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PHARMACEUTICAL STUDY OF EFFERVESCENT TABLETS

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ABSTRACT

Effervescent tablets are a popular solid dosage form designed to rapidly dissolve or disperse in water prior to oral administration, producing carbon dioxide gas through a chemical reaction between organic acids and alkaline substances. These tablets offer several advantages over conventional tablets, including rapid dissolution, improved drug absorption, enhanced patient compliance, better taste, and ease of administration. Current pharmaceutical studies focus on formulation, development and evaluation of effective tablets using suitable pharmaceutical ingredients such as citric acid, tartaric acid and sodium bicarbonate. The study involved selection of suitable excipients, preparation of tablets by proper compression technique and evaluation of various pharmaceutical parameters. The prepared tablets are evaluated for general appearance, weight change, thickness, hardness, instability, effect time, dissolution time, pH, moisture content and uniformity of drug content. Special attention is paid to moisture protection and packaging as active tablets are highly sensitive to moisture. Stability studies are also important to assess the quality and shelf life of the finished formulation. The aim of the study is to develop an effective, stable and patient-friendly dosage form with rapid dissolution and good acceptability. Thus, effervescent tablets represent an important advance in pharmaceutical technology and provide a convenient alternative to conventional oral solid dosage forms.

KEYWORDS: Effervescent Tablets, Formulation, Evaluation, Citric Acid, Tartaric Acid, Sodium Bicarbonate, Carbon Dioxide, Dissolution, Stability, Drug Delivery.

INTRODUCTION

Among all the routes employed for systemic delivery of drug through various pharmaceutical products of different dosage forms, oral drug delivery has been known as the most widely used route for decades. The reason why the oral route has gained so much popularity can be attributed in part to its ease of administration. Oral sustained drug delivery systems are complex due to limited gastric residence time (GRT). Rapid GI transit may prevent complete release of the drug in the absorption zone and reduce the efficacy of the administered dose. Effervescent tablets are becoming increasingly popular in various fields including supplement and pharmaceutical uses due to their ease of consumption. Effervescent tablets are designed to come in contact with liquids such as water or juice, often causing the tablet to dissolve into a solution. These buoyant delivery systems use matrices prepared from swelling polymers, such as methocell or polysaccharides, such as chitosan, and effervescent components, such as sodium bicarbonate and citric or tartaric acid, or a matrix containing chambers of liquid that is gasified at body temperature. Flotation of drug delivery systems in the stomach can be achieved by incorporating a floating chamber filled with vacuum, air or inert gas. The gas can be introduced into the floating chamber by evaporation of an organic solvent (such as ether or cyclopentane) or by CO2 produced as a result of an emission reaction between organic acids and carbonate-bicarbonate salts. The matrix is constructed so that upon reaching the stomach, carbon dioxide is liberated by the acidity of the gastric contents and trapped in the gelified hydrocolloid. This results in upward movement in dosage form and maintenance

Effervescent or carbon tablets are tablets designed to dissolve in water and release carbon dioxide. They are products of compressing the constituent ingredients in powder form into a dense mass, packed in blister packs, or a hermetically sealed package with desiccant incorporated in the cap. To use them, they are added to water to make a solution. Powdered materials are also packaged and sold as effervescent powder or may be granulated and sold as effervescent granules. Typically powdered ingredients are first granulated before being formed into tablets, effervescent tablets are becoming increasingly popular in a variety of fields including supplement and pharmaceutical uses because they are easier to consume. Effervescent tablets are designed to come in contact with liquids such as water or juice, often causing the tablet to dissolve into a solution. This makes effervescent tablets a preferred choice for many people, including those who are taking tablets medicinally as well as dietary supplements.

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

Pleasant taste compared to regular tablets

Effervescent tablets are so popular due to the fact that they can be dissolved in liquids such as water or fruit juice, meaning they often taste better than regular tablets. Traditional tablets dissolve slowly which can result in a lower absorption rate, in contrast, effervescent tablets dissolve quickly and completely, meaning you get the full benefits from the ingredients.

More evenly distributed than traditional pills

Once swallowed dissolves slowly in the stomach and may sometimes dissolve only partially which may cause irritation in some cases. The advantage of effervescent tablets is that they dissolve completely and evenly, meaning that there cannot be localized concentrations of ingredients. This not only means better taste but also less chance of irritation and a more efficient means of swallowing the ingredients.

Increased fluid intake effervescent tablets

Provide the desired nutritional benefits, but they also increase fluid intake. This can be especially beneficial if you are dehydrated or sick and not taking in as many fluids as usual. Effervescent pills can be a great way to rehydrate as well as get the benefits you need from the pills you're taking, whether it's a dietary supplement, herbal or medicinal..

Easy Alternative to Regular Tablets

They can be a great alternative for those who may have trouble swallowing either due to illness or age. Older individuals may have difficulty swallowing but need to take medication or supplements on a regular basis and in this respect, effervescent tablets can be a lot easier than having to swallow a tablet. In addition to this, they can be a great way of ingesting medicine for individuals with sore throats or medical issues that make swallowing difficult and so are a viable alternative to regular tablets.

Simple and Easy to Measure

Effervescent tablets are easily dissolved into water or a liquid of your choice and then after a while are consistent, well mixed and ready to drink. Traditional tablets or powders, however, need to be measured and stirred in repeatedly to avoid an inconsistent drink with lumpy bits. ven with stirring and measuring it is common to have an inconsistent drink with lumpy bits and an odd taste and this is where effervescent tablets are more efficient. Simply drop them in and they dissolve fully and evenly ensuring you get all the benefits of the tablet, as well as being able to comfortably drink it.

To Sum Up

Effervescent tablets are becoming increasingly popular and it is easy to see why. They provide a much more efficient way of taking supplements or medication due to being distributed evenly and much more quickly than regular tablets. In addition to this, they taste better as can be added to water or a liquid drink of your choice as well as being easier to take for people who may find it difficult to swallow. All these factors combine to make effervescent tablets a very popular choice for those taking tablets for either dietary supplementation or medicinal reasons. As per revised definition proposed to US FDA, Effervescent tablet is 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 any other suitable acid or acid anhydride) and carbonates or bicarbonates (Sodium, potassium or any other suitable alkali metal carbonate or hydrogen carbonate), which react rapidly in the presence

BASIC PRINCIPLES OF EFFERVESCENTS:

The effervescent solution contains a soluble organic acid and an alkali metal carbonate salt, one of which is often an API. If this mixture comes in contact with water, carbon dioxide is formed. Typical examples of acids and bases used include:

Citric acid

Tartaric acid

Malic acid

Fumaric acid

Adipic acid

Sodium bicarbonate

Sodium carbonate

potassium bicarbonate

Potassium carbonate

ADVANTAGES OF EFFERVESCENT TABLETS:

rapid onset of action

No need to swallow the pill.

Stomach and intestinal tolerance is good.

Greater portability.

Better taste.

Better stability.

More consistent response.

Containing large amounts of active ingredients.

Precise dosage.

In remote areas, especially where parenteral forms are not available due to prohibitive cost and lack of qualified medical staff, effervescent tablets may become an alternative.

DISADVANTAGES OF EFFERVESCENT TABLETS: Unpleasant taste of some active ingredients.

Larger tablets require special packaging materials., It is relatively expensive to produce in large quantities due to more or less expensive excipients and specialized production facilities, Clear solutions for administration are preferred, although fine dispersions are now universally accepted.

Evaluation parameters of effervescent tablets

Effervescent tablets are solid dosage forms that dissolve or disperse in water with the release of carbon dioxide (CO_2), forming a fizzy solution prior to administration.

The following evaluation parameters are used to determine the quality, safety, stability and performance of effervescent tablets.

1. General appearance The surface of the tablet should be smooth and uniform, check the color, shape, size and presence of cracks or chips, the tablet should be free from visible defects.

2. Weight Variation Test Weigh 20 tablets separately, calculate the average weight. Compare the weight of individual tablets with the average weight, this test ensures uniformity of tablet weight.

3.Thickness and diameter Measure the thickness and diameter of the tablet using vernier calliper, check the uniformity between the tablets, this helps to keep the tablet dimensions consistent.

4. Hardness Test Determine the crushing strength of the tablet using Monsanto or Pfizer hardness tester, this indicates the mechanical strength of the tablet, the tablet should be strong enough to handle but dissolve rapidly in water.

5. Friability test: Test using Roche fribrillator, weigh the tablets before and after the test, rotate for 4 minutes (100 revolutions) at 25 rpm. Normally, friability should not exceed 1%.

6. Bubbling Time Place a tablet in a beaker containing a specified amount of water, record the time taken for the tablet to completely dissolve or expand with the visible gas bubbles stopping, this indicates the efficiency of the bubbling reaction.

7. Dissolution Time Determine the time required for the tablet to completely dissolve in water, the effervescent tablet should dissolve rapidly without leaving unwanted residues.

8. pH Determination Dissolve a tablet in a specified amount of distilled water, measure the pH using a calibrated digital pH meter, this helps to determine the acidity or alkalinity of the prepared solution.

9. Carbon Dioxide Release Evaluate the amount of CO_2 released during the reaction between acid and alkaline ingredients, common ingredients include citric acid, tartaric acid and sodium bicarbonate, this emission indicates the efficiency of the reaction.

10. Uniformity of drug content Select individual tablets and determine the drug content using an appropriate analytical method, common methods include UV-Visible spectrophotometry or HPLC, this ensures uniform distribution of the active pharmaceutical ingredient.

11. Assay of Active Ingredient Determine the actual amount of active pharmaceutical ingredient present in the tablet, compare the result with the specified label claim.

12. Moisture Content Determine the moisture content using a Karl Fischer titrator or suitable loss-on-drying method, effervescent tablets are highly sensitive to moisture, excess moisture may cause premature effervescence and reduce stability.

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