

Water Soluble Polymeric Dyes for Enhanced Stability in Ink Jet Printing

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Abstract

Almost twenty years ago Dr. Dawson of Dynapol Corp. prepared many small samples of polymeric dyes for use as harmless food colorants and non-ingestible pharmaceuticals. The approach was to prepare a suitable polymeric backbone to attach common colorants. Many of these backbones were not workable for attachment of dyes or had stability problems. The approach proved to be much more difficult and costly for the applications proposed. The concept, however, was not without merit since polymeric substances often exhibit improved stability over their monomeric counterparts.

In this paper we will discuss the general preparation and application of classes of highly water soluble dyes, with high tint strength, for use in ink jet printing. Such factors as viscosity control, molecular weight, spectral properties and image stability will be covered. The use of polymeric dyes was reexamined, because new approaches are now possible and by the use of additives, critical properties can be adjusted.

Examples of actual working dyes and their light and heat stabilities will be shown. To compete against existing

systems such factors as availability, cost, stability and ease of use, will be presented. Many existing dye structures, with minor modifications, can be used as adducts to polymer backbones and some dyes are suitable without any modification. These chemistries will be illustrated with actual working examples, dye structures will be shown and samples will be available to show solid and solution properties. Because these dye structures are so new, there is limited data on light and heat stability; however the results are so encouraging that the general approach is being made available to have others take up the approach to verify results.

Today pigmented inks are being used widely for their superior image stability. However, it has always been known that soluble dyes have a wider spectrum of color available for use and simplicity in the design and trouble free operation of low cost ink jet equipment has perpetuated the use of soluble inks.

With soluble polymeric dyes it may be possible to bridge the gap between the stability of pigmented inks and preserve the wide color spectrum of soluble dyes.