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Identification of mango and orange flavours in flavoured Chyawanprash by Gas Chromatography-Headspace

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Abstract

A gas chromatographic (GC) analysis was carried out for the identification of volatile flavours in two new fruit-flavoured variants of Dabur 'Chyawanprash'. Quality control is important for ensuring the quality in terms of consistency and uniformity across batches of herbal medicines by monitoring the concentrations of their chemical constituents and other relevant parameters. This study presents the use of GC with headspace to evaluate the profile of volatile flavours as a quality control check for orange and mango flavours in polyherbal Chyawanprash preparations. The GC-headspace analysis allowed the identification of mango and orange flavours in the product basis on comparison of retention time between the reference standard and test samples.

Key-Words: Chyawanprash, Gas chromatography (GC), Quality control, Headspace (HS)

Introduction

Chyawanprash is classified under the category of Rasayana, which aims to preserve physique, vigor and vitality, while delaying the ageing process. Chyawanprash is a mixture of more than 40 herbal ingredients. All the ingredients in Chyawanprash have been scientifically studied individually for their health benefits (Rastogi et al., 2004). Chyawanprash is helpful in clearing the accumulated excreta by promoting digestion and excretion (Parle and Bansal, 2006). It is not only hepatoprotective but also streamlines the metabolism of fats and proteins (Handa et al., 1986). It relieves cough, asthma, bronchospasm, respiratory tract infections and tuberculosis (Ojha et al., 1975) and possesses promising antioxidant, cardiotonic, cholesterol lowering and anti-inflammatory properties (Manjunath at el., 2001). Recently Alok et al., 2012 studied the comparative study for determination of reducing sugars by High-Performance Liquid Chromatography and Titration Method in Chyawanprash.

Fruit-flavoured Chyawanprash in orange and mango variants has been developed recently by Dabur with an intention to make Chyawanprash popular among the population who may have a disliking for the natural taste and odour of the product, especially children.

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Flavour components present in the fruit-flavoured Chyawanprash variants, being volatile in nature, have been selected as identification compounds for a quality control of the final product by GC analysis. The analysis by GC-headspace has been conducted for identification and quality control of the flavoured variants of Chyawanprash. Gas Chromatography is a suitable and reliable method for the simultaneous determination of volatile compounds in the complex natural matrix of plant extracts.

Material and Methods

Instruments

1. Gas chromatography (Perklin Elmer Clarus 500 Gas Chromatograph)
2. Perklin Elmer Headspace Sampler Turbomatrix 40.
3. Capillary column BP-624 (30m X 0.53mm i.d. X 0.25µm coating thickness)
4. Nitrogen as carrier gas.
5. Solvents of analytical grade

Gas chromatographic conditions

Gas Chromatographic analysis was done using capillary column having mid-polar stationary phase. Injector and detector were maintained at temperature of 250°C. Temperature gradient was programmed with initial temperature of 40°C which was gradually increased up to 280 °C for a hold time of 6 minutes. Nitrogen was used as a carrier gas with a split ratio of 10:1.

Standard Preparation

250 mg of reference standard of flavours was accurately weighed into a 25 mL volumetric flask which was dissolved and diluted to volume using

dimethyl sulphoxide (DMSO). An aliquot of 5 mL of the solution was taken into a headspace vial which was sealed properly.

Sample solution Preparation

2 g of sample was accurately weighed into a headspace vial and 5 mL of DMSO was added to it. The vial was sealed and then shaken to disperse and solubilize the material.

Flavours identification

The identification of flavours in the samples was performed by comparison of the retention time (RT) of the peak in the sample & reference chromatogram.

Results and Discussion

The GC analysis allowed the identification of mango and orange flavours in fruit –flavoured Chyawanprash based on comparison of retention time between the reference standard and test samples. The profile of the peaks eluting in the standard was compared with the peaks in sample chromatogram obtained by GC are shown in Fig.1 – Fig.8.

Chromatograms of the blank solution, standard orange flavours (RT 30.6min), standard mango flavours (RT 21.2min, 23.2min), test samples with orange (RT 30.6min), mango (RT 21.2min, 23.2min) flavours and samples without added fruit flavour are given in figure 1-figure 8.

The chromatogram confirmed the presence of flavours of orange and mango in the sample. No peaks corresponding to these flavours were detected in the samples without added fruit flavours (fig.4 and fig.8).

Quality control is important for ensuring the quality in terms of batch to batch consistency of herbal medicines, which monitors the concentrations of various constituents in these medicines. Thus, the development of methods for the quality control of active constituents or marker compounds in the herbal extract is of great importance in medicinal and dietary applications.

For the analysis of volatile compounds in herbal medicines, GC has been widely used (Lee et al., 2009). It is a suitable and reliable method for the simultaneous determination of volatile compounds in the complex natural matrix of poly-herbal formulations like 'Chyawanprash'. The given method ensures the identification of the flavours for the routine quality purpose and allows the formulator to experiment with more flavours in future with well qualified quality methods in place.

References

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Fig.1: Blank (For Identification of Orange Flavour)

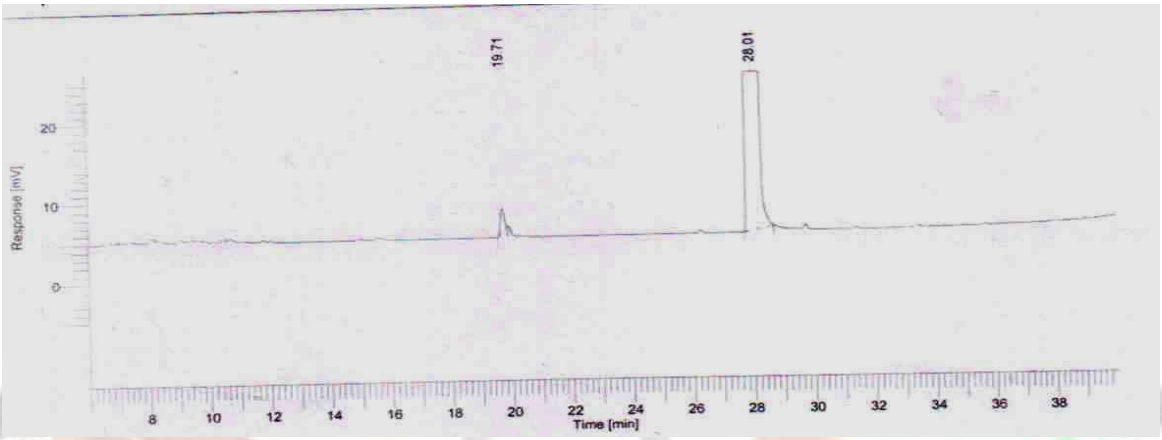

Fig. 2; GC profile of Standard Orange flavor

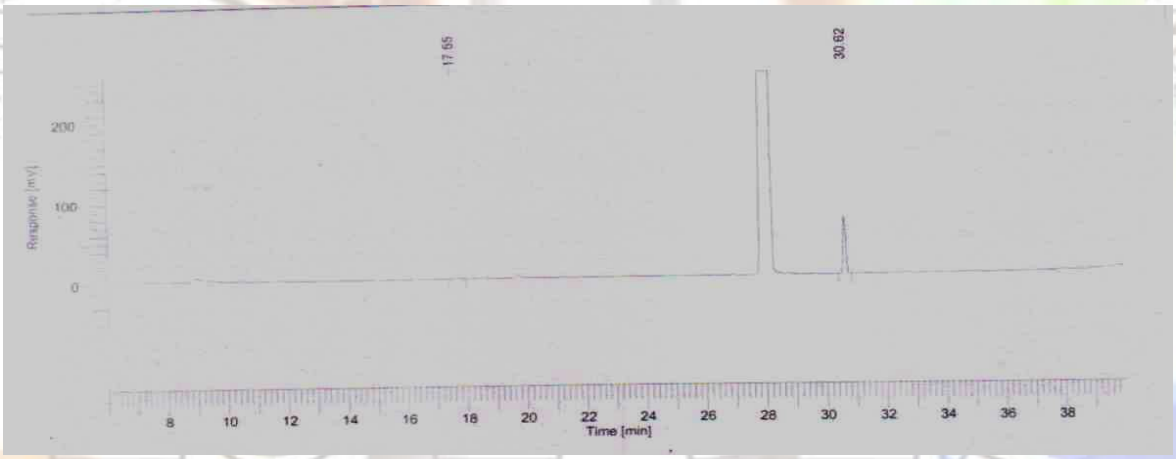

Fig. 3: GC profile of Sample with Orange flavor

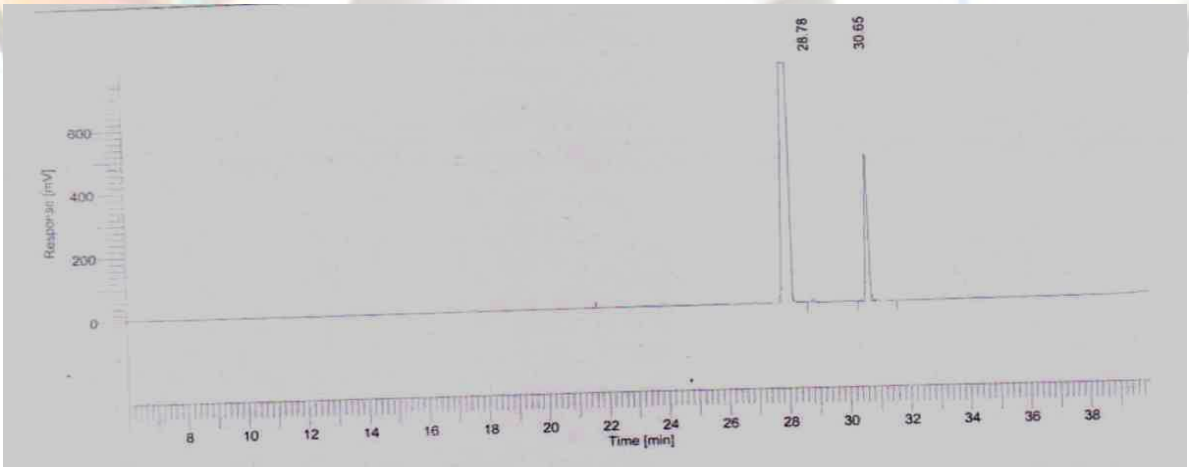

Fig. 4: GC profile of Sample without flavor

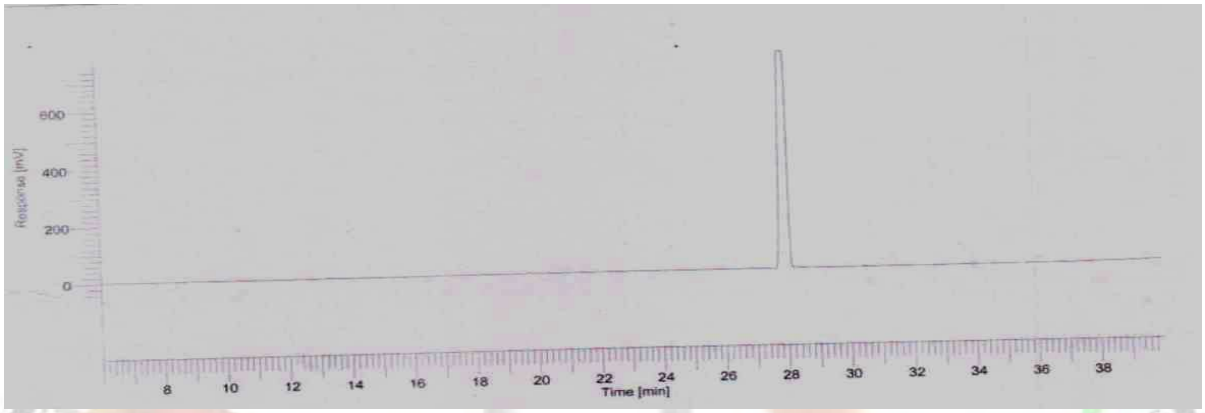

Fig. 5: Blank (For Identification of mango Flavour)

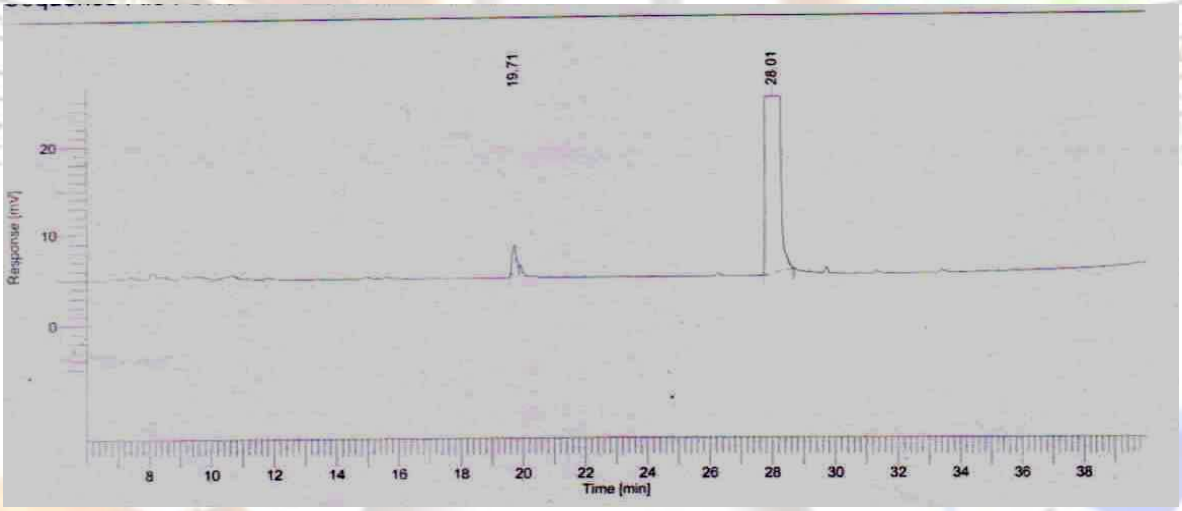

Fig. 6: GC profile of Standard Mango flavours

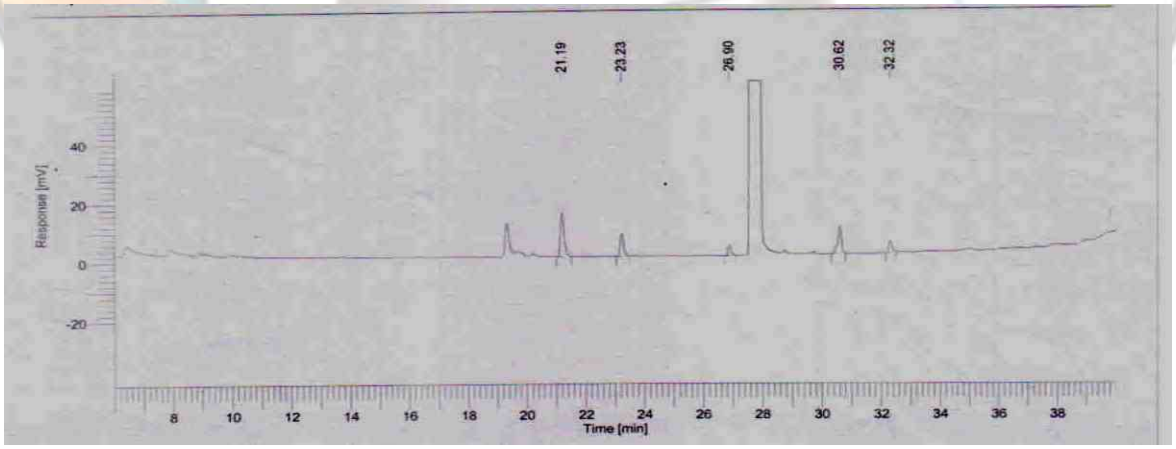

Fig. 7: GC profile of Sample with Mango flavours

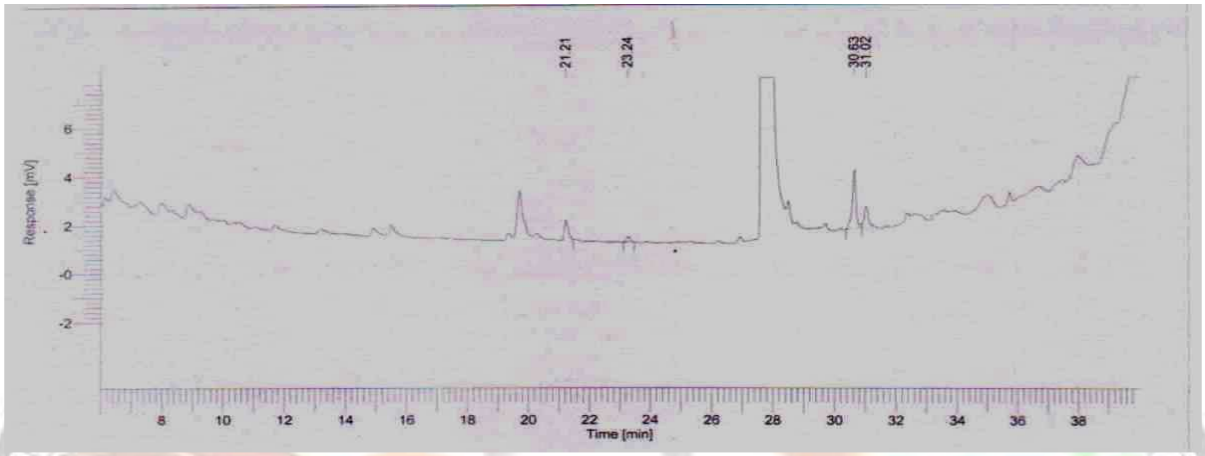

Fig. 8: GC profile of Sample without flavours