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Determination of Arsenic in Pectinase by Atomic Fluorescence Spectrometry

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Abstract

An atomic fluorescence method was established for the determination of arsenic in pectinase. After sample digestion, arsenic reacts with potassium borohydride in a specific medium to produce volatile hydride. The fluorescence of characteristic wavelength is emitted under the irradiation of argon loaded quartz atomizer light source, and the fluorescence intensity is proportional to the content of elements.

Keywords

Microwave digestion; atomic fluorescence; Pectin enzyme; arsenic.

1. Introduction

Enzyme is a kind of biocatalyzer, which can improve the processing performance of apple raw materials and improve the quality of its products. Pectinase has been a necessary application in the clarification of fruit juice. Most of the manufacturers can skillfully master the correct use of enzyme preparation for clarification.

Arsenic is a toxic element with strong accumulation. There are silver salt colorimetric method, spectrophotometry, atomic absorption spectrometry, atomic fluorescence spectrometry and other hydride generation atomic fluorescence techniques[1-6] are developing rapidly in recent years.

2. Experimence

2.1. Instrument

Atomic fluorescence spectrophotometer; Arsenic hollow cathode lamp; CEM microwave digester

2.2. Sample pretreatment

Microwave digestion program: the sample was weighed about 1.0g+2.5ml nitric acid +5ml water, 0120 5min,120-170 20min. 2.5 mL hydrochloric acid 2.5ml thiosara-ascorbic acid mixed solution was added in turn. The solution was volumetric and shaken well, and placed for at least 15 min.

3. Results and Discussion

3.1 The selective fluorescence intensity of the lamp current and negative high voltage increases with the increase of the lamp current and negative high voltage of the photomultiplier tube, but it affects the service life of the lamp. The increase of negative high voltage is beneficial to the

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improvement of sensitivity, but the reduction of linear range is considered comprehensively. The lamp current is 60 mA and negative high voltage is 300 V.

3.2 The results of potassium borocyanide dosage show that too low or too high concentration of potassium borocyanide will lead to the decrease of sensitivity, the concentration of potassium borocyanide at 1%~2% is more stable, so the concentration of potassium borocyanide at 1% is used as a reducing agent.

3.3 In this method, hydrochloric acid was selected as the carrier. When the concentration of hydrochloric acid was 1% and 10%, the fluorescence intensity was stable, and 5% hydrochloric acid was used as the medium.

3.4 Standard Curve

There was a linear relationship between fluorescence intensity and concentration, when As was 0~10.00μg/L. Linear equation was Y=156.28x—22.45, r=0.9991.

3.5 Sample Analysis

In this experiment, several representative pectinase amylases were selected, which were pectinase (Danisco), and the samples were treated according to the above method. Meanwhile, the blank samples were analyzed, and the results were shown in the table below.

Sample	As(mg/kg)
Pectinase (Danisco)	0.134

4. Conclusion

This method is suitable for the determination of arsenic in pectinase by microwave digestion and hydride atomic fluorescence method. The results are in line with the national standard limit. This method has the advantages of simple, rapid and accurate operation, less interference, high sensitivity, precision and recovery tests, and is suitable for the determination of arsenic in pectinase.

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