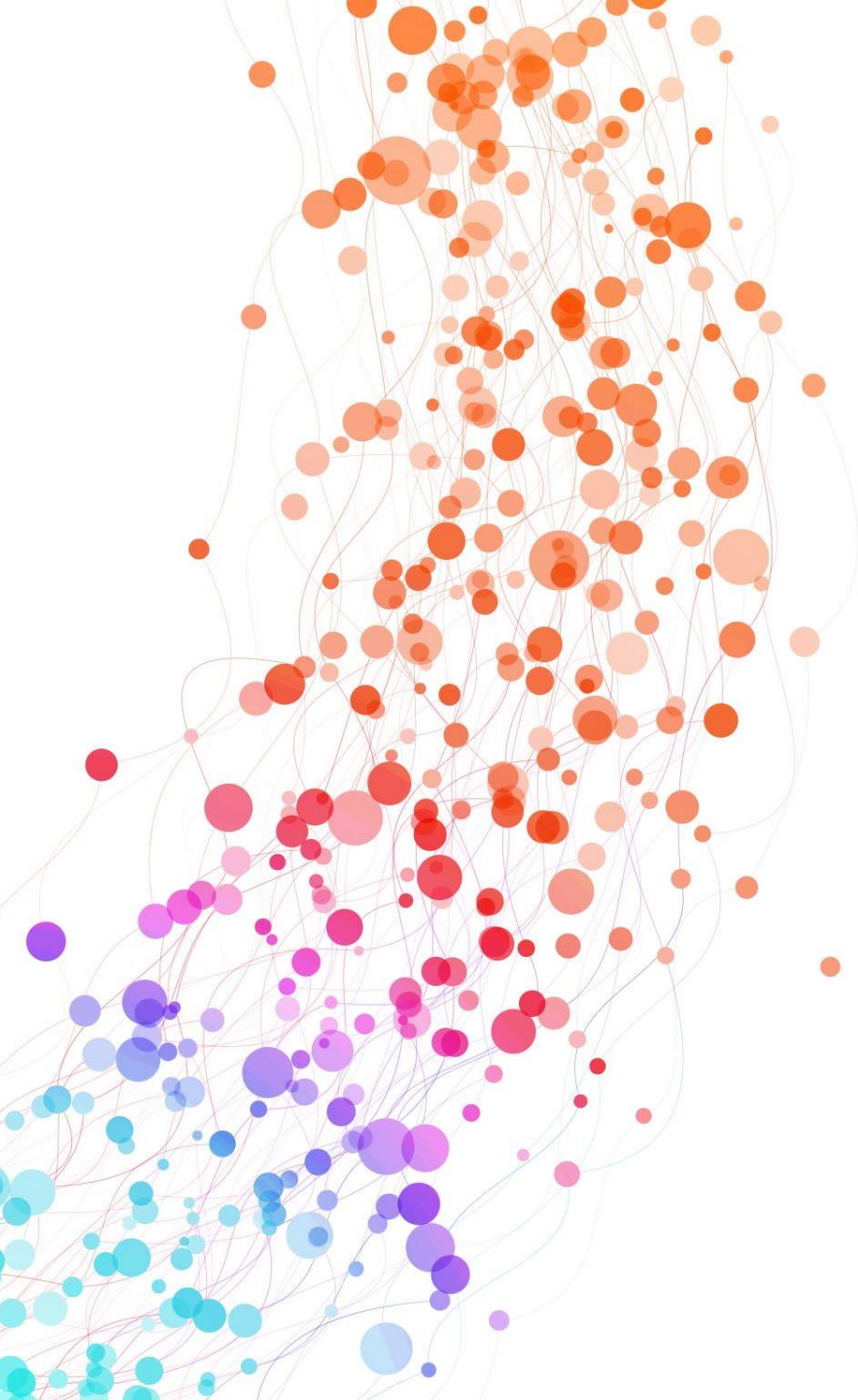




Industrial Pharmacy/Fifth Stage

Lec:6

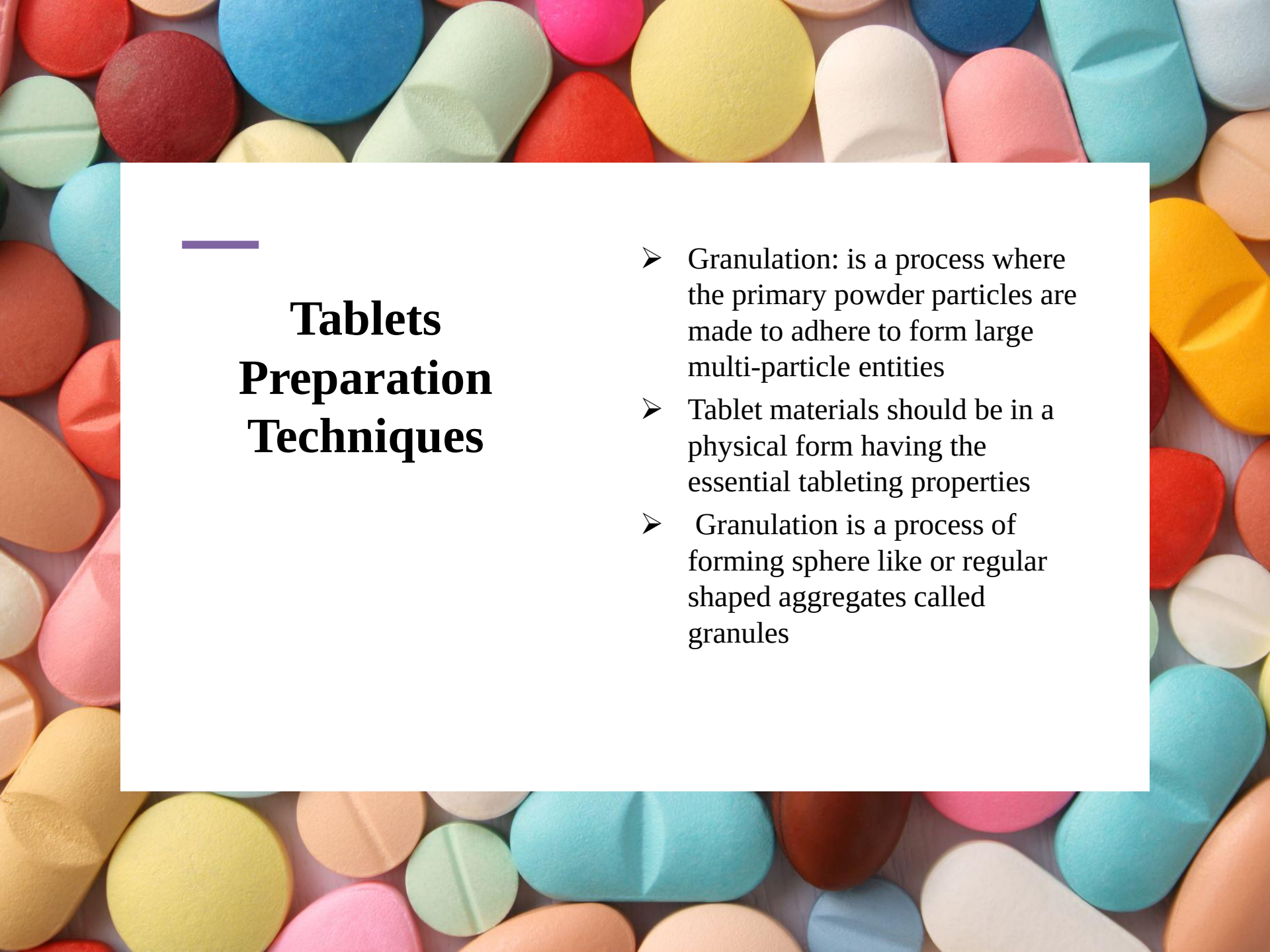
Dr Yasir Qasim Al-Majidi

PhD in Pharmaceutics

**Al-Nahrain University/Collage
of Pharmacy**



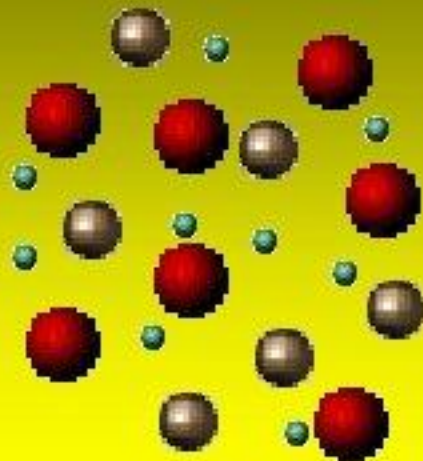
Oral Solid Dosage Forms(Tablets)



Tablets Preparation Techniques

- Granulation: is a process where the primary powder particles are made to adhere to form large multi-particle entities
- Tablet materials should be in a physical form having the essential tableting properties
- Granulation is a process of forming sphere like or regular shaped aggregates called granules

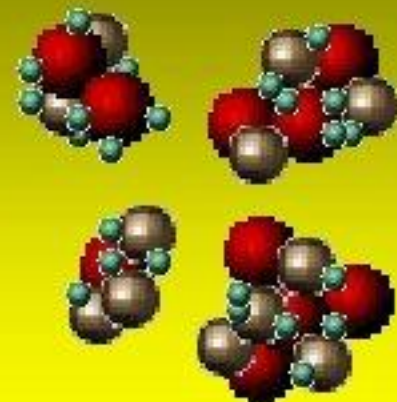
Powder



Granulation



Granules



sieving



Segregated Powder



Monosized Granules



Tablets Preparation Techniques

➤ Rationale Behind Granulation

- 1) Increase bulk density
- 2) Improve the flowability
- 3) Improve mixing homogeneity
- 4) Improve compressibility of the powder
- 5) Affect dissolution process of hydrophobic drugs



Tablets Preparation Techniques



Dry Granulation



In dry granulation, the powder mixture is compacted into large pieces and subsequently broken down or sized into granules



It also called pre-compression or double compression

DRY GRANULATION

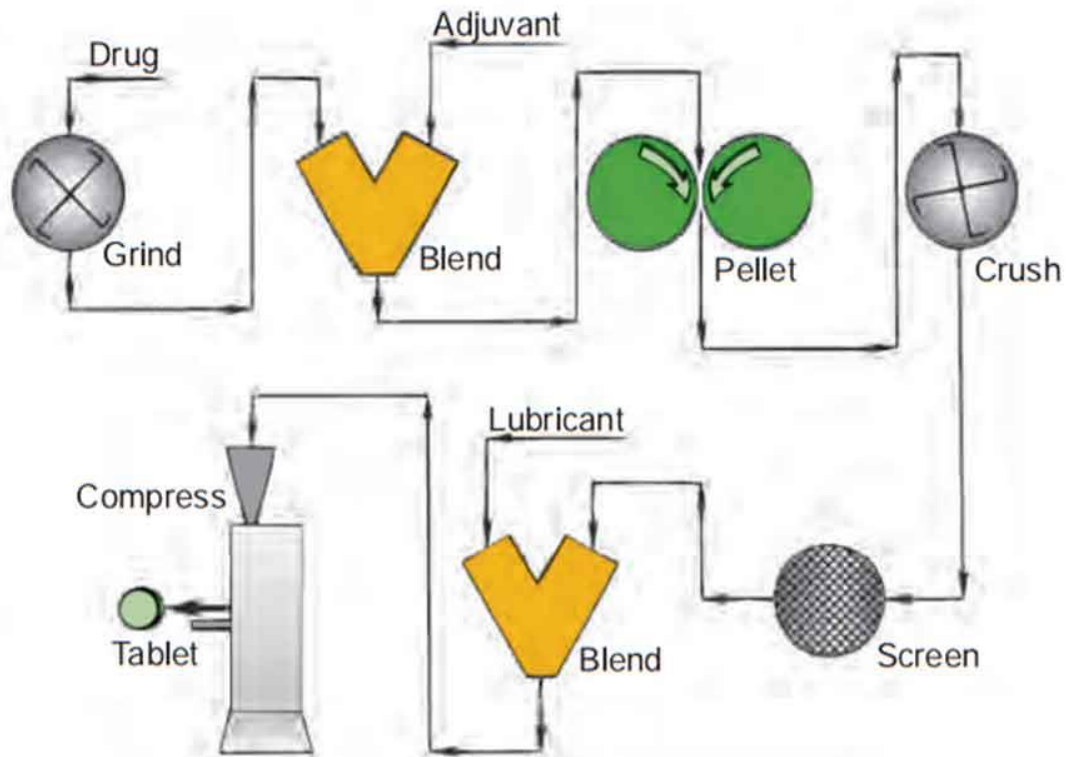


Photo credit: Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Philadelphia: Lipincott Williams and Wilkins.

Tablets Preparation Techniques

- For this method the drug or the diluent must have cohesive properties, and it is applicable for substances degraded by elevated temperature or sensitive to moisture
- Two methods have been introduced to achieve dry granulation:
 - 1-Slugging
 - 2-Roller Compaction

Tablets Preparation Techniques

1-Slugging:

- After weighing and mixing the ingredient the powder mixture is slugged or compressed into large flat tablets of about 1 inch in diameter
- The slugs are broken up by hand or by a mill and pass through a screen of suitable size
- The pressure used to produce the slugs is usually less than that used in the final compression.

Tablets Preparation Techniques

- When a single slugging is not sufficient to confer the required granular properties to the mixture, it can be screened and slugged again.
- Slugging is a method to increase compression time.
- The more compression cause strengthening the bonds holding the tablet together.

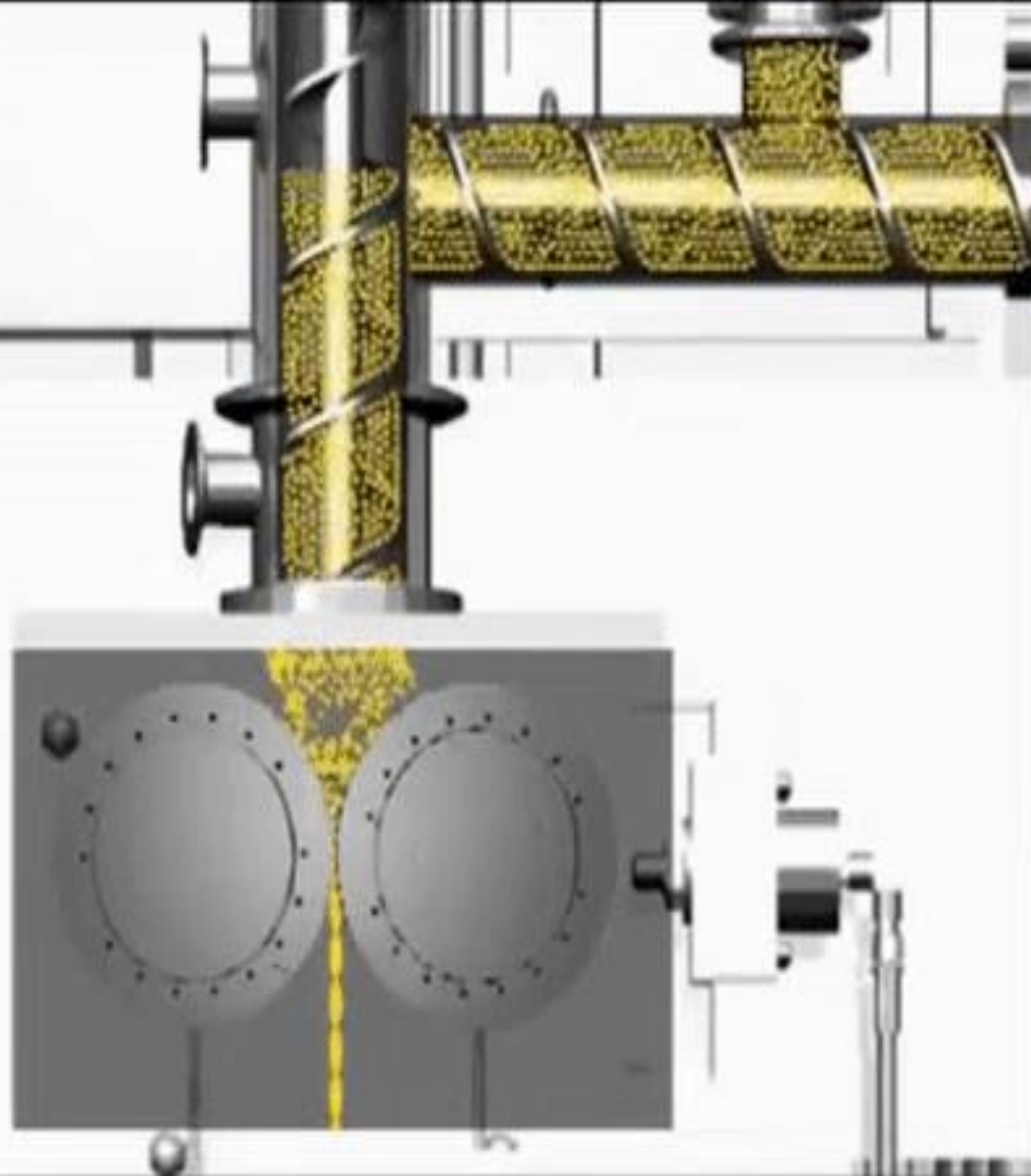
Tablets Preparation Techniques

2- Roller Compactor:

- On large scale production, granulation can be achieved by pressing powders between two rollers at 1-6 tons of pressure
- Roller compactor can produce as much as 500 kg per hour of compacted materials (ribbon-like) which can be broken up, sized, lubricated and compressed into tablets



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Tablets Preparation Techniques

Advantages of dry granulation



Less equipment



Eliminate addition of moisture and using of heat



The process can be done with conventional excipients



Fast disintegration may be attained

Disadvantages of dry granulation

- Require specialized heavy duty equipment
- The process generate considerable dust
- Excessive pressure which require to obtain cohesive mass and the use of lubricant twice may prolonged dissolution time

Tablets Preparation Techniques

- Wet Granulation:
- The most widely used and most general method of tablet preparation, Its popularity is due to the greater probability that the granulation will meet all the physical requirements for the compression of good tablets.
- Its chief disadvantages are the number of separate steps involved, as well as the time and labor necessary to carry out the procedure, especially on a large scale

Tablets

Preparation Techniques

- The steps in the wet method are weighing, mixing, granulation, screening the damp mass, drying, dry screening, lubrication, and compression.

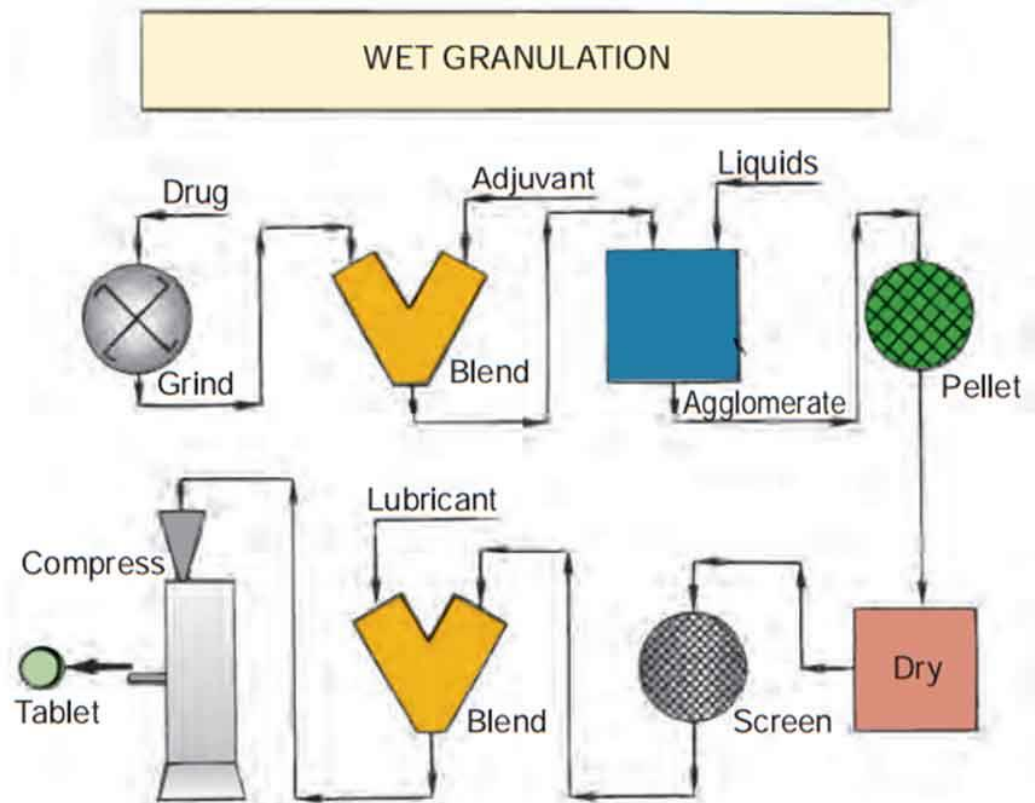


Photo credit: Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Philadelphia: Lippincott Williams and Wilkins

Tablets Preparation Techniques



The powder binding together by adhesive granulating liquid, instead of compaction



Granulating liquid contain solvent that must be volatile to be removed(water, ethanol)



The granulating liquid may used alone or it may contain dissolve adhesive(binder) to ensure particle adhesion once the granules is dry and maintain the integrity of tablet after compression.

Tablets Preparation Techniques

- The powder mass is wetted with the binding solution until the mass has the consistency of damp snow (ball test)



Tablets Preparation Techniques

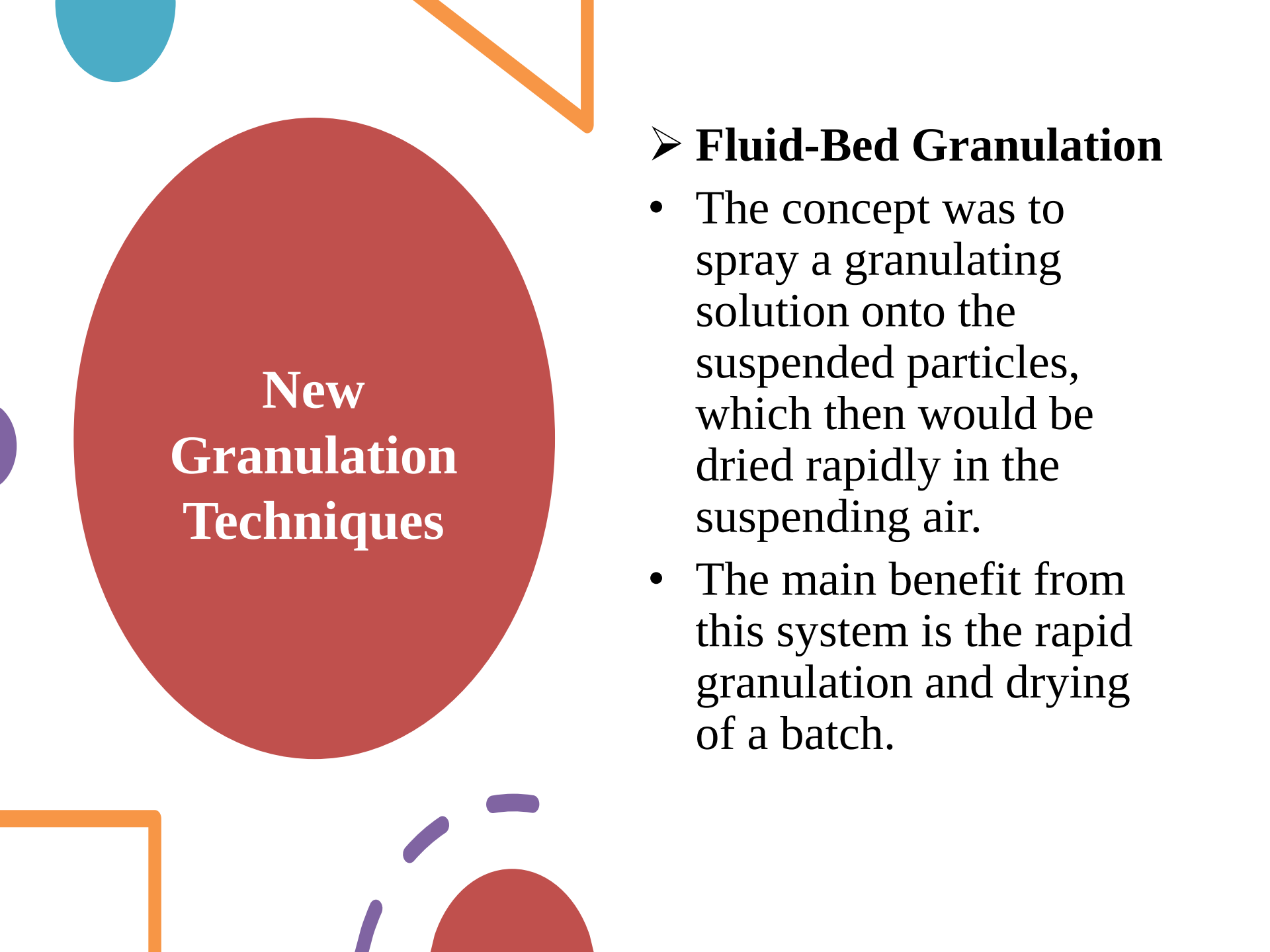
- The mass should be merely moist rather than wet or pasty,
- If it is over wetted it will dry slowly and form hard aggregate which convert into powder by subsequent dry milling, or it may be hard and require extra-pressure for compression
- If it is not wetted sufficiently, the resulting granules will be soft breaking down during lubrication and being difficult to compress

Tablets Preparation Techniques

- The wet screening process involve converting the moist mass into coarse, granular, aggregates of suitable size by passing through hammer mill or screen of suitable mesh size
- In drying, it is preferable to maintain residual amount of moisture in the granules to maintain the binder in hydrated state also the presence of moisture reduce the electrostatic charges around the particles.

Tablets Preparation Techniques

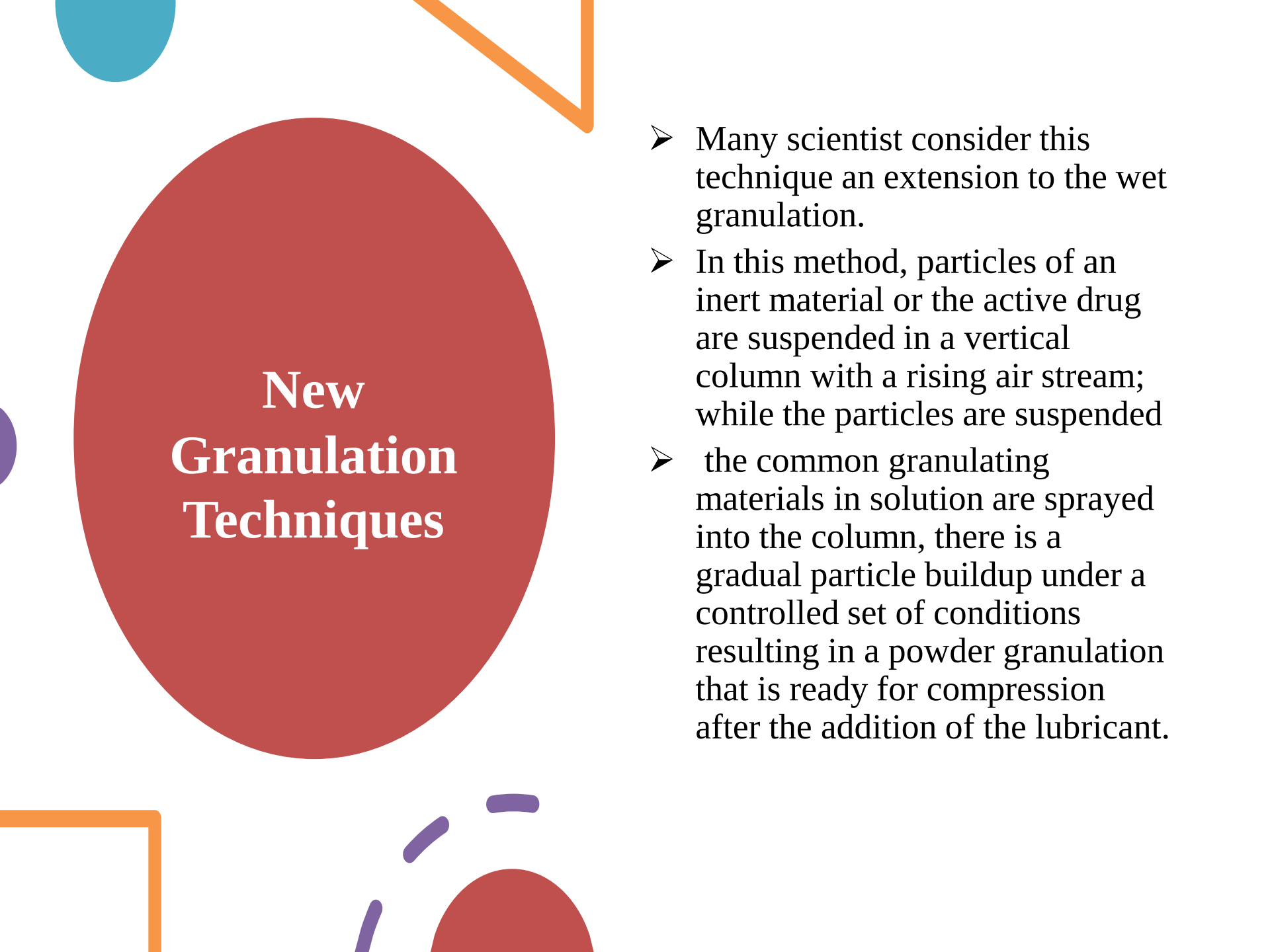
- After drying, the granulation is reduced in particle size by passing it through a smaller-mesh screen.
- Following dry screening, the granule size tends to be more uniform and ready for compression but the lubricant should be added before that.



New Granulation Techniques

➤ **Fluid-Bed Granulation**

- The concept was to spray a granulating solution onto the suspended particles, which then would be dried rapidly in the suspending air.
- The main benefit from this system is the rapid granulation and drying of a batch.



New Granulation Techniques

- Many scientist consider this technique an extension to the wet granulation.
- In this method, particles of an inert material or the active drug are suspended in a vertical column with a rising air stream; while the particles are suspended
- the common granulating materials in solution are sprayed into the column, there is a gradual particle buildup under a controlled set of conditions resulting in a powder granulation that is ready for compression after the addition of the lubricant.



Fluidization

Constant airstream





Thanks for
Listening