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Research Paper :

Polymerised salicornia oil based alkyd resins and its comparision with polymerised Karanja Oil Based Resins

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ABSTRACT

Salicornia and Karanja oils are widely available in India. With the aim to develop value added products from local resources, Salicornia and Karanja oils were polymerized thermally and thermocatalytically using various percentage of benzoyl peroxide (BPO) as a free radical catalyst. During polymerization the free fatty acid content increases as revealed by increasing acid value and unsaturation decreases as indicated by decreasing iodine value. Alkyd resins were prepared from thermally polymerized, thermocatalyticlly polymerized and unpolymerized oils. The mechanical and chemical properties of air-dried and baked films of alkyd resins were studied and compared. The study indicates that the film properties of the alkyds prepared from the catalytically polymerized oils are better than those of the alkyds from the thermally polymerized and unpolymerised oils.It was also observed that the Salicornia oil based alkyds have better properties than Karanja oil based alkyds . Karanja oil based alkyds were not suitable for coating due to its nondrying nature.

Key words : Polymerised salicornia oil, Polymerised karanja oil, Iodine value, Alkyd resins, Thermal and thermocatalytical polymerization

Among the oldest coatings, binders are "drying oils". The drying oils have been used as raw materials for decorative and protective coatings due to their ability to polymerize or dry after they have been applied to surface to form tough, adherent,impervious and abrasion resistance films (1). The film properties of the resins based on drying oils such as linseed oil and soyabean oil are generally satisfactory. However, the rising cost of traditional oils on one hand and the ready cheap availability of nontraditional oils have attracted the attention of researchers (2,3,4). Since the oils by themselves can not meet the desired film properties, a number of ways for oil modification have been proposed (5,6) *viz.*, introduction of functional groups like ester (7), amide (8), oxarine (9), urethane (10), esteramide (11) etc. The synthesis of low molecular weight polymers like alkyds, polyepoxies, polyurethane and polyesteramide was carried out by the incorporation of such functional groups in oils (12-15). One of the methods of modifying the oils is polymerization. The thermal and catalytic polymerization of oil is widely reported in literature (16-22).

In the present study, thermal and thermocatalytic polymerization of Salicornia (*Salicornia brachiata*) and Karanja (*Pongomia pinnata*) oils were conducted . The polymerized oils were used to prepare alkyd resins.

MATERIALS AND METHODS

Karanja oil was procured from SPRERI (Sardar Patel Renewable Energy Research Institute, Vallabh Vidyanagar). Salicornia oil was procured from CSMCRI (Central Salt and Marine Chemicals Research Institute, Bhavnagar).All other chemicals used for the study were of laboratory grade .Characteristics of the oils have been shown in Table 1.

Table 1 : Characteristics of oils

Sr. No.	Characteristics	Salicornia	Karanja
1.	Acid Value	9.80	7.8
2.	Saponification Value	230	185
3.	Iodine Value	128.0	81.0
4.	Hydroxyl Value	9.0	6.0
5.	SpecificGravity	0.92	0.919
6.	Refractive Index	1.4642	1.4690

Polymerization of oil:

Oil was placed in a round bottom flask.In thermocatalytic polymerization benzoyl peroxide (% 0.5, 1.0, 1.5 to 2.0) was added as a catalyst. The temperature was raised to 230^{0}C. The samples for checking viscosity and R.I. were taken out after every 1 hr. The Polymerization was carried out for 4 h in all the cases.

Similar procedure was repeated for thermal polymerization but catalyst was not added. Viscosity and refractive index of polymerized oils were determined by gardner bubble viscometer and Abbe's refractometer,