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Press Release: Determination of water in printing inks.

Date: 3rd June 2010

Printing inks are complicated mixtures of chemical compounds. The composition varies by printing process, by whether printing is sheet fed or web, and by substrate.

Recent developments in printing presses (sheet fed and web machines in term of high speed production and inking/dampening units) and drier equipment (nitrogen blanketing, cold lamps) have led to a significant increase in the number of applications in the graphic arts industry: boxes for cosmetics, food, tobacco, spirits, business forms, direct mail, lottery tickets, credit cards, to name but a few.

The composition varies by the solvent base, be it oil based or water based. It varies by drying mechanism and by whether the drying is by primarily chemical or by a physical processes.
Inks are divided into liquid and paste inks.
Gravure, flexo, ink jet, electrographic and some electrophotographic inks (or toners) are liquid inks. Lithographic and letterpress inks are paste inks.
The distinction between liquid and paste inks can be an arbitrary one, since it is based on apparent viscosity.

Sheet fed Inks dry by oxidation of the vehicles or varnishes carrying the pigment in the ink. These varnishes made from Linseed Oil, or Tung oil will oxidize slowly at room temperatures. To assist in drying all inks have some drying catalysts added in the form of an inorganic salt, Cobalt, Manganese, and Lead (rarely).
When ink is applied to a non-porous surface or where accelerated drying is required an extra boost of these catalysts can be applied by adding Cobalt driers to the ink. The accelerated drying also takes place on the rollers and in the ink duct so inks with added driers must be processed quickly or they set in the ink train.

On non-porous surfaces getting enough Oxygen to the ink may be a problem so driers, (Calcium Perborate), can be added to release Oxygen into the ink. The more ink the slower the drying and some colours dry slower than others. Ink drying will be retarded by cold temperature, low pH (acid), and high Relative Humidity. High humidity and high levels of water will emulsify in the ink and will slow ink drying. Keeping water to a minimum and using alcohol to reduce the film thickness is important on non-porous surfaces.

This water level needs to be determined both quickly and accurately, preferably at the point of manufacture, but also when the inks are applied to different substrates.

Metrohm have developed a method, based on Karl Fischer Titration by utilizing their 874 Oven Sample Processor in conjunction with the 851 coulometer, which is both fast and accurate.

The ink (and substrate) is weighed into a vial and the top is sealed (crimped). This sample is then introduced into an oven where the water evolved is titrated in the KF coulometric cell.

The refined methodology of this technique brings decisive advantages;

- Strictly reproducible analysis conditions for all samples, this is shown by the considerably improved precision of the results.
- Manual sample preparation is reduced to a minimum, just “weigh, crimp and analyse”.
- Considerable savings in time and money, less reagent costs for example, no more acid and solvent extraction.
- No contamination of the oven, consequently there is no carryover and memory effects.
- Improved water release from the sample as the carrier gas does not just pass over the sample but directly through it.
- Fast analysis times; typically 3 minutes, and up to 35 samples at a time!!

We also have applications where the bound and unbound moisture can be determined separately.

For more information visit our website www.metrohm.co.uk or contact us on 01928 579 600
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Note to Editors:
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Set up in 1995, Metrohm UK serves the key markets of the UK including the chemical, petrochemical and pharmaceutical industries, as well as the automotive and food sectors.