Summary

The **taste quality** has no clear cut dimension and is more a human perception. It is influenced by geographical, environmental, physical, physiological, psychological, technological and nutritional factors. Early studies of 19th Century expresses the opinion that four basic tastes qualities fall into a single taste modality just as colours are with qualities within vision. The concentration of each component have an influence on the taste perceptions. Very low concentration component may not be recognizable for its quality impact but still adds to the overall quality of food. But, they are independent entities which are not able to change to another. Amongst the taste qualities, bitterness resembles sweetness because of stereochemistry of stimulus molecules. For eg. when sugar molecules are chemically modified, the resulting derivatives are almost bitter or may be sweet-bitter. Thus it is truly a molecular effect depending on stereo chemical, hydrophobic and polar structure features showing varied responses. The molecular patterns ultimately are responsible for both basic tastes. In the case of saltiness and sourness, the taste quality is on molecular pattern of cation and anions, but, the intermolecular changes do not arise. There are many factors that alters taste perceptions. The factors are age, meals,hunger,tastemedium,temperature,smoking,obesity,pregnancy,cold,cough,allergies,diseases . Taste discrimination decrease with increase in age. Around 45 years of age, taste buds begin to degenerate. Taste loss become apparent in late 50's. In advanced age, taste thresholds for sweet, salt and bitter are 2.5 times higher than in the young. Sensitivity is reduced after the meals. It also depend on the type of the meal whether spicy or bland meal. Hungry persons are more sensitive to sweetness and saltiness. This makes to overcome the hunger which is not good. Taste thresholds are lower in water than in fruit juice. Increasing temperature increases the response to sweetness but decreases with saltiness and bitterness.

Taste modification is a very interesting phenomenon to the consumers. The taste modification physically modifies the perception of a compound, food, drink etc. The taste modification can be achieved by

- a) Combination of the basic tastes and taste sensations.
- b) By topical application
- c) By the use of condiments

- d) By the use of flavouring agents
- e) By the use of texture modifiers
- f) Synergism

However, the modification can also be met by a negative path of approach through

- a) Suppression
- b) Masking
- c) Disorder

The basic taste and taste sensations at times may have a combined phenomenal action for the clarity in expression of perception of food. For eg. bitter taste and pungency of ginger; acid taste and astringency of betel leaves may provide a better impact for the sensory organs for expression of perception. In many of the fried snacks, vegetable salads, cut fruits, salt & pepper, cardamom powder, sugar powder are used for topical application prior to consumption. The taste quality modifies, but the independent taste remain during perception. Similarly, the use of condiments, flavouring agents result in mixed interactions among the four taste qualities. When substances are mixed, their taste change, but no chemical reaction occur among the substances. The use of starch, or dhal powders in food systems changes the texture as well as the taste. The taste quality is felt in terms of reduced intensity. The saltiness perception is reduced in starch thickened foods with the reduction in mouth amalyse activity. In a model system of four sugars sucrose, fructose, glucose, maltose when subjects concentration versus the perceived intensity is seen, it reflected psychophysical function with a greater strength of perception which shows the expansion. The mixture of these sugars tasted much stronger than the simple sum of single components taste scores showing the synergism. The taste-flavour interactions in the study of sucrose-caffeine system have shown their reciprocal action on <u>suppression</u> ie. the perceived intensity of say sugar increase, the caffeine intensity decrease. Besides these, taste can be suppressed by local anaesthetic application on the tongue. Amiloride, a blocker of epithelial Na channels reduces the salt taste in humans. Adenosine monophosphate may block the bitterness of several bitter compounds. Gymnemic acid from Indian shrub Gymnema Sylvestre decreases the sweet perception. Chlorogenic acid and cyanarin by Suppression of sour and bitter taste receptors enhances the sweet taste. Miraculin in miracle fruit turns sour tastes sweet by binding the site near the sweet receptor. Masking is another aspect of taste to eliminate undesirable taste. Acid

taste is masked by using more quantity of sugar or sweet compounds. At times, the condition of disorder of taste is experienced and is associated with smell. Thus the taste modifications reflects on the relative intensity of basic tastes through one of the processes of **suppression or expansion, masking and disorder** depending on the components used and the system of application.

Besides these, the **reaction time** is also an important factor to express the changed perception. The reaction time is the interval between initial stimulation of the receptors and the report of the reaction. The reaction time to taste has been reported as 0.02-0.06secs as per the electrophysiological studies. However, the oral-response reaction time for salt, 0.307 sec; for sweet 0.446 sec; for sour 0.536 sec and for bitter 1.082 secs. The oral response reaction time depend on the concentration too and the technique adopted. Relatively, taste has slow reaction time as compared to other sensory stimuli.

Taste Threshhold is a statistically determined point on the stimulus scale at which occurs a transition in a series of sensations or judgements. There are four types of thresholds that are generally known. They are absolute threshold, difference threshold, recognition threshold and terminal threshold. **Absolute threshold** is that magnitude of stimulus at which transition occurs from no sensation to sensation. It is also referred at times as detection threshold or stimulus threshold or sensation threshold. **Difference threshold** is the least amount of change of a given stimulus necessary to produce the change in sensation. **Recognition threshold** is the minimum concentration at which a substance is correctly identified. It is also referred as identification threshold. **Terminal threshold** is that magnitude of a stimulus above which there is no increase in perceived intensity of the appropriate quality for the stimulus. Above this point, changed sensation of pain, burning, piercing often occurs.

The **threshold measurement** is the procedure of studying the Psychophysics of taste which concerns the functional relation between stimulus and response. Taste Thresholds is a complex phenomenon since the data depends on the subject, difference in techniques employed, and statistical compliance, the effect of temperature, environmental factors, and time of the day, experience, age, sex and physical condition. Each compound will have a unique threshold level which depends both on the properties of the receptor and the concentration of the molecules. Generally, recognition threshold which identifies the minimum Concentration is followed and is

expressed as percentage. The threshold value is effected by various factors such as lack of sleep, hunger, age, habits such as smoking, alcoholism, cold, fever and allergy.

The measurement of taste depends on which basic taste to be determined. Secondly, depends on the food products and quality control methods followed are compared with the sensory evaluation of tastes. Thus, both objective and subjective measurements have to be followed for evaluation of the taste of the product.

Some of the points of concern for subjective and objective measurements are

- 1. The samples for both tests should be identical.
- 2. There must be sufficient replication.
- 3. The same individuals should participate in all panels for comparison.
- 4. Sufficient range of test variable to be chosen.
- 5. Degree of variation from Sensory Panel to instruments results to be determined.

The objective instrumental methods vary depending on the basic taste to be determined or the product from which the taste component to be identified and quantified. Still the limitations exist in terms of specific factor determination by instruments where as human responds to various sensory attributes. Specificity for mouth feel will be more relevant for taste measurements. The evaluation of taste of any food product should be based on the fields of **Psychology** which describes the responses to sensory stimuli, **Psychophysics** which quantifies the relationship between stimuli and response and **Statistics** which formulates the precision judgments. The methods followed for taste evaluation are ranking, scoring, hedonic scaling and evalution.

The recent development for the taste evaluation is the use of **electronic tongue**. Professor Fredrik from Sweden University has invented the electronic tongue which measures and compares tastes. In the biological system, taste signals are transducted by nerves in the brain into electric signals. E-tongue sensors process also generates electrical signals as potentiometric variations.. Electronic tongue have the applications in food & beverage and pharmaceutical industry.