CHAPTER-V

16.0 Review of work done on chemical modification of sugarcane wax:

Hard waxes obtained from crude sugarcane wax by different authorities by applying various techniques possess many desirable properties, still needed hard wax component in polishes and other solvent paste preparations. Although the hard waxes obtained are quite satisfactory yet the solvent retentivity power and other characteristics essential for wax to be used in polishes, carbon paper manufacturing etc., lack in gel strength and flow points. Process yet to be devised which can produce waxes from crude wax comparable to carnauba wax, I.G. wax or any other industrial quality wax in hardness, melting point and gelling properties. In order that sugarcane crude wax may replace industrial quality wax and other hard waxes available in market, it is essential that the crude sugarcane wax extracted from press mud be subjected to further modification in crude stage. Numerous workers have carried out researches normally with the hard and bleached waxes but no work has been done to modify crude wax without separating undesirable constituents to get industrial quality wax having high melting point jelling properties and other essential chemical characteristics. The author has developed a new process to modify crude sugarcane wax chemically to hard wax having all desirable characteristics without separating the undesirable constituents like pitch, fatty matters and soft waxes as per needs of the industry for commercial purposes. Before describing the process developed by the author, a brief accounts of the work
done in the field of chemical modifications of sugar cane wax by various investigators are given as under:

Bleached waxes especially those obtained by chromic acid bleaching, consists essentially of mixtures of long chain higher fatty acids. Starting with this bleached wax, number of derivatives were prepared by replacing the carboxyl group with glycols or poly hydric alcohols or conversion to amides and diamides. In this regard, Hatt et. al. have made a comprehensive study of such waxes and have reported very encouraging results.

16.1 Ester Waxes:

The ester was prepared by heating the bleached wax with ethylene glycol by Y. P. Kapil. In the experiment conducted amount of alcohol required to esterify the free acidity of the wax was calculated from the acid value of the bleached wax. A little more than the theoretical amount was used and p-toluene sulphonic acid was used as catalyst. By trial experiment, it was possible to establish quantity of alcohol and the time required for complete esterification. Ester wax so obtained showed lowering of melting point but exhibited higher solvent retaining power than the original wax.

16.2 Amide wax:

Amide waxes melt at higher temperature and also are harder than the corresponding esters. Carothers found polyamides to be hard, tough and less easily fusible than polyesters. They give an extremely
high lusture when polished, and when dissolved in a suitable solvent make an excellent waxing and polishing composition. Armour Company states that 'Armo Wax' is not suitable as the hard wax components in polishes in spite of its hardness it seems likely that if similar derivatives of the higher fatty acids present in bleached sugar cane wax were prepared, they might be suitable.

Amide wax was prepared by heating the bleached wax with appropriate amine (ethylene diamine), amount of amine used being little more than theoretical quantity calculated from the acid value of the bleached wax. From a number of experiments, it was found that free acidity of wax is almost completely neutralized by heating the wax for 10 hours with theoretical quantity of amine plus 10% extra. The acid value of wax was brought down 123 to 13 while melting point increased from 80-82 °C to 110-112 °C. Amide wax was found to be much harder than camauba wax but exhibits lower solvent retaining power. Most serious disadvantage of amide wax noticed to be contraction in pastes when cooled to room temperature accompanied by checking, so that the paste no longer adheres to container.

16.3 Anilide Waxes:

Anilide waxes have likewise been prepared by heating the chromic acid bleached wax with aniline for 10 hours. Anilide waxes like esterified waxes exhibit low melting points and high solvent retentivity. Thus it has been observed that ester waxes and anilide waxes possess low melting
points but higher retaining power while the amide waxes possess higher melting point but lower solvent retaining power. By blending these waxes it was possible to produce a wax having all desirable properties required of hard wax for using in solvent pastes.