

TABLET GRANULATION TECHNIQUES

By

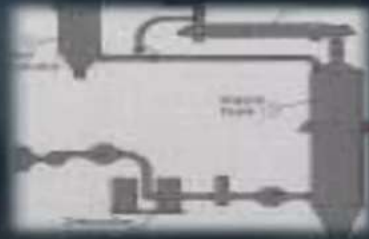
Swarnakshi Upadhyay

Assistant Professor

School of Pharmaceutical Sciences

CSJM University

Unit Dose Operations of Solid Dosage Form



Crystallization /drying



Milling



Blending



Granulation



Compression



Coating



Packaging

PLAY

GRANULATION PROCESS

Granulation process may be defined as a process wherein small particles adhere together by forming bonds between them , resulting in the formation of large aggregates called granules.

Why we prepare granules when we have powders?

1. To avoid powder segregation,
if, the powder is composed of particles with different dimensions & different densities a separation between these particles will occur.
2. To enhance the flow of powder,
Higher flowability gives better filling of the dies or containers, during a volumetric dosage

3. Granules have higher porosity than powders,

4. To improve the compressibility of powders.

5. The granulation of toxic materials will reduce the hazard of generation of toxic dust, which may arise during the handling of the powders.

6. Materials, which are slightly hygroscopic, may adhere & form a cake if stored as a powder.

Methods of Granulation

Some of the available methods in the industrial field for the preparation of granules:

- A. Direct compression.
- B. Dry granulation methods.
- C. Wet Granulation.
- D. Granulation by Crystallization.

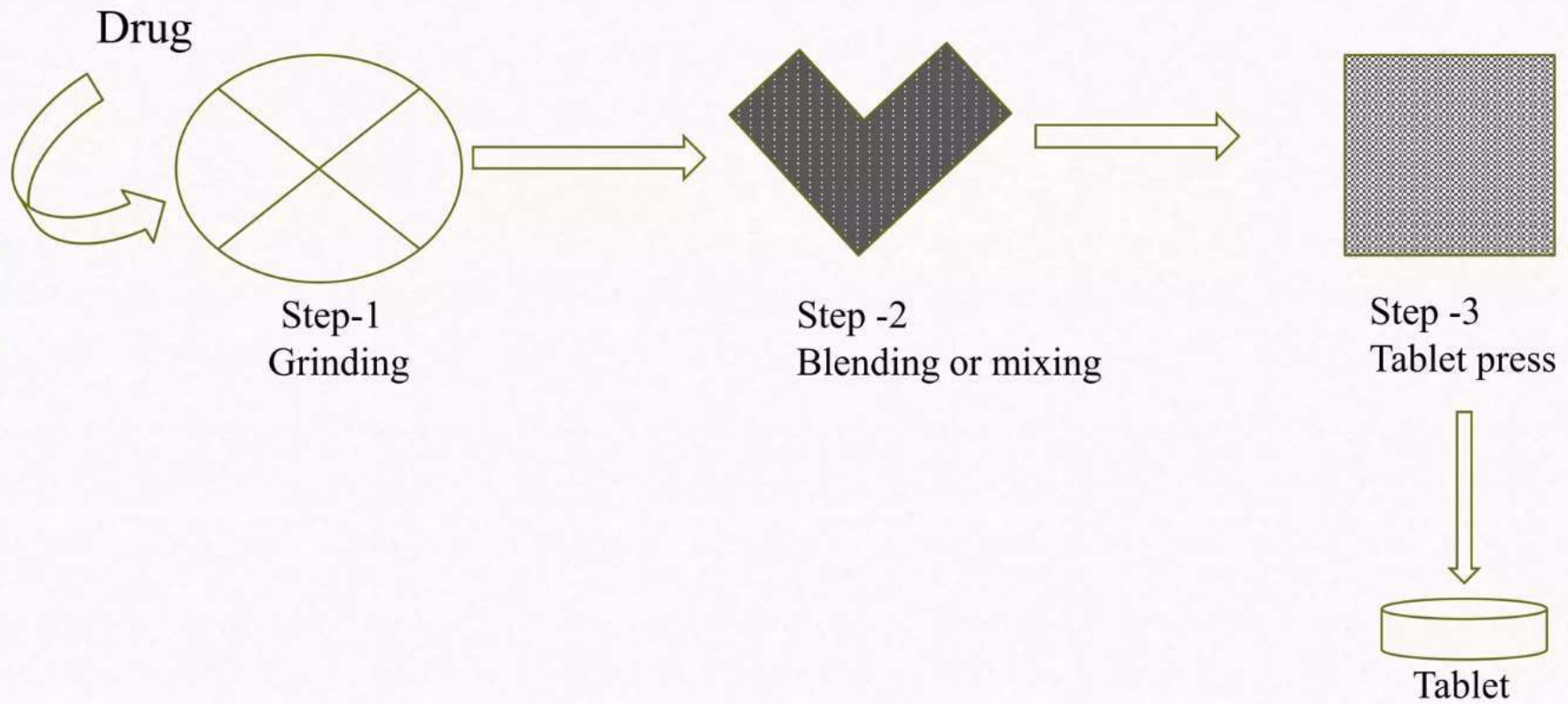
A. Direct compression

Direct compression is a dry process where in the powdered material (tablet formulation) is compressed directly into the tablets without the physical nature of the former being modified.

Ex.- Formulation of Ascorbic Acid Tablets.

Formulation of Chewable Antacid Tablets.

Direct compression procedure



Step -1 Grinding

Drug is added to the granulator and grinded.

Step -2 Blending or Mixing

The suitable adjuvants (Ex. Directly compressible vehicles and other excipients) are added in a blender and mix thoroughly.

Step -3 Tablet press

The blended powdered material is compressed by machine tooling (Dies and punches) of a tablet press .

B. Dry Granulation

The process of dry granulation is also called Double Compression or Compression Granulation or Pre-Compression Granulation.

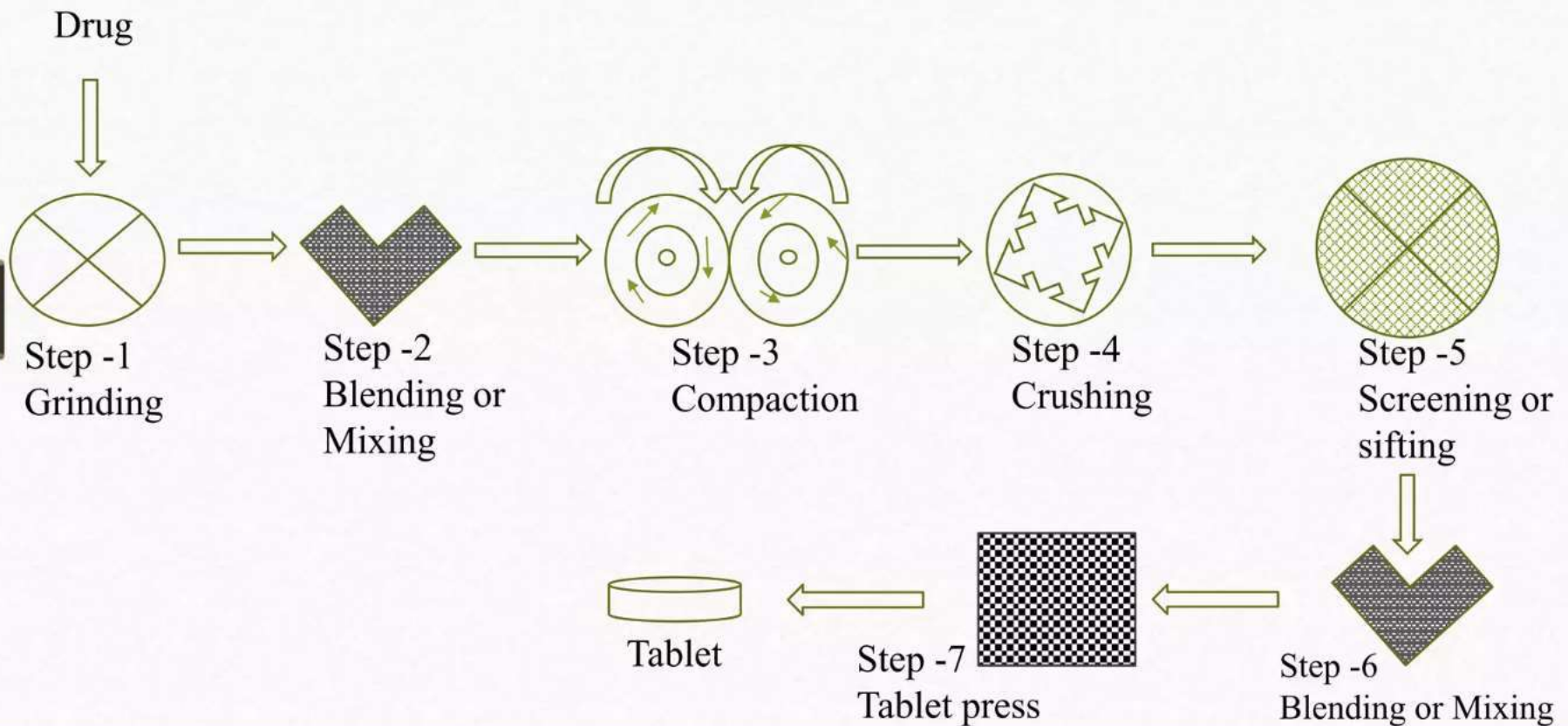
The process involves the formation of tablet by first converting the tablet formulation into slugs or compact masses. These formed masses are screened to form uniform sized fine granules. The technique is suitable for those drugs which are moisture sensitive, degrade at higher temperature and administered in higher doses.

The technique of Dry granulation of powdered material can be accomplished by two methods.

(a) Slugging (slug formation).

(b) Roller compaction method.

Dry Granulation procedure



Step -1 Grinding

Drug is added to the granulator and grinded.

Step -2 Blending or Mixing

The suitable adjuvants (Ex. Diluent and other excipients) are added and mixed in a blender .

Step -3 Compaction

After mixing, the powder mixture is slugged or compressed into large flat tablets or pellets about 1 inch diameter . On large scale , Roller compactor is preferred.

Step -4 Crushing

These slugs are broken down by hand or by milling to form granules

Step -5 Screening or Sifting

The granules undergo dry screening through a desired mesh for sizing.

Step -6 Blending or Mixing

Finally, the lubricating agent is added and mixed thoroughly in a blender.

Step -7 Tablet press

The resultant granules are compressed by machine tooling (Dies and punches) of a tablet press.

Ex. Of Formulations Prepared by Dry Granulation Method:

Formulation of Acetyl Salicylic Acid tablets.,

Formulation of Vitamin B Complex.

C. Wet Granulation

Wet granulation or Moist granulation is the most conventional , versatile and widely used techniques for the manufacture of compressed tablets, as it imparts all the physical properties to the granules.

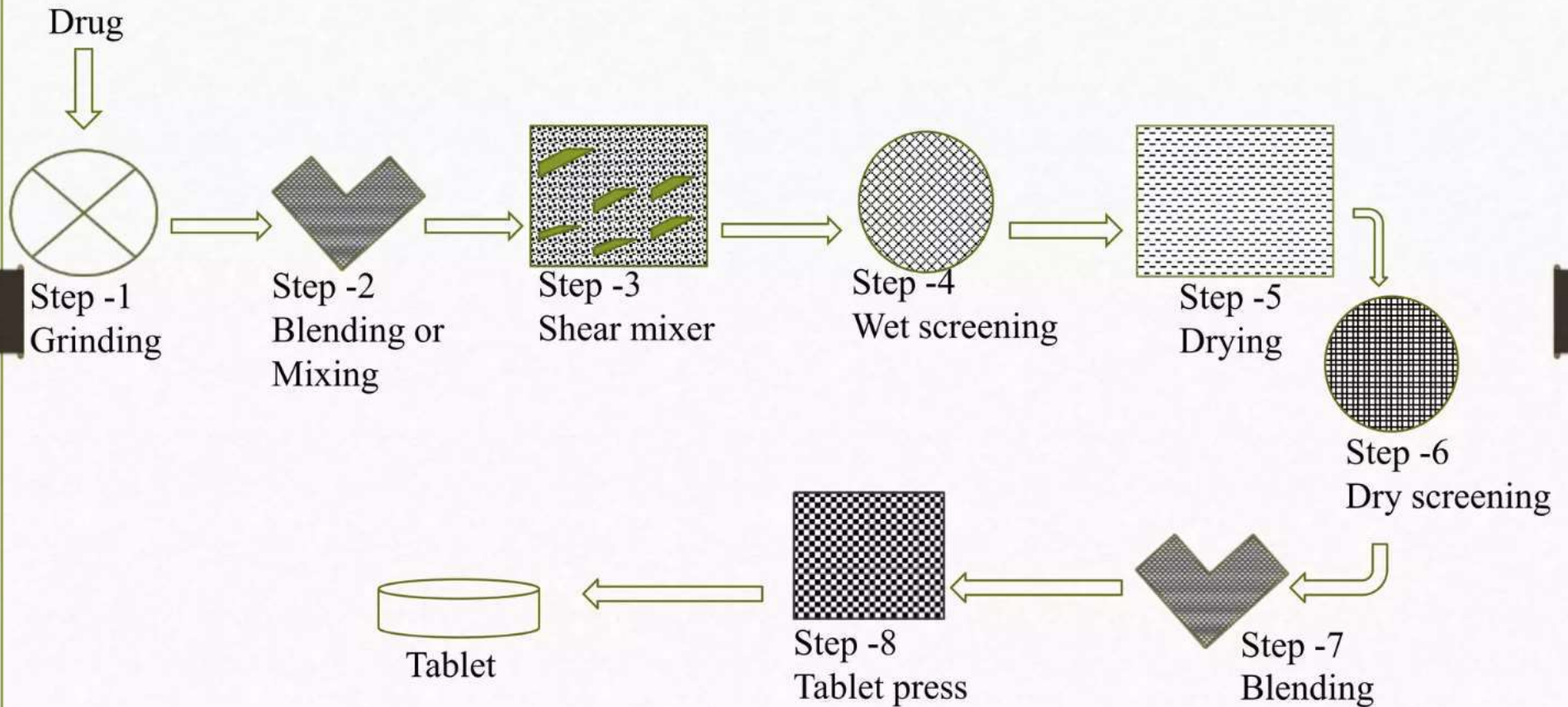
This technique differs from the other granulation methods as it involves the usage of liquids to form compact masses.

Ex. Of Formulations Prepared by Wet Granulation Method:

Formulation of Acetaminophen tablets.,

Formulation of Aluminium Hydroxide Chewable tablets.

Wet Granulation procedure



Step -1 Grinding

Drug is added to the granulator and grinded

Step -2 Blending or Mixing

The suitable adjuvants (Ex. Diluent and other excipients) are added and mixed in a blender .

Step -3 Shear Mixing

Granulating liquids (Ex. Alcohols) are added to form a damp mass of the powdered material which resembles agglomerates.

Step -4 Wet screening

The mass is screened to form pellets or granules.

Step -5 Drying

The pellets or granules are dried to remove excess of the liquid.

Step -6 Dry screening

Dry screening of granules results in size reduction.

Step -7 Blending

The lubricating agent is added and the mixture is mixed thoroughly in a blender.

Step -8 Tablet press

The resultant granules are compressed by machine tooling of a tablet press.

D. Granulation by Crystallization

This method exploits the presence of crystallization water in the active material; this method is rarely used.