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Analysis of Potassium Iodate and Potassium Bromate in Bakery Products -by Electroanalytical Techniques

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Abstract: Potassium bromate and potassium iodate (which are used as oxidizing agents and as a food additives) are one of the main ingredients of bakery products like bread . In the present study an attempt was made to analyse the bromate content in bakery products such as bread by using an electro analytical methods (colorimetry). Various samples of bread made from flour treated with potassium bromate were analysed colorimetrically (red dyes were obtained in acid medium). The bromated levels were in the range of 4 to 5 mg/lit. The results were reproducible and the method was found to be accurate and precise.

Keywords: *Potassium bromate , Potassium iodate, colorimetry.*

I. INTRODUCTION

Potassium bromate is a white crystalline solid which is widely used in baking industry to improve the flour quality and to strengthen the dough. It is an oxidizing agent and is a food additive. But if used in large amounts and also if the bread is not baked properly then the residual amount which remains is harmful to health when consumed. The use of both the additives potassium bromate and potassium iodate is banned in several countries due to their ill effects on health. But some countries use under permissible limits. The environment and health watchdog also claimed that the tested products containing potassium iodate and potassium bromated can effect thyroid function and is also a possible carcinogenic (1, 2).

Bromate being a dough conditioner can help a lower quality gluten to perform like a good gluten. Gluten is a protein needed to trap gas and expand the dough. Bromate also helps gluten to form small uniform holes in the bread. The presence of bromate in bread may cause renal failure, respiratory depression, hearing loss, break down of vitamins and cancer to humans (3,4).

II.METHODOLOGY

Bread samples were bought from different outlets in Hyderabad city ,Telangana , India. A stock solution of potassium bromate was prepared by dissolving 4 gm of potassium bromated in 1 litre water. Working standards solutions were prepared in the range 1o ppm to 100 ppm. Dilute hydrochloric acid solution and a red dye solution were prepared.

Colorimetric measurements were made using a colorimeter and samples were analysed and absorbance was measured at 520nm. In colorimetry , the light absorbtive capacity of a system (coloured solution) is measured and this measurement is related to the concentration of the coloured substance in the solution. When monochromatic light passes through a transparent medium (coloured solution) the rate of decrease in intensity with the concentration and thickness of the medium is directly proportional to the intensity of the light(5).The samples were analysed and optical density of the coloured compound is measured at 520 nm.There is maximum absorption at 520nm , hence all measurements were made at 520 nm unless otherwise mentioned.Samples of bread were air dried at 80^0C in an oven and ground to a powder .Water was added to each of the samples and diluted upto 100 ml in volumetric flasks. To 2 ml of the aliquot of each sample red dye was added in acid medium (the dye was water soluble).

III. RESULTS AND DISCUSSION

Concentration of each of the samples was calculated and plotted against absorbance as shown in figure-1.

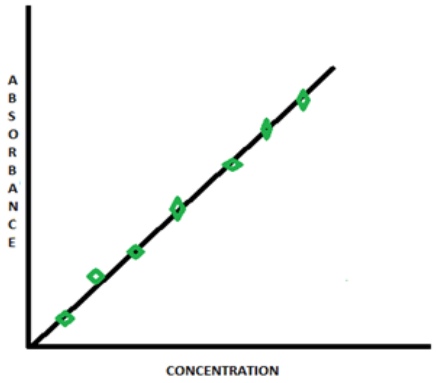

Figure-1

There is a linear relationship between concentration and absorbance. Beer Lambert ‘s law verified which states that when monochromatic light passes through a transparent medium (coloured solution), the rate of decrease in intensity with the concentration and thickness of the medium is directly proportional to the intensity of the light(6).The colorimeter works on the principle - A low voltage lamp forms the light source. This light passes through a selected filter. The light transmitted by the filter passes through the cell containing the coloured solution, and falls on a sensitive photocell. An amplifier amplifies the current generated by the photocell. The amplifier output drives a current meter calibrated in optical density % transmittance(7-8). Absorbance of the chromophore is directly proportional to the amount of potassium bromate present.

CONCLUSION

This method of electroanalytical technique by colorimetry was found to more precise, less expensive and less time consuming. The results were reproducible and in agreement with those obtained from spectrophotometrical analysis (9,10) .

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