ABSTRACT

Synthetic tanning agents (syntans) are indispensable for making any type of leather article. There is achallenge for syntans to be processed low or without formaldehyde to meet strict regulations in the leathergoods. Conventional amino resins based retanning agents possess excess free formaldehyde and are sensitive to pH as they are precipitated and deposit superficially on the surface of leather during their application in retanning process.

Present study provides methods for low formaldehyde and formaldehyde-free amino resins based retanning agents.Five methods of low formaldehyde sulfonated hydrazide modified amino resins based on succinic dihydrazide, adipic dihydrazide, glutaric dihydrazide; terephthalic dihydrazide andisophthalic dihydrazide were developed and prepared.

Sulfonated succinic, glutaric, adipic, isophthalic and terephthalic dihydrazide formaldehyde condensates were preparedby controlled reaction of dihydrazide, formaldehyde and sodium metabisulfite by varying mole ratio of sodium metabisulfite/dihydrazide and formaldehyde/ dihydrazide molar ratio.

Two series of formaldehyde free retanningsbased on melamine, glyoxal, glutaraldehydeand sodium sulfamate were developed. Sulfonated melamine glyoxylated resins were prepared by controlled reaction of melamine with glyoxal and sodium sulfamate by varying glyoxal to melamine mole ratio and sodium sulfamate to melamine mole ratio. Sulfonated melamine glutaraldehyde resins were synthesized by controlled reaction of melamine with glutaraldehyde by varying glutaraldehyde to melamine mole ratio and sodium sulfamate to melamine mole ratio. All stabilized resins were characterized by Fourier Transform Infra Red Spectrometer (FTIR) and proton NMR spectroscopy. It was observed in five dihydrazide based series that viscosity of resin solutions increases by increasing formalin/dihydrazide mole ratio and decreases by increasing sodium metabisulphite/dihydrazide mole ratio. The same trend of viscosity behavior was also observed in two series of free formaldehyde melamine based resin, i.e., viscosity decreases with increasing degree of sulfonation. Molecular weight of the resins was determined by intrinsic viscosity method.Molecular weight shows a direct relationship with the viscosity of

e resins. Resins with higher viscosity have higher molecular weight and vice versa. . After aining a critical molecular weight during condensation, resins turned into a gel form.

tabilized resins of the series were applied comparatively as retanning agent against a standard tanning agent on leather by a retanning procedure. Organoleptic properties of the resins were isually assessed. Tensile and tear strength, percentelongationatbreak, grain cracking of re-anned leathers were comparatively evaluated and resins with optimum performance were elected respectively.

Morphological analysis of the grain surface and cross section of the leather fibers re-tanned by ontrol and optimized synthesized resins were analyzed by scanning electron microscope (SEM) which showed more compactness of grain and fiber structures of experimental re-tanned leather. Organoleptic properties of optimally re-tanned leather show better performance in comparison to ontrol re-tanned leather. Free formaldehyde contents in the five series of hydrazide basedresins ere found <0.05 % and free formaldehyde contents in re-tanned leather was found upto 10ppm. here was, however, no detection of formaldehyde in two series of melamine based resins and eir retanned leathers.

Resins with optimum re-tanning performance showed good thermal stability evaluated by thermal gravimetric analysis. Retanned leathers with optimum performance were also assessed for thermal stability by thermogravimetric analysis and showed better thermal stability.