INDUSTRIAL PHARMACY-I

UNIT II-TABLETS AND LIQUID ORALS

CLASS:15

Quality control tests: In process and finished product tests

QUALITY CONTROL OF COMPRESSED TABLET

Quality control of compressed tablet can be done by

(i) Official methods and

(ii) Unofficial methods.

1. WEIGHT VARIATION (Official)

This test is based on the fact that, if the weight variation is not much then it can be said that *the amount of medicament will not vary considerably*. Conversely, if the weight variation is largerthen it can be concluded that the active medicament will also vary considerably.

Sources of weight variation

Weight variation is solely dependent on the poor flow property of granules and filling of diecavity.

Poor flow properties arise from: (a) improper lubrication

(b) size of granules

(c) adjustment of lower punch.

Weight variation test

The U.S.P. weight variation test is run by weighing 20 tablets individually, calculating the average weight, and comparing the individual tablet weights to the average. The tablets meet the USP test if

"*not more than 2 tablets are outside the percentage limit and ifno tablet differs by more than 2 times the percentage limit."*

Say 20 tablets weighed separately Percentage limit is 10%.

Say the average weight was 100 mg.

Then the sample of tablets will pass the USP weight variation test if 18 tablets remain within 90 mg to 110 mg and

2 tablets remain within 80 mg to 120 mg

The weight variation tolerance for uncoated tablets differ on average tablet weight.

Average weight of tablets (mg)	Maximum percentage difference Allowed
130 or less	10
130 to 324	7.5
More than 324	5

. CONTENT UNIFORMITY TEST

Weight variation test is applicable when the amount of medicament in the tablet is high. in potent drug the medicament is less in amount incomparison to the other excipients. The weight variation may meet the pharmacopoeial limitation but this will not ensure the correct variation of potency. hence, in this case the weight variation test is followed by content uniformity test.

Content uniformity test

In this test 30 tablets are randomly selected for sample, and at least 10 of them are assayed individually according to the official assay method.

Nine of the 10 tablets must have potency within 15 % of the labeled drug content. Only one tablet may be within 25%.

if this conditions are not met then the tablets remaining from the 30 must be assayed individually and none may fall outside 15% of the labeled content.

For example:

30 tablets are taken at random10 tablets are assayed individually In which 8 tablets remained within 15%and 2 tablets remained within 15 % and 25 %.

So the test has to be carried out with rest of the 20 tablets. And those 20 tablets must remain within 15%.

Conclusion: Out of the 30 tablets the potency of only 2 tablets may remain within 15 to 25 % rest of all the tablets should remain within 15%.

3. TABLET HARDNESS

The resistance of the tablet to chipping, abrasion or breakage under conditions of storage, transportation and handling before usage depends on its hardness.

Method:

A tablet is taken between the 2nd and 3rd finger and pressing it with the thumb as fulcrum. If the tablet breaks with a "sharp snap", yet, it does not break when it falls on the floor – is said to possess proper hardness.

Instruments used:

1. Monsanto Hardness Tester
2. Strong Cobb Hardness Tester — Manual mode of operation are more or less similar
3. Pfizer Hardness Tester
4. Schleuniger Apparatus — – Operates without manual involvement.

Hardness of a tablet:

The hardness at which the tablet crushes is the hardness of the tablet.

Unit of hardness: Kg/sq.in. orlb/ sq.in

Limit : Generally maximum 5 kg/sq.in. hardness is required.

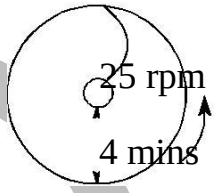
If the tablets are too hard then it may not meet tablet disintegration test.

If the tablets are too soft then it may not with stand the handling, packaging and shipping operations.

4. FRIABILITY

Tablet hardness is not an absolute indicator of strength since some formulations, when compressed into very hard tablets may produce chipping, capping and lamination problems. Therefore another measure of tablet strength i.e. friability is often measured, i.e. the friability.

Instrument: ROCHE FRIABILATOR



Objective of friability test:

This apparatus is designed to evaluate the ability of the tablet to withstand abrasion, in handling, packaging and shipping operation.

Roche Friabilator

Method:

Few tablets, previously weighed are taken in the plastic chamber of the laboratory friability tester. In the plastic chamber the tablets are subjected to abrasion and shock by rotating the plastic chamber at 25 rpm for 4 mins (i.e. total 100 revolutions). The tablets are dusted and reweighed.

Limit

For conventional compressed tablet the weight loss should be within 0.5 to 1.0 %.

5. DISINTEGRATION TEST OF TABLETS (Official)

For most tablets, the first important step toward solution is breakdown of the tablet into smaller particles or granules – this process is known as disintegration .

The time a tablet takes to disintegrate is the disintegration time. USP disintegration test apparatus

The USP device to test disintegration uses glass tubes with the following dimensions: number of tubes= 6

length = 3 inches

Upper end open, lower end closed with #10 mesh screen.

To test the disintegration time one tablet is placed in each tube, and the basket rack assembly is positioned in a 1-litre beaker of water, simulated gastric fluid or simulated intestinal fluid, at 37^0C 2^0C, such that the tablet remain 2.5 cm from the bottom of the beaker.

A standard motor moves the basket up and down through a distance of 5 to 6 cm at a frequency of 28 to 32 cpm (cycles per minute).

Perforated plastic discs may also be placed on top of the tablets to impart an abrasive action to the tablets. They are useful for tablets that float.

USP disintegration test will be passed if all the tablets disintegrate and the particles passed through the #10 mesh screen within the specified time. If any residue remains, it must have a soft mass with no palpable firm core.

Disintegration time is suggested for 5 minutes for uncoated Aspirin tablets. Majority of the uncoated tablets have maximum disintegration time (DT) of 30 minutes.

Enteric coated tablets shows no evidence of disintegration after 1 hr in simulated gastric fluid. The same tablets are then tested in simulated intestinal fluid and are to disintegrate in 2 hrs plus the time specified in the monograph.

6. DISSOLUTION TEST

Why is it required?

1. Disintegration test simply identifies the time required for the tablet to break up under the condition of the test but it does not ensure the drug release in the bulk of the fluid.
2. Rate of dissolution is directly related to the efficacy of the drug.
3. Rate of dissolution is a good index for comparing the bioavailability of two tablet products of the same drug.

USP XX / NF XV, Supplement 3 specifies two apparatus for dissolution test. 1. Apparatus - I

In general, a single tablet is placed in a small wire mesh basket and immersed in the dissolution medium (as specified in the monograph) contained in a 1000 ml flask at 37^0 0.5^0C. Generally it is rotated at 50 rpm unless otherwise specified.

2. Apparatus 2

The same equipment is used. Instead of basket a paddle is introduced as the stirring element. The tablet is allowed to sink at the bottom of the flask before stirring.

Limit: A value of $t_{90\%}$ (i.e 90% drug release) within 30 minutes is often considered satisfactory and is an excellent goal since a common dissolution tolerance in the USP/NF is not less than 75% dissolved in 45 minutes.

In process quality control tests

- Weight
- Weight variation
- Content uniformity
- Thickness
- Hardness

- Disintegration

General appearance

- Size,shape,color,presence or abscence of an odor taste surface texture and physical flaws,legibility and identity marks

Size,shape

- Determined by tooling\
- Crown thickness measured with micrometer
- 5to 10 tablets in a holding tray total thickness measured with sliding caliper scale

Tablet Thickness

The thickness of a tablet is determined by:

1. The diameter of the die
2. The amount of fill permitted to enter the die
3. The compaction characteristics of the fill material
4. The force or pressure applied during compression.
5. To produce tablets of uniform thickness during and between batch productions for the same formulation, care must be exercised to employ the same factors of fill, die, and pressure.
6. The degree of pressure affects not only thickness but also hardness of the tablet; hardness is perhaps the more important criterion since it can affect disintegration and dissolution.

Unique identification markings

- Company name or symbol or product code given by National Drug Code
- Organaoleptic properties
- Color

visual inspection

- Reflectance spectrophotometry,
- tristimulus colorometric measurements
- microreflectance photometer to measure the colour uniformity gloss on tablet surface

Odor

- Indicate stability problem(odor of acetic acid in the degradation of asprin

- Odor could be charecteristic of the drug vitamins
- Added ingredients(flavourants)
- Film coated tablets have charecteristic odor

Taste :important in chewable tablets many companies utilize taste panels to judge preference of flavors