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Review Paper

A Review on Formulation and Evaluation of Effervescent Tablet

Deshmukh Komal*, Narsale Somanath, Salve Bhumika, Chavan Rutuja

Samarth Institute of Pharmacy, Belhe, Pune 412410, Maharashtra, India

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ABSTRACT

Although there are certain drawbacks to oral dosage forms compared to alternative approaches, such as the possibility of drug absorption, these can be addressed by providing the medicine in a liquid form, potentially enabling the use of lower dosages. Oral dosage forms are the most often used form of medication. However, many medications' volatility in liquid dose form limits their use. Creating effervescent tablets or granules, which are typically employed in quick-release arrangements, is an alternative to creating a dosage form that might hasten the dispersion and degradation of medications. This approach can expedite the benefits of drug overdose and elimination. One example of a product made in this manner is the preparation's instant release. A widely effervescent technique is used to make pills, which are necessary for medication delivery control. Other products of this process include drug delivery systems, continuous maintenance and control arrangements, etc. The new application of the effervescent tablet is reflected in this review.

INTRODUCTION

The exclusion of carbon dioxide gas from a fluid as a result of a chemical reaction is known as effervescence. When the preparation comes into touch with water, which acts as a catalytic agent, this action begins. Before being administered, effervescent tablets must be dissolved in water. By releasing carbon dioxide in water, the tablet breaks down on time. The effervescent reaction produces carbon dioxide, which improves the active substance's penetration into the paracellular route and, as a result, its absorption. Since the effervescent formulation avoids direct contact with the gastrointestinal tract, this type of patient can benefit from such dose forms. Because liquid dose forms absorb formulations more quickly than tablet formulations, they reduce the beginning of effect. [1-2] Because they are convenient to take, effervescent pills are growing in popularity across a range of industries, including pharmaceuticals and supplements. When effervescent tablets come

***Corresponding Author:** Deshmukh Komal
Address: *Samarth Institute of Pharmacy, Belhe, Pune 412410, Maharashtra, India*
Email ✉: Komaldeshmukh3448@gmail.com
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into contact with liquid, such as water or juice, they are made to break, which frequently results in the tablet dissolving into a solution. [3] Effervescence is the release of CO2 gas in response to acids and bicarbonates when H2O is present. Citric, malic, tartaric, adipic, fumaric, and malic acids are also frequently utilized in this reaction. Sodium bicarbonate, potassium bicarbonate, and potassium are the bicarbonates used in the effervescent reaction. The acid-base reaction between citric acid and sodium bicarbonate is the most often used drug reaction in pharmaceuticals. aqueous 3NaHCO3 + H3C6H5O7 = aqueous 3Na3C6H5O7 + 3H2O + 3CO2. Water is present during this reaction, even in trace amounts, which speeds up the reaction by acting as a catalytic agent. Since water catalyzes the process, all goods that are sensitive to moisture or that are effervescent should be kept in an atmosphere free of moisture**.** **[3-4]**

Fig No.1 Effervescent Tablet

Benefits of Effervescent Tablets Over Regular Tablets

Good Taste [4,5]

Effervescent tablets are very popular because they can be dissolved in a liquid such as water or fruit juice, which means they often taste better than regular tablets. In contrast to regular tablets, which dissolve slowly and may result in lower absorption rates, effervescent tablets dissolve quickly, allowing you to benefit fully from the components.

Good Distribution **[5,6]**

Ordinary tablets can occasionally become slightly distributed and dissolve slowly in the stomach if they are imported, which can occasionally cause irritation. An effervescent tablet's benefit is that all of the components dissolve uniformly, preventing substance accumulation. In addition to the greatest taste, this also means fewer chances of irritation and more effective ways to include components.

More Liquid Intake **[7]**

Effervescent pills boost fluid consumption in addition to offering nutritional advantages. If you are sick or dehydrated and not drinking as much fluid, this is helpful. Effervescent pills, whether they are herbal, pharmaceutical, or dietary supplements, may be the greatest approach to both rehydrate and get the benefits of the tablets.

Alternative to Regular **[8]**

They are regarded as a fantastic substitute for people who might have difficulty swallowing because of age or disease. Effervescent tablets can be much easier for elderly persons who occasionally have trouble swallowing but must take medication or vitamins on a regular basis. Furthermore, they are an excellent alternative to conventional tablets for people with sore throats or other medical conditions that make swallowing difficult.

Simple and Easy Measurement [9]

Effervescent tablets dissolve easily into water or a liquid of your choice and are consistent, mixed, and ready to drink. Traditional tablets or powders, however, need to be measured and stirred repeatedly to avoid a lumpy bit. Although arousing and measuring it is common to have an inconsistent drink with bumps and bumps and this is where effervescent pills work. Just install them and dispose of them fully and evenly to ensure you get all the benefits of the tablet, as well as being able to drink it properly.

Fast onset of Action [10]

The primary benefit of effervescent tablets is that the medication is already in solution when they are taken. As a result, absorption occurs earlier and is more thorough than with a regular pill. A quicker beginning of effect results from earlier absorption. The pH of the effervescent medication is just right for absorption when it is delivered to the stomach. Many drugs. It can be absorbed slowly through the stomach or be impeded by food or another medication.

No need to Swallow Tablet [11]

Because they are liquid, effervescent tablets are convenient to take. The number of people who detest ingesting tablets and capsules or who are unable to take them is increasing. One dose can often be transported in just three or four ounces of water using an effervescent dosage form.

More Portability [12]

Since no water is added until the tablet is ready to use, effervescent tablets are easier to administer than liquid medications.

Improved palatability [12]

Drugs conveyed with effervescent base, flavor improved than most liquids, combination and suspensions. By reducing irritating qualities and incorporating flavorful and fragrant compounds, greater taste masking can be achieved.

Good stomach and Intestinal Tolerance [12]

Effervescent tablet liquefies completely in a buffered solution. Reduced localized contact in the upper stomach leads to fewer irritation and greater acceptability. Buffering also prevent intestinal acids from interrelating with drug themselves, which can be a main cause of stomach tolerance.3.

FORMULATION METHODS [13]

Different Methods for formulation of Effervescent Tablet.

Method A

A) Wet Granulation

- Shear granulation
- Fluidized-bed granulation

Method B

B) Dry Granulation

- Sluggers
- Roller compaction

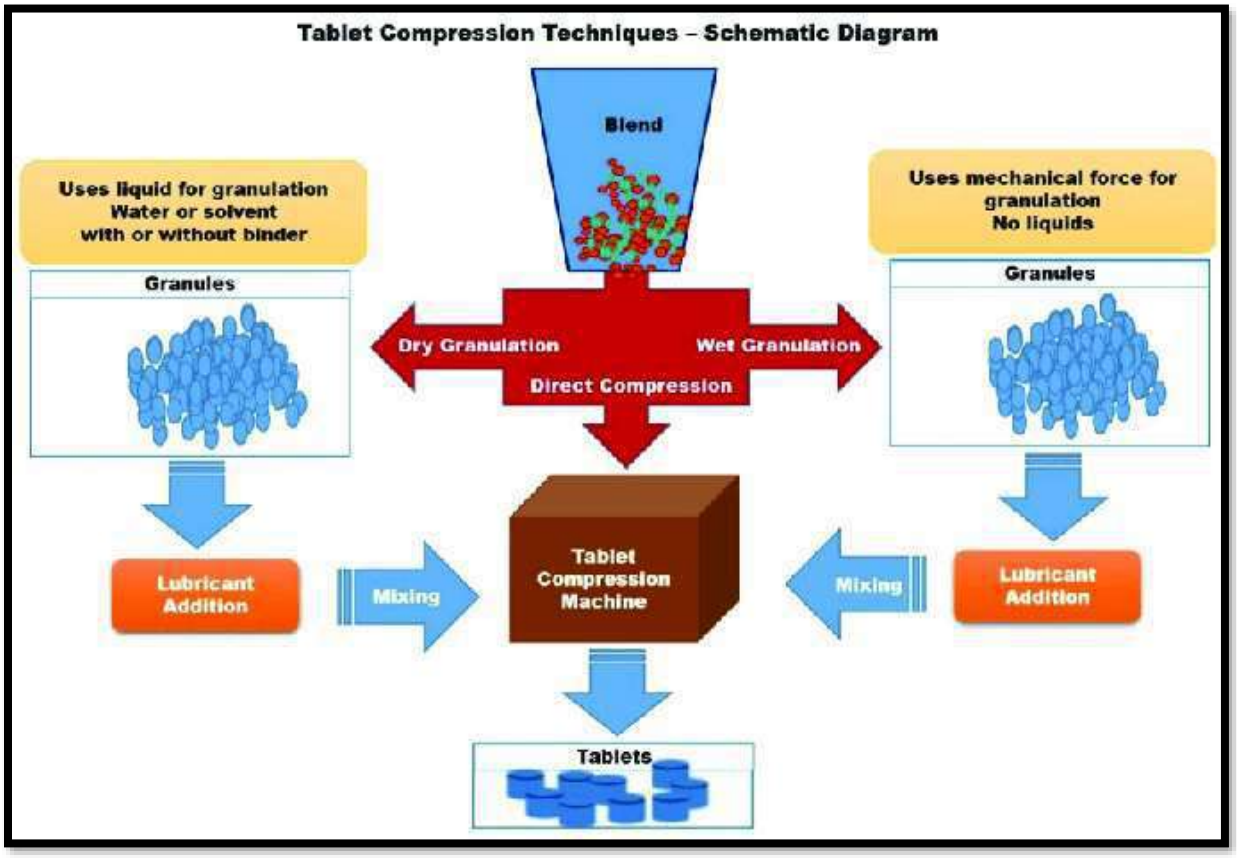

Fig No.2 Tablet Compression Technique

Method A

A) Wet Granulation

The most used technique for effervescent granulation is still wet granulation. This process produces uniform tablets in terms of weight or active component content and provides homogeneous granules for compression. Wet granulation method further may be divided in two types looking on the amount of process steps- Crucial processes in the wet granulation process. drying of grains that are wet. Mixing of binder solution with powder mixture to make wet mass. Preparation of binder solution. Mixing of the drug(s) and excipients Mixing of screened granules with disintegrate, gliding, and lubricant. (14)

• Shear Granulation

Shear granulators have been successfully used by the pharmaceutical industry for decades as a shaping method for granulation. High-shear granulation involves adding a binding fluid to the powdered particles in a closed tank equipped with a chopper and an agitator blade. Effective granulation is ensured by the agitator blade's high shear and compaction. Granules become dense. The chopper disperses the granulation fluid throughout the product and stops excessive granule growth. For example, Hobart, Collette, and Beken. (15,16)

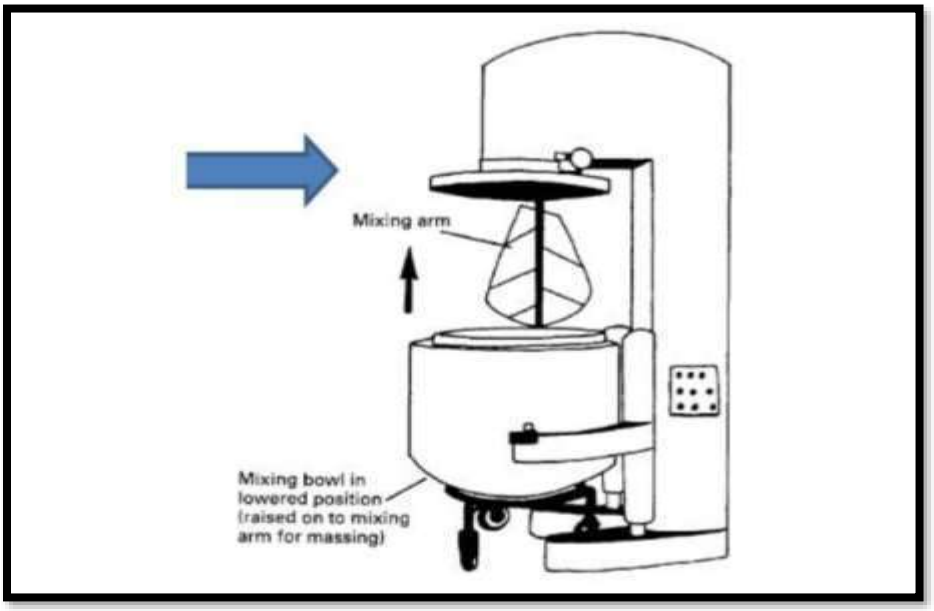

Fig No.3 Shear Granulator

Fluidized-Bed Granulation

A liquid is sprayed from the top of the system down into the fluidized bed (top-down spray) while particles are suspended in an air stream as part of the fluid bed granulation process, sometimes referred to as agglomeration. Particles in the spray's path become slightly moist and sticky. Granules are created when the sticky particles come into contact with and cling to other particles in the material bed. [17,18]

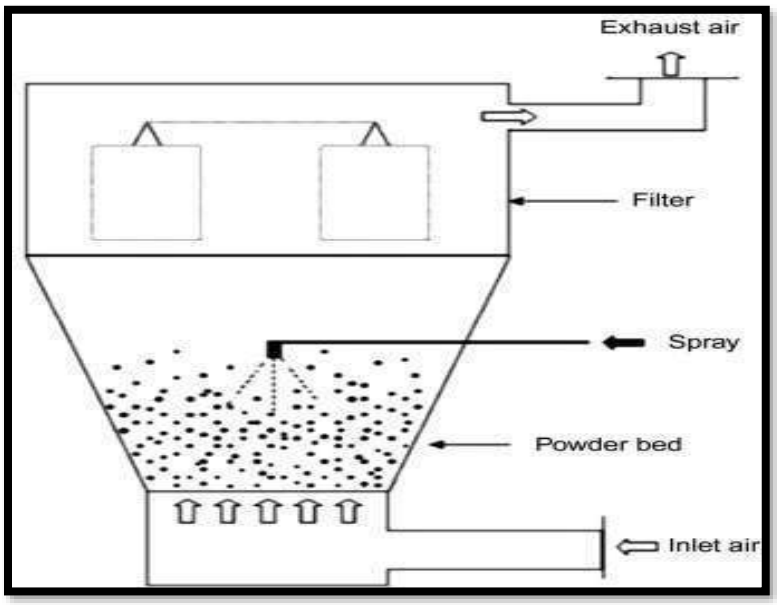

Fig. No.4 Fluidized-Bed Granulator

B) Method B

3.2 Dry Granulation

Because the product to 3be granulated may be sensitive to heat and moisture, the dry granulation technique is used to create granules without the use

of a liquid solution. It is necessary to compact and densify the powders in order to form granules without moisture. Slugging tooling or a roller compactor, often known as a "roller compactor," can be used for dry granulation. When a tablet press is used for dry granulation, the powders may not have enough natural flow to feed the product evenly into the die cavity. Because the product to be granulated may be sensitive to heat and moisture, the dry granulation technique is used to create granules without the use of a liquid solution. It is necessary to compact and densify the powders in order to form granules without moisture. [19,20]

Sluggers

A traditional tablet machine or, more frequently, a huge, heavy-duty rotary press can be employed to compress the dry particles. The clump created by this process, which is usually 25 mm in diameter and 10–15 mm thick, is referred to as a "slug." This procedure is frequently called "slugging." The compacts can be broken with a hammer mill. [19,21]

Fig no 5. Sluggers

• Roller compaction

A softer option is roller compaction, which creates a compressed sheet by squeezing the powder mixture between two rollers. Usually weak and fragile, the sheet breaks into flakes instantly. To break these flakes into granules, a softer approach is required. The appropriate particle size can be achieved by further milling this. A technique for compacting dry powders into a solid mass called a ribbon is called roller compaction. Powder is fed through a series of counter-rotating, directly opposed rollers to accomplish this procedure. High heat and liquids are not used in this technique. A milling system, like an oscillating mill, breaks the ribbon down into granules of a certain size. Dry granulation is used to increase the bulk density of powders and particle size to ensure a better flow of scattered material. Using production machinery, this is an essential stage in the manufacturing of tablets and capsules. [19,20]

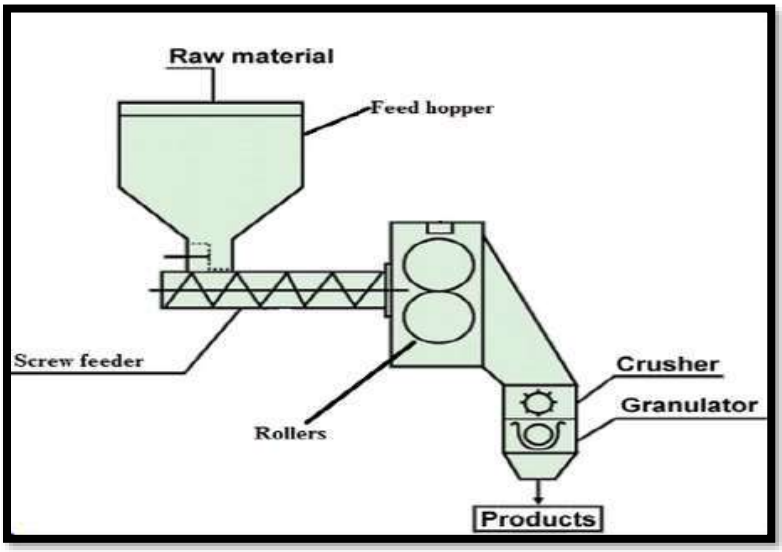

Fig No.6 Roller Compactor

Excipients Used in Effervescent Tablet

Effervescent tablet formulations often include an agent that is capable of releasing CO2 (sodium carbonate and sodium bicarbonate) and an agent that triggers releases of CO2 (adipic acid, malic acid, tartaric acid, ascorbic acid, fumaric acid, maleic acid, succinic acid, or citric acid). A weak organic acid, such as citric or tartaric acid, and a carbonate or bicarbonate salt, such as sodium bicarbonate, react chemically in the presence of water to produce carbon dioxide. [23-24]

Sr no	Excipient	Category
1	Citric acid	Acidifying agent
2	Sodium citrate	Buffering agent
3	Tartaric acid	Acidifying agent
4	Sodium bicarbonate (unhydrous)	Alkalizing agent
5	Sodium carbonate	Alkalizing agent
6	Ascorbic acid	Antioxidant
7	Polyethylene glycol 6000	Binding agent
8	Polyvinaylpyrollidone 30	Binding agent
9	Fumaric acid	Acidulant
10	Sodium benzoate	Lubricant
11	Sodium lauryl sulphate	Lubricant
12	Mannitol	Binding agent
13	Acesulfum potassium	Sweetner

Evaluation of Effervescent Tablets:

1. Weight Variation

A good way to assess the uniformity of drug distribution and drug content would be to use the weight variation test. When a table contains 50 mg or more of a psychoactive substance, the weight variation test is appropriate. At least 50% (by weight) of the dosage form unit is made up of the medication ingredient. Weigh 20 randomly chosen tablets, one at a time. Find the mean weight. (Xl+X2 +X3+... xz)/20 is equal to X. [23-25]

2. Thickness

Twenty effervescent tablets are chosen at random from a holding tray, and the total crown thickness is measured using a sliding caliper scale to determine the thickness of each tablet. [26]

3. Hardness [27]

Another name for the tablet's hardness is its crushing strength. The produced tablet's hardness is assessed using the harness test. This test allows us to measure the force necessary to break the tablet. 5.

Fig No.7 Hardness Tester

4. Friability [28]

The Roche friabilator is filled with twenty effervescent tablets that have been weighed. With each revolution, the Effervescent Tablet is dropped six inches away while it rotates at 25 rpm. After that, the Effervescent Tablets are reweighed and dusted.

Fig No.8 Friabilator

5. Disintegration time [29]

A lot of gas bubbles form when you place an effervescent tablet in a beaker with 200 milliliters of water at 1500 to 2500 degrees Celsius. when there is no longer any particle agglomeration and the gas evolution surrounding the effervescent tablet in the water ends. Five additional effervescent tablets are put through the test again.

6. Solution pH [29]

A digital pH meter is used to measure the pH of a solution in specified water volume and temperature. In a beaker with 200 milliliters of water, place one effervescent tablet between 1500 and 2500 degrees Celsius. Once the effervescent tablet has completely disintegrated, the pH is measured.

7. Drug content [30]

Willpower the Effervescent Tablet is dissolved in 200 milliliters of water to ascertain the drug content. To find out how much medicine is in the tablet, use a UV Spectrophotometer to measure the drug content absorbance of this solution.

8. In-vitro drug release study [31]

A variety of equipment and the proper dissolving liquid were used to conduct in-vitro release investigations. The dissolving medium's temperature was kept at 37 ± 0.5°C. The duration of the release study is 3.30 hours. At a predetermined period, the aliquot of the dissolving medium is taken out and filtered. After that, absorbance is calculated.

9. Measurement of CO2 content [32]

After dissolving one effervescent tablet in 100 milliliters of 1N sulfuric acid solution, weight changes are calculated. The amount of CO2 (mg) in each tablet is indicated by the weight difference that was achieved. The determinations are averaged.

10. Evaluation of the water content [32]

Ten of the formulation's tablets are dried for four hours in a desiccator that contains activated silica gel. A water content of 0.5% or less is considered acceptable.

CONCLUSION:

There are three ways to make effervescent tablets: dry, wet, and compression. The wet approach is the most popular for creating effervescent granules. The hardness, friability, weight fluctuation, and disintegration time of these formulations were assessed. In addition to making administration easier, effervescent tablets also cover up the taste of some components, eliminating the need for flavoring compounds. The use of effervescent pills may lessen issues like gastrointestinal compatibility that arise with ordinary tablets. Because effervescent tablets act quickly, the individual using them will feel better. Carbon tablets, often known as effervescent tablets, are made to dissolve in water and release carbon dioxide. It is made by compressing powdered components into a thick mass and then covering it with a blister pack or a packet of gasoline with a desiccant inside the cap. They are used by combining them with water to create a solution. Additionally, powder materials might be granulated and sold as effervescent granules or packed and marketed as effervescent powders. Before the tablets are manufactured, the powdered materials are frequently first granulated.

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