather or when dealing with very deliquescent substances, for there wrapping in aluminium foil or plastic cover is advisable.

Efflorescent powders

Some crystalline substances liberate water of crystallization wholly or partly on exposure to humid atmosphere or during trituration and thus become wet or liquefy. Example of such substances include caffeine, citric acid, ferrous sulphate etc. the difficulty may be overcome by using corresponding anhydrous salt or an inert substance may be mixed with efflorescent substance before incorporating with other ingredients. Problems pertaining to efflorescent powder include: water liberated when the drug or chemical is triturated may cause the powders to become damp or pasty.

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If water is released to the atmosphere because of low relative humidity, the drug loses its crystallinity and becomes powdery. Water of hydration is given off; a given weight of the resulting powder no longer contains the same amount of the drug. Hence strategies for handling efflorescent powders includes: storage and dispense of these powders in airtight containers. The anhydrous form of the drug may be substituted for the hydrate, but be sure to make appropriate dose corrections..

Eutectic mixtures:

These substances can be dispensed by two methods Dispense as separate set of powders with directions that one of each kind shall be taken as a dose An equal amount of any of inert absorbent like magnesium carbonate, light magnesium oxide kaolin starch may be mixed with eutectic substance then blended together lightly with a spatula on a sheet of paper.

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When in addition to liquefying substances, other ingredients also present, the liquefiable substances should first be triturated together to form the eutectic mixture. Then the remaining ingredients of the prescription are incorporated and mixed together.

Evaluation of powder

Pharmaceutical powders are evaluated for following quality control parameters

- Content uniformity
- Particle size and size distribution
- Flow property:
- Angle of repose,
- Flow rate Density:
- Bulk density, tapped density and true density
- Hausners ratio
- Moisture content Tensile and cohensive strength measurements
- Safety and efficacy Stability


Thank
you!!!