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A Review on Effervescent Tablet

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ABSTRACT: One of the most popular ways of administering a medicament is by converting it to its oral dosage form although it hasseveral advantages over the other methods of administration which includes lesser extent of absorption of medicament but thesedisadvantages can be easily masked by manufacturing medicament in its liquid dosage form. The possible benefit of doing so isreduction in dosage used. The problem which causes the limited use of liquid dosage form is that there are certain drugs which arenot stable in its liquid dosage form. There is an alternative method available which use effervescent technique to develop dosageforms. The advantage of using this method is drug disintegration and dissolution can be accelerated by it. Thequick releasepreparations are the example of product produced by this method. The tablets produced by effervescent technique are broadlysignificant in controlling the behavior of drug release, sustained and controlled release preparations, pulsate drugdelivery systemetcarethefew productsofthistechnique.Thisreview illustrated thefresh application ofeffervescenttablet.

Keywords: Effervescent Tablet, Sustainedrelease, Floating Delivery System.

I. INTRODUCTION

The definition of effervescent includes liberation of dissolved as from solution containing water or from an aqueous solution and this process is complemented with bubbling, foaming and fizzing. Gases can be inducted to liquid media with the help of pressurization or in situ by chemical under change.

For example metal carbonates react with acids to produce co_2 gas. In recent past effervescent technique has developed greater significance accompanied with its use with existing extraction. The advantage of effervescent has been taken by some of the studies to increase the dispersion (surface contact) and to obtain homogenous distribution of the interaction through the process of analysis extraction from liquid matrices. For example interferences drawn from the work of lacerate argons. The dispersion and aggregation of sorbent (extracting) in micro solid phase extraction was prevented by the use of effervescence technique. Ultimately making extraction efficient and reliable. The homogenous distribution of an organic solvent in liquid-liquid micro extraction of matrices like juice, urine, saliva was also achieved by effervescence technique. In the prescribed analytical methods, the co_2 gas was generated in situ during the course of a neutralization reaction of suitable precursors (a carbonate salt and a proton donor) In the presence of sample matrix containing water by involving effervescence phenomenon. Most of the precursors utilized are present in tablet form in extraction process eliminated by effervescence this result in simplification of extraction procedure consequence of which need of other equipments like mixtures can be eliminated.

During a closed system effervescence can be easily observed by bubble formation and liberation after a sudden pressure drop. This bursting of bubbles at the meniscus of carbonated drinks pressure aroma release thus affecting the composition of wine glass headeqace. Some VOCS were found of champagne wine glasses were found to be more concentrated than in the liquid bulk. Which is the influenced caused by ascending and bubble bursting liberated upon pouring the urine. The advantage taken by fizzy infraction on analytical technique is carbonation to liberate the voluble solute from liquid matrices. Due to the sudden drop of preserve inside sample chamber results in production of micro bubbles. Which are used to extract volatile solutes from liquid On the basis of its therefore said that release of volatile solute from liquid matrix into the gas phase can be

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assessed by effervescence. We concluded that upon insertion of an effervescence tablet into aqueous sample the extraction process of VOCS dissolved in liquid matrix can be facilitated by bubble formation.

Here we look at 5 benefits of effervescent tablets over regular tablets.

Pleasant Taste Compared to Regular Tablets

Effervescent tablet can be dissolved in a liquid such as fruit juice or water, which is the main cause of their popularity. Due to which there taste gets way better than regular tablet. The dissolution rate and extent of conventional tablet is slower and lesser than effervescent tablet which result in maximum absorption rate and full benefit from the ingredient of effervescent tablet.

Distributed More Evenly

The dissolution of conventional tablet is gradually in sometime and can sometime be portal causing there to the reason of irritation in some cases, in contrast the dissolution of effervescent tablet is complete and even throughout the stomach which prevents the accumulation of ingredient in local area. This makes effervescent tablet taste better and less irrigative and on effervescent way of ingestion of ingredient. Apart from providing nutritional benefit intended effervescent tablet also increase liquid intake.

Increased Liquid Intake

Increased Liquid Intake is more beneficial during period of dehydration ill time and in less liquid ingestion. The fantastic way of rehydration as well as reaping the benefit that you are taking from dietary supplements, verbally or medicinally is effervescent tablet.

Easy Alternative to Regular Tablets

Effervescent tablet can use in place of regular tablet. Which cause difficulty in swallowing either due to illness or age, old age people who administer medication or supplement on daily basis reports problem related to swallowing of tablet to overcome these problems effervescent tablets are of great significance and can be on easier way to swallow a tablet. Individuals with sore throats or medical issue having swallowing. Can use effervescent tablet to remove swallowing difficulty, so these are beneficial alternative to regular tablet.

Easy Alternative to Regular Tablets

Effervescent tablet can be easily make consistence well mixed and ready to drink with few minutes in after dissolving in aqueous solvent and other liquid. On the other hand, the process making drink of traditional tablet or powder it is stirred repeatedly. The drink obtained after stirring and measuring is in consist and bit of lumpy, having an odd taste this shows the efficiency of effervescent tablet. The drink from effervescent tablet can be easily prepared by simply dropping them in water or any other liquid. It makes drink comfortable and beneficial to complete dissolution.

To SumUp

Effervescent tablets are getting increasingly popular and it's easy to work out why. They supply a way more efficient way of taking supplements or medication because of being distributed evenly and far more quickly than regular tablets. Additionally to the present, they taste better as are often added to water or a liquid drink of your choice additionally as being easier to require for those that may find it difficult to swallow of these factors combine to create effervescent tablets a really popular choice for those taking tablets for either dietary supplementation or medicinal reasons. As per revised definition proposed to US FDA, Effervescent tablet may be a tablet intended to be dissolved or dispersed in water before administration. Effervescent tablets are uncoated tablets that generally contain acid or acid salts (Citric, tartaric, Malic acid or the opposite suitable acid or acid anhydride) and carbonates or bicarbonates.

(Sodium, potassium or the other suitable metal carbonate or hydrogen carbonate), which react rapidly within the presence of water by releasing greenhouse emission. Because of liberation in CO2 gas, the dissolution of API in water additionally as taste masking effect is enhanced. The reaction between acid and saleratus & hydroxy acid and saleratus, which ends up in liberation of greenhouse emission shown as follows:

$C_6H_8O_7.H_2O + 3NaHCO_3$ (aq) → $Na_3C_6H_5O_7 + 4H_2O + 3CO_2$ (g) ↑ acid + saleratus → Sodium citrate + Water + greenhouse emission

$C_4H_6O_6 + 2\ NaHCO_3$ → $Na_2C_4H_4O_6 + 2H_2O + 2CO_2$ (g) ↑ hydroxy acid + saleratus → Sodium tartrate + Water + greenhouse emission.

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FUNDAMENTALS OF EFFERVESCENTS

Effervescence consists of a soluble organic acid and an alkaline metal carbonate salt, one in all which is usually the API. Carbonate hydrogen carbonate Sodium carbonate bicarbonate of soda carboxylic acid acid Malic acid hydroxy acid acid greenhouse emission is created if this mixture comes into contact with water. Typical samples of the acids and alkalis used include:

Advantages of Effervescent Tablets

Less irritation and greater tolerability. Effervescent drugs are delivered to the stomach at a pH that's excellent for absorption. Swallowing is prevented. More stability is achieved. Improved therapeutic effect. Faster onset of action. No must swallow tablets. Good stomach and intestinal tolerance. Superior stability. More consistent response. Incorporation of enormous amounts of active ingredients. Accurate dosing. Improved therapeutic effects. High patient compliance Reactions due to moisture. Require special packaging. Maintenance of specified humidity and temperature is difficult. Disintegration time in an exceedingly tablet form depends mainly on the temperature of the water and the type of API. Relatively expensive to provide thanks to the massive amount of more or more cost effective and hygroscopic excipients and stringent requirement of producing, packaging and storage. Due to high amount of excipients, tablets are larger so requires specialized packaging materials. Clear solution is preferred for administration , although a fine dispersion is now universally acceptable. No portability and pleasant of mouth feeling as compared to mouth dissolving tablets.

FORMULATION

It generally contains additionally to active ingredients, mixture of acids/acid salts and carbonate and hydrogen carbonates which release carbonic acid gas when mixed with water.

DRUGS THAT ARE FORMULATED AS EFFERVESCENT TABLETS

1. Drugs difficult to digest or disruptive to the stomach: If the carbonate is taken in an effervescent formulation, the calcium dissolves in water, is instantly available for the body to soak up, and there's no risk of excessive gas within the stomach and there's no constipation caused due to less amount of acid within the stomach.

2. pH-sensitive drugs like amino acids and antibiotics: Effervescent formulation can buffer the water-active solution so the stomach pH increases (becomes less acidic) and thus prevent the degradation or inactivation of the active ingredient that's caused because of low PH within the stomach.

3. Drugs requiring an oversized dose: A typical effervescent tablet (1 inch in diameter weighing 5 g in total weight) can include quite 2 g of water soluble active ingredients in a very single dose. If the specified dose is larger than that, the sachet (powder form) is that the common means of delivery.

EXCIPIENTS

The excipients used in the effervescent formulations are

Lubricant

An ideal lubricant (or auxiliary agent, in general) for effervescent products must be non-toxic, tasteless, and water-soluble a mix of 4% polyethylene glycol (PEG) 6000 and 0.1% sodium stearyl fumarate proved to be a decent lubricant for vitamin C tablets made by direct compression on a little scale. Common salt, sodium acetate, and D, L-leucine (water soluble lubricants) even have been suggested for effervescent tablets. Very low concentrations of metal states. Surfactants like sodium lauryl sulfate and magnesium lauryl sulfate also act as lubricants.

Ant adherents

By using discs, like poly tetra fluorethylene or polyurethane, the adherence of the granules is prevented.

Binders

As binders prevent a rapid dissolution of the bubbling tablet usually not used. But effervescent granules is also formulated with binders. An effervescent granulation composed of anhydrous acid and NaHCO3 was made with dehydrated alcohol because the granulating liquid. A little of the acid dissolved during the massing and functioned as a binder 4.Maltitol was an acceptable binder for vitamin C effervescent tablets. Formation of crystal bridges of maltitol was the assumed binding mechanism.

Disintegrates or dissolution aids

Disintegrates are selected specified a transparent solution should be obtained within

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some minutes after adding the tablet to a glass of cold water.

Surfactants
Want to increase the wetting and dissolution rates of medicine.

Antifoaming agents
To reduce the formation of froth, and consequently the tendency of medicine to stay to the wall of the glass above the water level.
Polydimethylsiloxane is employed as antifoaming agent

Sweeteners
Sweeteners like sucrose, saccharin and other natural sweeteners were used.

Flavors
Flavors are used for giving the additive effect for sweeteners to mask the unpleasant taste.

Colors
A water-soluble color is also added to induce the pleasant appearance.
General Manufacturing Process for Effervescent Products Raw Materials
The effervescent formulation mainly consists of three components-
• Active ingredient
• Acid source
• Alkaline compound, constituted by a carbonate or bicarbonate

Table:1.ComponentsofEffervescentFormulation

AcidSources	**AlkaliSources**
CitricAcid,Tartaric Acid,FumaricAcid, AdipicAcid,Malic Acid,AscorbicAcid, AcidCitrateSalts	SodiumBicarbonate, PotassiumCarbonate, CalciumCarbonate, SodiumCarbonate, SodiumGlycineCarbonate
Lubricant	**OtherAgents**
SodiumBenzoate, SodiumAcetate, FumaricAcid, PolyethyleneGlycols (PEG)HigherThan 4000,Alanine And Glycine	Binders,Glidants, Disintegrates,Anti-adherents, Sweeteners,Flavors,Colors, Surfactants

Granulation Process
Methods which can be used for preparation of effervescent granules are as follows-
a) Wet granulation

Wet granulation despite some disadvantages, wet granulation remains the foremost preferred method for effervescent granulation. This method gives homogeneous granules for compression, and is in a position to produce uniform tablets either in terms of weight or active ingredient content. Wet granulation method further may be divided in two types looking on the amount of process steps- Important steps involved within the wet granulation.

Drying of moist granules. 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.

Advantages of wet granulation

Permits mechanical handling of powders without loss of mix quality.□ Improves the flow of powders by increasing particle size and sphericity.□ Increases and improves the uniformity of powder density.

Limitation of wet granulation

Loss of fabric during various stages of processing. Two-step granulation method the best disadvantage of wet granulation is its cost. It's a fashionable process due to labor, time, equipment, and energy and space requirements.

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1. Two step granulation method

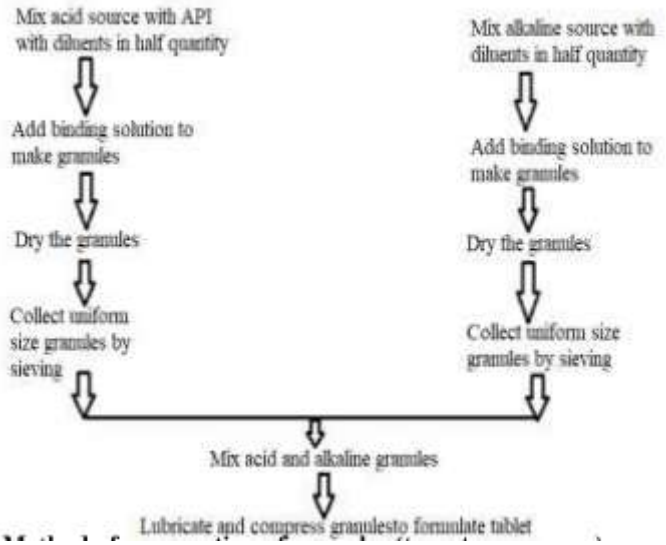

Fig: 1. Method of preparation of granules (two steps process)

2. One step granulation method

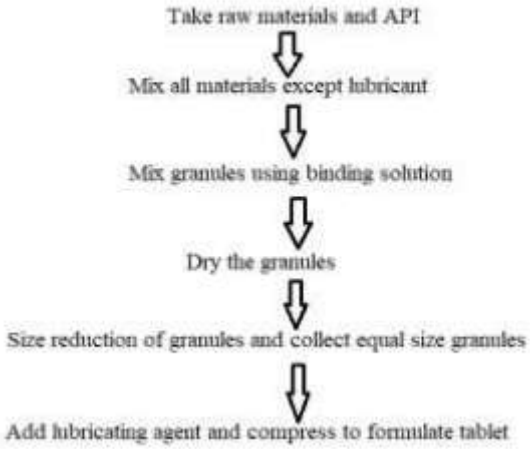

Fig: 2. Method of preparation of granules (one step process)Direct compression

Direct compression

Another alternative process for dry granulation is direct compression. This was successfully used for preparing effervescent tablets of acetyl hydroxy acid. This helps in overcoming operational and stability problems during the method. This can be a perfect process of producing, but its use is restricted because of the need of requirements of sophisticated material mixture (Compressible, free flowing and non-segregating).

Dry granulation

Granulation by slugging (slugs or large tablets that are compressed using heavy-duty tableting equipment) or roller compaction is suitable for materials that can't be wet granulated. Slugs and therefore the material from the roller compactor are reduced to the right size. Lubrication is usually necessary during slugging but not always with roller compaction. The acidic and basic components could also be dry granulated separately or together.

High shear granulator

This is the foremost common configuration used on an industrial scale for the assembly of pharmaceutical granules. Again, this technique allows full integration with upstream and

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downstream equipments, and even includes a wet mill between the granulator and dryer. With modern control systems, it's easy to load, mix and granulate a second batch within the high shear granulator whilst drying the previous batch within the fluid bed before discharge. All equipment may be cleaned in situ in a very single automatic process.

Fluid bed granulation

The production of effervescent granules which will be accustomed prepare effervescent tablets was accomplished using fluidized bed granulation. A dry mixture of the powdered sort of an acid and carbonate source is suspended in a very stream of hot air, forming a constantly agitated, fluidized bed. An amount of granulating fluid, usually water, is introduced in a very finely dispersed form causing momentary reaction before its vaporized. This causes the ingredients to react to a limited extent forming single granules of the 2 reactive components. The granules are larger than the powder particles of the starting materials and suitable for compression into tablets after drying has been completed within the fluidize bed apparatus. This procedure has the advantage of ingredient mixing, granulating, and drying dead one piece of kit with minimal loss of carbonic acid gas.

Hot melt granulation

In a melt granulation process, the binder solution of a regular wet granulation process is replaced with a melt able under. This binder may be added in molten form, but the high shear process offers the advantage of allowing the binder to be added in its solid state. Melting is achieved by the energy added through the mixer friction and therefore the heated jacket of the bowl.

Market Products

Table: 2. Effervescent products available in market (Desai)

Nameofproduct	**ActiveIngredientRanitidine**	**Manufacturer**
HISTAC	RanitidineHCl	Ranbaxy,India
NEXX-DT	Loratidine	Anthiea,India
LORID	Loratidine	Finecure,India
CUCET-DT	Cetrizine	Cubit,India
EZE-DT	Cetrizine	Saga Lab,India
EKON-DT	Cetrizine	BlueCross,India
INCEZ	Cetrizine	Intralab,India

Environmental Conditions

Manufacturing of effervescent formulation requires careful control of environmental factors. The raw materials used for preparation of effervescent formulation are hygroscopic in nature. It should result in do effervescent reaction during the method by absorbing moisture from the atmosphere. To stop these problems like effervescent reaction and sticking of granules/ powder with machinery, low humidity and coldness during processing are essential to maintain. In accordance with this example, the method of producing is completed under close and well equipped processing system. After the completion of the method, all equipment should be clean and air dry with low moisture air to get rid of moisture and any materials from it, otherwise hygroscopic materials may make ruff surface of machines and processing problems during next batch manufacturing. The choice is that the open handling of the merchandise, which allows the utilization of much simpler kinds of equipment, but manufacturing area must have maximum tolerable moisture levels. It's clear that it's essential to keep up ratio throughout the plant no more than 20%. Additionally, a consistent temperature of 21oC is also desirable. A maximum of 25% RH at a controlled temperature of 25oC or less is

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sometimes sufficient to avoid problems caused by atmospheric moisture.

Physicochemical Evaluation of the Effervescent Tablets

The following physicochemical tests were conducted to evaluate the tablets.

Weight Variation

Weight Variation Twenty tablets were randomly selected and weighed individually and so the weights of tablets were compared with the calculated mean weight. During this method, less than two tablets should have a deviation greater than pharmacopoeia limits ± 5% of the burden.16

Friability Test

Friability of the tablets makes up my mind using friabilator. It subjected the tablets to the combined abrasion and shock in a very plastic chamber revolving at 25 rpm for 4 minutes and dropping a tablet at height of 6 inches in each revolution. The tablets were reweighed. Tablets were de-dusted employing a soft muslin cloth and reweighed. The proportion of the tablets friability was calculated as. The desirable friability
make up my mind as below 1%.16

Thickness

A venire micrometer was wont to determine the thickness of randomly 10 selected tablets.
Hardness Test The force required to interrupt down a tablet in a very compression is defined because the hardness or crushing strength of a tablet. During this study, ten tablets were randomly selected and individually placed in a very hardness tester then the hardness of tablets reported

CO2 Content

Three tablets were placed in 100 ml of oil of vitriol solution 1N in 3 separate beakers. So as to work out the quantity of released CO2 (mg), the difference in weight before and after dissolving the tablets was calculated.

Evaluating the solution pH

Employing a pH meter the pH of the solution was measured by dissolving 3 tablets in 3 beakers containing 200 ml of water.

Effervescence Time

Three tablets were put in 3 beakers of water and so the effervescence time was measured employing a stopwatch Effervescence time was defined because the moment when a transparent solution was obtained.

Assay

Twenty tablets were weighed and grounded into a fine powder. An amount of powder similar to 200 mg of ranitidine HCl was weighed accurately and mixed with 70 ml of pure water in a very 100 ml volumetric flask. The mixture was shaken for about 20 minutes. Purified water was then added to fill the flask. After mixing well, the answer was filtered employing a Whattman No. 42 paper. The primary 10 ml of the filtrate was discarded. an acceptable aliquot was subsequently subjected to analysis by titrimetry. The filtrate (equivalent to 2 mg/ml) was diluted appropriately to get a 100 µg/ml solution which is then analyzed by spectrophotometer.

Content Uniformity

After selecting 10 tablets randomly, the content of every tablet make up my mind separately.

Water Content

Ten tablets were dried for 4 hours in a very desiccators containing colloid. The proportion of water content was calculated as.

Equilibrium Moisture Content

Three tablets were placed in 3 desiccators containing saturated salt solutions of nitrite (RH, 60%), binary compound (RH, 71%), and nitric (RH, 90%). the proportion of equilibrium moisture content make up my mind on the primary and seventh days by the subsequent method. First, about 50 ml of methanol was poured in Autotitrator (Mettler, TOLEDO-DL53, Switzerland) while a dry magnet was present with methanol. it absolutely was titrated by the endpoint with Karl Fischer reagent. in a very dry mortar, the pellets were grounded to fine powder of which 100 mg was accurately weighed and transferred to the titration vessel quickly. it absolutely was stirred by the tip point.20 The equilibrium moisture content was then calculated as V×F×100 during which F was an element of Karl Fischer reagent and V, the degree of Karl Fischer reagent consumed for sample titration in ml.

Applications of Effervescent Tablets

- Better stability and easy transporting.
- Alternative to parenteral forms, where administration through parenteral route is difficult.
- Zero order release is achieved by incorporation of low levels of effervescent mixtures with within the tablet matrix.
- It's helpful in pulsatile system; a fast releasing core was formulated so as to get rapid drug

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release after the rupture of the polymer coating.

- The concentration of effervescent agents significantly affects the floating time in floating drug delivery systems.
- Programmed drug delivery is achieved.
- Effervescent osmotic pump tablets were used for controlled release.
- Cosmetic effervescent tablets were also available.
- Effervescence induced enhancement is seen like opening of tight junctions and Increase the hydrophobic nature of the membrane across rat and rabbits bowel.

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