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Study of Heavy Metal Content By AAS in A Variety Of Flavours of Jam Samples and its Physicochemical Characterization

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ABSTRACT

Different flavours of jam samples were collected from local market and were analysed for the physico chemical parameters like pH, loss on drying, refractive index and acidity calculated as citric acid. Heavy metal such as, Fe, Cu, Zn &Pb were analyses by using atomic absorption spectrophotometer (AAS). pH values ranged from 4.2 to 7.5 , acidity was calculated as citric acid as gm/100gm and it was found to have the values from 0. 22 to 3.4, Moisture from 28.8% to 66.05 % , refractive index value was nearly constant for all the flavours. From among the heavy metals, iron was present in maximum amount ie 2.3462 ppm . Lead was found to have the maximum value of 0.3823 ppm for the strawberry flavor and minimum value was obtained for zinc in mix fruit flavor ie 0.0697 ppm. Copper was found below detectable limit in three flavours and it was 0.0941 ppm for strawberry flavor.

Key words: Heavy metals, Atomic Absorption Spectroscopy, Physico chemical, Jam

I. INTRODUCTION

The Chemical Analysis of food enables us to know the composition of food material with aid of nutritional and biochemical knowledge to know what we should eat and avoid eating[1]. Jam was originally made in ancient days probably to preserve certain foodstuff. Jams are solid gels made from fruit pulp or juice, sugar and added pectin. They can be made from single fruit or combination of fruits. Human beings need trace amounts of heavy metals like cobalt, copper, manganese, zinc , lead etc, but unnecessary levels can be injurious to the human being. The toxic metals can enter the food products by numerous ways ie, preparation during which the food product comes in contact with metal containers, different type of gases in atmosphere, from water pollution, during packaging when the food material will come in contact with different packaging material , etc. hence it is necessary to evaluate the heavy metal content in the ready to eat food samples. Physico chemical characterization explains about the physical properties and chemical properties of a particular sample.

In the present work jam samples selected form the local market of Aurangabad depending upon the popularity was selected and analysed for the physicochemical characteristics such as pH, acidity, moisture and refractive index and heavy metals such as Iron, copper, zinc and lead were investigated by Atomic absorption spectroscopy.

II. MATERIAL AND METHODS

The chemicals and solvents which were used for analysis were of A.R. grade. Borosil make apparatus were used in the practical work. The apparatus which

were used like burettes, pipettes volumetric flask etc were calibrated following the standard methods[2]. Each sample was labeled and preserved for analysis by following the analytical methods[3]. The jam samples collected from local market were subjected for analysis of physicochemical parameters which are moisture content in the form of loss on drying at 105°C , pH, Acidity, refractive index , and estimation of heavy elements such as Iron, Copper, Zinc, lead by using Atomic absorption spectroscopy.

2 gm jam samples were heated in an oven for 24 hours at 105°C . it was cooled in a desiccators and weighed and again heated up till the constant weight is obtained to calculate the moisture content in the form of loss on drying. Acidity was calculated by titrating the sample solution with sodium hydroxide using phenolphthalein indicator . Refractive index was found by using Abbes refractometer. pH of the jam samples was investigated by preparing the sample solution and using a pH meter. The heavy metals were investigated on AAS by preparing the ash of the samples at 520°C and the ash obtained was dissolved in Aqua Regia and proper dilutions were obtained.

III. RESULT AND DISCUSSION

Table 1. Physicochemical parameters of jam samples

Flavours	pH	Acidity gm/100 gm	Moisture %	Refractive Index
Mix Fruit	7.5	0.22	46	1.353
Pineapple	4.22	0.34	28.8	1.353
Mango	4.4	0.32	30.13	1.356
Strawberry	6.34	0.22	66.05	1.357

pH of different flavours ranged from 4.2 to 7.5 . The acidic pH was obtained for all the samples. Higher pH indicates less acidity. Chikku Meera Chacko and Dr. D. Estherlydia[4] studied Antimicrobial Evaluation Of Jams Made From Indigenous Fruit Peels for They studied with the objective of preparing jams from peels from fruits like orange, pineapple, pomegranate and banana. Total soluble solids, acidity, pH, and moisture were analysed and found pH ranged from 4.4 – 5.9. Orange peel jam had the highest (0.47%) and pomegranate and banana peel jam had the lowest (0.16%) value for acidity. The highest and the lowest pH values were recorded in banana peel jam (5.94) and pomegranate peel jam (4.48) respectively.

The proper level of acidity is critical to gel formation. If there is too little acid, the gel will never set and if there is too much acid, the gel will lose liquid. The principal acid that is present in fruits are citric, tartaric, maleic and ascorbic acid in different proportions. The maximum amount of acid that is present is citric acid. The acidity value is found in terms of citric acid. In the present investigation the acidity value ranged from 0.22 to 0.34 gm / 100 gm. It was lowest for mix fruit and highest for pineapple flavor. Fatih Özdoğan, Emin Yılmaz[5] studied Evaluation of Green Tomato Jams Prepared from Two Kinds of Tomatoes they found total acidity measured as citric acid There was no statistical differences among total acidity values of jams .To set a stable gel, and to form enough acidity in taste, there should be 0.3-1.5% total acidity in jam products. Depending on the fruit's natural acid level and added acid, total acidity can be arranged easily.

The moisture content of the present investigation ranged from 28.8 % for pineapple jam to 66.05 % for strawberry jam. Moisture generally refers to the presence of water. Excess moisture can promote bacterial growth, decay, moulding or rotting over time. Singh and Chopra found the moisture content as high as 91.77 % in the carambola fruit plup[6].

Refractive index is used to determine the total solids where sugar is the main component. The refractive index values of jam samples were 1.353 for mixfruit and pineapple, 1.356 for mango and 1.357 for strawberry. Ajenifujah-Solebo SO and JO Aina[7] studied Physico-Chemical Properties And Sensory Evaluation Of Jam Made From Black-Plum Fruit and

found refractive index value of black plum jam as 1.42.

Table 2. Heavy Metal content in jam samples in ppm

Flavours	Iron	Copper	Zinc	Lead
Mix Fruit	1.2666	BDL	0.0697	0.2185
Pineapple	2.3069	BDL	1.1833	0.2365
Mango	2.3249	BDL	1.1973	0.2485
Strawberry	2.3462	0.0941	0.7754	0.3823

BDL: Below detectable limit

Some heavy metals such as zinc, copper, chromium, iron and manganese are required in small amounts, but these same elements can be toxic in larger quantities. Heavy metals are present in virtually every area of modern consumerism from construction material to cosmetics, medicines to processed foods. Hence it was decided to analyze heavy metals in the present work. Iron ranged from 1.2666 to 2.3462 ppm, copper was below detectable limit in three samples and it was present only in strawberry jam and it was 0.0941 ppm. Zinc ranged from 0.0697 to 1.1973 ppm and lead was 0.2185 to 0.3823 ppm. Amongst all the heavy metals analysed iron was found to be present in the highest amount.

M. Plessi[8] and coworkers studied the distribution of metals in black current fruits and jams . Metals were lower in jam than in fruits. Leaching of lead from local ceramics table ware into the food products was reported by Mohamed et.al[9]. Bhatia[10] has claimed that the soldered can has posed the problem of possible lead contamination in the products packed.

IV. CONCLUSION

The physicochemical parameters analysed, the heavy metals investigated allows the jam samples to be consumed.

V. REFERENCES

[1]. Morris B. Jacobs, The Chemical Analysis of Food and Food Products, CBS Publishers , New Delhi, 3rd ed, 01-03

[2]. G. H. Jeffery, J. Bassett, J. Medham, R.C. Denny, Vogel's textbook of quantitative chemical analysis, 5thed, Longman Scientific & Technical, (1989)

[3]. AOAC , Methods of analysis, 14th ed, Association of analytical chemist, Washington DC (1984)

[4]. Chikku Meera Chacko and Dr. D. Estherlydia4 , Antimicrobial Evaluation Of Jams Made From Indigenous Fruit Peels, Int J of Adv Res Volume 2, Issue 1, 202-207(2014)

[5]. Fatih Ozdogan, Emin Yılmaz, Evaluation of Green Tomato Jams Prepared from Two Kinds of Tomatoes, Academic Food Journal, 9(2) (2011) 19-25

[6]. Singh J and Chopra C.S, Beverages and Food world, 28 (2), 22-23 (2001)

[7]. Ajenifujah-Solebo SO and JO Aina, Physico-Chemical Properties And Sensory Evaluation Of Jam Made From Black-Plum Fruit (Vitex Doniana), African Journal of Food, Agriculture, Nutrition and Development, Vol. 11, No. 3, 2011 pp.

[8]. M. Plessi, D. Bertelli and A. Albasini , Food Chemistry, 100(1) 419-427 (2007)

[9]. Mohamed N, Chin Y. M and Prok F. W, Food Chemistry, 54 (3) 245-249 (1995)

[10]. Bhatia S. Indian Food Packers, 55 (3), 303-308(1993)