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To prepare and evaluate ginger: Chamomile anti-emetic tablet

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Abstract
Ginger is used for the motion sickness and as anti-emetic remedy from longer period of time. In Ayurveda also ginger is mentioned as one of the important ingredient to remove the cough from the body. The main effects of ginger are due to chemical constituents present in that such as gingerols and shogaols that act as their active agents. In the dried flower of chamomile there are presence of flavonoid and terpenoid due to which if gave the medicinal effects. Chamomile preparations are commonly used for many human ailments such as hay fever, inflammation, muscle spasms, menstrual disorders, insomnia, ulcers, wounds, gastrointestinal disorders, rheumatic pain, and hemorrhoids. Essential oils of chamomile are used extensively in cosmetics and aromatherapy. Many different preparations of chamomile have been developed, the most popular of which is in the form of herbal tea consumed more than one million cups per day. In this study we prepare and evaluate chamomile and ginger tablet. Tablets are among convenient dosage forms which patients prefer due to their advantages. This tablet is specifically use for anti-emetic purpose.

Keywords: Ginger, Chamomile, Tablet, Anti-emetic

Introduction
Definition: Tablet is defined as a compressed unit solid dosage form containing medicaments with or without excipients.

Different types of Tablets
(A) Tablets ingested orally
- Compressed tablet
- Multiple compressed tablet
- Repeat action tablet
- Delayed release tablet
- Sugar coated tablet
- Film coated tablet
- Chewable tablet

(B) Tablets used in oral cavity
- Buccal tablet
- Sublingual tablet
- Troches or lozenges
- Dental cone

(C) Tablets administered by other route
- Implantation tablet
- Vaginal tablet

(D) Tablets used to prepare solution
- Effervescent tablet
- Dispensing tablet
- Hypodermic tablet

1. Compressed tablet
- These tablets are formed by compression and contain no special coating. They are made from powdered, crystalline, or granular materials, alone or in combination with binders, disintegrants, controlled release polymers, lubricants, diluents, and in many cases colorants.

2. Herbal tablet

- Herbal medicines are one type of dietary supplement. They are sold as tablets, capsules, powders, teas, extracts, and fresh or dried plants. People use herbal medicines to try to maintain or improve their health.

3. Delayed release tablet

- These are compressed tablets coated with substances that resist solution in gastric fluid but disintegrate in the intestine. Enteric coatings can be used for tablets containing drug substances that are inactivated or destroyed in the stomach, for those that irritate the mucosa, or as a means of delayed release of the medication.

4. Sugar coated tablet

- These are compressed tablets containing a sugar coating. Such coatings may be colored and are beneficial in covering up drug substances possessing objectionable tastes or odors and in protecting materials sensitive to oxidation.

5. Film coated tablet

- These are compressed tablets that are covered with a thin layer or film of a water-soluble material. A number of polymeric substances with film-forming properties may be used. Film coating imparts the same general characteristics as sugar coating with the added advantage of greatly reduced time period required for the coating operation.

6. Chewable tablet

- A solid dosage form containing medicinal substances with or without suitable diluents is intended to be chewed producing a pleasant tasting residue in the oral cavity that is easily swallowed and does not leave a bitter or unpleasant after taste.

7. Buccal and sublingual tablets

- These are small, flat, oval tablets. These tablets are intended for buccal administration by inserting into the buccal pouch may dissolve or erode slowly; therefore, they are formulated and compressed with sufficient pressure to give a hard tablet. E.g. progesterone tablets may be administered in this way.

8. Effervescent tablets

- A solid dosage form containing mixture of acids and sodium bicarbonate which release carbon dioxide when dissolved in water; it is intended to be dissolved or dispersed in water before administration.

9. Compressed suppositories or inserts

- Occasionally, vaginal suppositories, such as Metronidazole Tablets, are prepared by compression. Tablets for this use usually contain lactose as the diluents. In this case, as well as for any tablet intended for administration other than by swallowing the label must indicate the manner in which it is to be used

10. Molded tablets or tablet triturates

- Tablet triturates usually are made from moist material, using a triturate mold that gives them the shape of cut sections of a cylinder. Such tablets must be completely and rapidly soluble. The problem arising from compression of these tablets is the failure to find a lubricant that is completely water-soluble.

11. Dispensing Tablets (DT)

- These tablets provide a convenient quantity of potent drug that can be incorporated readily into powders and liquids, thus the necessity to weigh small quantities. These tablets are supplied primarily as a convenience for extemporaneous compounding and should never be dispensed as a dosage form.

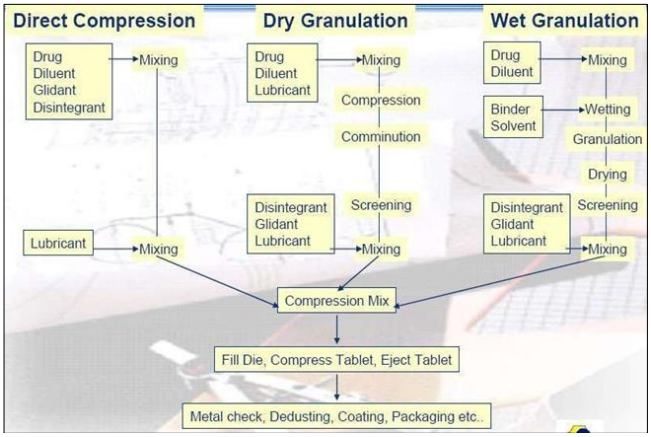


Fig 1: Tablating Method

Wet granulation

- The most popular method (over 70%) Granulation is done
- To prevent segregation of the constituents of the powder blend.
- To improve flowability of the powder mixture.
- To improve the compaction characteristics of the powder mixture due to better distribution of the binder within the granules.
- To improve homogeneity and thus ensure content uniformity.
- Wet granulation is a process of using a solution binder to the powder mixture. The amount of liquid can be properly managed; over wetting the granules to be too hard, under wetting too soft and friable.
- Aqueous solutions are safer than other solvents.

Ginger

- **Synonym:** Zingiber; Zingiberis.
- **Biological source:** Ginger consists of rhizomes of *Zingiber officinale Roscoe;* It is known as *Jamaica ginger* in the market.
- **Family:** zingiberaceae.
- **Geographical source:** It is said East Asia, but is cultivated in Caribbean island, Africa, Australia, Mauritius, Jamaica, Taiwan and India.

Macroscopic characters

Colour - Externally, it is buff coloured.
Odour - Agreeable and aromatic.
Taste - Agreeable and pungent.
Size - Rhizomes of ginger are about 5 to 15 X 1.5 to 6.5 cm.
Shape - The rhizomes are laterally compressed bearing short flat, ovate and oblique branches on the upper side, with bud at the apex.
Fracture - Short and fibrous.

Fig 1: ginger rhizomes with buds

Fig 2: ginger powder

Uses

- Ginger is used as a stomachic, an aromatic, a carminative, stimulant and flavouring agent.
- Ginger powder has been reported to be effective in motion sickness. In has been suggested that adsorbent, aromatic and carminative properties if ginger on G.I track cause adsorption of toxins and acid enhanced gastric motility.

Storage

- Ginger is coated with lime to improve its colour and quality and hence this particular variety is known as limed ginger.
- Ginger powder should be stored in a very cold, dark place, away from direct sunlight and other heat sources. After opening the package, keeping it cool is more important. Obviously, you do not want moisture to enter the powder, so the place where you store the powder should also be dry.

Chamomile

- **Synonym:** Anthemis nobilis, chamomile.
- **Biological source:** Chamomile (*Matricaria chamomilla L.*) is a well-known medicinal plant.
- **Family:** Asteraceae
- **Geographical source:** Chamomile is a traditional medicinal herb native to Western Europe, India, and western Asia.
- **Macroscopic characters**

Colour - medium light shade of yellow-green.
Odour - sweet and fresh.
Taste - honey-like sweetness.
Size - German chamomile (*Matricaria recutita*) is a taller version of Roman chamomile, reaching up to 2 feet tall.
Shape - True chamomile is an annual plant with thin spindle-shaped roots only penetrating flatly into the soil. Thebranched stem is erect, heavily ramified, and grows to a height of 10-80 cm. The long and narrow leaves are bi- to tripinnate.
Fracture - Thin spindle-shaped roots.

Fig 3: chamomile flower

Fig 4: chamomile flower powder

Uses

- Chamomile preparations are commonly used for many human ailments such as hay fever, inflammation, muscle spasms, menstrual disorders, insomnia, ulcers, wounds, gastrointestinal disorders, rheumatic pain, and hemorrhoids.
- The Chamomile powder is so versatile. Simply mix with water for a rich tea to sooth your stomach and calm your nerves.

Storage

- Dried chamomile keeps its flavor for up to a year if it's stored in an air-tight glass jar or metal container, away from heat and humidity, and out of direct light.
- Chamomile should be stored at temperatures below 63°F. Light powder with a slight floral or fruity scent.

Extraction

- Extraction is the method of removing active constituents from a solid or liquid by means of liquid solvent.

Method of Extraction

- Infusion
- Decoction
- Digestion
- Maceration
- Percolation
- Continues hot extraction (Soxhlet method)
- Supercritical fluid extraction
- Counter current extraction
- Microwave assisted extraction
- Ultrasonication assisted extraction

Continues hot extraction: (soxhlet method)

- The soxhlet extractor continues extraction of a component from a solid mixture.
- Boiling solvent vapours rise up thorugh the larger side-arm. Condensed drop of solvent fail into the porous cup, dissolving out the desired component from a solid mixture.
- When the smaller side-arm fills to overflowing, it intiates a siphoning action.
- The solvent, containing the dissolved component is siphoned into the boiler below residual solvent drops continues to fail into porous cup.
- And the cycle repeats…

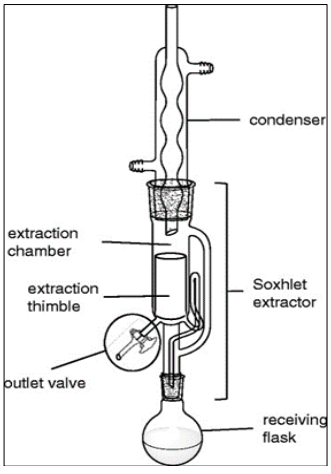


Fig 5: Sauxhlet extraction

Merits

- Large amount of drug can be extracted with much smaller quantity of solvent.
- Tremendous economy in terms of time, energy & ultimately financial inputs.
- Small scale used a batch-process.
- Becomes more economical when converted into continuous extraction.
- Procedure on large scale.

Demerits

- Physical nature of drug.
- Solvent.
- Chemical constituent of drug.

Materials and methods

Extraction of Ginger by soxhlet apparatus

- Take 75 gm of ginger powder. Then 350 ml of absolute ethanol solvent was added into the flask with ginger powder.
- The process was conducted at 78.4 ^{0}C for 12 hours, with 5-6 heat cycles in a heating mantle for 1 hour.

Fig 6: ginger extraction

Extraction of chamomile soxhlet apparatus

- Take 35 gm chamolie powder. Then 100 ml of absolute ethanol solvent was added into the flask with chamomile powder.
- The process was conducted at 78.4^{0}C for 12 hours, with 5-6 heat cycles in a heating mantle for 1 hour.

Fig 7: chamomile extraction

Wet granulation method

- In this powdered medicament and other excipients are moistened with granulating agent.

Ingredients	gm/tablet
Ginger and chamomile extract	7 gm
Moringa powder (binder)	2 gm
Lactose MCC (diluents)	19.5 gm
Magnesium stearate (lubricant)	1.2 gm

Steps in wet granulation

1. •**mixing of drugs &excipients.**
   •prepare solution of binder with water add API & diluent mixture to form a wet mass.
2. •**course screening of wet mass using suitable sieve**.
   •pass the wet mass through sieve (12-14 mesh).
3. •**drying of granules.**
   •dry the granules in hot air oven**.**
4. •**lubrication**
   •add the lubricant.
5. •**screening of dry granules through a suitable sieve**.
   •pass the granules through sieve (40-44 mesh).
6. •**compression.**
   •compress tablets using tablet compression machine.

Stage of wet granulation

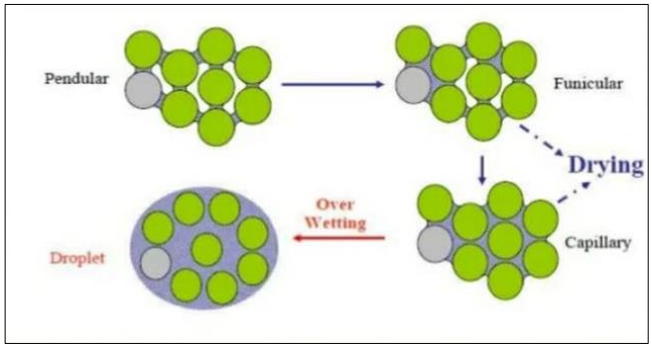


Fig 8: wet granulation

Tablet compress machine

- A tablet press is a mechanical device that compresses powder into tablets of uniform size and weight.
- A tablet press can be used to manufacture tablets of a wide variety of materials, including pharmaceuticals, nutraceuticals, cleaning products, industrial pellets and cosmetics.

Principle

- The basic principle behind the tablet compression machine is hydraulic pressure.
- This pressure is transmitted unreduced through the static fluid.
- Any externally applied pressure is transmitted via static fluid to all the directions in the same proportion.
- It also makes it possible to multiply the force as needed.

Tablet press in current use can be classified into two part

- Single punch/single station/eccentric presses.
- Multi-station/rotary presses.

Fig 9: Tablet compression machine

Part of tablet compression machine

Hopper

- This is connected to the feed shoe and it is where the granules/powder mixtures are poured into prior to tabletting or compression. The hopper can be filled manually or by using mechanical equipment during subsequent tabletting.

Die cavity

- The die cavity is where the powder granules are compressed into tablets. The die determines; the diameter of the tablet; the size of the tablet to some extent the thickness of the tablet.

Punches

- This comprises upper and lower punch and they compress the powder into tablets of various shapes within the die.

Cam truck

- This guides the position/movement of the punches.

Tablet adjuster

- This is used to adjust the volume of the powder to be compressed and so determines the weight of the tablet.

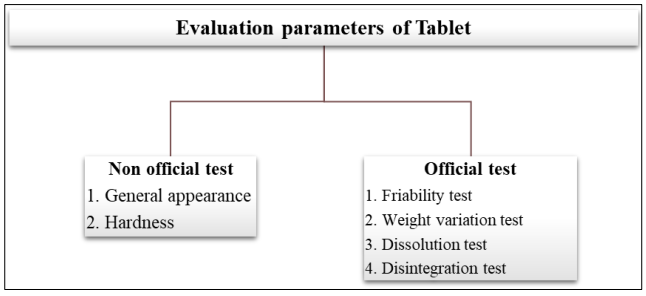
Ejection adjuster

- This facilitates the ejection of the tablet from the die cavity after compression.

Size of punches & dies:

- Upper punch: 10 mm
- Lower punch: 10 mm
- Die: 10 mm.

Evaluation Parameters



Non-official test

General appearance

- Organoleptic properties
- Size and shape
- Thickness

Hardness

Basically follloing Instrument is used in hardness test:

- Monsanto tester
- Pfizer tester
- Erweka tester
- Schleuniger tester

Fig 10: Pfizer tester

Official test

Friability test

- It is used to measure the strength of the tablet.
- It is used to measure tablet to withstand mechanical shock & abrasion without crumbling during the handling of manufacturing packaging, shipping, and consumer use.
- Friability is strictly adhered to coated tablets.
- Friability problem is encountered with thin tablets large diameter tablets granules (excessively dried or excessive fine granules).
- The extent of friability is measured by using Roche Friabilator.

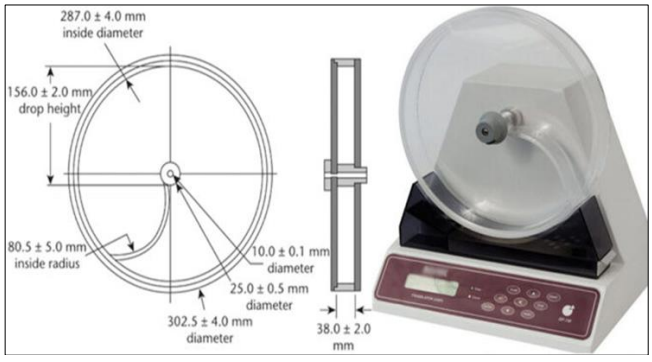


Fig 11: Roche friabilitor

It rotates at a rate of 25 rpm 10 tablets are weighed collectively & Waced in the chamber of friabilator in the friabilator the tablets are posed to rolling resulting from free fall of the tablets within the camber of friabilator.

% friahility is calculated by using the formula

$$\% \text{ Friability} = \frac{W1 - W2}{W1} \times 100$$

WI= Weight of the tablet before test

W2= Weight of the tablet after test.

Weight variation test

- The weight variation test would be a satisfactory method for determining drug content uniformity of drug distribution.
- Weight variation test is applicable when the tablets containing 50 mg or more of drug substance or when the drug substance represents 50% or more (by weight) of the dosage form unit.

Table 1: IP - Official Limits

Tablets weight	Limit
80 mg or less	±10%
80 mg – 250 mg	±7.5%
>250 mg	±5%

Table 2: Bp – Official Limits

Tablets weight	Limit
80 mg or less	±10%
80 mg – 250 mg	±7.5%
>250 mg	±5%

Table 3: USP – Official Limits

Tablets weight	Limit
130 mg or less	±10%
130 mg – 324 mg	±7.5%
>324 mg	±5%

The Perce mage deviation is calculated by using the formula.

$$\text{Weight variation} = \frac{\text{individual weight-average weight}}{\text{Individual weight}} \times 100$$

Dissolution Test

- Dissolution is the process in which a substance forms a solution.
- Dissolution testing measures the extent and rate of solution formation from a dosage form, such as tablet, capsule, ointment, etc.
- The dissolution of a drug is important for its bioavailability and therapeutic effectiveness.
- Based on sink (or) non-sink conditions dissolution apparatus are classified as:
  - Closed compartment apparatus
  - Open compartment apparatus

Types of dissolution apparatus according to IP:

- TYPE I: PADDLE
- TYPE II: BASKET

Currently, there are seven different types of dissolution apparatus defined in the United States Pharmacopeia (USP)-

basket type, paddle type, reciprocating cylinder, and flow through cell, paddle over disc, rotating cylinder, and reciprocating disc.

Fig 12: Dissolution test apparatus

Disintegration test

- The disintegration test is used to show how quickly the tablet breaks down into smaller particles, allowing for a greater surface area and availability of the drug when taken by a patient.
- There is no correlation between dissolution and disintegration.

Fig 13: Disintegration test apparatus

Table 4: Table type

Tablet type	Disintegration time
Uncoated tablet	15 minutes
Plain coated tablet	60 minutes
Enteric coated tablet	3 hours
Dispersible tablet	3 minutes
Effervescent tablet	< 3 minutes
Sublingual tablet	4 hours
Buccal tablet	4 hours
Vaginal tablet	60 minutes
Chewable tablet	Not required

Results and Discussion

Ginger and chamomile tablet

- Chamomile-ginger is a great blend.
- Chamomile flowers are a source of calm and relaxation, which help me de-stress when deadlines and work goals pile up.
- Chamomile also works well as a pre-bedtime drink, helping to bring about a good night's rest.
- Ginger adds a spicy, deep flavor to the tea.

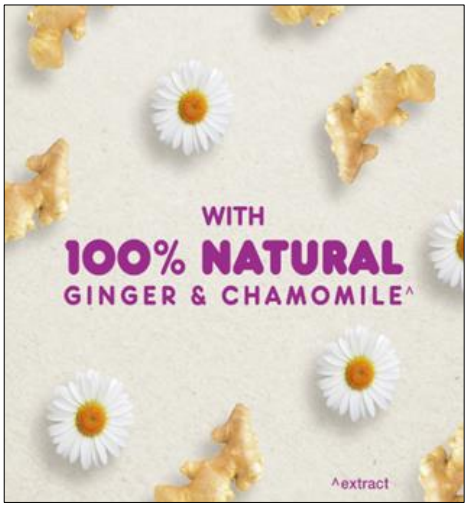


Fig 14: Ginger and chamomile portfolio

Fig 15: Ginger and chamomile tablet

Table 5: Non-official results

Sr. No	Test	Result
1.	State	Solid
2.	Colour	Brownish green
3.	Odour	Pungent
4.	Cracks	No cracks
5.	Dark marks	Absent
6.	Shape	Oval
7.	Thickness	3.8mm
8.	hardness	190

Table 6: Official results

Sr. No	Test	Results
1.	% friability	0.19%
2.	Average weight	9.795 gm
3.	Range of % weight variation	-1.45 to 1.52
4.	Dissolution time (% release at 30 min)	97.6
5.	Designation time	360 sec

Uses of Ginger and chamomile tablet

- Ginger and chamomile tablet acts as an anti-emetic so it can be used in nausea and vomiting.
- It can also be used in morning sickness during first trimester of pregnancy.
- It might be safe when used orally for medicinal purposes over the short term.
- It provides calming effects on stomach.
- It is an aid in digestion.
- The combination of chamomile and ginger is a perfect combination for seasonal cold and flu.
- Whether you have overworked or you are stressed, this tablet can be used.

Conclusion

- The act of emesis is controlled by the vomiting center in the medulla, which integrates afferent input from the vestibular system, the chemoreceptor trigger zone (CTZ), the cortex and the gut.
- The mechanism of action of antiemetic is related to blockage of various type of receptor located in various region of various organ of the body parts.
- In relation to its antiemetic properties, ginger (and its constituents) acts peripherally, within the gastrointestinal tract, by increasing the gastric tone and motility due to anticholinenergic and antiserotonergic actions. It is also reported to increase gastric emptying.
- The mechanism of action of chamomile on the inhibition of PGE2 production is due to the suppression of the COX-2 gene expression and direct inhibition of COX-2 enzyme activity. The chamomile works by a mechanism of action similar to that attributed to non-steroidal anti-inflammatory drugs.

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.sss

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