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Diploma in Pharmacy 1st Year
Pharmaceutics
Experiment
To demonstrate various stages of tablet manufacturing processes (including tablet coating).

Aim:

To demonstrate various stages of tablet manufacturing processes (including tablet coating).

Reference :

‘ Dr. Gupta G.D , Dr. Sharma Shailish , Dr. Sharma Neelam’ “Practical Manual of Pharmaceutics” Published by Nirali Prakashan, Page no 109 – 112

Apparatus and Materials Required :

Single punch tablet press.

Instrumentation

1) **Hopper:** Prior to tabletting or compression, the granules/powder combinations are poured into this hopper, which is attached to the feed shoe During subsequent tabletting, the hopper can be filled manually or with the help of mechanical equipment.
2) **Die Cavity:** The powder graits are compacted into tablets in the die cavity The die determines:
   i) Tablet's diameter
   ii) Tabler's dimensions
   iii) Tablet's thickness, to some extent
3) **Punches:** There are upper and lower punches in the die that compress the powder into tablets of various forms
4) **Cam Truck:** This controls the position and movement of the punches.

5) **Tablet Adjuster:** This regulates the weight of the tablet by adjusting the volume of the powder to be compressed
6) **Ejection Adjuster:** This allows the tablet to be ejected from the die chamber once it has been compressed.

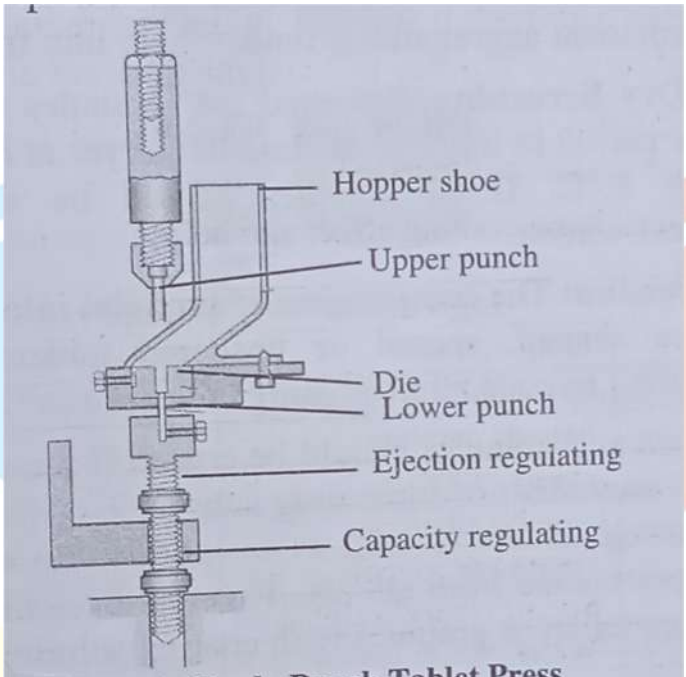

Figure 1: Single-Punch Tablet Press

Theory :

Powder compression is used to force particles into close proximity to one another. allowing them to cohere mio a pomus, solid object with a predetermined geometry to form a tablet. Compression occurs in a die due to the action of two punches, the lower and upper, which apply the compressive force. The reduction in volume of a powder caused by the application of a force is known as powder compression

Bonds are created between particles as a result of the greater proximity of particle surfaces achieved during compression, providing coherence to the powder, i.e a compact is formed. Compaction is described as the compression of powder to form a solid specimen with a predetermined shape. The tabletting process is broken into three stages (sometimes known as the compaction cycle).

The single punch tablet press, also known as an eccentric press or a single station press, is the most basic machine for producing tablets As the name implies, a single punch tablet uses a single set of station tooling, which includes a die and a pair of upper and lower punches.

Only the upper punch exerts a compaction force on the fill material, while the lower punch remains stationary: this action is analogous to hammering, and as a result, the single punch press is referred to as a stamping process. For example, a single punch tablet press may produce approx 60-85 tablets per minute for example Manesty F3

Procedure :

Various stages of tablet manufacturing are:

1) **Dispensing :** Each ingredient in the tablet formula should be weighed and accurately dispensed as per dose. It is one of the important steps in any type of formulation process and should be done under technical supervision.
2) **Sizing :** Formulation ingredients should be in finely divided form.else, size reduction must be carried out for better flow property and easy mixing
3) **Powder Blending :** Powders should be mixed with the help of suitable blender to obtain a uniform and homogeneous powder mix. The drug substance and excipients should be mixed in geometric dilution.
4) **Granulation :** The small powder particles should becollected together into layers, and permanent aggregates to render them into free flowing states.
5) **Drying and Dry Screening :** Screened wet granules should be dried for a particular time period in tray dry or fluid bed dryer at controlled temperature not exceeding 55°C. Dried granules should be screened through the appropriate mesh screen.
6) **Tablet compression :** The compression of granules into a flat, convex, round, oblong, unique shaped, scored or unscored tablets, engraved with an identifying symbol or code number using tablet press.
7) **Coating :** Tablets and granules should be coated if there is necessity to mask the unpleasant taste/odour of some drug substance or to increase the aesthetic appeal of uncoated tablets as well as to modify the release or control the release

of drugsubstance from tablets. This can be achieved by enclosing or covering the core tablet or granules with coating solutions.

Some of the above steps can be skipped depending on the manufacturing process used during tablet formulation.

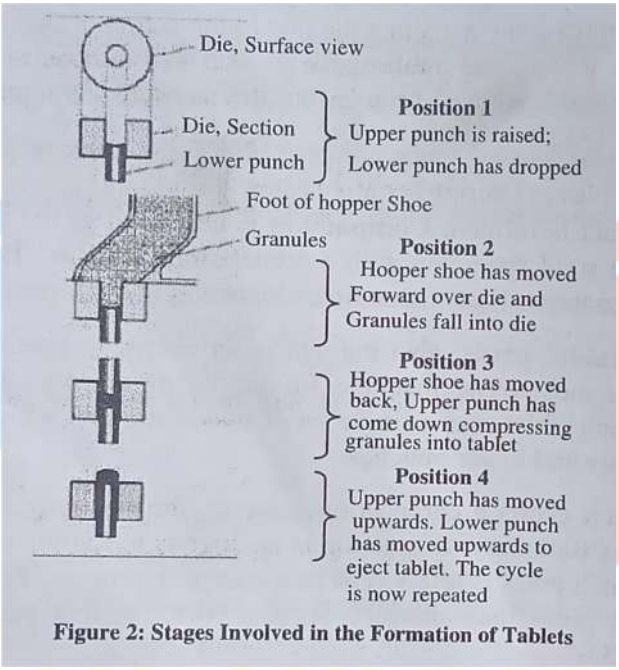

Figure 2: Stages Involved in the Formation of Tablets

Working

1) In the single punch, a feed shoe which is connected to the hopper should be laid down on die table.
2) Tooling set is the basic mechanical and functional unit which comprises a pair of upper and lower and a die cavity which is also called as a station.
   They are available in various shapes in following sizes.


Figure 3: Tooling Set

Table 1: Sizes of Tooling Set

Tooling Type	Punch Barred Diameter	Outer Diameter of Die
D	25.4mm	38.10mm
B	19.0mm	30.16mm
BB	19.0mm	24.00mm
DB	25.4mm	30.16mm

3) Dies should be used to define the size and shape of the tablet.
4) Punches should be used for compressing the granules within thedie.
5) Cam trackguide the position of the punches there connection to the head of the punches.
6) The mechanism involved in tablet press is that the compaction of powder blend should be accomplished by exerting the pressure via upper and lower punches, the resultant tablets are formed in the die cavity.
7) Working process can be divided into three stages,
   i) **Filling :** The lower punch should be dropped in the die leaving a cavity into which granules flows under the influence of gravity from the hopper.
   ii) **Compression :** The upper punch, drops, and its tip should be entering the die. The porosity of the contents of the dies should be reduced progressively, and the particles should be forced into the over closer proximity to each other.
   iii) **Ejection :** The upper punch should be withdrawn from the die; lower punch should be raised upwards simultaneously feed shoe should come over die and move the compressed tablet from the site.

Result :

Vanous stages of tablet manufacturing were demonstrated.