

PENGARUH VARIASI KONSENTRASI ASAM BENZOAT PADA POLIMERISASI DAN KARAKTERISASI RESIN ALKYD DARI MINYAK KEDELAI

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INTISARI

Penelitian pengaruh variasi konsentrasi asam benzoat pada polimerisasi dan karakterisasi resin alkyd dari minyak kedelai telah dilakukan. Tujuan penelitian ini adalah mempelajari pengaruh variasi konsentrasi asam benzoat pada polimerisasi resin alkyd dari minyak kedelai terhadap waktu kering film yang dihasilkan, serta dipelajari karakteristik fisika dan kimia resin dan film resin alkyd.

Polimerisasi resin alkyd dilakukan dengan dua tahap. Tahap pertama, reaksi alkoholisis antara minyak kedelai, poliol, dan LiOH untuk menghasilkan monogliserida. Tahap kedua, reaksi poliesterifikasi antara monogliserida, anhidrida ftalat, asam benzoat, dan poliol untuk menghasilkan resin alkyd. Delapan resin alkyd diberi kode RA1 s.d. RA8. Poliol pentaeritritol digunakan RA1 s.d. RA4, sedangkan poliol gliserol digunakan RA5 s.d. RA8. Pada masing-masing poliol divariasikan persen mol anhidrida ftalat dan asam benzoat. Resin dianalisis dengan FTIR dan $^1\text{H-NMR}$. Karakterisasi fisika dan kimia dilakukan untuk resin alkyd dan filmnya. SEM digunakan untuk analisis morfologi permukaan film.

Hasil penelitian menunjukkan bahwa resin alkyd berwujud gel dan berwarna kuning. Waktu kering film tercepat, yaitu 1,47 jam, terjadi pada resin RA3 dengan persen mol optimum asam benzoat sebesar 8%. Resin RA3 s.d. RA8 memiliki bilangan asam kurang dari 10 mg KOH/g, sedangkan resin RA1 dan RA2 memiliki bilangan asam masing-masing 11,22 mg KOH/g and 13,68 mg KOH/g. Film RA3 memiliki kekerasan tertinggi dengan viskositas optimum Z10+ dan daya rekat film resin alkyd 100%. Film resin yang dihasilkan berwarna kuning dengan daya kilap film lebih dari 89% dan fleksibilitas tinggi. Uji ketahanan dengan larutan NaCl 10% mempengaruhi film resin alkyd dengan poliol gliserol, sedangkan film resin alkyd dengan poliol pentaeritritol tidak terpengaruh. Spektra FTIR menunjukkan adanya gugus ester pada resin alkyd yang terkonfirmasi dengan spektra $^1\text{H-NMR}$. Morfologi permukaan seluruh film resin bersifat rata dan tidak berpori.

Kata kunci: resin alkyd, pentaeritritol, gliserol, asam benzoat, film.

THE EFFECT OF BENZOIT ACID'S CONCENTRATION VARIATIONS ON POLYMERIZATION AND CHARACTERIZATION OF ALKYD RESIN BASED ON SOYBEAN OIL

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ABSTRACT

Research on the effect of benzoit acid's concentration variations on polymerization and characterization of alkyd resin from soybean oil has been carried out. The purpose of this research was to study the effect of benzoic acid's concentration variations on the polymerization of alkyd resin from soybean oil toward drying time of film produced and to know the physical and chemical characteristics of the resins and alkyd resin films.

Alkyd resin polymerization was carried out in two steps. The first step was alcoholysis reaction between soybean oil, polyol, and LiOH to produce monoglycerides. The second step was polyesterification reaction between monoglycerides, phthalic anhydride, benzoic acid, and polyols to produce alkyd resins. Eight alkyd resins were coded RA1 until RA8. Pentaerythritol was used RA1 until RA4, while glycerol was used RA5 until RA8. Four variations mol percent of phthalic anhydride and benzoic acid were carried out of the resin synthesis with each polyol. Resins elucidation structure were carried out by FTIR and $^1\text{H-NMR}$. Physical and chemical characterizations were carried out for resins and films of alkyd. SEM was used to analyze the surface morphology of the film.

The results showed that alkyd resin was yellow gel. The fastest drying time was 1.47 hours. It was RA3 with eight mol percent of benzoic acid. RA3 until RA8 had acid numbers of less than 10 mg KOH/g, while RA1 and RA2 resins were 11.22 mg KOH/g and 13.68 mg KOH/g. The highest film hardness was RA3 film with optimum viscosity, namely Z10+, and the adhesive power of the alkyd resin film was 100%. The color of resin film was yellow and film had high flexibility. The glossiness of the film was more than 89%. Alkyd resin film with pentaerythritol as polyol was not affected while the alkyd resin film with glycerol as polyol was affected by 10% NaCl solution. FTIR spectra showed the presence of ester groups in alkyd resin confirmed by $^1\text{H-NMR}$ spectra. The surface morphology of all resin films was flat and non-porous.

Keyword: alkyd resin, pentaerythritol, glycerol, benzoic acid, film.