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Advances in the Taste Masking Technologies of Pharmaceutical Dosage Form

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ABSTRACT

Taste is the ability to determine the flavor of substances like food, drugs, etc. The aspect of taste only occurs when the drug gets soluble in saliva. Firstly the drug gets dispersible in saliva then it show interaction with taste bud and then perception of taste is occurred. The above test receptor get binds to the molecules of saliva and generates electrical impulses from the area of brain that area is cranial nerves 7th ,9th 10th and then perception of taste occurs. Currently varieties of drugs are available like cardiac, analgesic, anti-inflammatory, opioid analgesic, anti-epileptic, anticoagulant, oral vaccine and sex hormone. Due to bitter formulation it tends to patients complain the problem of bitter and unpleasant taste of drug in the pediatrics and geriatric formulation is provocation to the pharmacist in the current scenario. Bitter taste masking becomes important to solve patient complain. This is become most important issue regards with pharmaceutical therapies. Taste masking get broadly classify into physical, chemical, biochemical and organoleptic methods. There are different types of methods are available to mask the unpleasant taste of drug. The physical method involves the use of sweeteners and flavor enhancers. The chemical method involves Ion exchange resin, solid dispersions, spray drying, Inclusion complex, Microencapsulation, coating. The biochemical method involves Pro-drug, Hot melt extrusion. The most abundantly used methods involves are spray drying, Inclusion complex, Micro-encapsulation, coating, hot-melt extrusion, and organoleptic methods.

INTRODUCTION

In the biological sense, definition of taste (gustation) is a chemical reaction derived from a Sensory response from the four main taste perceptions; salt, sour, bitter, and Sweet. Taste is the ability of the human body to discover the flavor of substances like food, drugs, etc. It gained its attention as most of the drugs are administered through the oral route. The unpleasant taste of the drug creates a huge problem in drug administration, particularly in the case of pediatrics and geriatrics. Humans detect taste with taste receptor cells which get combined to form an onion-shaped organ called taste buds. Each taste bud has a pore that opens out to the surface of the tongue through which molecules and ions reach the receptor cell inside. Chemicals are detected by gustatory cells in taste buds in the papillae of the tongue that relay these sensory signals to neurons in cranial nerves VII, IX, and X (facial nerve, glossopharyngeal nerve, and vagus nerve, respectively). Each taste bud's taste cells are replaced every 10 to 14 days. These are elongated cells with hair-like processes called microvilli at the tips that extend into the taste bud pore. Food molecules (tastants) are dissolved in saliva, and they bind with and stimulate the receptors on the microvilli. The receptors for tastants are located across the outer portion and front of the tongue, outside of the middle area where the filiform papillae are most prominent.

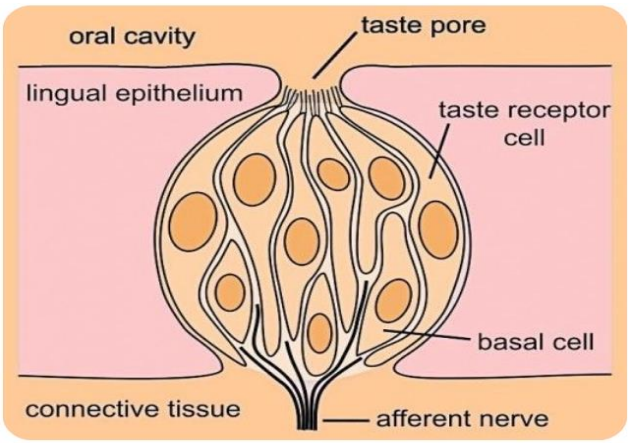


FIGURE 1: Taste bud

There are about 10000 taste buds in humans and in foetus condition 50 -100 taste bud present in a single cell. Taste cell receptors are transmembrane proteins that bind to the molecule and ion giving rise to four primary sensations of taste. The sensitive nerves ending present over taste bud produce and pass on electrical instinct to the brain. once the substances are dissolved in salt solubilized and commune with taste bud and perception of taste occurs. Oral

administration of medicine is Convenient and economical. Several oral pharmaceutical preparations countless food, and beverage products, and bulking agent have annoying, tart-tasting components. So pharmaceutical formulation with pleasant taste is more preferential today to compete with over a competitor's products and its provide better therapeutic values for patient and businesses also. Some properties are followed by ideal taste masking process and formulation.

1.) Few equipment and processing step is required.

2.) Least usage of different excipients for formulation.

3.) No inauspicious effect on the bio-availability of the drug.

4.) Economical and easily available excipient must be in use

5.) Manufacturing costs should be minimal

6.) required excipient having the safety of high margins.

7.) Perform formulation at room temperature.

8.) Easy and expeditious to prepare

The fifth independent taste unani, recently discover the monosodium glutamate present in seaweed and disodium inosinate in fish and meant. The taste receptor binds to the molecule by saliva and transmits electrical instinct by the 7th, 9th, and 10th cranial nerves to the area of the brain which participates in the detection of taste. 1

TASTE ANATOMY AND PHYSIOLOGY

The primary tastes detected by humans are sweet, sour, bitter, and salty. Detecting a taste (gustation) is fairly similar to detecting an odor (olfaction), given that both taste and smell rely on chemical receptors being stimulated by certain molecules. The tongue is a crucial organ in mechanical digestion and taste. Taste buds contain taste receptor cells which are the smallest functional unit in gustation. Taste buds can be found throughout the length of the upper digestive tract. On the surface of the tongue are protrusions called papillae. Circumvallate papillae are arranged in a v-shape pattern toward the base of the tongue, on the dorsal aspect, and contain more than 100 taste buds each. The fungiform

papillae are found all over the dorsal aspect of the tongue and contain only about 5 taste buds each. The foliate papillae are found on the lateral aspects of the tongue and only contain taste buds during childhood. Finally, there are the filiform papillae which, like the fungiform papillae, are found all over the tongue, however, they do not contain taste buds. Instead, their barbed shape provides the friction for moving food around during mastication.

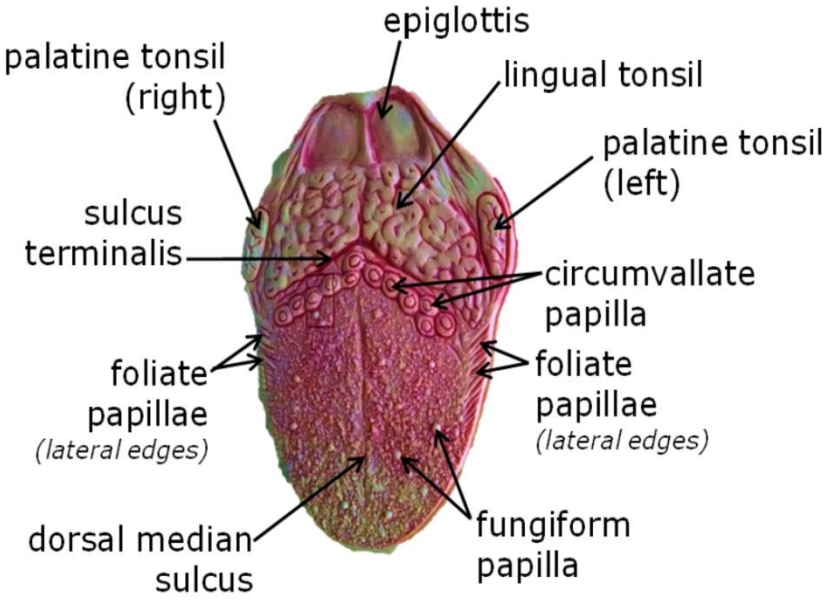


FIGURE 2: Anatomy of tongue

Types of taste:-

Taste is one of the five senses and is the ability to detect the flavor of substances such as food, certain minerals, and poisons, etc. It determines the selection of food, its palatability and the stimulation of reflexes for secretion of saliva, gastric juices and pancreatic juices. The sensation of taste can be categorized into:

a) Sweet (sugars, glycerol)

b) Sour (acidic substances)

c) Bitter (quinine, nicotine)

d) Saltish (sodium)

e) Savory (amino acid glutamate, salami)

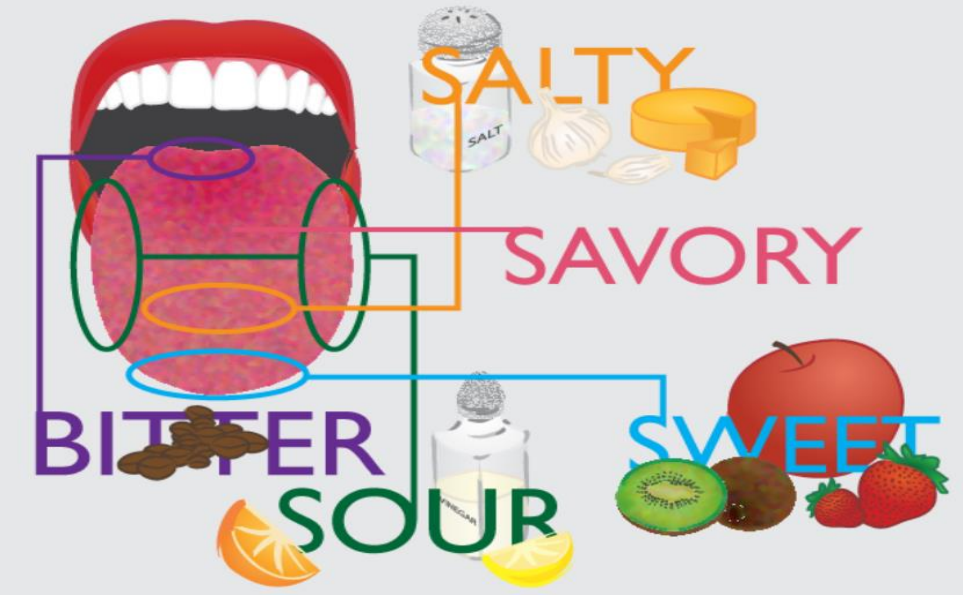


FIGURE 3: Types of taste

Humans receive tastes through sensory organs, and taste buds(gustatory calyculi) concentrated on the upper surface of the tongue.

Need of taste masking:-

• One of the important characteristics of good oral form is pleasant taste. Significant development has been attained in the taste-masked formulation over the past decades.

• use of a proven method for inhibition and bitterness deduction has resulted in improved palatability of these preparations.

• A central challenge of administrating medicine to children is a “matter of taste” drugs by their very nature, often taste unpleasant, with bitter taste a primary culprit. 95% of pediatricians describes that the greatest barrier to completing treatment are palatability and drug taste.

• The medicine has the potential to be poisonous when consumed in enough quantity as numbers of drugs interrupt with physiological process with in cell. The bitter taste is thought to have been involved as the biggest barrier against consumed poisonous substances; this thing explains the bitter taste of the drug.

• The basic biology of pediatrics, as reviewed here, explain the reason adults and Children reject the bittertasting drug. Bitter compounds are very efficacious in preventing pediatric

poisoning when synergized with different preventive excipients, such as child-resistant closure. Sweet taste is very loved by our species it was found out in a survey of the taste preference of humans of all age categories.

• Hence effort is directed to make the preparation sweet to a different degree for controlling the taste qualities.

Advantage of taste masking:-

• For the pediatric population, pediatricians have reported obnoxious taste as the biggest barrier in the treatment. 5 Unless the active ingredient does not have any unpleasant taste or must be pleasant tasting this barrier can be broken by using certain taste-masking techniques.

•The industry will continue to see improvement and development in taste masking of dosage form for the geriatric and pediatric patient population. It is a need of present world hence it will give large amounts of employment for people in this field who will work just to cover the taste of bitter drug thus makes it more palatable.

Disadvantage of taste masking:-

• In some cases adding a flavor or sweetener is a sample in others, applying some type of barrier membrane is used. A taste masker that seizes the API from taste receptors may recently fully affect PK, leading to efficacious taste masking but leading to a decrease in bioavailability.

• Destitute correlation of in vitro taste models frequently results in playability and sub-optimal taste masking. There is also increasing regulatory pressure to decrease the number of excipient usage in pediatric formulation, leading to the bioavailability of lack of regulatory clarity and fewer on how specifically to approach pediatric formulation. Advancement “rather than ascribing a defined process, for the most part, agencies have adopted an approach of ‘proposed and justify'.

• Babies to teenagers are all parts of the pediatric community, each with its demand. Full filling this requirement will be required a huge amount of time and money for its research and testing.

• Due to the progressive loss of taste masking efficiency upon storage in the liquid from polymer coating appears less effective for the oral liquid dosage form such as suspension.

TASTE MASKING TECHNOLOGIES

Taste masking technology is very important for improving patient compliance and better therapeutic efficacy. Many oral drug delivery formulations have objectionable taste such as bitterness, saltiness or sourness. Taste masking technologies include two aspect:

Selection of suitable taste masking substances such as polymers, sweeteners, flavors, amino acids etc.

Selection of suitable taste masking techniques. A suitable taste masking technique can powerfully impact both, quality of taste masking and process effectiveness.

There are many techniques developed for taste masking of bitter drugs these are:

Use of sweeteners:-

Sweeteners are frequently utilized in pharmaceutical formulation for a variety of purposes (eg, diluents in tablet) in combination to their critical role in taste masking nutritive sweetener, polyols, and hydrogenated starch hydrolysates, and high-intensity sweetener are three types. They have different organoleptic and functional qualities as no specific individual sweetener is suitable for everyone. This can be overcome by using a mixture of sweeteners that lower the ingestion rate of a specific sweetener. Example:- saccharin is 500 times sweeter than sucrose but can be Carcinogenic Aspartame.

Use of flavor enhancer:-

• The material used for taste masking is frequently categorized based on the basic flavor that is hidden. Natural and manmade sources of flavoring and perfuming agents are available.

• Some example of natural products are distilled fraction of fruit juice, aromatic oils such as peppermint and lemon oil , and herbs species. They are accessible as concerned extracts, alcoholic, aqueous solutions, and other forms.

• By adding some traditional material like alkaline earth oxide ,alkaline earth hydroxide has proved effective for masking the bitter nature of chemicals.

• Natural flavors are the most common type of taste found in food and pharmaceutical products. They are however being phased out in the flavor of synthetic flavor due to numerous drawbacks, including unpredictability in standard due to natural origin, unreliability, expense, and reachability.

Granulation:-

• Granulation is a flavor masking method that is less expensive, quick, and scalable. To conceal the taste of bitter medicine, polymer, flavor, and waxes have been utilized as granulating agents.

• Liquid having low melting point waxes such as glycerol palmitosterate, glyceryl behenate and hydrogenated castor oil are used.

• The practical coating may be incomplete during granulation. Swelling of the matrix, on the other hand, can reduce the diffusion of the bitter active. As a result, when compared to a non-swellable polymer, a swellable polymer can provide greater taste masking in granulation.

• It's a common procedure in the manufacturing of tablet dosage forms. As a binding agent, several saliva insoluble polymers are utilized. The taste of granules made of these polymers is muted because they are less solubilized in saliva. The productive surface area of the bitter chemical that contacts the tongue during oral consumption is reduced by granulation.

• Taste masked granules made from saliva insoluble polymer cab be made into a variety of tablet dosage forms, including chewable and rapidly dissolving tablets. To produce the taste masking liquid and waxes of low melting point such as glycerol palmitate stearate, glyceryl behenate, and hydrogenated castor oil is typically utilized in the process of granulation.

Example:- furosemide (FUR)

Pro-drug:-

Approach Chemical modification, including pro-drug design, is an effective method for reducing solubility and thereby improving taste. A pro-drug is chemically modified inert drug precursor which upon bio-transformation liberates the pharmaceutically active parent compound. e.g. 3 hydroxymorphinans are well absorbed from the buccal cavity, many of these compounds have a bitter taste which makes them difficult to administer by that route.

The present invention relates to pro-drugs of 3- hydroxymorphinans which are devoid of any taste, and are thus more suitable for buccal, sub-lingual, or nasal administration.

Example:- Famotidine.

Ion Exchange Resins:-

Ion exchange resins (IER) have received considerable attention from pharmaceutical scientists because of their versatile properties as drug delivery vehicles. In past few years, IER has been extensively studied in the development of Novel drug delivery system and other biomedical applications. Several ion exchange resin products for oral and per-oral administration have been developed for immediate release and sustained release purposes. Ion exchange resins are solid and suitably insoluble high molecular weight poly-electrolytes that can exchange their mobile ions of equal charge with the surrounding medium. An ion exchange resin is an insoluble matrix (or support structure) normally in the form of small (1-2 mm diameter) beads, usually white or yellowish, fabricated from an organic polymer substrate. The material has a highly developed structure of pores on the surface of which easily traps and releases ions. In taste masking by ion exchange resins, the resin-drug complexes formed will elute only a limited percentage of drugs in the saliva pH. Thus the taste of the drug is masked without interrupting the drug release profile. Some ion exchange resins used widely for taste masking purposes in industries are Amberlite IRP64, Amberlite IRP69, Indion 204, Indion 214, Kyron T-114 and Kyron T-104. Taste masking was performed by complex formation of drug (Tinidazole) with Kyron T-114 and Indion 214 in different ratios. Drug resin complex was evaluated for drug content, taste masking, stability studies, molecular characteristics and in vitro release of drug. The drug resin ratio (1:2) results of a good loading at pH 8 and shows good stability as well as retained its objectionable taste.

Example:- Tinidazole.

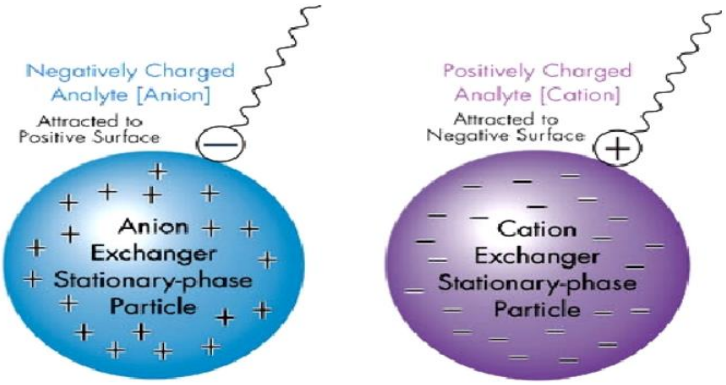


FIGURE 4: Ion exchange resin

Solid Dispersion System:-

Solid dispersion has been defined as the dispersion of one or more active ingredients in an inert carrier or matrix at solid state prepared by melting (fusion) solvent or melting solvent method. Amine or amido group of dimenhydrinate can have a physical and chemical interaction with the carboxylic acid and esters groups of co-polymers such as shellac, zinc and cellulose acetate phthalate hydrophobic polymers and long-chain fatty acids have been used to achieve the taste masking by solid dispersion.

Example:- Isoniazide.

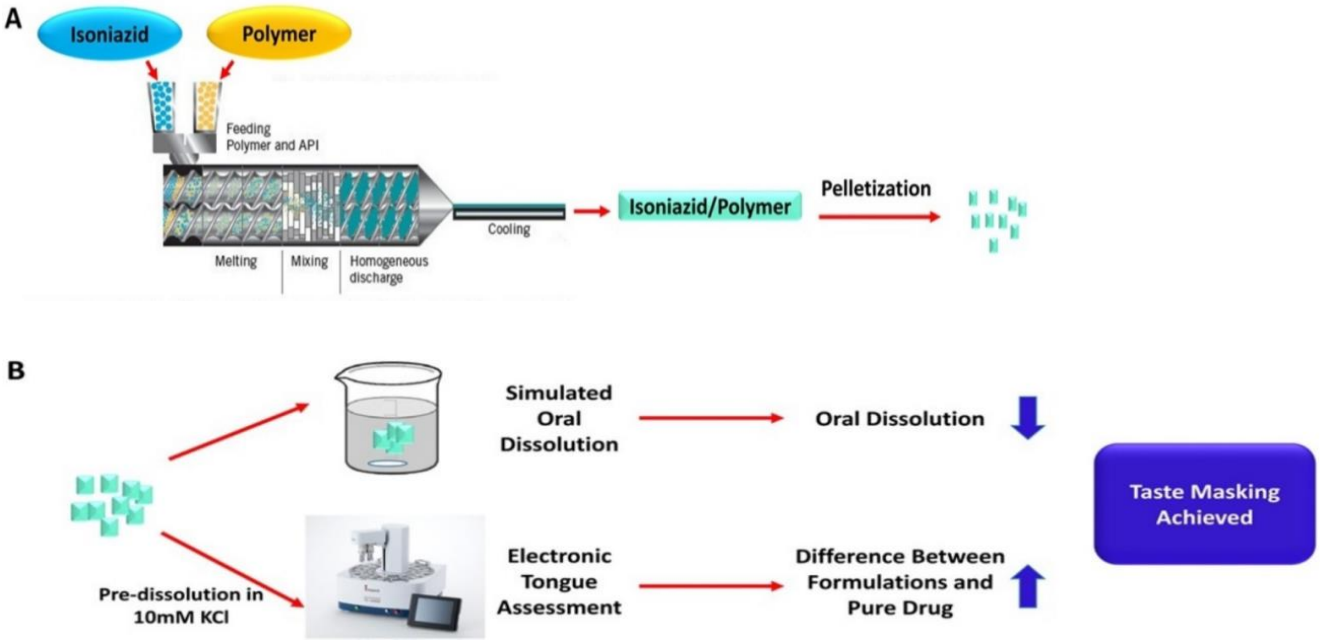


FIGURE 5: Solid dispersion system

Taste techniques on an industrial scale The taste-masking technique is frequently used in conjunction with formulation technologies. In a nutshell, they must be compatible with one another. Coated particles created from the fluid-bed coating, for example, should be capable of holding out against the compression process employed in the fabrication of the final dosage form. The organoleptic method is one of the most often utilized industrial taste-masking methods. Organoleptic approaches, polymer coating, hot-melt extrusion, microencapsulation, complexation, and spray drying are some of the most regularly utilized industrial taste masking techniques.

Organoleptic methods:-

• This is the most straightforward way to hide your taste. To disguise the disagreeable taste of low to moderate bitter actives, an aggregate of sweeteners and flavors is used.

• To improve the mouthfeel, effervescent substances can also be added. A bitterness-blocking agent may be included in some preparations to disguise the tart taste.

• The addition of sodium chloride to a formulation to conceal bitterness has also been discovered, as in the manufacturing of pioglitazone hydrochloride orally disintegrating tablets.

Hot-melt extrusion:-

• Hot-melt extrusion (HME) is a novel approach to mask the drug also has several disadvantages, including no organic solvent in the process, fewer processing stages, continuous operations, and scale-up potential. • The bitter active is combined with other substances in dry conditions to disguise the taste. • A hopper holds the mixture, which is then transported, combined, and melted by an extruder. • To make the taste-masked extrudates, the components go through a heating procedure with a lot of mixing. It is then micronized to make taste-masked granules which are then added to an appropriate dosage form.

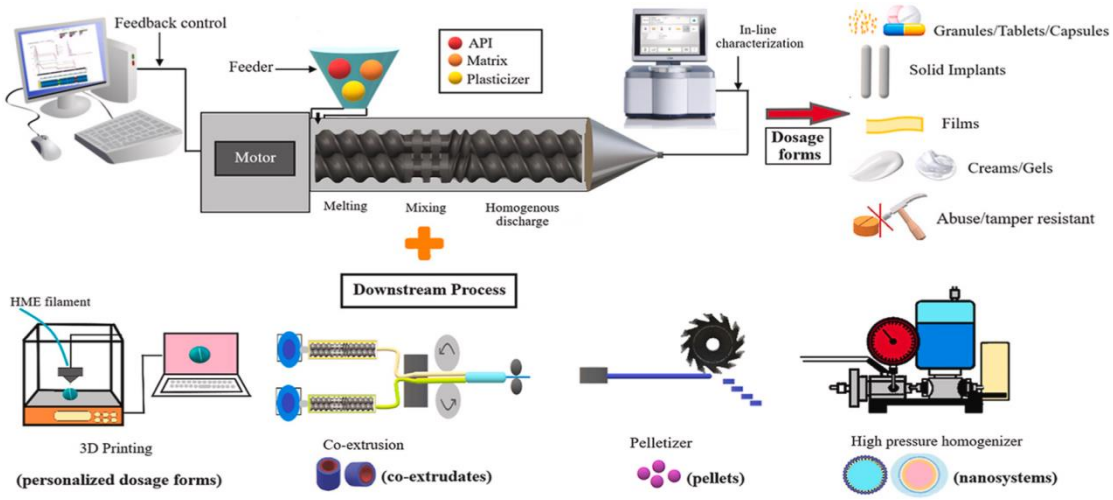


FIGURE 6: Hot melt extrusion

Spray drying:-

• By using a physical barrier coating spray drying is an alternative method to taste masking. The bitter medication is either dissolved or dispersed in a suitable solvent with a polymer, and then spray dried.

• Three steps are commonly involved in the procedure:

1. Atomization of feed into a spray

2. Before drying spray air.

3. estrangement of dried product from the air

• Spray drying has several advantages, including

a) A shorter processing time as it is a one-step process.

b) The capacity to level up.

c) A broad range of solvent and polymer options.

Example:- Casein hydrolysate.

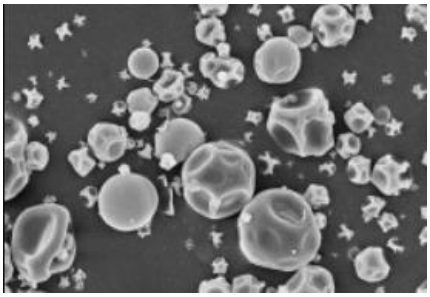


FIGURE 7: Spray drying

The use of spray drying technology to reduce bitter taste of casein hydrolysate.

Formulation of Inclusion Complexes:-

Inclusion complexation is a process in which the guest molecule is included in the cavity of a host or complexing agent. The complexing agent is capable of masking the bitter taste of drug by either decreasing its oral solubility on ingestion or decreasing the amount of drug particles exposed to taste buds thereby reducing the perception of bitter taste. Vander Waals forces are mainly involved in inclusion complexes. Cyclodextrin is most widely used complexing agent for inclusion type complexes.

Example:- prazosin hydrochloride. (PZS)

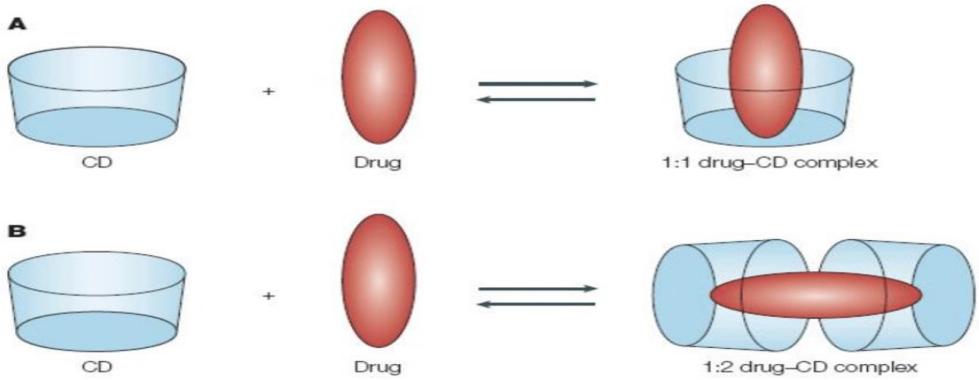


FIGURE 8: Inclusion complex

Micro-encapsulation:-

Micro-encapsulation is a process by which very tiny droplets or particles of liquid or solid material are surrounded or coated with a film or polymeric material. Although the coating is used primarily for the production of sustained release, Gastrointestinal dosage forms, it also

has major applications in masking the unpleasant taste. It is important to understand that only soluble portion of the drug can generate the sensation of taste. Coating the active drug with a properly selected polymer film can reduce its solubility in saliva and thus taste could be masked. Coating the drug particles creates a physical barrier between the drug and the taste buds and taste of active could be masked.

Example:- Azithromycin.

Microencapsulation comes in a variety of forms, such as:

1. Coating for air suspension.

2. Separation of coacervation phase.

3. Drying using a spray gun.

4. Evaporation of solvent.

5. Coating the pan.

6. Polymerization at the interface.

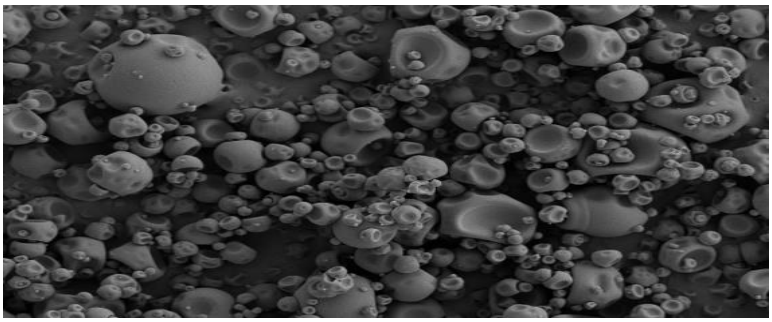
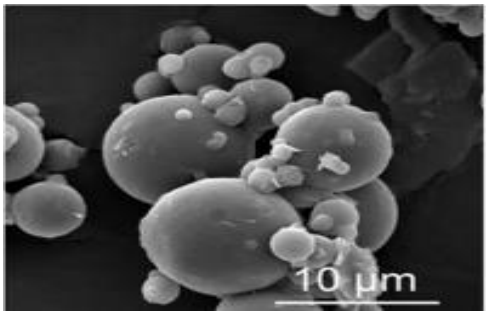


FIGURE 9: SEM image of micro-encapsulation.

Micro-spheres:-

Based on the preliminary studies, a micro-particles formulation with acceptable taste and an appropriate release profile was chosen. Micro-particles were obtained by the spray drying method using Mini Spray Dryer B-290 CET/polymer ratio of 0.5:1 and 10% Eudragit E PO was used for micro-particle formulation.



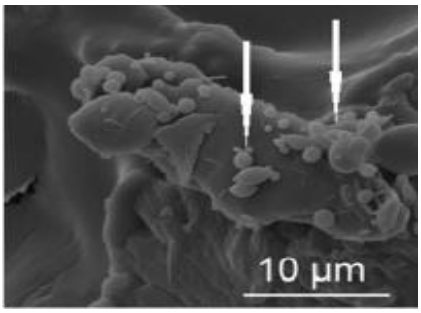


FIGURE 10:

SEM images of micro-particles with CET.

FIGURE 11:

Arrows indicate micro-particles in tablet

Development of Liposome:-

Another way of masking the unpleasant taste of therapeutic agents is to entrap them into liposomes. Liposomes are carrier molecules comprising several layers of lipids, in which the bitter drug is entrapped within the lipid molecule. Oils, surfactants, poly-alcohols and lipids effectively increase the viscosity in the mouth due to which the time of contact between the bitter drug and taste receptors decreases, thus improving the overall taste masking efficiency. Inhibition of bitterness of drugs by phospholipids such as phosphatidic acid, phosphatidylinositol, soya lecithin, etc has been reported. For example, the bitter taste of chloroquine phosphate in HEPES (N2- hydroxyetylpiperzine-N'- 2- ethane sulfonic acid) buffer at pH 7 by incorporating into a liposomal formulation prepared with egg phosphatidylcholine masked.

Lipids play a significant role as a barrier to sustain the release of drugs and biocompatible nature of lipids increases their acceptability by the human body. Further, lipids provide vast opportunities of altering the pharmacokinetics of the active ingredients by modulating release profiles. In taste sensors, also known as electronic tongue or e-tongue, lipids are used in preparing taste sensing membranes which are subsequently used in preparing taste sensors. Lipid membrane taste sensors have been widely used in assessing taste and palatability of pharmaceutical and food formulations. This review explores the applications of lipids in masking the bitter taste in pharmaceutical formulations and significant role of lipids in the evaluation of taste and palatability.

Example:- Chloroquine.

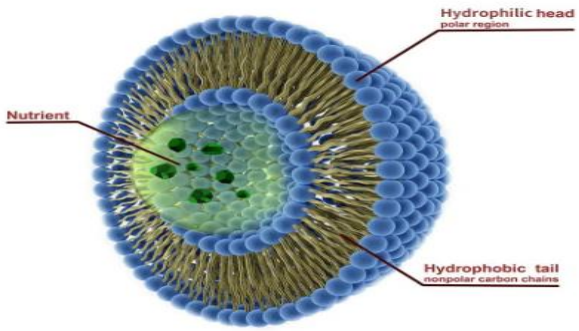


FIGURE 12: Liposome

Multiple Emulsions:-

Multiple emulsions are also a good approach for taste-masking of bitter drugs. Multiple emulsions are poly-dispersed systems where both water in oil and oil in water emulsion exist simultaneously in a single system. Lipophilic and hydrophilic surfactants are used for stabilizing these two emulsions respectively. Multiple emulsions can be water/oil/water (W/O/W) or oil/water/oil (O/W/O) depending on the dispersed phases in dispersion media. These are called as emulsions of emulsions because one simple emulsion is placed inside another one.

Taste masking is achieved by dissolving the drug moiety in the inner aqueous phase of w/o/w emulsion with good shelf life stability. O/W/O emulsion is a type of multiple emulsions in which water globules themselves contain dispersed oil globules, conversely, W/O/W emulsions are those in which internal and external aqueous phases are separated by the oil. The formulation is designed to release the drug through the oil phase in the presence of gastrointestinal fluid.

Taste Masking with Lipophilic Vehicles like lipids and lecithins Oils, surfactants, polyalcohols, and lipids effectively increase the viscosity in the mouth and coat the taste buds, and therefore they are potential taste-masking agents. Acetaminophen granules are sprayed with molten stearyl stearate, mixed with suitable tablet excipients, and incorporated into a taste-masked, chewable tablet formulation. Formulations with a large excess of lecithin or lecithin-like substances are claimed to control bitter taste in pharmaceuticals. Magnesium aluminum silicate with soybean lecithin is used to mask the unpleasant taste of talampicillin HCL.

Example:- Acetaminophen.

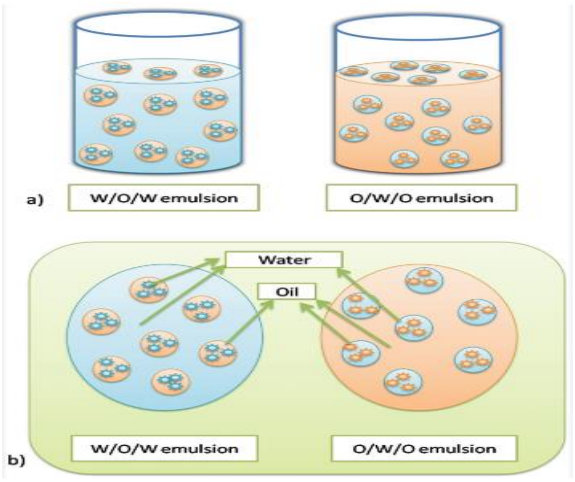


FIGURE 13: Emulsion

Coating:-

The number of coating layers, the kind of coating substance, the coating material, and the coating solvent system is all used to classify coatings. To accomplish flavor masking via aqueous or organic based coating method, hydrophobic polymers, lipids, sweeteners, and hydrophilic polymer can be employed as coating materials, eighter alone or in combination, as a single or layered coat.

However, this approach may be ineffective for oral liquid dosage forms such as suspension because of a gradual decrease of taste masking efficiency upon storage in a liquid dosage form. This method can provide an effective taste-masked suspension over a long prolonged storage time.

Example:- Atomoxetine.

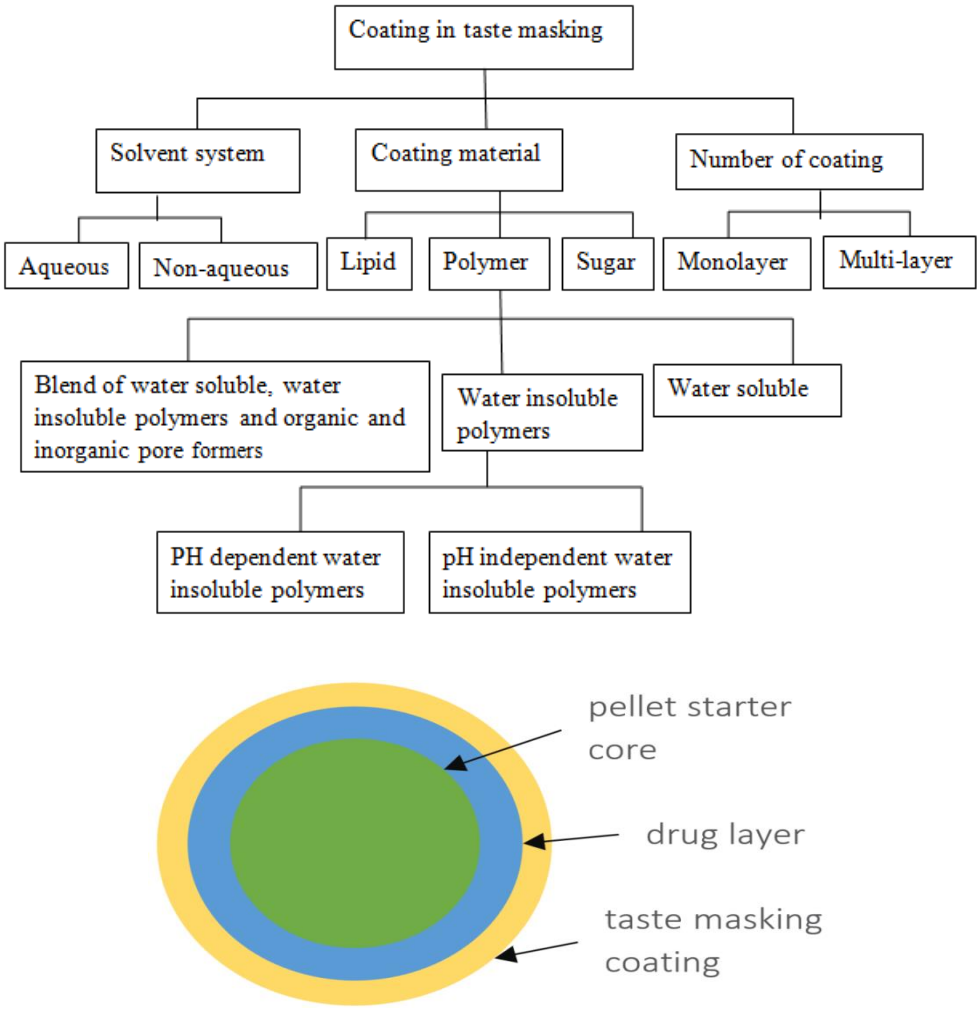


FIGURE 14: Coating

Electronic tongue and taste sensor:-

The taste sensor using lipid/polymer membranes is considered an electronic tongue with an approach to specifically mimic five basic tastes of the human tongue. Almost all e-tongues were essentially based on arrays of potentiometric sensors over the last three decades. Additionally, e-tongue systems based upon non-electrochemical methods such as a dual shear horizontal surface acoustic wave (SHSAW) device [22] or colorimetric sensor arrays [86] have also been reported to discriminate between liquids of different taste qualities or substances. In recent years, many efforts have been made to recognize the specific chemical signals presented by various taste substances using bio-sensors based on taste cells and receptors.

Principle of taste sensors and application to food sensing:-

The basic five tastes can be classified according to their physiochemical properties such as electric charge and hydrophobicity.

For example, bitter substances have higher hydrophobicity.

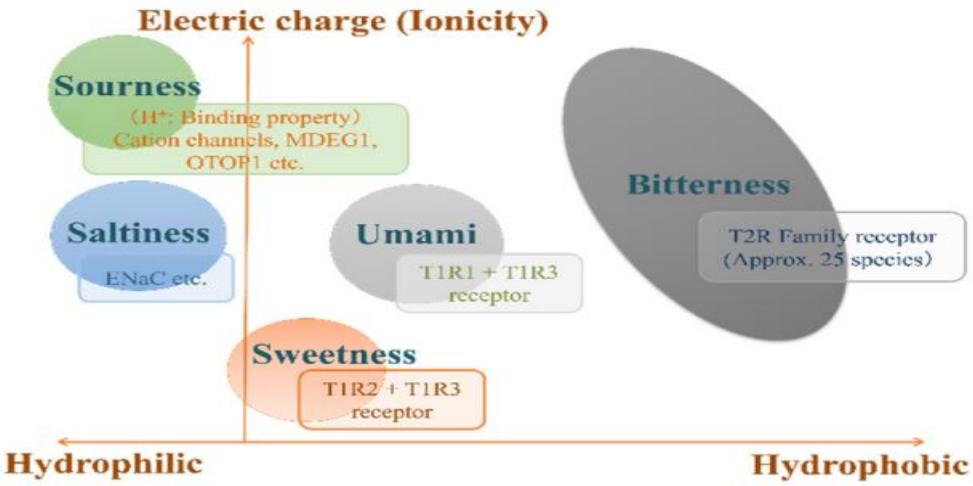


FIGURE 15: Ionicity

Saltiness and sourness are sensed through hydrophilic ions such as sodium, chloride, and hydrogen ions. Based on this principle, over the past 15 years, we have designed and fabricated sensor membranes such that they can have specific physicochemical properties to respond to the corresponding taste quality. In practice, a taste sensor has a scale for taste and can digitize and classify foods (such as coffee, tea, beer, Japanese sake, shochu, wine, rice, bread, dashi stock, soup, meats, milk, mineral water, miso, soy sauce, seasoning, fruits, and vegetables) into taste qualities. With the help of a taste sensor, not only food products can be distinguished, but also their taste information can be identified by the taste sensing system, the measurement mechanism, and the membrane structure of the taste sensor. The taste sensor functions based on principles of potentiometry, that is, it works by detecting the potential difference between the working (sensor) electrode and the reference electrode. The working electrode is composed of a lipid/polymer membrane, or a modified lipid/polymer membrane attached to a hollow polyvinyl chloride (PVC) probe, and an Ag/AgCl electrode. Both the working and reference electrodes are filled with the inner solution. Lipids are used to adjust the charge density on the surface of the membrane and the hydrophilicity of the me.

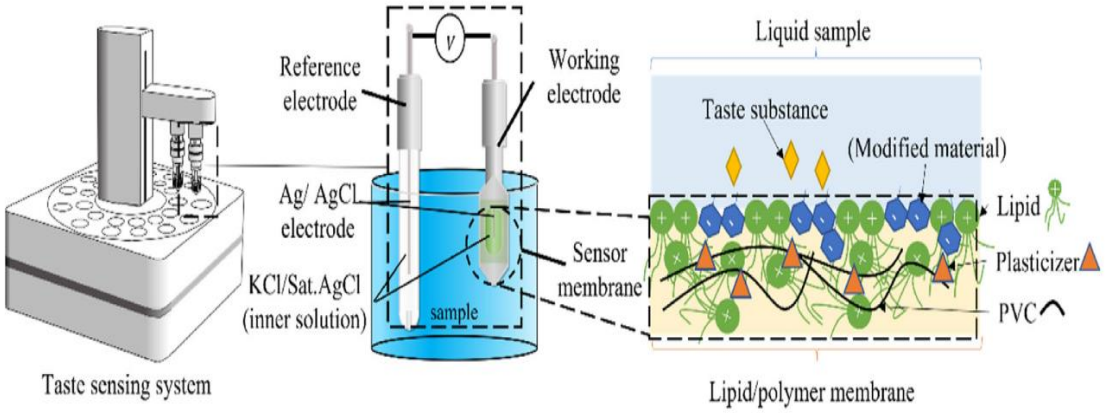


FIGURE 16: Taste sensing system, measuring mechanism, and membrane structure of taste sensor.

Adsorption:-

Adsorption involves preparing a solution of the drug and mixing it with an insoluble powder that will adsorb the drug, removing the solvent, drying the resultant powder, and then using these dried adsorbates in the preparation of the final dosage form. Many substrates like veegum, bentonite, silica gel and silicates can be used for the preparation of adsorbate of bitter drugs.

Example:- Ranitidine

Gelation:-

Water insoluble gelation on the surface of tablets containing bitter drug can be used for taste masking. Sodium alginate has the ability to cause water-insoluble gelation in presence of bivalent metal ions. Tablets of amiprolose hydrochloride have been taste masked by applying an undercoat of sodium alginate and overcoat of calcium gluconate. In presence of saliva, sodium alginate reacts with bivalent calcium and forms water insoluble gel and thus taste masking is achieved.

Example:- Chlorpheniramine maleate.

Desensitizing agents:-

Desensitizing agents like phenols, sodium phenolates desensitize the taste buds by interfering with taste transduction, the process by which taste message from the mouth to the brain and thus mask the taste of a drug.

pH Modifiers:-

Many natural and synthetic polymers, resins and waxes alone or in combination have been employed for taste masking. The Enteric polymers like eudragit L are used for taste masking but the pH of saliva is near 5.8 and these polymers solubilize at pH beyond 5.5 so there is a possibility of the drug being partially leached. Therefore, there is a need for the development of taste masking polymer such that the bitter taste is completely masked by the polymer at the pH of saliva in mouth and in the reconstitution medium as in case of the liquid orals and further which is able to protect the drug in a biologically active form, from the moisture in the dosage form and releasing the drug rapidly in the stomach without affecting its absorption and bio-availability. In the application of pH modifying agents such as L-arginine for taste masking of bitter medicament, L-arginine maintains alkaline pH of suspending vehicle to promote in situ precipitation of des-quinolone in saliva.

Example:- Ibuprofen

Use of Amino Acids:-

Amino acids and their salts (alanine, taurine, glutamic acid, glycine) in combination with bitter drugs reduce the bitterness of the drugs. Some of the preferred amino acids include sarcosine, alanine, taurine, glutamic acid, and glycine.

Example:- Ampicillin.

Molecular complexes of drugs with other chemicals:-

Molecular complexes can minimize the intensity of bitterness by modifying the solubility and absorption of drug by the formation of the complex.

Example:- Caffeine.

Salt formation:-

The salting-out taste-masking system is a multi-particle system consisting of a drug core, a salting-out layer containing salts and water-soluble polymers, and a water penetration control layer containing water-insoluble materials. The system generates a long lag time (time when released drug is less than 1%) for numbness masking, and a subsequent immediate drug release for high bio-availability. Aiming to contain the system and drugs that cause numbness in oral disintegrating tablets, the system was optimized to reduce the particle size and contain drugs with high water solubility in this study. The amount of coating on the layers, the coating solvent, and the positioning of the components were also optimized.

Adding alkaline metal bicarbonate such as sodium bicarbonate masks the unpleasant taste of water-soluble ibuprofen salts in an aqueous solution. Aspirin tablets can be rendered tasteless by making magnesium salt of aspirin. D-chlorpheniramine maleate is taste masked salt of chlorpheniramine. Sodium salts such as sodium chloride, sodium acetate, and sodium gluconate have been shown to be potent inhibitors of some bitter compound.

Example:- Aspirin.

CONCLUSION

There is a variety of technologies that can disguise the unpleasant taste of medication but they must be used with care so that the pharmacokinetics of the drug is not harmed. This approach, combined with proper assesment of the taste masking effect, can significantly improve product preferences. New technologies for effective taste masking are also discussed in the review. With the use of these strategies, one can significantly enhance the product preference the flavor to hide the fact that the medication was being delivered. For the quality of care delivered to patients, particularly children, and adolescents, research is becoming increasingly important. All these procedures vary in their applicability from drug to drug and are dependent on the type of dosage form required. The universal inhibitor of all bitter taste compounds that do not influence other taste modalities such as sweetness would be the ultimate solution to bitterness reduction or inhibition. However, no single ingredient has yet been discovered that functions as a universal bitter taste inhibitor.

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