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A Review on Effervescent Tablet

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Abstract:- The practise of medicine is both a science and an art. It doesn't involve mixing up drugs and bandages; instead, it deals with how life's fundamental processes must be comprehended before they can be guided. Pharmaceutical oral solid dosage forms have been utilised extensively for decades, mostly due to their ease of administration and suitability for systemic drug delivery. The tablet may be produced directly from powder, granule, or pellet form, as well as from numerous units that have been film-coated. Nowadays, tablets are the most widely used dosage form, making up roughly 70% of all ethically made pharmaceutical preparations. A tablet is a solid pharmaceutical dose form that contains appropriate diluents and is prepared either by compression or modelling. The most common dose types are those taken orally.

***Keywords*:-** *Sustained Release, Floating Delivery System, Effervescent Tablet.*

I. INTRODUCTION

Solid medications can be taken orally in the form of powders, pills, capsules, or tablets. Even in the case of sustained action preparation, which technically contains the equivalent of numerous standard doses of medication, these dosage forms are referred collectively as solid unit dosage forms because they include an amount of medication that is administered as a single unit. The prescribing of powder and pills has steadily decreased due to the strict formulation requirements of current medications, the numerous benefits of tablet and capsule medication, the expansion of health services, and the commitment required for large-scale economic manufacture. (1) Granules are a special kind of dosage form made up of aggregates of powdered, dried solid particles that contain one or more active pharmaceutical drugs, together with or without additional components.

Treatments for the following conditions may benefit greatly from effervescent delivery: Arthritis, inflammation, and pain management Ulcers and gastrointestinal disorders

- Allergies
- Osteoporosis
- Medications and medication mixtures used to create effervescent products:-
- Aspirin (acetyl salicylic acid)
- Acetaminophen (Paracetamol)
- Ibuprofen
- An antacid remedy

Additional vitamins and ascorbic acid an antidote for Paracetamol overdose is acetyl cysteine, an amicolytic drug. A treatment containing activated charcoal is used to treat theophylline toxicity. (4)

II. EFFERVESCENT TABLETS HAVE A FEW ADVANTAGES OVER REGULAR TABLETS

➢ *Good Flavour*

Due to its ability to dissolve in a liquid, such as water or fruit juice, effervescent pills are particularly well-liked since they frequently taste better than ordinary tablets. Effervescent pills dissolve quickly, but regular tablets dissolve slowly, which can lead to reduce absorption rates. This means you get the maximum benefit of the contents.

➢ *Effective Dispersion*

Imported regular tablets can occasionally be slightly distributed and dissolve slowly in the stomach, which can occasionally cause irritation. The benefit of an effervescent pill is that all of the contents totally dissolve equally, preventing ingredient build-up. This indicates not just the best flavour but also a lower risk of irritability and more effective ways to incorporate components.

➢ *Added Fluid Intake*

Absorbent tablets

➢ *An Alternative to Custom*

They are regarded as a terrific alternative for people who might have difficulty swallowing as a result of illness or advancing age. Effervescent pills can make it much easier for older adults who occasionally have trouble swallowing but still need to take their medications or supplements on a regular basis. In addition to this, they are an excellent alternative to normal tablets for people who have sore throats or medical conditions that make swallowing difficult.

➢ *Efficient and Simple Measuring*

Effervescent pills are uniform, blended, and ready to drink. They dissolve quickly into water or a liquid of your choosing. To prevent a lumpy bit, traditional tablets or powders must, however, be measured and repeatedly stirred. Although it is common, arousing, and measuring

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III. CONCEPT OF TABLET

Pharmaceutical tablets are solid, flat or biconvex dishes that are prepared by compressing a medicine or a drug combination, with or without diluents, according to the Indian Pharmacopoeia. A compacted solid dosage form called a tablet can contain excipients or not. Depending on the amount of therapeutic chemicals and the intended manner of administration, they vary widely in size, weight, and shape.

➢ *Advantages-*

- Tablets are a unit dosage form with the most capabilities of any oral dosage form for the most precise dosing and the least amount of content variability. They are simple and affordable to pack and ship.
- Simple to handle.
- Appropriate for mass production.
- Being the most bacterial and chemically stable of all oral dosage forms.

➢ *Disadvantages***:**

- Problem with compression to crystalline drug.
- Hygroscopic drugs are not suitable for compressed tablet.
- Swallowing is difficult especially for children and ill patient.
- Cost of production may be increase because of coating and encapsulation to remove bitter and unpleasant taste.

➢ *Tablet Types and Classes*

Tablets are divided into different categories based on their function or administration route, the sort of drug delivery system they represent along that route, as well as their form and manufacturing process. The following are the many tablet classifications:

- *Tablets to be Taken Orally:*

✓ Standard compressed tablet (CT) or compressed tablet
✓ MCT, or multiple compressed tablets

- Tablets with layers
- Tablet with a compressed coating Chewable pills Tablets with chocolate and sugar coating Tablets covered in film Repeat-action medications Enteric-coated and delayed-action tablet. Tablets with a controlled release

- *Using Tablets in the Mouth:*

✓ Sublingual and buccal tablets
✓ Lozenges and troches
✓ Dentist cones

- *Tablets Taken by a Different Route:*

✓ Implantable Pills
✓ Vaginal Pills

- *Solution-Preparation Tablets:*

✓ Floating tablets
✓ Doling out tablets (DT)
✓ HT Hypodermic Tablets
✓ Triturates for tablets (TT)

IV. EFFERVESCENT TABLETS

Effervescent tablets are becoming increasingly popular in a variety of sectors including supplements and pharmaceutical use due to the ease in which they can be consumed. Effervescent tablet are used to break in contact with liquid such as water or juice, often causing the tablet to dissolve into a solution. The buoyant delivery system utilize matrices prepared with swellable polymers such as mythical or poly saccharides , e.g., chitosan , and effervescent components , e.g., sodium bicarbonate and citric or tartaric acid or matrices containing chambers of liquid that gamify at body temperature.

Flotation of a drug delivery system in the stomach can be achieved by in corpora ting a floating chamber filled with vacuum, air or an inert gas. Gas can be introduced into the floating chamber by vitalization of an organic solvent (e.g. Ether or cyclopentane) or by the CO2 produced as a result of an effervescent reaction between organic acids and carbonate – Bicarbonate salts. The matrices are fabricated so that upon arrival in the stomach, carbon dioxide is liberated by the acidity of the gastric contents and is entrapped in the jellified hydrocolloid.

Fig 1 Effervescent Tablets

Tablets that dissolve in water and release carbon dioxide are known as effervescent or carbon tablets. They are the results of compacting the component ingredients, which were originally in the form of powders, into a dense mass and packaging them in blister packs or hermetically sealed packages with desiccants built into the caps.

➢ *How Effervescence Works*

According to the updated definition submitted to the US FDA, an effervescent tablet is one that is designed to dissolve or scatter in water prior to administration. It often includes a combination of acids, acid salts, carbonate, and hydrogen carbonates, which, when combined with water, release carbon dioxide. Effervescence is the process through which liquid evolves into gas bubbles as a result of a chemical reaction.

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$$Na3C6H5O7\ (aq) + 4H2O + 3CO2\ (g) = C6H8O7\ (aq) + 3NaHCO3\ (aq) \uparrow$$

Water + Carbon dioxide + Sodium citrate + Citric acid = Sodium bicarbonate + Sodium citrate 3(8)

Even a small amount of water can catalyse this reaction, and because water is one of the reaction products, the presence of water enhances the rate of the process, making it difficult to stop. Due to this, minimal water interaction is incorporated into the entire manufacture and storage of effervescent items.

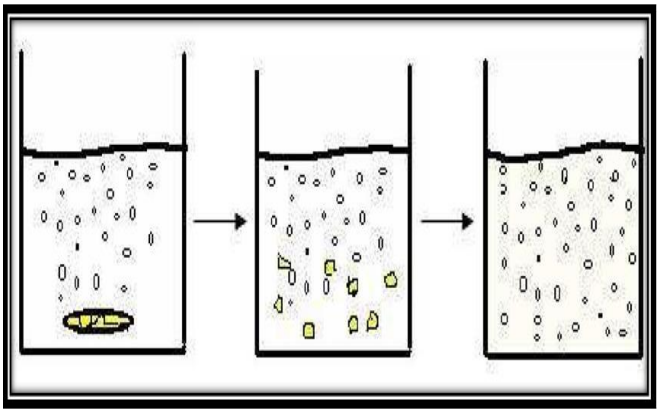

Fig 2 Mechanism of Effervescence

➢ *Principles of Effervescent*

The selection of ingredients for effervescent granules is primarily influenced by two factors: the production process requirements and the need to create a preparation that dissolves in water.

Acid and base are necessary ingredients, as well as a sweetener and a binding agent.

- *Acids*: Citric acid, tartaric acid, malic acid, adipic acid, and fumaric acid are examples of these acids.
- *Bases*: Sodium carbonate, sodium hydrogen carbonate, potassium bicarbonate, and sodium sesquicarbonate are a few examples of bases.
- *Sweeteners*: Sucrose and mannitol are sweeteners.
- *Binding Agent*: paste of starch Vehicle: Non-aqueous method ethanol

Active pharmaceutical ingredients (APIs), combinations of acids/acid salts (citric, tartaric, and malic acids), hydrogen carbonate, or carbonate salts (sodium, potassium, or hydrogen carbonate), and APIs are all ingredients in effervescent tablets that release carbon dioxide when taken.

- *Wet Granulation has the following benefits:*

✓ It allows mechanical handling of powders without compromising mix quality;
✓ It improves powder flow by increasing particle size and sphericity.
✓ Increase and enhance powder density homogeneity.

➢ *Effervescent Limitations of Wet Granulation*

- *Two Step Granulation Method*

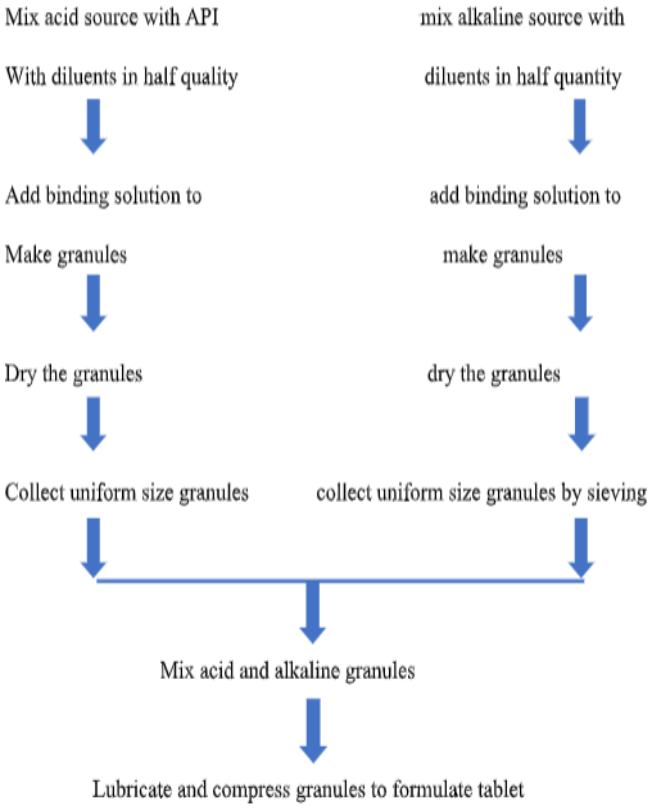

Chart 1 Method of Preparation of Granules (Two Step Process)

- *One Step Granulation Process*

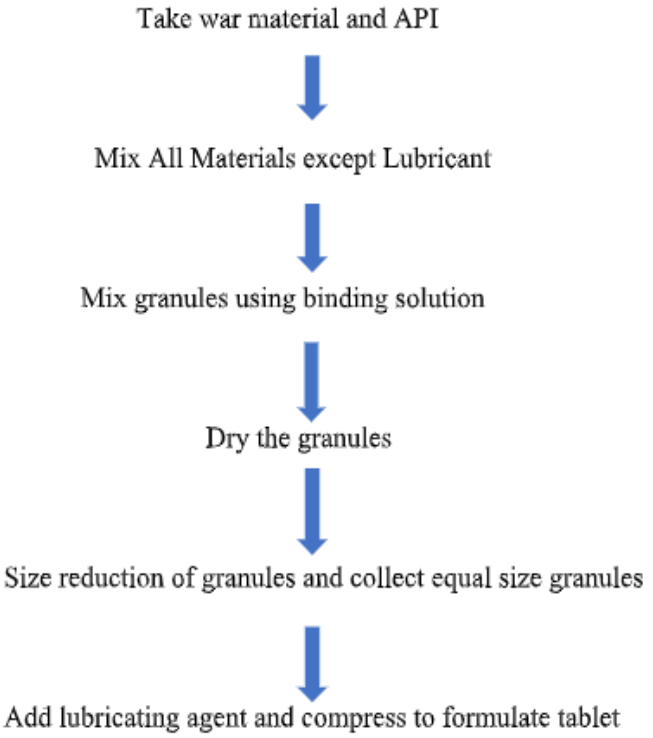

Chart 2-Method of Preparation of Granules (One Step Process)

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- *Granulation that is Done in the Dry:*

Dry granulation doesn't require the use of a heat source or a solvent. This method of granulation is the least popular of the others. The two essential steps are first compressing fibrous material into a compact, and secondly milling the compact to produce granules. There are two techniques for dry granulation. The most popular technique is called slugging, in which the powder is squeezed again and the resulting tablets or slug are ground to produce granules. Recompressing the powder with pressure rolls, or using a device resembling a Chilodontid, is an alternative option. (14)

For materials that cannot be wet graded, direct granulation by slugging or roller compaction is appropriate. Slugs are reduced to the appropriate size, together with the material coming from the roller compactor. During slugging, lubrication is typically required but not always.

- *CO2 Levels*

In three separate beakers, 100 ml of oil of vitriol solution 1N was added to three tablets. The difference between the weight of the tablets before and after being dissolved was computed to determine the amount of emitted CO2 (mg).

✓ *Measuring the pH of the Solution*

By dissolving 3 pills in 3 beakers of 200 ml water, the pH of the solution was determined using a pH metre.

✓ *Time For Effervescence*

A stopwatch was used to time how long the effervescence lasted after three pills were dissolved in three beakers of water. Since a transparent solution was obtained at that precise instant, effervescence time was specified.

✓ *Assay*

Weighed and crushed into a fine powder, twenty tablets. Weighed was a quantity of powder equivalent to 200 mg of ranitidine Hcl.

➢ *Uses for Effervescent Tablets*

- An alternative to parenteral forms, if administration by the parenteral route is challenging, with better stability and ease of transfer.
- Low levels of effervescent mixes are incorporated into the tablet matrix to achieve
- Zero order release.
- A fast-releasing core was developed in order to obtain quick drug release following the rupture of the polymer coating, which is beneficial in pulsatile systems.
- In floating medication delivery systems, the concentration of effervescent agents has a major impact on the floating time.
- The achievement of programmed medication delivery.
- For regulated release, effervescent osmotic pump tablets were utilised.
- Additionally offered were effervescent cosmetic tablets.
- Tight junctions open and other effervescence-induced enhancements can be observed, including
- Make the intestinal membranes of rats and rabbits more hydrophobic.(16)

V. EFFERVESCENT PARACETAMOL TABLET

➢ *The development and chemical and physical evaluation of the effervescent paracetamol tablets was the goal of this investigation. To make paracetamol more soluble and to speed up the drug's onset of action.*

- To produce a quicker start to action
- In order to improve patient compliance.
- In order to prevent the First Pass Effect.
- The effervescent tablets ought to have acceptable qualities.
- The bioavailability of tablets is higher than that of other dosage forms.
- Effervescent tablets' stability can be improved.
- Strictly controlled humidity is needed for the effervescent tablets. The Flourishing
- Tablets can be produced in a typical environment with unmaintained humidity and temperature levels.
- The tablet had faster action onset and better patient compliance. (17)

➢ *Reason for Choosing Effervescent Paracetamol Tablets:*

- *Fast Onset of Action:*

A significant benefit of effervescent tablets is that the medication is already in solution when they are taken. This means that compared to traditional tablets, the absorption is quicker and more thorough. Faster absorption results in a quicker start to the action. Effervescent medications are given to the stomach at a pH that is ideal for absorption. Effervescent drugs are supplied in liquid form, making them easier to take than pills or capsules because there is no need to swallow a tablet. There are an increasing number of people who either find it difficult or unpleasant to take tablets and capsules. One dose can often be administered using an effervescent dosage form in just 3 or 4 ounces of water.

- *Good Intestinal and Stomach Tolerance*

Tablets that are effervescent dissolve easily in a buffered.

➢ *Methods and material*

Shri Krishna Pharmaceuticals (Mumbai, India) purchased paracetamol along with citric acid, sodium citrate (anhydrous), fumaric acid, and Thomas Baker of Mumbai, India donated sodium benzoate, tartaric acid, sodium bicarbonate (anhydrous), sodium citrate, ascorbic acid, and sodium bicarbonate (anhydrous). Simethicone was given as a gift by Nouvveaw Exports Pvt.Ltd. (Mumbai, India), Mannitol was given by Bajaj Health Care Ltd. (Mumbai, India), Polyethylene Glycol-6000, Polyvinylpyrolidone-K-30 was given as a gift by Nan Hang Industrial Co.Ltd., and

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Acesulfame Potassium was given as a gift by Shanghai Fortune was Co. [22]

VI. PREFORMULATION

A branch of pharmaceutical sciences known as pre-formulation uses biopharmaceutical concepts to ascertain a medicinal substance's physicochemical qualities. Pre-formulation studies aim to determine the best medication delivery system by selecting the best form of the substance, assessing its physical properties, and producing a thorough understanding of the material's stability under diverse conditions. The preformulation study is concerned with the physiochemical factors that might influence the creation of an effective dosage form. These characteristics might eventually offer a justification for formulation design. Additionally, it will aid in minimising issues during later phases of drug development, cutting expenses associated with drug development, and speeding up the time it takes to bring a product to market. It provides the details required to describe the characteristics of the drug substance and establish a framework for preformulation testing's main goal is to produce data that will help the formulation process produce the intended, stable, and bioavailable dosage forms.

➢ *Scope:*

Utilising preformulation factors increases the likelihood of creating a product that is acceptable, safe, effective, and stable. At a minimum, preformulation includes the following tests: -

- *Characterization in Bulk*

Properties of the powder include flow, compaction, density, particle size, surface area, and crystallinity, polymorphism, and hygroscopicity. (Morphology, Particle Characteristics) Microscopy-IR molecular spectroscopy

- *PH Solubility Profile, Solubility, and Solubility Analysis*

✓ The common-ion impact
✓ The effect of heat on solubility
✓ Solubilisation
✓ Dissolution

- *Analysis of Stability*

Compatibility with excipients, stability (heat, light, acid, base, oxidised solid-state stability) Consideration for the formulation of effervescent tablets: A number of variables affect the drug release from effervescent tablets.

✓ Size of particles
✓ Dose
✓ Solubility [24]

Table 1 Drug-excipient compatibility study: The following excipients, which are employed in the tests, were examined for this study

Sr. no.	Excipients	Category
1	Citric acid acidifying agent	Acidifying agent
2	Tartaric acid	Acidifying agent
3	Fumaric acid	Acidulant
4	Ascorbic acid	Antioxidant
5	Sodium bicarbonate	Alkalizing agent
6	Sodium carbonate	Alkalizing agent
7	Polyvinylpyrollidone-30	Binding agent
8	Polyethylene glycol-6000	Binding agent
9	Mannitol	Binding agent
10	Sodium citrate	Buffering agent
11	Sodium lauryl sulphate	Lubricant
12	Sodium Benzoate	Lubricant
13	Acesulfum potassium	Sweetener

VII. CONCLUSION

Effervescent formulation results in a speedier action. There are three ways to make effervescent tablets: dry method, wet method, and compression. The wet method is the one that is most frequently used to make effervescent granules. Effervescent granules can be made using a wet method, fusion method, dry method, or hot melt method, with the fusion method being the most crucial step in the process. Regular tablets might be difficult to administer, therefore effervescent tablets are an excellent option. Effervescent tablets don't need to be swallowed and can be taken easily by elderly persons or those who have difficulty swallowing them. Due to their high absorption, effervescent pills have a positive therapeutic effect. More vitamins are produced in effervescent form today than ever before.

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