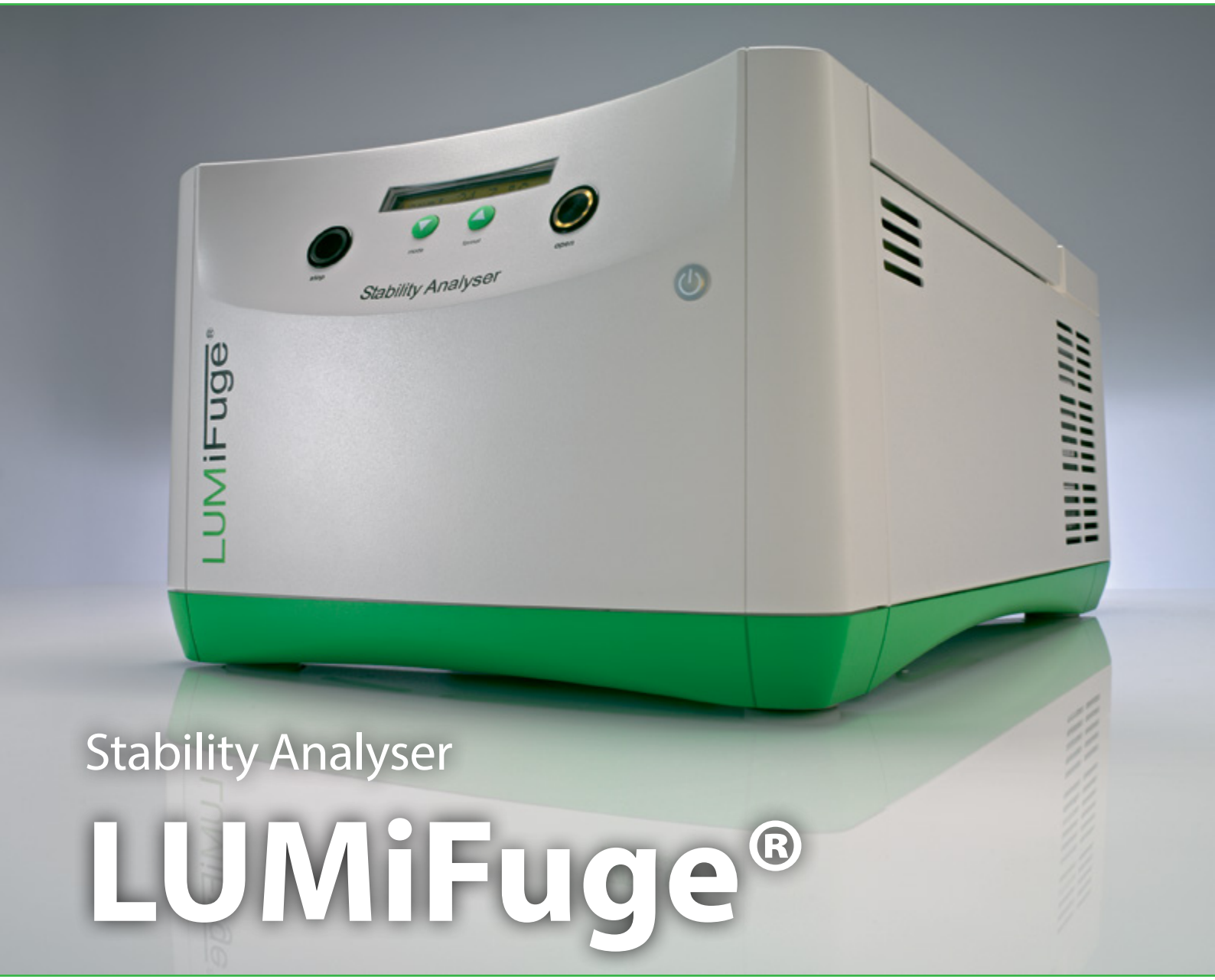
LUM

The NEXT STEP® in Dispersion Analysis
& Materials Testing



Stability Analyser

LUMiFuge®

The only direct and accelerated stability analysis.

Stability I Fingerprinting I Shelf Life I ISO/TR 13097

LUMiFuge® uses

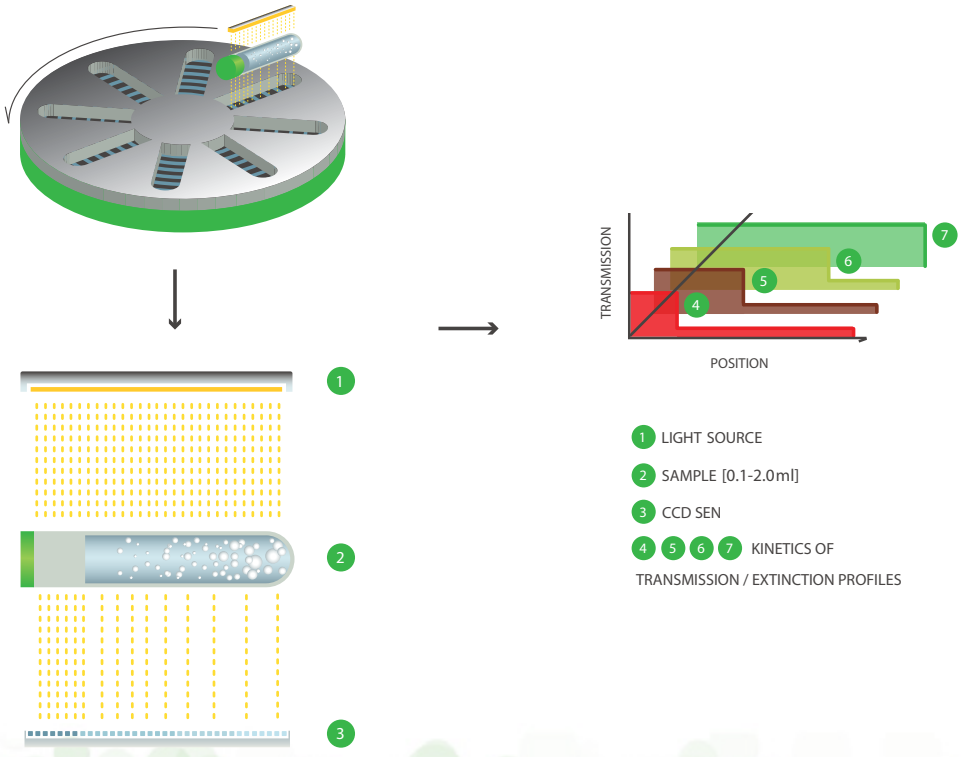
STEP® TECHNOLOGY

Allowing you to have a look at the whole sample

The High-End Stability Analyser LUMiFuge®, provides you with the objective classification and quantification of demixing phenomena and with the easy and fast determination of stability and shelf-life of dispersions. It is the instrument of choice for process optimization, quality assurance / quality control as well as for process control related research and development. Since 1998, classic versions of LUMiFuge® monitor daily quality parameters of products and processes, while the advanced LUMiFuge provides extended options for additional process development and even faster comparative and predictive shelf life analysis according to ISO/TR 13097.

The patented cutting-edge STEP-Technology® permits to obtain **S**pace- and **T**ime-resolved **E**xtinction **P**rofiles over the entire range of up to 8 different samples in situ recorded simultaneously with high accuracy. Parallel near infrared or blue light (1) illuminates the entire sample cell (2) and the transmitted light is detected by more than 2000 detectors of the CCD-line (3). Transmission is converted into extinction and particle concentration may be calculated (4-7).

STEP-Technology® Principle:

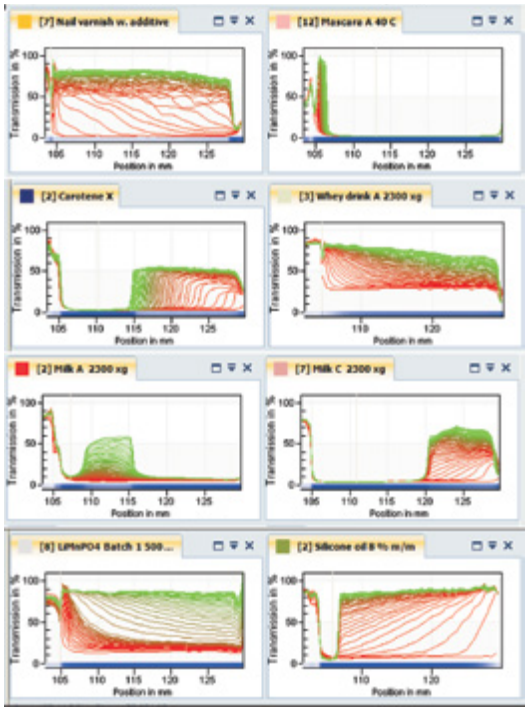


1 LIGHT SOURCE
2 SAMPLE [0.1-2.0ml]
3 CCD SEN
4 5 6 7 KINETICS OF TRANSMISSION / EXTINCTION PROFILES

runs on

SEPView®

your window to dispersion analysis

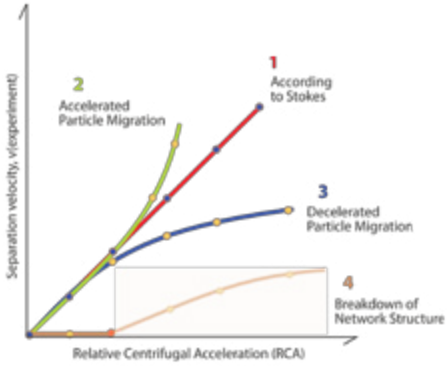


- Windows-based with Ribbon User Interface
- Plug & play, pack & go
- Simultaneous instability index analysis for 8 samples in real-time.
- Individual user customization.
- Full SOP concept (Creation, capture, data analysis)
- 7 different tools to understand (quantify) even the most complicated dispersion:
  - Time lapse measurement replay
  - Dispersion fingerprint
  - Instability index
  - Clarification
  - Phase separation
  - Sedimentation and creaming velocities
  - First derivative of integral transmission
- Windows Explorer based data management
- Comprehensive database security and full audit log
- Complies with 21 CFR Part 11.

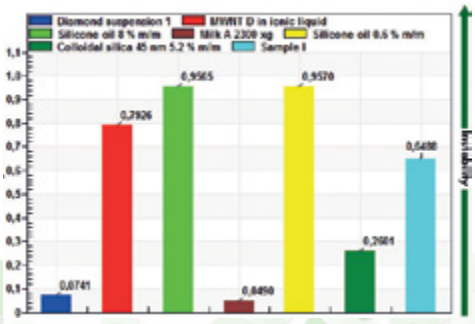
Stability

and shelf-life

Stability tests are up to 2300 times faster than performed in a test tube under earth gravity. Fast stability ranking and comparative shelf life analysis (ISO/TR 13097) of dispersions in original concentration are done in minutes/ hours instead of months/years. Predictive shelf life analysis (ISO/TR 13097) is enabled, too. In addition, separation velocity in dependence on RCA reveals information about the rheological behaviour of complex samples. In case ① - ③ , separation velocity at gravity may simply be calculated based on the obtained v-vs.-RCF-functions. Even for material with no separation at gravity (④) structural parameters similar to the yield point are provided.



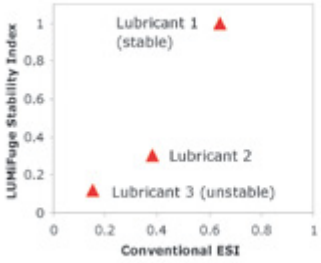
Shelf life and structural stability



Instability index for 7 different samples, see Dispersion Letters Technical, T4 (2013) 1-4 ISBN: 978-3-944261-29-4, www.dispersion-letters.com

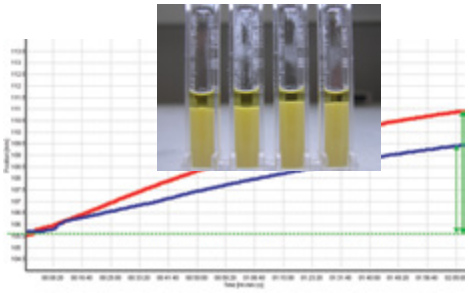
Quality Control

Lubricant (o/w emulsion) stability is determined within minutes instead of several hours required for emulsion stability index ESI, which is based on oil concentration measurement in the bottom and top phase after several hours storage in a measuring glass. The order of stability is the same, but LUMiFuge requires tiny sample amount and allows multisample measurement under identical conditions. Influences of the variation of process parameters, e.g. homogenizer time, are rapidly detected, too.



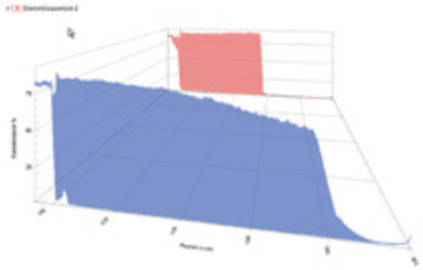
Stability comparison of lubricants within minutes

For quality control of margarine (w/o emulsions) the separation extent and kinetics can be easily compared and quantified. Using the ‚front tracking' analysis the kinetics of the water droplet sedimentation front is traced. Accelerated results at 2300 *g* are verified at lower RCA.



Quality control of margarine, 2h at 2300 *g*, 20°C - verified by measurements with lower RCA

Fingerprinting



3-D comparison of a zone sedimentation of an oily (red) and a polydisperse sedimentation of an aqueous diamond suspension (blue)

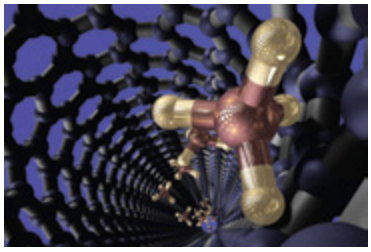
Demixing phenomena are quantified regarding clarification velocity, sedimentation and flotation, velocity of particles, residual turbidity, separated phase volume (liquid or solid), sediment consolidation or dewaterability. First information is obtained with respect to the multimodality or polydispersity of dispersed particles. Already after the first recorded transmission profiles, the fingerprinting option allows to classify different sedimentation types, e.g. Polydisperse or Zone sedimentation.

Particle-Particle Interactions

The LUMiFuge is ideally suited for characterization and optimization of dispersion properties. It quantifies particle-particle-interactions, the compressibility of particles, flocs, the degradation of gels and the elastic behaviour of sediments. The variation of centrifugal acceleration, i.e. excess pressure, within one measurement is used for the characterization of material with repulsive (e.g. quartz) and attractive particle forces (e.g. flocculated limestone). Reversibility of compression may be checked.

Benefits

- Efficient high-end analyser for quality control, research & development
- Direct, fast and objective characterization of any separation (instability) phenomena
- Precise information within minutes and hours instead of weeks and months
- Reliable stability information up to 2300 times faster than by other methods
- For concentrated and diluted suspensions and emulsions
- For a large sample viscosity range
- Minimal sample volume required
- Various versions, accessories and customizing options to fit your application
- Upgrade options to Dispersion Analyser LUMiSizer®
- Easy operation, comprehensive information



Materials & Applications

agrochemicals, biocells, bitumen, carbon black, carbon nanotubes, coolants & lubricants, cellulose, CMP slurries, cosmetic emulsions, creams, crude oil, drinks, fine chemicals, food, inks, paints, pastes, petrol, pharmaceutical dispersions, pigments, polymers, sludges ...

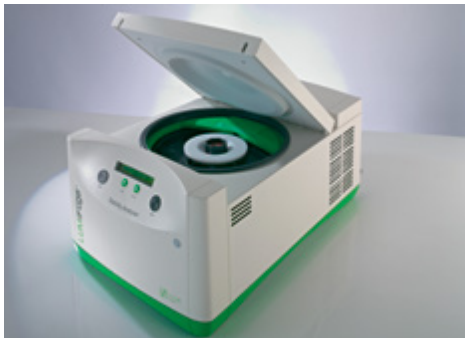
Key words

- Characterization of very slow separation processes (months till years), very stable, very high viscous dispersions with very high concentrations and very small particles and droplets
- Determination of separation stability and/or consolidation in one measuring step
- Particle-particle interactions, hydrodynamic density and magnetic susceptibility.

Specifications

2300x faster than sitting on a shelf

Accelerated phase separation	6–2300 times compared to gravity
Consolidation measurements	concentrated dispersions and sediments
Observation time	1 s to 99 h
Conformity	ISO/TR 13097; ISO/TR 18811; CFR 21 Part 11
Samples	suspensions, emulsions, suspo-emulsions, sludges, slurries
Channels	up to 8 simultaneously
Volume	0.05 ml to 2.0 ml
Concentration	0.00015 Vol% - 90 Vol%
Density	up to 22 g/cm^3
Viscosity	0.8–10^8 mPas
Light source	NIR, special versions
Temperature control	4 °C to 60 °C, +/– 1K
Cells	different material and optical path
Dimensions (WxHxD)	37 x 27 x 60 cm
Weight	40 kg
Power supply	100 V, 230 V; 50/60Hz



Version	Temperature control
LF 110	4 °C - 40 °C
LF 111	4 °C - 60 °C

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