CHAPTER III

LITERATURE REVIEW

Chen, Linker, Bemmel, Soerens [1991] examined in a disposible diaper or the similar materials which have a film layer to which adhesive tape fasteners are secured. The diaper film is reinforced against stresses produced from the used of adhesive tape. Each reinforcement, located on the back side of the film opposite the tape attachment area , is composed of a hotmelt adhesive formulated from two EVA copolymer. These polymer have different properties depending on a tackifier, a minor portion of a paraffin or microcrystalline wax.

Sorbo [1991] have an examined the chemistry of rosin esters. He also observed their use as primary or secondary tackifiers in hotmelt adhesives. The effects of Bevilite, Bevipale and Bevitack rosin ester tackifiers (Bergvik Kemi AB) on the properties of packaging and bookbinding adhesive formulations were reviewed.

Hakim, Seifert, Nichols, Graves, Barnes and McCormick [1991] presented a study of these additives that are microcrystalline waxes (Be Squre 175 and 195 and Sell Wax 700) and synthetic waxes (Petrolite CP-7 and C-9387 ethylene - propylene copolymers , Petrolite C - 4040 PE and Paraflint H-1 polymethylene). The additives properties of EVA hotmelt adhesives. The examined properties included viscosity, ring and ball softening point, adhesive fail temperatures, tensile strength and elongation.

Komornicki, Bourrel, Marin and Brogly [1992] have studied the visco-elastic and mechanical behavier of hotmelt adhesive formulation based on mixtures of an ethylene vinyl acetate (EVA) copolymer, a terpene phenolic tackifying resin, and increasing amounts of a highly crystalline synthetic Fisher-Tropsch wax. The visco-elastic behavier has been characterized by oscillatory experiments at a fixed frequency (thermomechanical analysis), and by creep measurements at various temperature.

Croda [1992] has developed a range of hotmelt adhesives with aim of simplifying the footwear manufacturing process and reducing cost in the shoe industries . Their main component is Elvax EVA by Du Pont whose adhesive properties at a wide range of temperatures and with a great variety of materials that make it suitable for the manufacturing of top quality leather shoes where complex labour-intensive operations were formerly required.

Crabtree and Walker [1992] present an overview on the developements and applications of hotmelt adhesives. The nature and characteristics of hotmelts are considered. These are the main end use sectors of industry. Advance in the usage of hotmelt adhesives can be attributed to the improvement in machine technology, the methods of examination of application techniques and including types of coatings and laminating techniques.

Nardin, Brogly and Scultz [1993] studied specific interactions in binary blends, models of hotmelt adhesives , The adhesive blend is ethylene vinyl acetate copolymer (EVA) with different terpene phenol low molecular weight tackifying resin (TPR) as a function of the composition of the blend.

Molecular electron donor-acceptor (or 'acid-base' according to Lewis' concept) complexes are clearly evidenced between TPR hydroxyl and EVA carbonyl groups. Quantitative data on the fraction of acid-base bonded carbonyl groups can be used to calculate the enthalpy of pair formation the analysis of the interface between the blends and basic (aluminium) or acidic (glass) substrate by FTIR allow us to show the establishment and to quantify the strenght of acid-base interfacial interactions in both cases. Finally, the comparison between the interfacial and bulk properties data and adhesive strength measurement (peel energy) leads to the estimation of fundamental parameters of adhesion science, in particular the acid-base component of the energy of adhesion and the number of acid-base interactions per unit interfacial area.

Honiboll [1993] studied the properties of EVA-based hotmelt adhesives containing a new Fischer-Tropsch wax (FTW1) with tailored MWD were compared with those of HMA formulations prepared using different wax types (including an high molecular weight FTW, two PE waxs, and a microcrystalline wax with a medium melting point). The FTW1 exhibited good compatibility with EVA copolymers with vinyl acetate (VA) contents of up to 33%, indicating that formulators can obtain good adhesion to polar and nonporous substrates using the new FTW1 in high-VA-content systems.

Earhart and Horsey [1993] combined a hindered phenol primary antioxidant with a hydrolytically stable phosphite secondary antioxidant to formulate the performance of a new bifunctional stabilization system for hotmelt adhesive.

Experimental results showed that the new system provided more effective resistance to discoloration and better control of viscosity in EVA/hydrocarbon-based hotmelt adhesives than did conventional antioxidant system.

Rao, Sitaramam and Rohinikumar [1993] prepared hotmelt adhesive of waste PE milk pouches and EVA. The effect of blend composition on softening points and on bond strengths with various metals was studied. These adhesives may find applications in low-demanding but high-value application such as book-binding , shoe manufacture and as adhesive support to heat shrinkable plastics for cable applications. Low cost is advantage.

Dexter's Hysol Engineering Adhesives Division [1993] has introduced an ethylene-vinyl acetate hotmelt adhesive formulated for closing wax-coated cartons even in refrigerated storage spaces and trucks. WaxPac has a vescosity of 2700 cps at 350F, a tensile strength of 730 psi and heat resistance to 150F (66°C). With an open time of 30 sec. WacPac is available in several shaped forms for use in hand-held applicators. The ingredient are FDA-approved, and it is safe to work with. This abstract includes all the information contained in the original article.

McBride [1994] designed experiments that investigated factors that were important for controlling viscosity in hotmelt adhesives , it was found that the concentrations of polymer and wax in the final formulation were the major variables determining viscosity in an EVA - based hotmelt adhesive . The introduction of SPC has enabled DuPont to upgrade process control on its Elvax production line , which has resulted in improved consistency of melt index measurements and better control of variability in the polymer melt index.

McBride [1994] studied an important quality problem in the production of a hotmelt adhesive with a consistent viscosity. Experimental design models are used to show which factors are important in controlling viscosity . The percentage of polymer and wax in the final formulation are the two most important variables in determining the viscosity of an EVA-based hotmelt. Melt index is one of the most important factors that the adhesive manufacturer cannot control . As an outgrowth of using statistical process control , DuPont recently upgraded the process control features at its plant to improve the consistency of the melt index measurement. Melt index measurements were taken once an hour , but now they are taken more frequenly. This has led to a step change reduction in the variability of the polymer index.

From this literature review , there are many types of base polymers used in hotmelt formulation but EVA is most widely use. Because it has good adhesion and cheap cost . Wetting agent generally rosin ester and hydrocarbon resin and some phenolic type. Wax is an important additive to reduce and adjust hotmelt viscosity. Wax may be PE wax that is by product from polyolefin polymerization. Antioxidant always use conventional BHT .