SUMMARY

To study the extraction and utilization of oils from some cheaper sources and industrial wastes, oils from the following sources have been investigated:

(i) rice bran
(ii) coffee meal
(iii) sapindus mukorossi gaertn. (ritha) seeds
(iv) cedrus deodara wood chips.

The work has been done on the solvent extraction of these materials under different conditions of temperature, time, solvent, moisture, particle size, etc., in order to find the optimum conditions for the extraction. To study their utilization, the rice bran oil and the coffee oil have been treated for the preparation of alkyd resin, varnishes, sulphated oil detergents and urethane oil.

Rice bran oil:

n-Hexane has been found to be a suitable solvent for the extraction of this oil. Moistening with water and drying before extraction helps the flow of the solvent and gives a light coloured oil with low viscosity although the quantity of oil extracted slightly decreases. Extraction by percolation is also found to give a light coloured oil after moistening and drying the bran.
The rice bran oil has been subjected to glycerolysis to get the product of low acid value (reduced from 12 to 4.5) and rich in monoglycerides by heating with glycerine under different conditions of temperature, time and composition.

Twenty nine samples of the alkyd resins have been prepared under different conditions of temperature and composition, using rice bran oil, linseed oil and their mixtures. Their characteristics and the characteristics of the varnishes from some of these samples have been determined. The study has indicated the possibility of partial replacement of the costly linseed oil by the cheaper rice bran oil in the preparation of alkyd resins and their varnishes, to yield products which are comparable to those obtained by using, exclusively, linseed oil.

For the preparation of the sulphated rice bran oil detergents from the glycerolysis product, the study of five variables was done in eight runs. The variables studied are oil acid ratio, temperature, time, solvent and catalyst, each at two levels. The catalyst and the solvent were found, not to be major variables. A lower oil acid ratio, longer stirring time and higher temperature were found to be better conditions for sulphation of rice bran oil in the presence of a catalyst and a solvent. Thirteen samples have been prepared and their
characteristics determined. The samples are comparable to those prepared from castor oil.

The hydroxy esters of rice bran oil have been used to prepare some samples of urethane oils under different conditions, of temperature and composition. The samples have been found to be very quick drying to produce films which are hard and resistant to the action of 2 per cent aqueous sulphuric acid and to the effect of pressure. The NGO/OH ratio of 0.5 at a temperature of 40 - 50°C is found to be suitable for their preparation in the presence of stannous chloride catalyst.

The presence of about 20 per cent carbohydrates including 2 per cent soluble sugars and 18 per cent of starch in the deoiled rice bran suggests the possibilities of its utilization for getting starch and of its utility in fermentation industries. Instead of using the bran as a cattle feed, extract its bran meal can also be used as a cattle feed and as a fertilizer.

Coffee oil:

Reducing the particle size and then extracting it with n-hexane at its boiling temperature, have been found to be the suitable conditions for the extraction of the oil from the spent coffee meal. Heating of 250 gms. of coffee oil with 150 gms. of glycerine at a temperature of 200°C with stirring, in the presence of a catalyst and in a current of nitrogen reduced the acid value from 157.5 to about 8 in two hours.
Fourteen samples of alkyd resins were prepared using coffee oil, linseed oil and their mixtures under different conditions of temperature and composition. The characteristics of these alkyd resin samples and of their varnishes were determined. The coffee oil alkyds have been found to be comparable to those prepared from linseed oil and suggest the possibility of substituting linseed oil by coffee oil for the preparation of alkyd resins and varnishes where colour requirement is not a major consideration.

Eight samples of sulphated coffee oil detergents were prepared from the product of glycerolysis of coffee oil rich in monoglycerides to study the effect of three variable factors, i.e., oil-acid ratio, temperature and time of acid addition, each at two levels. Their characteristics were also determined. The samples are comparable to and in some respects better than those prepared from castor oil which is generally used for this purpose. Higher oil-acid ratio, longer acid addition time and higher temperature give better results.

The hydroxy esters of the coffee oil have also been used to prepare some samples of urethane oils under different conditions of temperature and composition. Some of their characteristics have been studied and the samples found to be very quick drying to give a hard film of good rocker and scratch hardness, resistant to 2 per cent aqueous sulphuric acid and pass the pressure test.
The NCO/OH ratio of 0.75 at a temperature of 40 - 55° is more suitable. Higher temperature and greater NCO/OH ratio increase the chances of gelation.

_Sapindus mukorossi garti_ (ritha) oil:

After having used the pericarp of the fruit for ashing of clothes and for other detergent purposes, the black seed can be used for the extraction of oil from its kernel which is found to contain about thirty five per cent oil and for which n-hexane has been found to be a suitable solvent. The conditions for the extraction have been standardised. The size of the kernel has no effect on the extraction, which shows that there is no need of powdering the kernels before extraction. The oil has been investigated for its characteristics. The percentage composition of the acids, has been determined by converting the acids into their methyl esters and analysing through gas liquid chromatography.

_Cedrus deodara_ wood extract:

The wood chips have been extracted under different conditions with different solvents. Benzene has been found to be a good solvent. The extract was subjected to fractional distillation and the characteristics of various fractions have been determined.
The steam distillation of the benzene extract (7.96% of the wood) gives the steam volatile fraction (1.9% of the wood) which is about three times the amount (0.6% of the wood) obtained by direct steam distillation of wood. The colour of the benzene extract is improved by fraction distillation, vacuum distillation or by passing through an alumina column. The samples were tested for their use as a substitute for the imported cedar wood oil, in the oil immersion microscopy and were found to be equally good and at the same time, economical.