UTILIZATION OF RICE BRAN IN FOOD AND SOAP INDUSTRY

by
Amila Thathsarani Bulathsinghala (B.Sc.)
Department of Chemistry
University of Kelaniya
Kelaniya
Sri Lanka

Dissertation Submitted as a Partial Requirement for the M.Sc. Degree in Industrial & Environmental Chemistry of University of Kelaniya, Sri Lanka

June, 2008

ABSTRACT

Rice bran oil was extracted from the commercial bran and the traditional varieties namely, Rathusooduru and Madathawalu using water and hexane as solvents. It was observed that hexane extract contained maximum oil (19.75 – 24.82 %) than the aqueous extract (2.20 – 3.50 %)

Rice bran undergoes hydrolysis with lipase readily, and has to be stabilized. The percentage of free fatty acid in rice bran which was stabilized using hot air drying, moist air drying (steaming), deep freezing, refrigeration and sun drying and stored at room temperature and refrigerator, were determined. Even after stabilization, lipase activity was observed in 28 days stored samples. Deep freezing of the raw bran gave the lowest lipase activity (20.04% free fatty acids) after 28 days.

The quality of the oil (iodine value, peroxide value, saponification value and index of refraction) was determined for the aqueous and hexane extract of raw rice bran from Madathawalu.

It was observed that hexane extract contained lower saponifacation value (171.20 ± 0.80), iodine value (92.33 ± 0.71) and peroxide value (22.01 ± 0.34) than the aqueous extract where the saponification value, iodine value and peroxide value were 181.11 ± 0.68, 94.47 ± 1.22, 25.89 ± 0.48 respectively. Refractive index of the oil was similar in both extract. It was further observed that oil from the aqueous extract was better in colour and odour than the hexane extract.

The percentage of unsaturated fatty acids was higher in aqueous extract (76.59 %) than the hexane extract (72.25 %). The major fatty acids in the oil were oleic acid (40.82 - 43.38 %), linoleic acid (29.41- 29.80 %) the precursor for n-3 fatty acid and palmitic acid (23.17 - 24.78%). No significant difference in the fatty acid profile of the oil from the commercial and traditional local varieties was observed.

Soap was prepared from rice bran oil extracted from commercially available rice bran with hexane. It was observed the usual ratio of 11:2 of oil to NaOH, did not give a soap that complied with SLSI standard No 34:1981, but soap prepared using rice bran oil and sodium hydroxide in the ratio of 23:4 compile with the SLSI standard.

Cereal was produced using 5%, 10% and 15% rice bran and it was observed that the product acceptable to taste panel at ITI, was that contained 10% rice bran. The percentages of moisture, protein, fat, fiber, ash and carbohydrate content in 10% bran incorporated cereal was 9.3 $\pm$ 0.3 g/100g, 9.8 $\pm$ 0.5 g/100g, 3.8 $\pm$ 0.3 g/100g, 0.7 $\pm$ 0.0 g/100g, 1.0 $\pm$0.0 g/100g and 75.2 g/100g respectively, while the values in rice bran were 8.5$\pm$ 0.0 g/100g, 15.4 $\pm$ 0.4 g/100g, 16.5 $\pm$ 0.4 g/100g, 5.1$\pm$ 0.4 g/100g, 5.2$\pm$ 0.9 g/100g and 49.2 g/100g respectively. The nutrition value of the product was more than that in rice but less than that in rice bran.