ThermoFisher SCIENTIFIC

Paints, inks and coatings rheology application compendium

Assure, solve and discover.

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Introduction

As a leading manufacturer of rotational rheometers, Thermo Fisher Scientific supports the inks, paints and coating industry in developing modern, sustainable products across diverse fields, including architecture, construction, automotive industry, printing, and cosmetics. Paints and coatings are complex mixtures composed of pigments, binders, solvents, and various additives like anti-foaming, curing, and dispersing agents. Each ingredient plays a crucial role in determining the paint's quality and performance, including factors such as adhesion, leveling, strength, gloss, stability, durability, and impact resistance.

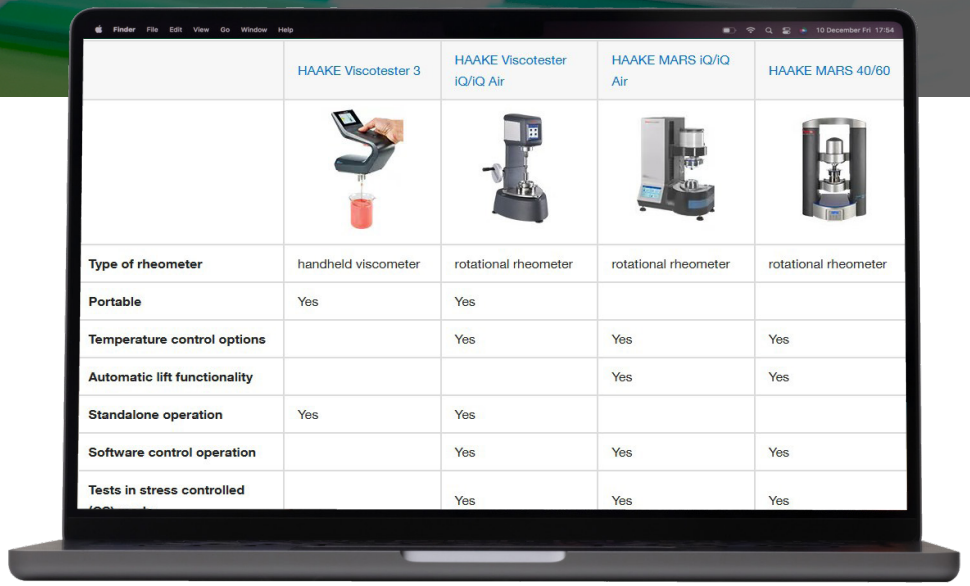
The high flexibility of the Thermo Scientific™ HAAKE™ Rheometers, with their broad range of measuring geometries and accessories including application-specific measuring cells for ultra-high-shear testing, UV curing or powder rheology allow for a comprehensive sample characterization to meet the industry demands.

With decades of application know-how, our worldwide demonstration labs, and scientists from different disciplines including rheology, extrusion, or spectroscopy, we can assist you in the realization of your specific application goals. Talk to our experts today and learn what options are available to further your advancement in this innovative arena (**contact us**).

Contents

Paints, inks, and coatings rheology requirements

A selection guide for rheometer and software features



	HAAKE Viscotester 3	HAAKE Viscotester iQ/iQ Air	HAAKE MARS iQ/iQ Air	HAAKE MARS 40/60
Type of rheometer	handheld viscometer	rotational rheometer	rotational rheometer	rotational rheometer
Portable	Yes	Yes		
Temperature control options		Yes	Yes	Yes
Automatic lift functionality			Yes	Yes
Standalone operation	Yes	Yes		
Software control operation		Yes	Yes	Yes
Tests in stress controlled		Yes	Yes	Yes

Overview

Paints, inks, and coatings are used in various fields ranging from architecture and construction to the automotive industry, printing, and cosmetics. Typical challenges in product development and manufacturing include ensuring consistency and stability, optimizing application properties, controlling drying and curing times, and assuring resistance to environmental influences and compliance with environmental regulations. Advanced rheometer capabilities play a crucial role in meeting these demands.

Discover the perfect rheometer for QC and R&D needs

Full selection guide

Ensure precise results with the Thermo Scientific™ HAAKE™ RheoWin™ Rheometer Software, which enables the creation of automated SOPs.

View mini tutorials

HAAKE RheoWin Software General Settings

A walk-through of how to set up and adjust HAAKE RheoWin software settings

HAAKE RheoWin Software Test Procedure Library

Walk-through of the test procedure library including how to access the library, job types, job descriptions, and how to change settings

Creating a test procedure with HAAKE RheoWin Software.

A walk through how to create a rheological test procedure from sample loading step, to rheological job creation and data evaluation.

Comprehensive rheological characterization capabilities from paints to coatings

FAQs: Expanding rheometer capabilities with the right accessories

Question	Documents
Which measuring geometry - plate, cone or cylinder - is most suitable for a sample or application?	The choice of measuring geometry—**plate/plate, plate/cone**, or **cylinder** measuring—depends on sample volume, particle size, and measurement requirements. Different sizes and finishes are available.
How can sample slippage be prevented during the rheological measurement?	Use matching diameter upper rotors and lower plates for easier loading and trimming, and choose sandblasted or serrated finishes on parallel plates to reduce slippage, **more information.**
Are there geometries available that are particularly easy to clean?	Yes, discover the ''Easy Clean'' version and see how simple cleaning can be, **more information.**
What is the best method to prevent sample evaporation and drying out?	Use one of the available sample covers, with solvent trap or inert gas connection if needed, **more information.**
Immobilization test – how long does it take for a sample to dry?	An immobilization cell can be used to simulate reliable drying conditions, **more information.**
Open time - How long can a product be processed?	Use special measuring geometry to easily and reliably determine the open time of coatings, **more information.**
High shear testing - How can very fast coating processes be simulated in a measurement?	Use a temperature module with high shear measuring geometry for viscosity measurements at high shear rates to simulate very fast coating processes, **more information.**
How can UV curing be measured rheologically and how can changes at the molecular level be better understood?	UV curing can be measured rheologically using a measuring cell for UV-assisted thermal curing, combined with simultaneous FTIR spectroscopy to better understand molecular-level changes, **more information.**
Which DIN / ISO standards can be fulfilled with Thermo Scientific HAAKE Rheometers?	Thermo Scientific HAAKE Rheometers fulfill a variety of established ASTM/DIN/ISO standards. Discover which ones! • **ASTM, DIN and ISO standards** • **Relative measurements according to ISO 2884-2**

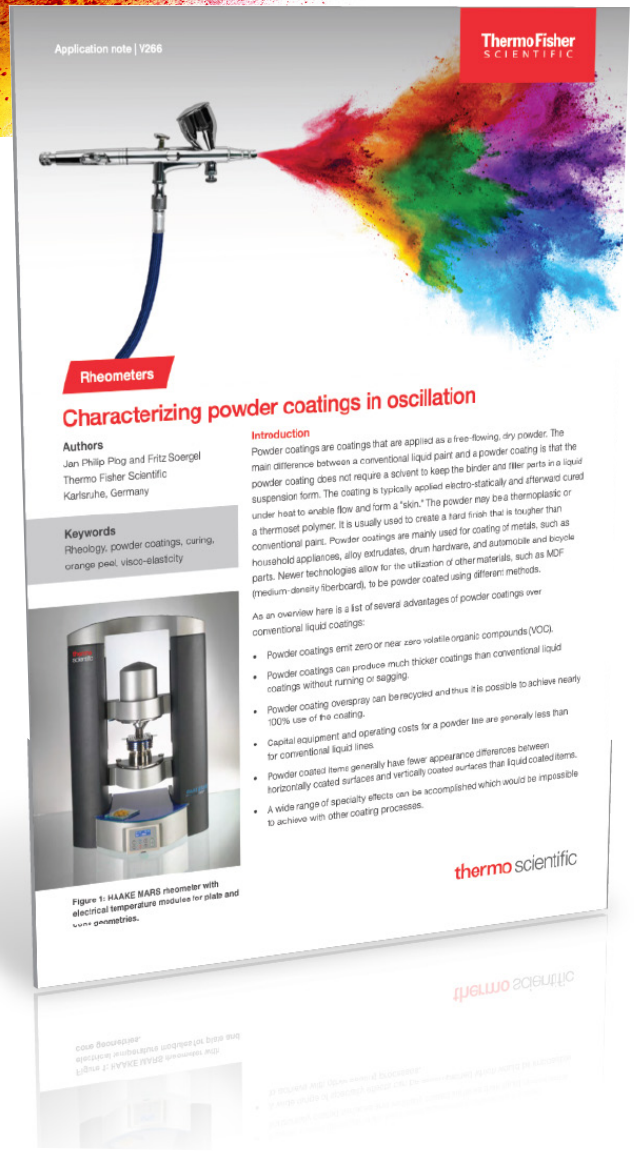
The influence of curing kinetics and viscoelasticity on surface texture

Rheological tests in oscillation for comprehensive characterization of powder coatings

Overview

Powder coatings offer many advantages such as zero VOC emissions, thicker coating layers without sagging, recyclability, and cost efficiency. However, differences in curing kinetics and viscoelastic properties can influence the surface quality of the final product. Therefore, rheological properties are determined before, during, and after the temperature-induced curing step in order to understand how a certain formulation will work during processing and the actual coating application. The method of choice for monitoring curing processes rheologically are tests in oscillation mode.

View the application note



Performance evaluation of paints and coatings

Investigating the shear flow and thixotropic behavior of paints and coatings

Overview

Paints and coatings are complex mixtures composed of pigments, binders, solvents, and various additives like anti-foaming, curing, and dispersing agents. Each ingredient plays a crucial role in the quality and application behavior of a paint; this includes factors such as adhesion, leveling, strength, gloss, stability, durability, and impact resistance. As highly structured particle dispersions, paints exhibit intricate flow behaviors, and they are often subjected to diverse shear rates and environments throughout their lifespan. Therefore, comprehensive rheological testing is essential to thoroughly evaluate the overall performance of paint.

View the application note

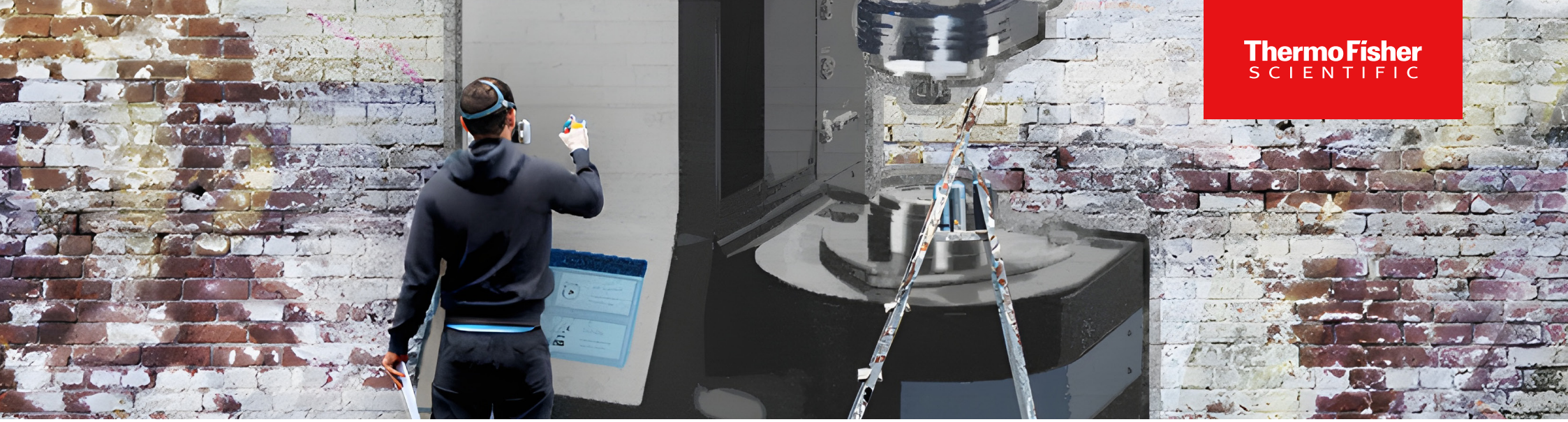
Investigation of UV light-curing adhesives

Impact of the UV light intensity on the shrinkage and curing behavior of an ultraviolet light-sensitive adhesive

Overview

UV light-sensitive adhesives are single-component materials that cure within seconds upon exposure to UV radiation. The curing mechanism typically involves the generation of free radicals from a photo initiator, which then interact with monomeric and oligomeric components to form a crosslinked polymer network. The curing speed is highly dependent on the intensity of the UV light, which spurs adhesive joints to form rapidly, often within seconds, through free radical polymerization. Combined with a suitable UV light source, a rheometer can assess the reaction kinetics and shrinkage during the curing process.

View the application note



Paints, inks, and coatings rheology resources

Application laboratories

In our fully equipped application laboratories, we are ready to demonstrate the performance of our instruments through test measurements with customer samples. Additionally, we support our customers in the development of future-oriented applications or in establishing robust and reliable routine measurement protocols. We provide a broad range of product and application solutions, and our team of application scientists and interdisciplinary technology specialists is on hand to answer your questions **(contact us)**.

Register for application and product information at **thermofisher.com/specoptin** to gain access to the latest resources to accelerate your research and improve laboratory productivity.

Seminars and trainings

Thermo Fisher Scientific offers comprehensive training programs, in-house seminars, and practical rheology and extrusion courses at various locations around the world. We support our customers through an array of on-demand webinars, videos, and application notes from our experts, sharing the benefits of our interdisciplinary knowledge in polymer science and technologies **(thermofisher.com/LearnWithUs)**.

Learn more at **thermofisher.com/rheometers**

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