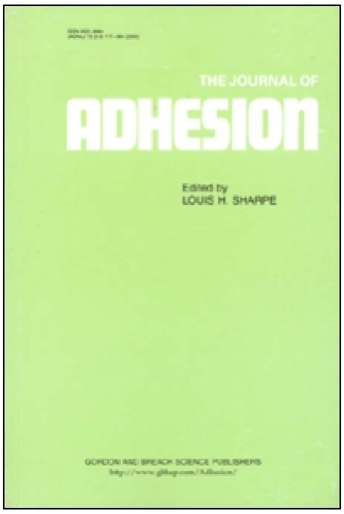

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Contents

Preparation and Solute Permeability of Composite Membrane Containing Hydrophilic and Hydrophobic Polymers

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Abstract

Asymmetric composite membranes are prepared through mixtures of aqueous solutions of hydrophilic polyvinyl alcohol and aqueous hydrophobic polyvinyl acetate emulsions.

Ultrafiltration through these membranes was examined, and the relations between the conditions for membrane preparations (amounts of lithium chloride as swelling agents added, drying temperatures of membranes, gelation times etc.) and permeabilities of water and solutes of molecular weights 1000 ~ 10,000 were studied.

Consequently, optimum condition to prepare a membrane was determined. The membrane had good water permeability and solute permeation selectivity.

(Received: July 4, 1987)

Studies on Two-Phase Structure of SIS/Tackifier Resin Mixtures

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Abstract

Two-phase structure in mixtures of polystyrene-polyisoprene-polystyrene triblock copolymers(SIS) and a variety of tackifier resins was investigated by small-angle X-ray scattering and transmission electron microscope. The following results were obtained.

(1) In the mixtures of SIS and the tackifier resins which dissolve in polyisoprene matrix, the polystyrene domains and the Bragg spacing were smaller than those of neat SIS.

(2) By adding tackifier resins which dissolve in the polystyrene domain, the size of the polystyrene domain increased and a two-phase nature was promoted.

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Contents

Behavior Analysis at Peeling Pressure Sensitive Adhesive Tapes Part 2. Morphology of Stringiness Phenomena at Peeling Pressure Sensitive Adhesive Tapes

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Abstract

Effect of backing materials on stringiness phenomenon was studied by using Miyagi's observation apparatus in my previous paper. The apparatus made it possible to analyze visually the moment of adhesive coming off from adherend. In the relatively low peeling speed range below 10 mm/min., stringiness conformation of adhesives of the porous backings was observed as a honeycomb structure and that of the nonporous backing was a sawtooth-shape structure.

Further detailed morphological analysis of the peeling front was done this time. Honeycomb structures were divided into two types such as an almost spherical cavity and a markedly transformed one. Sawtooth-shape structures were divided into three types such as a simple one, one with webfoot structure at the peeling front, and one with tiny projections at the front edge. Stereographic images of these peeling fronts were constructed by detailed observation of the side view and front view.

(Received: September 7, 1987)

Tack and Mean Friction Coefficient of Pressure Sensitive Adhesives (I) Effects of Coating Weight, Vertical Reaction, and the Content of Curing Agent on the Mean Friction Coefficient

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Abstract

Using a tester similar to the Duglus-ball-tack-method, tackiness of PSA's has been expressed by the mean friction coefficient ($\bar{\mu}$) in terms of rolling distance of a steel ball on PSA surface (x) and initial height of the ball (h) as follows.

$$\bar{\mu} = \frac{h}{x}$$

The effect of coating weight and the vertical reaction, and the content of curing agent on the ($\bar{\mu}$) of acrylic PSA's has been studied. This article has shown the ($\bar{\mu}$) is good enough to evaluate tackiness of PSA and also unable to a quality check of PSA-products as a safe and simple method.

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Contents

Two Dimensional Stress Analysis on Adhesive Bonded Lap Joints

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Abstract

In this paper, a two dimensional (in the x–y plane parallel to the adherends) elastic stress analysis method for adhesive bonded lap joint based on the finite element technique is presented. The present method can calculate the bond stress distribution for the case that the width of one adherend is different from the other one, while the conventional 2D. F.E.M. calculates the bond stress distribution along the longitudinal axis of the joint and through the thickness of the adhesive layer but the width of the adherend must be equal to the other one. In the present method, a classical plate theory approximation, where in-plane stresses are uncoupled with out-of-plane stresses, is adopted for the deformation of the adherends in order to simplify the problem and reduce the total number of degrees of the finite element model. For simplification, an assumption that the displacements in the adhesive layer are uniquely determined by the relative displacements of the adherends is also made. On the other hand, three dimensional stress state in the adhesive layer is considered and the stresses in the adhesive layer vary through the thickness. The lap area of the joint is also divided into double triangular finite elements. Each element has six nodes with five degree of freedom (x, y and z translations, rotations about x and y axes).

A three point bending test using a single lap in which the width of one adherend is twice the width of the other one, was conducted in order to examine the present method. Good agreement with respect to both surface strains of adherends and deflection of the joint between calculated result and experimental one was obtained. Some typical stress distributions for single lap joints under tensile shear loading were also calculated. The present method always gives higher values for maximum adhesive stresses than our previous program (one dimensional analysis).

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Formulations of Peeling Theories by Continuum Mechanics†

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Abstract

In this paper peeling theories have been formulated by using continuum mechanics. One of the formulations is derived from dynamic balance and another is from mechanical energy balance. Both are general expressions and valid regardless of the constitutive equation of the material. The following conclusions are drawn by these formulations.

1) Both of them correspond to the dynamic balance analysis and the mechanical energy theory of conventional peeling theories respectively, but they are physically identical because both can be derived from the equation of motion.

2) There is no difference is recognizing strength of peeling as either force or energy.

3) The peeling force is substantially the reaction of total interfacial forces which work between adhesives and adherends from the dynamic standpoint.

4) We deduced a relational expression which can connect the theories of surface chemistry of adhesion with the theories of rheology.

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† A study of Mechanics of Adhesion (I).