

ROLE OF FOOD CHEMISTRY IN OUR DAILY LIFE**Mrs. Nandita Bose Sarkar****GOVT. M.H. College of Home Science & Science for Women , Autonomous Jabalpur (M.P.)****ABSTRACT**

Chemistry is a big part of our daily life. It plays a very important role in our life. We always owe a debt to chemist for their important contribution for giving us life saving drugs, synthetic fibers, synthetic detergents, variety of cosmetic, preservatives for our food, fertilizers pesticides, paper, glass etc. There is no aspect of our life that is not affect by the developments in chemistry. Many different things are in commercially prepared foods and there is a good deal of suspicion among some people about the safety of these foods. In 2007, the World Cancer Research Fund reported on all the research by a panel of experts on the links between food, nutrition and physical activity and cancer. This report noted there is little epidemiological (the affect on humans) evidence on the possible effects of things added to food and drinks. The report also noted that, because these things are monitored internationally and nationally regulated, there is a lot of information on their effects on animals. The report also noted food additives are monitored if any chemical present seems to be of special concern. Regulations, which limit how much of any additive that may cause harm, are generally based on the results of animal studies which make them very safe for humans to eat or drink. Experts do not consider general use of food additives to be a cancer risk; however, the nitrates and nitrites added to preserve meats can change into carcinogens in the stomach and have been linked to cancer of the stomach.

Key words- Chemicals, food, Preservatives, Additives

Introduction- Food chemistry is the study of chemical processes and interactions of all biological and non-biological components of foods. The biological substances include such items as meat, poultry, lettuce, beer, and milk as examples. It is similar to biochemistry in its main components such as carbohydrates, lipids, and protein, but it also includes areas such as water, vitamins, minerals, enzymes, food additives, flavors, and colors. This discipline also encompasses how products change under certain food processing techniques and ways either to enhance or to prevent them from happening. An example of enhancing a process would be to encourage fermentation of dairy products with microorganisms that convert lactose to lactic acid; an example of preventing a process would be stopping the browning on the surface of freshly cut Red Delicious apples using lemon juice or other acidulated water.

Chemicals in Food- Food chemistry is the study of chemical processes and interactions of all biological and non-biological components of foods. The biological substances include such items as meat, poultry, lettuce, beer, and milk as examples. Many chemicals are added to food for their preservation and enhancing their appeal. These are food additives and are :-

1. Flavors and sweeteners
2. Food colours
3. Flour improvers and staling agents and bleaches
4. Fat emulsifiers and stabilizing agents
5. Antioxidants
6. Preservatives
7. Nutritional supplements such as vitamins, minerals and amino acid.

Some are discuss below-

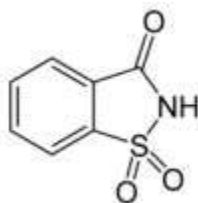
- **Food preservatives-** These are the chemical substance which are added to the food materials to prevent their spoilage and to retain their nutritive value for long periods. These preservatives prevent the rancidity of food and inhibit the growth or kill the micro-organisms

The growth of microbial in food materials can also be prevented by adding certain chemicals substances. The most common preservative used is sodium benzoate (C_6H_5COONa). It can be used safely in limited amounts and is metabolized by conversion to hippuric acid $C_6H_5CONHCH_2COOH$, which ultimately is excreted in the urine. Certain food preservatives such as butylated hydroxyanisole (BHA)

and butylated hydroxy toluene (BHT) for edible oils also act as antioxidants. Salts of sorbic acid propanoic acid also used as preservatives.

- **Artificial Sweetening Agents-** These are the chemical compound which give sweetening effect to the food and enhance its odour and flavor. Natural sweetening agents such as- sucrose, lactose, cane syrup, honey are commonly used artificial sweeteners have been in use since the discovery of ortho-sulphobenzimide known as saccharin in the 1880's. It is very popular sweetening agent and has been used for many articles of food.

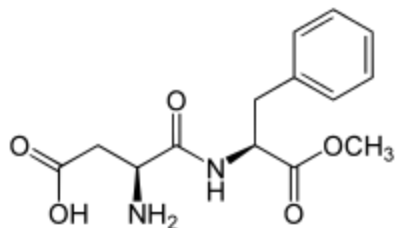
Saccharin is an artificial sweetener with effectively no food energy which is about 400 times as sweet as sucrose or table sugar, but has a bitter or metallic aftertaste, especially at high concentrations. It is used to sweeten products such as drinks, candies, cookies, medicines, and toothpaste. Today saccharin is used in a wide range of low- and no-calorie and sugar-free foods and beverages, including tabletop sweeteners, baked goods, jams, chewing gum, canned fruit, candy, dessert toppings and salad dressings as well as cosmetic products, vitamins and pharmaceuticals. Saccharin is not metabolized by humans. It passes through the body unchanged.



Saccharin

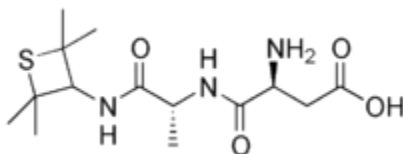
Other Artificial sweeteners commercially used in food articles are :- aspartame(methyl ester), alitame, dulcin (urea sweeteners), dihydrochalcones (DHC), sucralsoe etc.

ASPARTAME : Aspartame is a methyl ester of the aspartic acid/phenylalanine dipeptide. It was first sold under the brand name NutraSweet. It was first synthesized in 1965, and the patent expired in 1992. It is one of the most widely used artificial sweetener. It is about 100 times as sweet as sucrose. It may be noted that aspartame is unstable at cooking temperature and therefore, it is used as sugar substitute to cold food and soft drinks.

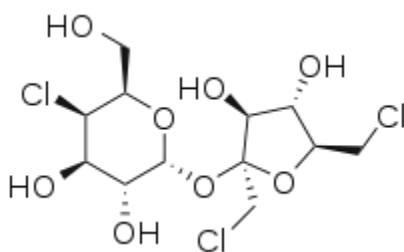
**Aspartame**

Alitame- Alitame is an aspartic acid-containing dipeptide sweetener. Alitame is about 2000 times sweeter than sucrose, about 10 times sweeter than aspartame, and has no aftertaste. Its half-life under hot or acidic conditions is about twice as long as aspartame's, although some other artificial sweeteners, including saccharin and acesulfame potassium, are more stable yet. Unlike aspartame, alitame does not contain phenylalanine, and can therefore be used by people with phenylketonuria.

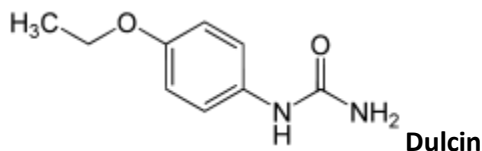
Alitame is more stable than aspartame during cooking. One main difficulty with alitame and similar type of high potency sweeteners is the difficulty in controlling the sweetness of the food.

**Alitame**

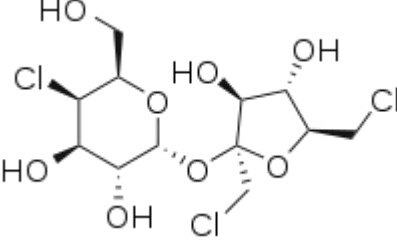
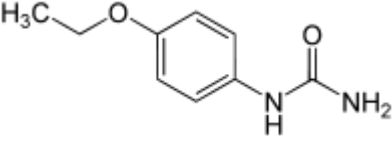
Sucrolose- Sucralose is an artificial sweetener. The majority of ingested sucrolose is not broken down by the body, so it is noncaloric. Sucralose is about 320 to 1,000 times as sweet as sucrose, twice as sweet as saccharin, and three times as sweet as aspartame. It is stable under heat and over a broad range of pH conditions. Therefore, it can be used in baking or in products that require a longer shelf life. The commercial success of sucrolose-based products stems from its favorable comparison to other low-calorie sweeteners in terms of taste, stability, and safety.

**Sucrolose-**

Dulcin - Dulcin is an artificial sweetener about 250 times sweeter than sugar discovered in 1884 by Joseph Berlinerbau . It was first mass-produced about seven years later. Despite the fact that it was discovered only five years after saccharin, it never enjoyed the latter compound's market success. Still, it was an important sweetener of the early 20th century and had an advantage over saccharin in that it did not possess a bitter aftertaste. A Pure Dulcin is a white crystalline solid with a melting point of 173 degree C -174 degree C and is about 250 times sweeter than sugar. To determine the purity of Dulcin synthesis, we used phenetidine and potassium cyanate in the presence of water and acetic acid.



Artificial Sweetener	Structural Formula	Sweetness value in comparison to cane sugar
SACCHARIN		550
ALITAME		2000
ASPARTAME		180

SUCROLOSE		650
DULCIN		500

Objective of Research –

- To examine the specific problems of chemical foods;
- Discuss the chemistry of food preservatives;
- Importance of chemistry in our daily life;
- Know about artificial sweetening agents and food preservative.

Research Hypothesis-

- Evaluate the Satisfaction of food preservatives and artificial sweeteners.

Research methodology –

This study relied on a sample of randomly selected Respondents.. We sampled 250 respondents, Out of the 250 questionnaire sent out, 250 were received, representing 100%. The survey instruments included open ended and closed ended questionnaires. We also followed up with personal interviews. The findings are presented by the use of descriptive statistics.

For the purpose of the research study both primary and secondary data had been used. The secondary data for the study was collected from journals, research papers, magazines, periodicals, abstracts, indexes, research report, conference paper, video, internal records of org., online data source etc. The primary source included questionnaire, schedules and person interviews and surveys for gathering first hand data for the purpose of conducting test and analyzing the trend of data so as to study its impact on the hypothesis undertaken, to fulfill the purpose of research.

Analysis of results -

In this section, we present an analysis and discussion of the empirical results

Table-1

**Classification on the Basic of Age
(food preservatives and artificial sweetners used)**

Age	Frequency	percentage
20-30	47	18.8
30-40	125	50
40-50	50	20
50-60	28	11.2
Total	250	100

Source- Based on Primary data

Table -1 clearly indicated that 47 number of respondents belongs to the age group of 20-30 years making the overall percentage to 18.8%, 125 respondents falls in the group of 30-40 years making them 50% of total distribution. 50 respondents make a 20% of total and at the lastly 28 respondents were noticed in the age group of 50-60 years making the percentage 11.2% of the overall percentage.

Table-2

Problem faced in food preservatives and artificial sweetners

Problems	Observed frequency(f_o)	Expected Frequency(f_e)	$(f_o - f_e)$	$(f_o - f_e)^2$	$\frac{(f_o - f_e)^2}{83.3}$
Lack of Funds and finance	82	83.3	-1.3	1.69	0.02
Lack of Labour	87	83.3	3.7	13.69	0.16
Lack of storage	81	83.3	-2.3	5.29	0.06
Total	250	-	-	-	0.24

. source- basis of primary data

Table 2 shows that the calculated value of chi-square was 0.24. chi square value at 2 degree of freedom at 5% level of significant is 5.991. (.24<5.991) calculated value is less than table . so Hypothesis was Accepted.

Rating Of Marks Scored Based Responses

Description	Excellent	Good	Average	Poor
Level of knowledge of growth food additives and preservatives	10-12	7-9	4-6	0-3

TABLE-3

Knowledge of growth food additives and preservatives

Category	Frequency	percentage
Excellent	155	62
Good	80	32
Average	15	6
Poor	0	0

source- Based on Primary data

Table-3 shows that 155 respondents believe that growth has taken place in this sector making them 62% of total distribution. They have excellent knowledge about food preservatives and additives and its growth. Then 80 (32%) of respondents have good knowledge of growth of food preservatives and additives. Also 15 (6%) of respondents have average knowledge of growth of food preservatives and additives. None such respondents have poor knowledge of growth of food preservatives and additives.

Hypothesis Testing

Table-4**Satisfaction of food preservatives and artificial sweeteners**

variables	Frequency(o)	Frequency(e)	o-e	(o-e) ²	$x^2 = \frac{(o - e)^2}{e}$
Helpful	145	140	5	25	0.178
Harmful	75	75	0	0	0
No effect	30	35	-5	25	0.714
Total	250	-	-	-	$X^2 = 0.892$

Degree of freedom = 2

The table value of x^2 at 5% significant level for 2 d.f. is 5.991. Since the calculated value of x^2 is less than the table value of x^2 , the null hypothesis is accepted.

Conclusion-

Food is very important role in our daily life. We always owe a debt to chemists for their important contribution for giving us life saving drugs, synthetic fibers, preservatives for our food, paper, glass, etc. food preservatives prevent spoilage of food due to microbial growth. The most commonly used preservatives include table salt, sugar, vegetable oils and sodium benzoate C_6H_5COONa . Sodium benzoate is used in limited quantities and is metabolized in the body. Salts of sorbic acid and propanoic acid are also used as preservatives.

Table no. 4 show that 145 respondents says that food preservatives and additives is very helpful to our daily life, 45 respondents says it is harmful for our health but 30 respondents says no effect if we used limited food preservatives and additives. Regulations, which limit how much of any additive that may cause harm, are generally based on the results of animal studies which make them very safe for humans to eat or drink. Experts do not consider general use of food additives to be a cancer risk; however, the nitrates and nitrites added to preserve meats can change into carcinogens in the stomach and have been linked to cancer of the stomach.

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