

Sulphite's determination of Mediterranean Red Shrimp (*Aristaeomorpha foliacea*), in ionic chromatography

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ABSTRACTS

In the red shrimp (*Aristaeomorpha foliacea*), sulphites are added because they block the activity of an enzymatic complex responsible of shrimp's browning and maintain the aesthetic and commercial characteristics. An ionic chromatography after rapid distillation method was carried out for the quantitative determination of sulfites in food products. On 100 samples, only 0.7% were below the detection limit, 12.7% were above the limit allowed by law, 86.6% of samples were below the maximum permitted by law.

KEY WORDS

Red shrimp; sulphites; chromatography.

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INTRODUCTION

Sulphites are antimicrobial and antioxidant substances recognized as additives by the Commission Regulation 1129/2011.

In the red shrimp, *Aristaeomorpha foliacea* (Fig. 1), sulphites are added because they block the activity of an enzymatic complex called polyphenoloxidase (present in the shrimp cuticle) responsible of shrimp's browning.

These compounds are added to different food types in the form of Sulphur dioxide (E220), potassium metabisulphite (E224), sodium bisulphite (E222), potassium bisulphite (E228). The European Parliament and Council Directive 94/34/EC and subsequent amendments, regulates food additives permitted in the preparation and preservation of food.

They are used especially for the improvement of food well-appearance to make it more inviting

for buyers because make it look fresher than it is.

In addition to these "free" sulphite species, formed in aqueous solutions, "bound" sulphites are also formed in foods by the reaction of sulfites with carbohydrate, protein and lipid molecules. These chemicals are harmful compounds which have mutagenic, cytotoxic and allergological effects.

MATERIAL AND METHODS

An ionic chromatography after rapid distillation method was carried out for the quantitative determination of sulfites in food products (Fig. 2).

The distillation was performed using vapor stream following acidification with HCl and addition of H₂O₂.

The distilled product was purified and injected into an ion chromatograph with Na₂CO₃ as eluent for the sulfites determination (mg SO₂ kg⁻¹).

The linearity ranged from 4.4 to 400 mg SO₂ kg⁻¹ with a correlation coefficient $r^2 = 0.9999$.

The LOD and LOQ were 4.2 and 4.4, respectively. All the parameters of validation were in accordance with the EC Regulation on the analytical parameters used for the method reliability.

The method was accredited by the Italian national accreditation body and turned out to be much faster and more accurate than the conventional procedures.



Figure 1. Red shrimp, *Aristaeomorpha foliacea*.

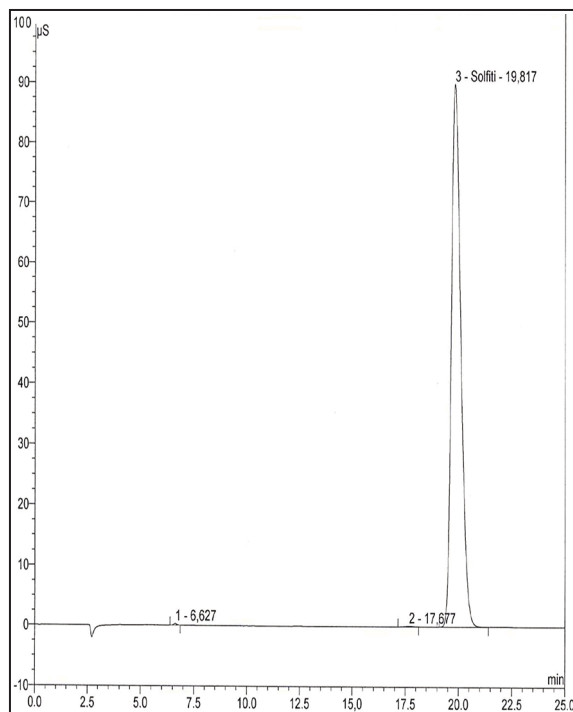


Figure 2. Chromatogram.

RESULTS

On a hundred specimens of the species in question, we revealed that only 0.7% are below the detection limit, 12.7% of the analyzed samples are above the limit allowed by law, in the remainder, quantized samples are below the maximum permitted by law.

DISCUSSION

The results obtained from the analyzes carried out on the red shrimp in question, it is clear that sulphites are used ubiquitously for the purpose of obtaining and maintaining the aesthetic and commercial characteristics.

To protect consumers (especially if they are intolerant to this chemical species), the law requires that the presence of this additive should be declared on the label. In addition, the method used for the analyzes in question was validated by an in-house validation model, according to the UNI CEI ENV 13005: 2000, UNI CEI EN ISO/IEC 17025:2005.

The method has a high recovery (> 98%) and does not interfere with the presence of interfering substances. See also cited references (Sullivan & Smith, 1985; Anderson et al., 1986; Campanella et al., 1990; Pizzoferrato et al., 1990).

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