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## **APPENDIX**

## APPENDIX A

THE CALCULATION OF THE MOLE RATIO BETWEEN ANACARDIC  
ACID AND FORMALDEHYDE AND SODIUM HYDROXIDE

$$\text{molecular weight of formaldehyde} = 30.03 \text{ g/mol}$$

$$\text{molecular weight of sodium hydroxide} = 40.01 \text{ g/mol}$$

a. average molecular weight of anacardic acid ( $\text{C}_{22}\text{H}_{30}\text{-36}\text{O}_3$ )

$$= (348+346+344+342)/4$$

$$= 345 \text{ g/mol}$$

$$\% \text{ anacardic acid in CNSL} = 82\%$$

$$\text{anacardic acid in 200 g CNSL} = (82 \times 200)/100 \text{ g}$$

$$= 164 \text{ g}$$

$$= 164/345 \text{ mole}$$

$$= 0.475 \text{ mole}$$

$$\text{formaldehyde in 40 g of 37\% formalin} = (37 \times 40)/100 \text{ g}$$

$$= (37 \times 40)/(100 \times 30.03) \text{ mole}$$

$$= 0.493 \text{ mole}$$

$$\text{mole formaldehyde : mole anacardic} = 0.493/0.475$$

$$= 1.038$$

b. 2 g sodium hydroxide =  $2/40.01$  mole

$$= 0.050 \text{ mole}$$

$$\text{mole sodium hydroxide : mole anacardic} = 0.050/0.48$$

$$= 0.104$$

## APPENDIX B

## TERMINOLOGY OF ADHESIVES [12,13]

**adherend, n**

a body held to another body by an adhesive.

**adhesion, n**

the state of being held together by means of an interlayer of adhesive between adherend interfaces : the attachment of two surfaces by interfacial forces, chemical bonding forces, interlocking action, or combinations of these.

**adhesive, n**

a material that binds other material together by surface attachment.

**adhesive assembly, n**

a group of materials or parts, including adhesive, placed together for bonding or which has been bonded together (See also assembly adhesive).

**adhesive, cold setting**

an adhesive which sets at temperature below 20°C (68°F).

**adhesive, hot setting**

an adhesive with a setting temperature of 100°C (212°F) or more.



**adhesive, intermediate temperature setting**

an adhesive which sets in the temperature range 31-99°C  
(87-211°F).

**adhesive, room temperature setting**

an adhesive which sets in the temperature range 20-30°C  
(68-86°F).

**adhesive, warm setting**

an intermediate temperature setting adhesive (31-99°C).

**assembly adhesive, n**

an adhesive that can be used for bonding together, such as in the manufacture of a boat, airplane, furniture, and the like.

**assembly time, n**

the time interval between applying the adhesive on the substrate and the application of pressure, or heat, or both, to the assembly.

**closed assembly time, n**

the time interval between the closing together of substrates after adhesive has been applied, and the application of pressure, heat, or both to the assembly.

**opened assembly time, n**

the time interval between applying adhesive on the substrates and closing them together before bonding.

**cold pressing**

a bonding operation in which an assembly is subjected to pressure without the application of heat.

**dry, v**

to change the physical state of an adhesive on an adherend by the loss of solvent by evaporation or absorption, or both.

**drying temperature, n**

the temperature to which an adhesive on an adherend or in an assembly or the assembly itself is subjected to dry the adhesive.

**drying time, n**

the period of time during which an adhesive on an adherend or an assembly is allowed to dry with or without the application of heat or pressure, or both.

**hot pressing**

the curing of thermosets by heat and pressure application to a bonded assembly, e.g. plywood and laminate manufacture or production of multi-layer printed circuit boards.

**laminate, n**

a product formed by bonding together two or more layers of material or materials.

**laminate, v**

to unite layers of material with adhesive.

**lamination, n**

- 1) the process of preparing a laminate.
- 2) any layer in a laminate.

**spread, n**

the quantity of adhesive per unit joint area applied to an adherend, usually expressed in pounds of adhesive per thousand square feet of joint area.

**double spread, n**

application of adhesive to both adherends of a joint.

**single spread, n**

application of adhesive to only one adherend of a joint.

**wetting**

a surface is said to be completely wet by a liquid if the contact angle is zero and incompletely wet if is a finite angle. Surfaces are commonly.

## APPENDIX C

## FORMULATION OF COMPOUNDED NATURAL RUBBER AND ITS RHEOGRAPH

Table C.1 Formulation of compounded natural rubber [40]

Compositions	Gradients
NR	60
Reclaim	80
Peptiser	1
Stearic acid	1
Pine tar	2
Antioxidant	1
Zinc oxide	5
Black	30
MBTS	1
TET	0.1
Sulphur	2
total	183.1

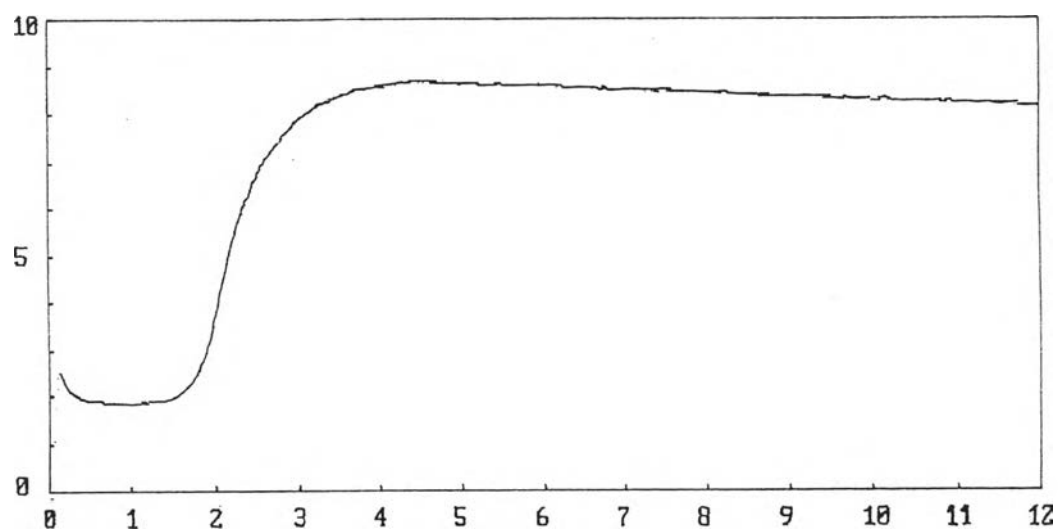


Figure C.1 Reograph of compounded natural rubber,  $T_{90} = 10$  min  
(Union Commercial Development Co., Ltd.)

Temperature setting	150 °C
Time range	15 min
Torque	41.0 in-lb
Torgue range	50
Vibration angle	1

## VITA

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