

## STABILITY AND USE PROPERTIES OF PIGMENT BASED INKS

Most of the inkjet inks are now a dispersion of pigments in a water base, as they give more environmentally friendly products that have also a better durability and compatibility with the packaging. However, with going away from dye solutions, the ink industry faces stability issues such as sedimentation and aggregation that can have a great impact on the quality of the finished product. Concentration gradients and blocking of the jet leading to inconsistency of the colour through the cartridge life can appear. A typical example of inks causing problem are the yellow inks that are known for being the most difficult to formulate. Moreover, in some cases foam is created when the ink is jetted on the substrate, leading also to bad quality printing.

### *Application 1: Stability of pigment based inkjet inks*



× **Common method:**

Visual observation is usually used to control the stability of inkjet inks. However, depending on the colour of the ink, it can be quite difficult to assess sedimentation phenomenon. These measurements are usually done during 2 months, with storing samples at 50°C. Moreover, particle size increase due to flocculation and/or aggregation are tricky to measure as a particle size analyser requires high dilution that can modify the colloidal properties of the system.

**The visual observation for stability tests of inks is tedious, subjective and time consuming. Moreover the results are only partial (no information on flocculation and kinetics).**

× **Turbiscan® method:**

The analyses performed with the Turbiscan LAB enable to monitor both migration and particle size increase without doing any dilution. The sedimentation is quantified through migration velocity so that formulations can be easily compared. Packing of the sediment is also monitored. The analyses can be done at high temperature (up to 60°C) and automated *via* a fully automated ageing station (Turbiscan AGS). The stability measurements are done in only a couple of days, they are objective and traceable.

**By using the Turbiscan LAB the stability tests of inkjet inks are accelerated by 20, enabling to increase the development capacities for new products and to improve the reliability of the batches produced.**

### *Application 2: Foamability of inks*



× **Common method:**

The formation of foam from a cartridge on the substrate leads to bad quality printings. It is therefore important to measure the foamability of ink and possibly the effect of anti-foams. These tests are usually performed by making the foam using an agitation device (ultrasounds, manual shaking, vibroshaker, *etc.*) and measuring visually the amount of foam created. The study of the breakage of the foam over time enables to monitor its instability.

**The investigation of foamability is therefore subjective and tedious.**

× **Turbiscan® method:**

The Turbiscan LAB can measure easily the quantity of foam produced thanks to its scanning device. The foam can be created directly in the measuring cell using the same method as mentioned previously. The measurements over time allow a monitoring of the stability of the foam and a comparison of different products *via* kinetics calculated with the software.

**The Turbiscan LAB enables to monitor the foamability of inks and to follow the stability of the foam created in an objective and traceable way.**

**Application 3: Re-dispersion of sediment****× Common method:**

It is difficult to avoid completely the sedimentation of the pigments. For industrial printing, where the ink is stored in a tank before being used in a continuous loop, the re-dispersibility of the pigments is a key parameter. If they sediment in the tank, it is important to be able to re-disperse them easily. It can be quite difficult to measure the good re-dispersibility of a sediment and when the test is done it is only performed through visual observation.

**× Turbiscan® method:**

The Turbiscan LAB can also be used to assess the re-dispersibility of the sediment in addition to the information obtained on its packing. This analysis is performed by measuring the sample before any sedimentation has occurred and after re-dispersion of the settled ink. If the backscattered level measured is the same in both cases, we can conclude that the sediment is not aggregated and can be re-dispersed easily. Otherwise, aggregation has occurred in the sediment and the ink cannot be used. This is a quick and easy measurement that can be used for quality control purposes.

**The Turbiscan LAB enables to get a quick and objective measurement of the re-dispersibility of a pigment in inkjet inks.**

These different tests concerning various aspects of the quality of inks are done with the same apparatus, the Turbiscan LAB. They concern both R&D labs that develop new inkjet inks formulations with the best stability properties possible, and quality control departments that check the products at the end of the production line and make long-term stability tests. Moreover, the technique can also be used to study other types of ink (*e.g.* monitoring of the crystallisation of dye).