

Quantitative determination of formaldehyde in cosmetics using combined headspace–solid-phase microextraction–gas chromatography

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Synopsis

The objective of this research was the application of headspace (HS)–solid-phase microextraction (SPME) for the quantitation of formaldehyde present in raw materials and cosmetic formulations. The formaldehyde was derivatized *in situ* first with pentadfluorophenylhydrazine (PPPH), to form a derivative hydrazone. The formed hydrazone was adsorbed on a SPME fiber during headspace extraction under controlled conditions (time, temperature, volume, etc.). After the adsorption step, the SPME fiber was directly transferred into the gas chromatography (GC) injection port in which the analytes were thermally desorbed. Deuterated acetone was used as an internal standard (IS) in order to quantitate the formaldehyde content. For the experiment, a gas chromatograph equipped with a flame ionization detector (GC/FID) was employed. A gas chromatograph/mass spectrometer (GC/MS) was used for the qualitative confirmation of results in this work.

INTRODUCTION

For decades, formaldehyde was one of the most widely used preservatives in personal care products due to its versatility, cost, and efficiency. In recent years, the potential for carcinogenic and respiratory sensitization from formaldehyde has become widely understood. This has led to a movement in the industry that has imposed regulations, restrictions, and formaldehyde's usage being banned.

In surfactant and cosmetic industries several analytical procedures have been developed for qualitative as well as quantitative analysis. One of the most well known procedures for qualitative analysis is the *phloroglucinol test*, in which formaldehyde reacts in an alkaline medium with phloroglucinol to produce a reddish-brown color complex. For the quantitation of formaldehyde, several methods have been employed, one of which is based on *Nash reagent*. In this determination, formaldehyde is condensed with ammonia and acetylacetone to form the lutidine derivative 3,5-diacetyl-1,4-dihydrolutidine (1,2). Nash reagent is sensitive not only to formaldehyde, but also to other aldehydes. If chromophore compounds are present in the product, they could interfere with the spectrophotometric determination. Formaldehyde can also be determined colorimetri-

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Products Amparo Salvador,Alberto Chisvert,2017-11-20 Analysis of Cosmetic Products Second Edition advises the reader from an analytical chemistry perspective on the choice of suitable analytical methods for production monitoring and quality control of cosmetic products This book helps professionals working in the cosmetic industry or in research laboratories select appropriate analytical procedures for production maintain in market quality control of cosmetic products and plan for the appropriate types of biomedical and environmental testing This updated and expanded second edition covers fundamental concepts relating to cosmetic products current global legislation the latest analytical methods for monitoring and quality control characterization of nanomaterials and other new active ingredients and an introduction to green cosmetic chemistry Provides comprehensive coverage of the specific analytical procedures for different analytes and cosmetic samples Includes information on the biomonitoring of cosmetic ingredients in the human body and the environment Describes the most recent developments in global legislation governing the cosmetics industry Introduces green technologies and the use of nanomaterials in the development and analysis of cosmetic ingredients Cosmetic Microbiology Daniel K.

Brannan,1997-04-23 Until now information on cosmetic microbiology was scattered and mostly consisted of oral tradition passed on from mentors to apprentices Finally here is an understandable and easy to read guide documenting cosmetic microbiology practices Cosmetic Microbiology A Practical Handbook contains technical information on sanitation and the preservation of cosmetics for microbiologists as well as for process engineers plant managers and workers The book provides the knowledge needed to create safe and usable cosmetic products All aspects of cosmetic microbiology are covered including testing methods preservation toxicology and regulatory concerns Index Medicus ,2004 Vols for 1963 include as pt 2 of the Jan issue Medical subject headings **Cosmetics Legislation: Methods of analysis** ,2000 *Determination of Formaldehyde and Toluene Diisocyanate Emissions from Indoor Residential Sources* Thomas J. Kelly,1996 **New**

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updated comprehensive review of its 35 year old counterpart Cosmetic Science New Cosmetic Science has been written to give as many people as possible a better understanding of the subject from scientists and technologists specializing in cosmetic research and manufacturing to students of cosmetic science and people with a wide range of interests concerning cosmetics The relationship between the various disciplines comprising cosmetic science and cosmetics is described in Part I In addition to discussing the safety of cosmetics the Usefulness of Cosmetics rapidly becoming an important theme is described using research examples The latest findings on cosmetic stability are presented as are databases books and magazines increasingly used by cosmetic scientists Part II deals with cosmetics from a usage viewpoint including skin care cosmetics makeup cosmetics hair care cosmetics fragrances body cosmetics and oral care cosmetics Oral care cosmetics and body cosmetics are presented with product performance types main components prescriptions and manufacturing methods described for each item This excellent volume enlightens the reader not only on current cosmetics and usage but indicates future progress enlarging the beneficial effects of cosmetics Products with better pharmaceutical properties cosmeceuticals working both physically and psychologically are also highlighted

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