SUMMARY

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Alkyd resins are the most important class of coating resins. The original alkyd resin was the condensation product of phthalic anhydride and glycerol. These alkyds had very limited usefulness, but it was found that carboxyl group from dibasic acids could be replaced in part of fatty acids giving oil-modified alkyd resins. The oil modified alkyd resins found commercials use because they dissolve in common solvents and are converted to useful films by baking or air drying.

The alkyds which were prepared from linseed oil, glycerol and phthalic anhydride are the most known and have excellent properties.

Phthalic anhydride is the most important acid used in alkyd resins because of its low cost and better properties. It is difunctional and may be used with difunctional alcohols to produce resins having a linear strcuture and may be also used with higher functional alcohols to produce resins having cross linked structure.

The main objectives of this investigation are the production and evaluation of alkyd resins based on rice bran oil and modified with tetrabromophthalic anhydride.These can be achieved by partial replacement of the phthalic anhydride by tetrabromophthalic anhydride without affecting the resin constants.These long oil alkyds were prepared via fusion technique.

The prepared alkyd resins were adjusted to suitable solid content by dilution with xylene (60% solids) followed by addition of driers then filtered. The prepared different varnishes were applied on glass plates and allowed to dry for 10 days before evalution studies.

Varnish and film evalutions were performed according to standard and well recognized methods.The main conclusion drown from this study show the following generalization :

A-During the resin preprations, the following observations were noticed:

1- Increasing the amount of rice bran oil leads to a relative increase in the esterification reaction.

On the other hand, using a mixture of tetrabromophthalic anhydride with phthalic anhydride results gradual increase in the time by increasing the percent of tetrabromophthalic anhydride .

2- The colour of the prepared resins usually increase by increasing the percent of tetrabromophthalic anhydride in most cases.

B- The main conclusions from varnish characteristics:

1- The colour of varnish increases by increasing the amount of tetrabromophthalic anhydride and rice bran oil or its fatty acids.

2- The viscosity of the prepared alkyds slightly increased by increasing the percentage of tetrabromophthalic anhydride .

3- The final acid value of resins prepared by tetrabromophthalic anhydride are higher than those prepared by phthalic anhydride.

C-From drying characteristics data we can conclude the following:

1- Modification by either tetrabromophthalic anhydride or linseed oil or fatty acids decreases the air drying time.

2- The alkyds based on linseed oil and its fatty acids are air dried.

3- Formulations containing rice bran oil and its fatty acids give air dried film only when phthalic anhydried is totally replaced by tetrabromophthalic anhydried.

4- The stoving schedules were also improved by increasing the amount of tetrabromophthalic anhydride and linseed oil or its fatty acids.

5- The presence of rice bran oil or its fatty acids increases the air and stoved drying times which may be due to the saturated properties of their fatty acids.

D-The main conclusions derived from the study of acid, solvent, water and alkali resistance:

1- All films (air dried – stoved dried) show excellent performance when subjected to acid and solvent.

2- The modification of resins using teterabromophthalic anhydride are affected by water than phthalic anhydride where loss of gloss values were observed in case of teterabromophthalic anhydride.

3- The alkali resistance is highly improved by modification with tetrabromophthalic anhydride.

4- Stoved films showed improved chemical resistance when compared to the air dried films of the same resin content.

5- Rice bran oil and its fatty acids produced alkyds with lower alkali resistance than that of linseed oil and its fatty acids, which may be due to the saturation nature of rice bran fatty acids.

6- Films prepared from oleic acid give excellent resistance to water except those modified by tetrabromophthalic anhydride which are affected by water and least resistant to alkali than other resins.

E-The collected results from the mechanical properties measurments were:

1- The hardness of dry films was improved by the increase of :
   i- Percentage of linseed oil or linseed oil fatty acids.
   ii- Percentage of tetrabromophthalic anhydride.
2- The gloss of the investigated dried films were satisfactory. However it slightly increases by increasing the amount of tetrabromophthalic anhydride.
3- Modification of alkyd by either linseed oil or its fatty acids or tetrabromophthalic anhydride leads to improvement in the scratch hardness.
4- Adhesion of modified alkyds showed outstanding performance similar to that of the unmodified alkyds.
5- Stoved films showed better performance than the air dried films of the same resin content.

From the previous records and the collected results, it can concluded that modification by tetrabromophthalic anhydride showed improvements in each of alkali resistance, hardness, gloss, drying properties in addition to better resistance to scratching than those of unmodified alkyds. On the other hand colour, adhesion, acid resistance, solvent resistance showed similar performance as unmodified alkyds.