International Journal of Trend in Research and Development, Volume 3(4), ISSN: 2394-9333
www.ijtrd.com

Determination of Methyl Parabens- A Colorimetric Study

Shobharani Panchagnula,
Department of chemistry, G.Narayanamma Institute Of Technology And Science,(Affiliated to JNTU-H), Telangana, India.

Abstract-- In the present study an attempt was made to estimate methyl parabens using electro analytical technique – colorimetry. Methyl parabens are anti fungal agents and also used in personal care products and cosmetics. Some bacteria completely metabolise methyl parabens making them biodegradable. Methyl parabens were estimated colorimetrically , the results were found to be reproducible and the method was economical and less time consuming. Diazotisation was done using sodium nitrite and the resulting orange coloured product was analysed colorimetrically at 520 nm obeying Beer Lambert's Law.

Key Words-- *Diaziotisation, Colorimetry.*

I. INTRODUCTION

Methyl paraben (para hydroxyl benzoate) is a white crystalline powder soluble in water and alcohol.It is used as a [preservative for food and cosmetics and is a broad spectrum antibiotic. Parabens replaced formaldehyde many decades ago as a preservative. Methyl parabens are absorbed through the skin or gastrointestinal tract, further hydrolysed and get excreted in the urine without getting accumulated in the body (1,2).It was found that these parabens could be absorbed, metabolized and excreted easily. Parabens exert a broad spectrum of antimicrobial activity over a wide range of pH. Parabens are used in pharmaceuticals in drug formulations (pills, syrups, injectible solutions and contracerptives). Parabens were considered to be practically non toxic. However recent studies have shown accumulation of parabens in breast tissue and leading to cancer in long term usage.

Some studies have revealed a link between parabens and breast cancer(3) and low levels of parabens in cosmetics was found to be safe (4).Parabens , the most widely used preservatives stop fungus, microbes and bacteria growing in cosmetics.They mimic estrogen and are a mean for concern. Long term exposure to these parabens might have an impact on breast cancer(5).

Some studies have shown that these parabens elevate estrogen levels through inhibition of estrogen metabolizing enzymes in the skin (6,7).

II. METHODOLOGY

Colorometric measurements were made using a colorimeter and samples were analysed 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(8).The samples of parabens were analysed with certain reagents 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.

Standard stock solution of parabens (1000µg.ml) was prepared by dissolving pure methyl paraben in distilled water and diluting upto 100ml in a volumetric flask. Working standards were next prepared by diluting 10ml of the stock solution upto 100ml with distilled water.

To 0.5 ml of the working standard 0.5 ml of 1M NaOH ,0.5ml of ortho amino benzene and 0.5ml of sodium nitrite were added .The resulting orange coloured compound was analysed colorimetrically at 520nm against a blank solution prepared in the same method(without methyl paraben).

III. RESULTS AND DISCUSSION

The analysis was based on the reaction of parabens with sodium nitrite in acid medium and the diazotization reaction resulted in an orange coloured compound which was analysed at 520nm. Methyl parabens were prepared in different concentrations and the plot of concentration vs. absorption is shown in figure 1.

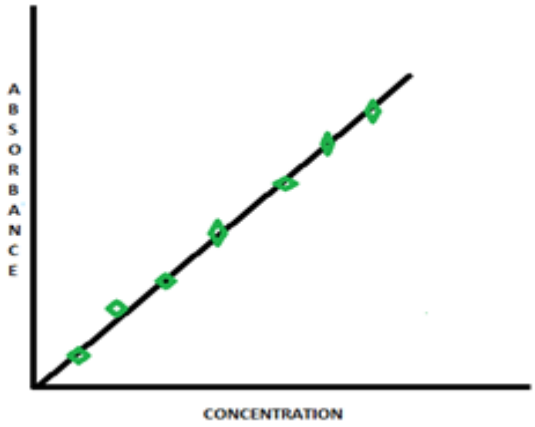

Figure 1

Absorbance of the chromophore is directly proportional to the amount of methyl parabens present.

CONCLUSION

The Beer-Lambert law was adhered and best accuracy was obtained (9,10) .The colour was stable for at least 2 hr. Analysis can be directly performed colorimetrically and was found to be simple, rapid ,sensitive and the results were accurate and reproducible.

ACKNOWLEDGMENTS

The author is thankful to the Chairman, Joint secretary and the Principal of G. Narayanamma Institute of Technology and Science for providing all the facilities to carry on the research work.

References

[1] Darbre, P.D., Environmental oestrogens, cosmetics and brest cancer. Best Practice and Research Clinical Endocrinology and Metabolism, 20 (1) 121-143 (2006)
[2] Lobemeier, C., et al. Hydrolysis of parabens by extracts from differing layers of human skin. Biological Chemistry 377(10), 647-651 (1996)

[3] Soni, M.G., et al., Safety assessment of propyl paraben: a review of the published literature. Food and Chemical Toxicology 39, 513-532 (2001) and references cited therein

[4] Gilliland, D., et al., Kinetic evaluation of claimed synergistic paraben combinations using a factorial design. *Journal of Applied Bacteriology* 72, 258-261 (1992)

[5] FDA. Monograph on OTC topical analgesics. Federal Register 44, 69790 (1979)

[6] Darbre. P.D., et al., Concentration of parabens in human breast tumors. J. Appl. Toxicol. 24, 5-13 (2004)

[7] Harvey, P.W., et al., Endocrine disrupters and human health: could oestrogenic chemicals in bodycare cosmetics adversely affect breast cancer incidence in women? A review of evidence and call for further research. J. Appl. Toxicol. 24, 167-176 (2004)

[8] Prusakiewicz, J.J, et al., Parabens inhibit human skin estrogen sulfotransferase activity: Possible link to paraben estrogenic effects. *Toxicology*, In press, available on line 19 January, 2007

[9] Hindmarsh, K.W., et al., Urinary excretion of methyl paraben and its metabolites. *Journal of Pharmaceutical Sciences*. 72, 1039-1041 (1983)

[10] Nakagawa, Y., Mechanism of p-hydroxybenzoate ester-induced mitochondrial dysfunction and cytotoxicity in isolated rat hepatocytes. *Biochemical Pharmacology*55, 1907-1914 (1998)