

# TURBISCAN LAB



- » Characterisation of concentrated dispersions
- » Formulation, analysis & quality control



Formulation



In order to achieve a complete understanding of "industrial" systems, the physical parameters of the concentrated suspensions and emulsions need to be measured. Working at process concentrations is essential for the analysis to fully reflect naturally occurring particle / droplet interactions. The TurbiScan LAB range uses multiple light scattering, to take up the measurement challenge of concentrated systems without dilution.

Multiple light scattering offers the following advantages :

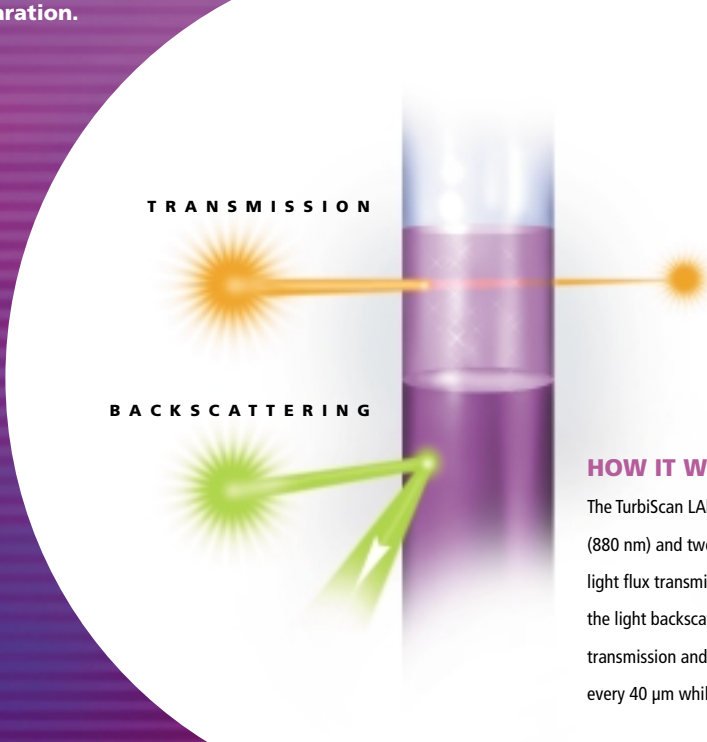
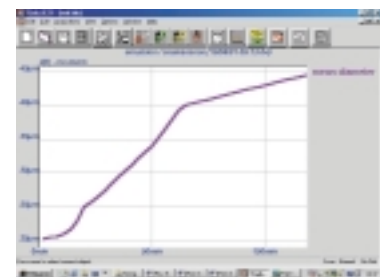
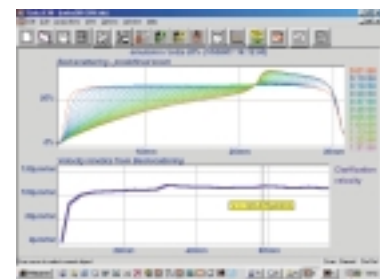
- Measurement of physical parameters at up to **95% v/v concentrated systems** (for emulsions) and **over a wide size range from 0.05 µm to 1 mm**
- Measurement of the photon mean free path ( $\lambda$ ) and transport mean free path ( $\lambda^*$ ), **absolute parameters which describe the real state of dispersions**, without mathematical approximations.
- Calculation of **mean particle diameter** or **volume fraction**
- **Non-destructive** technique
- **No sample preparation.**

## ▶▶ CORRECT & IMPROVE FORMULATIONS WITH AN EFFECTIVE FORMULATION TOOL

To fulfil new product development specifications in terms of quality, cost and time, formulators need a reliable and effective tool to quickly eliminate "bad" formulations, correct non-optimised ones and accurately document "good" ones.

The TurbiScan LAB range **quickly detects and determines** the destabilisation phenomena in order to correct formulations, shorten and document ageing tests. Thus, particle size variations due to **coalescence** or **flocculation** are monitored and can be visualised through "easy to plot" kinetics of **particle Mean Diameter** versus time. Particle migration leading to **sedimentation** or **creaming** phenomena can be seen through direct calculation of the **Migration Velocity**, or of the sediment / cream Phase Thickness. These results are obtained **20 to 50 times quicker than a visual** subjective and non-discriminative detection.

Moreover, dispersions stability can be analysed under **usual & normalized conditions of tests** thanks to the temperature controlled measurement unit.



### HOW IT WORKS

The TurbiScan LAB reading head consists of a pulsed near infrared light source (880 nm) and two synchronous detectors. The transmission detector receives the light flux transmitted (T) through the product, the backscattering detector measures the light backscattered (BS) by the product (135°). The reading head acquires transmission and backscattering data at a chosen position on the sample cell, or every 40 µm while moving along the 55 mm cell height.

## CONTROL DISPERSIONS WITH A QUICK QUALITY CONTROL TOOL



The quality of dispersions can be checked and quantified during the manufacturing process or on the finished product. These verifications have to be reliable & traceable to fulfil quality control requirements.

The TurbiScan LAb range offers the ability to perform measurement at a fixed chosen position (no scan of the tube but just a measurement at one point) to get a quick and reliable fingerprint of the analysed product. It enables *quality control of concentrated dispersions* through the *instantaneous and reproducible measurement* of **BS** (backscattering) or **T** (transmission) describing the dispersion state (in term of particle diameter and concentration). Comparison of the tested product with a reference sample can be completed in just a few seconds during or at the end of the manufacturing process.

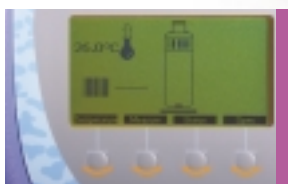
## ▶▶ ANALYSE DISPERSIONS WITH AN ACCURATE CHARACTERISATION TOOL

For a fine knowledge of industrial colloidal systems, testing laboratories need precise and quick characterisation tools.

The TurbiScan LAb Expert associates the measurement at one point with the conversion of sample optical characteristics into physical parameters:  $\lambda^*$  (photon transport mean free path), **d** (mean diameter),  $\phi$  (volume fraction), **S** (specific surface),  $\ell$  (mean distance between particles). These parameters describing the dispersion real state can be monitored to check whether the products meet the physical specifications.

### EASY SAMPLING AND CONSERVATION OF THE TUBES

The TurbiScan LAb Range works with disposable, flat bottomed, glass tubes (diameter : 27.5 mm, height : 70 mm). Whatever their viscosity, products are easy to sample and can be kept for long term storage or thrown away after TurbiScan LAb analysis. The tubes are resistant to temperatures up to 100°C, to centrifugation up to 2000 G, and can be autoclaved.



### AUTOMATIC TUBE RECOGNITION

The TurbiScan LAb range comes complete with an integral *Bar Code Reader* which will recognise a tube (if it has been tested before), and will open the corresponding result file. This automatic tube recognition will allow reliable management of samples, during long term ageing tests or following a product through a quality control test regime. (A number of bar codes are supplied with the instrument).

## BENEFITS

THE OBJECTIVE  
EVALUATION OF  
COLLOIDAL SYSTEMS  
TO IDENTIFY AND  
MEASURE THE  
PHYSICAL  
PARAMETERS  
DETERMINING  
STABILITY AND  
QUALITY

DECREASE PRODUCT  
DEVELOPMENT TIME  
& COSTS

IMPROVE PRODUCT  
QUALITY & COMPANY  
COMPETITIVENESS





## TECHNICAL SPECIFICATIONS

- Particle size measurement range: 0.05 to 1000  $\mu\text{m}$
- Particle concentration: up to 95 volume percent for emulsions
- Measurement technique: multiple light scattering
- Measuring unit  
Emission: pulsed near infrared light source (880 nm) / Detection: transmission and backscattering photodiodes
- Temperature range: from 5 °C above the ambient temperature to 60°C, accuracy  $\pm 0.5$  °C
- Sample requirements
  - maximal volume: 22 ml
  - samples must be inert in contact with the glass and Teflon
- Sample cells:  
flat bottomed glass cells (external diameter: 27.5 mm, height: 70 mm) with modified polycarbonate screwed top cap and butyl/teflon sealing ring
- Repeatability
  - for manual measurements on the same tube\*  $\pm 0.1$  %
  - for automatic measurements on the same tube\*  $\pm 0.05$  %
  - from tube to tube\*  $\pm 0.5$  %

\* experiment performed at constant temperature  $\pm 0.5^\circ\text{C}$  with 0.3  $\mu\text{m}$  latex beads dispersion 10 % concentrated on 30 measures.
- Software and data processing
  - Software operates on IBM compatible PC running Windows 95, 98, 2000 (recommended) and NT
  - Recommended hardware requirements: Pentium 400 MHz processor, 64 MO RAM
  - Communication port: RS 232 C or USB (USB / RS 232 adapters provided on demand)
- Power current: 100 and 240 V, 50/60 Hz
- Dimensions: Instrument only 378 mm (w), 418 mm (d), 314 mm (h) / Transport (flight) case 582 mm (w), 478 mm (d), 413 mm (h)
- Weight: Instrument only 13 kg / Instrument, Transport (flight) case and accessories 27 kg.

## TURBISCAN FULL RANGE

### FORMULATION (R&D laboratory)

TurbiScan instruments are dedicated to help formulators to quickly and accurately develop the best formulations. In a static or dynamic way, they give the chance to detect & measure the determinant parameters of concentrated dispersions stability. These parameters can be ingredients nature, quality and quantity but also processing characteristic (stirring speed, temperature, etc.).

Kinetic measurement	STATIC (after sampling)				DYNAMIC	
	TurbiScan MA 2000	TurbiScan Lab "scan mode"			TurbiScan On Line	TurbiScan On Line + Stab (*)
		Standard	Thermo	Expert		
Qualitative monitoring of dispersions evolutions	X	X	X	X	X	
Migration velocity	X	X	X	X		X
Hydrodynamic diameter	X	X	X	X		
Characterisation of dispersions evolutions ( $\lambda^*$ , d, $\phi$ )				X	X	
Temperature control			X	X		
Automatic sample recognition		X	X	X		
Disposable glass tubes		X	X	X		
On line & in real time measurement					X	X

(\*) TurbiScan On Line + equipped with a system to stop the product flow and perform a periodic static measurement

### QUALITY CONTROL ON SEMI-FINISHED OR FINISHED PRODUCT (Analyses & Quality control laboratory, Pilot & Process plant)

TurbiScan Lab and On Line offers the ability to control concentrated emulsions & suspensions instantaneously and without dilution. The characteristics of semi-finished products (through manufacturing process at the lab, pilot or process scale) and /or final products can thus be easily tracked after sampling or with a derivation from the process reactor.

Instantaneous measurement	AT / OFF LINE (with sampling)			ON LINE	
	TurbiScan Lab "fixed position mode"			TurbiScan On Line	TurbiScan On Line +
	Standard	Thermo	Expert		
BS & T levels control	X	X	X	X	X
Physical parameters control ( $\lambda^*$ , d, $\phi$ )			X	X	X
Temperature control		X	X		
Automatic sample recognition & Disposable glass tubes	X	X	X		
On line & in real time measurement				X	X
Adaptation for process constraints (stainless steel cabinet IP 65 / long cables / quartz cell / Viton gasket ...)					X

DISTRIBUTOR

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