

Composition rice bran oil determinate for spectroscopy IR

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Abstract

This article presents the determination of the composition of rice bran oil determined by FTIR spectroscopy using a Perkin Elmer spectroscope. The spectra obtained have wavelenghts between 3465 and 1744 cm^{-1} . The functional groups that enter the composition of rice bran oil are: OH, CH₂, CH.

Keywords: Chemical composition, rice bran oil, IR spectroscopy

Introduction

Rice is the largest cereal crop in China. Rice bran is one of the by-products of rice processing. It is produced by grinding brown rice into white rice. Rice bran is a mixture of skin, seed coat, aleurone layer and part of the germ, accounting for 8-10 percent of the mass of brown rice. Rice bran is not only rich in oleic acid, linoleic acid and other unsaturated fatty acids, but also contains B vitamins, vitamin E, dietary fiber, protein, amino acids and other nutrients. It is a good nutritional material. However, rice bran has not been fully utilized due to its poor appearance, unpleasant smell and lack of edible application^[1-5].

At present, there are more than 10 million tons of rice bran as a by-product of rice processing in China every year, most of which is used as feed, and a small part is used to make fertilizer. In Japan, rice bran is regarded as a new resource for the development of high-value-added products. After extracting rice bran oil from rice bran as raw material, other special components of rice bran separated in the refining process are commercialized, so as to increase the comprehensive utilization of rice bran in the factory and the economic benefits of enterprises.

There is a considerable amount of rice bran oil in rice bran, its main components are oleic acid, linoleic acid. Compared with other vegetable oils, it contains more unsaponifiable substances and trace components, and has the effect of reducing serum cholesterol. Rice bran oil is not easily oxidized when heated, so it is safe to eat. At the same time, rice bran oil has a good flavor, the color of cooked food is beautiful, very suitable for cooking oil. It is often considered a good, premium oil, along with sesame and olive oil, as a healthy oil.

As a kind of health care medicine, plant sterols have the function of reducing blood and liver cholesterol concentration, and can prevent and treat many diseases such as hyperlipidemia and arteriosclerosis.

In the past, defatted rice bran was mainly used as compound feed, as well as food curing and fertilizer manufacturing. At present, defatted rice bran products are: inositol. It can be used as raw materials of medicine and various comprehensive beverage preparations, as well as essential

vitamins and infant food fortifier, phytic acid. Recent studies have found that phytic acid has anti-cancer effects, as well as antioxidant, fatty liver and kidney stone inhibition. Phytic acid has been used as a food additive to regulate acidity and pH.

In addition, bioactive substances such as vitamin E, dietary fiber, rice bran protein and polysaccharides can also be prepared from rice bran. As a potentially useful resource, rice bran will provide more food, nutrition and medical resources for human beings^[6-12].

Materials and Methods

Materials

Edible oils like rice bran oil are purchased in local commerce.

Sample preparation for FTIR analysis

Perkin Elmer Fourier transform infrared spectrometer with deuterated triglycin sulphate (DTGS) as a detector is used for the analysis. The liquid sample is placed between two KBr pellets with the help of capillary tube. Each pellet is made of 0.2mm thickness and it is placed in the path of the sample beam. The spectra are recorded from 4000 to 450 cm^{-1} , the number of scans being 256 at a resolution of 4 cm^{-1} . Scan speed is 0.20 cm/s .



Fig 1: Perkin Elmer Fourier transform infrared spectrometer

Results and discussions

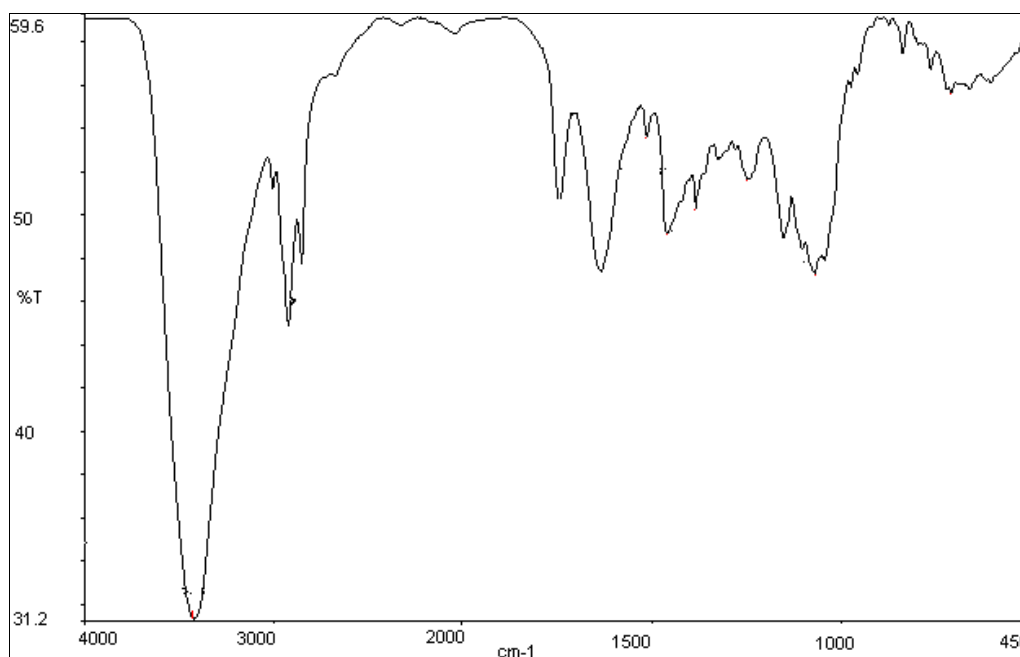


Fig 2: FTIR spectra of rice bran oil (unheated)

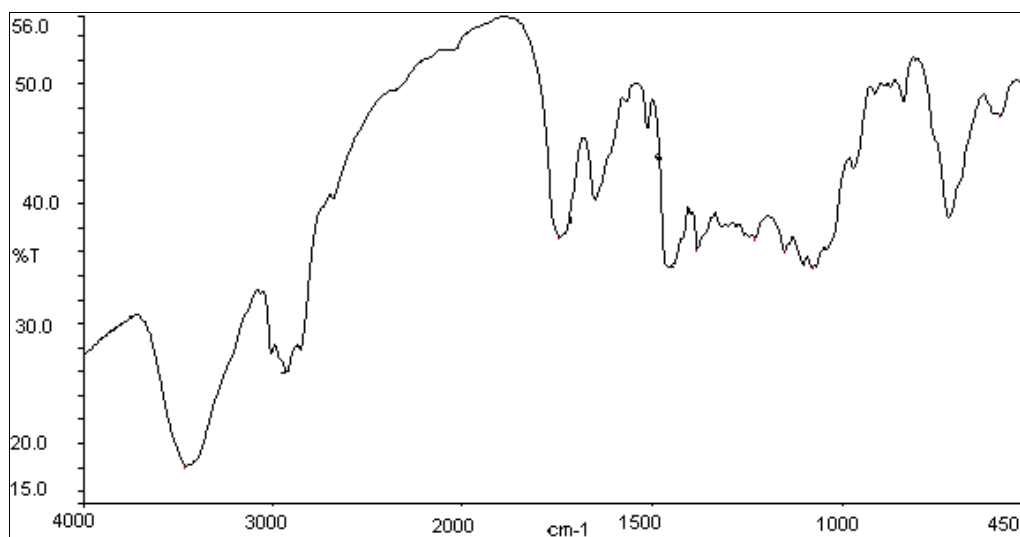


Fig 3: FTIR spectra of rice bran oil (heated)

Figs 2 and 3 show the FTIR spectra of unheated and heated rice bran oil. Almost all the transmissions are found to be the same. The decrease in transmission from 3465cm^{-1} (fig.2) to 3432cm^{-1} (fig. 3) reveals the lack of formation of hydroperoxide ^[10]. This might be due to the presence of 2417ppm of antioxidants in RBO ^[8]. Transmission at 3008cm^{-1} shows the higher presence of Linoleic and linolenic acyl groups ^[5]. 2854cm^{-1} has been formed due to symmetric and asymmetric stretching of $-\text{CH}_2$ group ^[11]. The broadening of 1743 to 1744cm^{-1} may be due to production of saturated aldehydes functional groups ^[9-19].

Conclusions

The composition of rice bran oil was determined by FTIR spectroscopy using a Perkin Elmer spectroscope and the spectra obtained have wavelengths between 3465 and 1744cm^{-1} . The functional groups that enter the composition of rice bran oil are: OH, CH_2 , CH.

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