

Petrochemicals

Weighing and Analysis in the Laboratory

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News

Weighing Technology in the Chinese Petrochemicals Market

In a petrochemical laboratory, the accuracy and precision of weighing play a vital role as crude oil, jet fuel, diesel, fuel oil, lubricants, polythene, polypropylene and other chemical raw materials are weighed-in in order to inspect micro elements of oil products and the allocation of primary reagents.

A Wide Range of Applications

The Dushanzi Petrochemical Company is an affiliate to the Petrochina Company Limited and is engaged in processing crude oil and producing ethane. METTLER TOLEDO balances are widely used in its refinery, ethane factory, thermal power plant and research institute with over 100 sets of different balance models utilized since the introduction of METTLER TOLEDO's series of electronic balances in 1986.

Fast and Accurate Weighing

Balances are used within the Petrochemicals industry for many different weighing applications as the above table demonstrates. Therefore, the Dushanzi Petrochemicals Company is planning to purchase a new batch of METTLER

TOLEDO XP analytical balances and precision balances as they cover their needs and offer ease of use. The XP analytical balances have impressed the Dushanzi Petrochemicals Company with their design to reduce air flow impact above the weighing unit with their unique Grid weighing pan (SmartGrid) and with ErgoClips, which fit the weighing pan. These ensure that different tare containers are placed safely, allowing for quicker, easier and more accurate weighing. In addition, the dismountable draft-shield or stainless weighing plate with its flat surface makes the cleaning of the balance quick and easy. The clear operating menu also makes the operation of the balance so simple.

Thanks to these excellent characteristics, the XP analytical balances make



METTLER TOLEDO

Applications with METTLER TOLEDO balances at the Dushanzi Petrochemical Company:

Application area	Sample	Balance
Oil weighing	Kerosene, diesel, lubricants, crude oil, additives	<ul style="list-style-type: none"> ■ Readability 0.1 mg, analytical balance with max capacity 220 g ■ Readability 1 mg, analytical balance with max weighing value 210 g
Chemical weighing	Polythene, polypropylene, chemical raw materials, specialty chemical	<ul style="list-style-type: none"> ■ Readability 0.1 mg, analytical balance with max capacity 220 g ■ Readability 1 mg, analytical balance with max capacity 410 g
<ul style="list-style-type: none"> • Differential weighing • Constant weight weighing • Scientific research weighing 		<ul style="list-style-type: none"> ■ Readability 0.1 mg, analytical balance with max capacity 220 g ■ Readability 0.1 g, analytical balance with max capacity 3100 g
Pressure container inspection weighing	Gas bottle	■ Precision balance or scale
Environmental monitoring	Sewage	■ Different kinds of analytical balances and precision balances
Power plant	Coal powder	■ Different kinds of analytical balances and precision balances
Hydrogen additive device		■ Readability 1 g, scales with max capacity 16100 g
Safety fire-fighting	Extinguisher	■ Readability 1 g, scales with max capacity 32100 g



weighing a smooth, easy and efficient task. Yurongqiu, senior engineer of the Research Institute, said that “the performance of METTLER TOLEDO’s balances over the last 20 years has maintained stability and accuracy and, equally important, METTLER TOLEDO has always offered satisfactory technical support and services. METTLER TOLEDO balances have always been our first choice.

► www.mt.com/excellence

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Determination of Acid and Base Number in Lubricants Made Easy

TOTAL East China Lubricants (Zhenjiang) Co. Ltd., is a solely foreign funded subsidiary established by the TOTAL Group in China, which manufactures and sells high quality vehicle and industrial lubricants involving gear, engine and industrial transmission lubricants. Strict control over the quality of products is carried out through inspection and quality control which is conducted at every phase of the production flowpath. Many samples have to be analyzed, so instruments used have to be reliable and efficient.



An Important Lubricants Test Parameter

New and used lubricants all contain some acid or alkali components which exist in forms of additives or degraded products produced during usage, such as oxides.

The relative contents of these substances may be determined through acid or alkali titration. Whilst determining acid number or base number, the sample is dissolved in a mixed solvent of methyl benzene or isopropanol containing a small quantity of water thus creating a homogeneous sample to be

titrated under ambient temperature with standard acid or alkali alcohol solvent.

Rapid and Reliable Solution

TOTAL's Zhenjiang based laboratory uses METTLER TOLEDO's DL 53 Titrator to determine acid number and base number of lubricants. The DL53 features prompt analytical results, ease of connection to the Rondo 60 sample changer and easy to use software available in several languages including Chinese. Additionally, it reduces the cost of titration for each analysis and produces an accurate and consistently reliable result. Mr. Zhang, the lab manager, remarked; "The METTLER TOLEDO DL53 Titrator is characterized as convenient, swift and universal in use, and able to be upgraded as well where flexibility is needed."

These and further considerations were the basis for METTLER TOLEDO's development of the successor of the DL53: the new Titration Excellence T50 Titrator – have a look at it on www.one-click-titration.com.

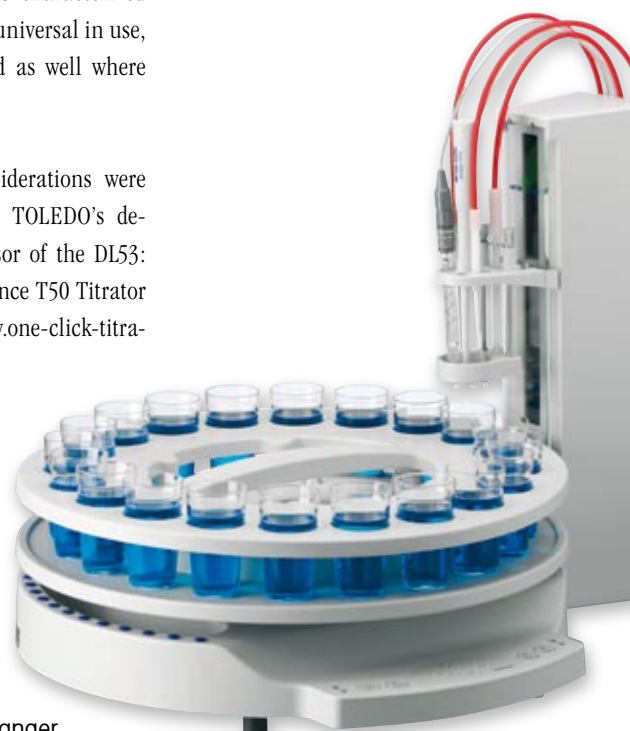
Convincing Services

METTLER TOLEDO'S engineer and technicians also helped reach optimal parameters for method development. Mr. Zhang reported to us that "METTLER TOLEDO's services are very professional, timely and considerate, helping us to set up the appropriate test method with satisfactory results with smooth progress ensured."

► www.mt.com/titration
 ► www.mt.com/one-click-titration



The new Titration Excellence T50 Titrator



Rondo 60 Sample Changer

Increasing Lubricant Oil Efficiency Using the TGA Noack Test

The ASTM D6375 test method covers the procedure for determining the Noack evaporation loss of lubricating oils using thermogravimetric analysis (TGA). The test method is applicable to base stocks and fully formulated lubricant oils having a Noack evaporative loss ranging from 0 to 30%. The test results are characteristic of the chemical and physical properties of the lubricating oil.

TGA/SDTA851^e

Knowledge of the evaporation behavior of engine oils is crucial as the more the motor oil vaporizes, the thicker and denser it becomes.

This:

- Contributes to poor circulation
- Reduces fuel economy
- Increases oil consumption
- Increases wear and emissions.

The ASTM D 6375 Procedure

The TGA/SDTA851^e thermogravimetric analyzer allows consistent data to be obtained by using much smaller samples, making it safer compared to other standard tests. Automation possibilities of TGA help to increase throughput and aid data interpretation, which results in more reliable manufacturer performance specifications.

In the ASTM D6375 procedure, a lubricant specimen is quickly heated to between 247 °C and 249 °C under a stream of air and is then held isothermally for an appropriate time. The TGA monitors and records the mass loss experienced by the specimen due to evaporation. The Noack evaporation loss is determined from the TGA curve of percent mass loss versus time in Figure 1, shown as the mass percent lost by the specimen at the Noack reference time. The Noack reference time was determined under the same TGA conditions and is the basis for direct comparisons of different lubricating oils.

TGA/SDTA851^e measurements allow safe and reliable characterization of different types of lubricating oils. The Noack test and the results obtained from TGA reflect how well the oil will protect engine components, cylinders and pistons. The TGA data curves serve as “characteristic fingerprints” and allow the performance of the lubricating oil to be quantified before use.

► www.mt.com/tga

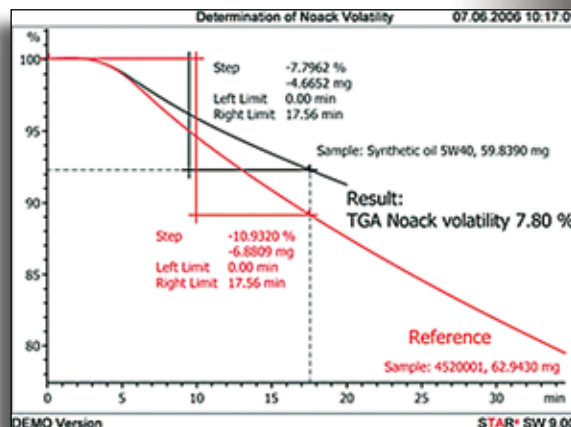


Fig 1: TGA Noack results following ASTM D6375



Pipetting of Non-Aqueous Fluids – With Positive Displacement Pipettes

R&D and testing laboratories in the petrochemical industry often deal with non-aqueous fluids that usually are difficult to aspirate and dispense correctly with regular air-displacement pipettes. That's why RAININ*, a leader in manual liquid handling, developed the Pos-DTM, the world's first positive displacement pipette with ergonomic features. The Pos-D is especially suited for liquids with high densities, viscosities or vapor pressures.

Challenges in Liquid Handling

Conventional air-displacement pipettes are not suitable for viscous, dense, or high vapor pressure solutions, as the necessary pressure equalization within the pipette tip does not completely occur. A viscous sample, for example, will tend to adhere to the tip wall, and possibly allow air to be aspirated. A volatile liquid will evaporate, increasing the gas pressure in the tip above the sample, forcing some of the sample out of the tip. In these cases, sampling will be neither accurate nor precise and results will be compromised.

Precise Dispensing of 'Problem Liquids'

Precise testing of oils, fuels, or lubricants is crucial in R&D and quality testing alike. Like in any other laboratory, inaccuracies due to improper equipment cannot be accepted. Given the often enormous volumes that are generated in the petrochemical industry, small pipetting errors not only hinder repeatability, but can scale up to large and very costly errors. With the RAININ Pos-D, precision and accuracy are assured even with these problematic liquids

RAININ Pos-D is especially suited for liquids encountered in the petrochemical industry. The disposable piston, moving within a plastic capillary, makes direct contact with the liquid. The positive wip-

ing of the piston against the capillary wall ensures complete dispensing without droplets and protects samples from instrument contamination.

Hand-Friendly Pipetting

Like all RAININ pipettes, the Pos-D is designed with ergonomic benefits in mind. The large handle feels natural and fits comfortably in the hand. The

ergonomic finger-hook eliminates the need to grip the pipette firmly, allowing Pos-D to rest comfortably in the hand. The volume setting faces the user, avoiding awkward twisting to set volume, and is always visible to help avoid mistakes. RAININ Pos-D: Taking the challenge out of pipetting.

► www.mt.com/rainin



* RAININ, a METTLER TOLEDO Company, is the leading pipetting solutions provider in the USA and globally present with dedicated sales and service teams.

Calibrated Weights Ensure Consistently Accurate Weighing Results

ISO9001 requires that measurement equipment like balances shall be calibrated or verified at specified intervals, or prior to use, against measurement standards traceable to international or national standards to trust display and measurement results and to guarantee the security of the processes. METTLER TOLEDO's ISO 17025 accredited weight service supplies such highly accurate and high-quality weights to support you in this matter.



Why are Calibrated Weights for Balances so important?

In regulated environments, accurate weighing results constantly need to be guaranteed and proven. This requires regular balance testing using calibration weights. A calibrated weight is the only accepted measuring device for this task as it can be traced back to an approved reference, ensuring traceability of your testing results. This because measurement equipment is sensible to working environment conditions and can drift with time.

Traceable Balance Verification with OIML weights

If analytical test results must be traceable, so must the weighing results in order to guarantee a reliable manufacturing process or quality control. Therefore balances need to be calibrated or verified. Verification means the confirmation that the user requirement specification is fulfilled. But furthermore, legal guidelines specify that all tests must be fully traceable and therefore only certified calibration weights can be used to be

fully compliant. Calibration weights and relevant certification have to conform with OIML (International Organization of Legal Metrology) which includes clear documentation of material, density and nominal weight, ensuring traceability back to the original Kilogram Prototype stored in Paris. METTLER TOLEDO balance software also supports this process by memorizing up to 10 weights, including information on nominal weight, certification number and complete calibration test documentation.

Regular Calibration and Verification

Calibration and verification of measurement equipment needs to be realized at regular intervals to guarantee the reliability of measurement at any time. The specific calibration time interval is determined by evaluating the risk of the process and the frequency of use of the measurement equipment. Furthermore it depends on the user requirement specifications as for example the process tolerance.

Regular tests of balances with calibrated weights are required to guarantee the reliability of the processes and to ensure the trust in the weighing results at any time. METTLER TOLEDO accredited weight services not only offer high quality calibration weights but also provide recalibration services. Your local METTLER TOLEDO representative will be pleased to recommend the necessary calibration weights and services for your balances.

► www.mt.com/lab-compliance

► www.mt.com/weights



Accuracy and Uptime Guaranteed With ServiceXXL

METTLER TOLEDO provides cost-effective service solutions that ensure accurate, traceable results and unprecedented equipment uptime. With over 1800 dedicated service professionals worldwide, our aim is to optimally support you during all phases of the equipment lifecycle – from equipment selection to installation and qualification through to many years of trouble-free routine operation.



Initial Qualification

METTLER TOLEDO provides the peace of mind that your measurement instruments fulfill all relevant quality requirements and that your investment is well protected. Our Service XXL approach offers you tailored services that cover the entire life cycle of your equipment:

- Equipment selection
- Installation and qualification
- Routine operation

Our IPac (Initial Qualification Package) ensures that balances, titrators and moisture analyzers are properly installed and configured to your needs right from the start – the prerequisite for accurate results compliant with your Quality Management System. To document the entire qualification process we offer the EQPac (Equipment Qualification).

Maintenance and Calibration

With preventive maintenance and regular calibrations according to ISO 9001 or other industry standards performed by METTLER TOLEDO-certified technicians, you can be assured of smooth routine operation and dependable measurement accuracy from your equipment. The frequency of calibrations and preventive maintenance visits vary based on customer requirements and equipment criticality. Typically, a service agreement including an annual visit reduces the risk of emergency repair and downtime, protecting your financial investment whilst ensuring that your range of analytical and weighing instruments remains clean, optimized, and effective. The bottom line: reliable results and maximum equipment uptime at low cost.

Process Step

METTLER TOLEDO Services

1 Equipment Selection



- Support in defining customer requirements
- Selection guides help choosing the right product

2 Installation & Qualification



- Initial Qualification Pacs for installation and initial calibration
- Equipment Qualification Pacs for documenting the entire qualification process

3 Routine Operation



- Maintenance services
- Calibration services (ISO 17025)
- User seminars and training
- Application and technical support

Customer Value

- Accurate, traceable results compliant with regulations
- Optimized equipment uptime
- Protection of your investment
- Low total cost of ownership

The IPac (Initial Qualification Package) ensures that your equipment is properly installed and configured to your needs right from the start – the prerequisite for accurate results compliant with your QM-System.

- ▶ www.mt.com/service
- ▶ www.mt.com/IPac

Amazing Solutions For Improved Productivity

METTLER TOLEDO delivers powerful solutions that simplify work in laboratories around the world. Combining our state-of-the-art technologies with our applicative competence, we have a strong value proposition to make: accurate results and productivity second to none.



One-Click Titration:

Excellence titrators combine high applicative power with most efficient operation and unprecedented data security. Together with the Rondo 60 sample changer the analysis of synthetic products, liquids, pastes and resinous materials is made easy through automation!

www.mt.com/one-click-titration



Coulometric Karl Fischer Titrators:

The METTLER TOLEDO coulometric Karl Fischer Titrators for water content determination save analysis and cleaning time, providing a fast analytical response when it really matters. This is crucial when a tanker is waiting to be unloaded.

www.mt.com/karl-fischer

Analytical Instruments



Automated Chemistry

Lasentec® & React IR™ Tools:

In-Process tools for the Petrochemical industry allowing real-time measuring, understanding and control. Continuous Phase analysis is done via in-situ mid-infrared spectroscopy. Measurement can be done in opaque/black process fluids from asphaltines to micronized coal to water in crude oil.

www.mt.com/lasentec

Weighing Solutions



METTLER TOLEDO XS analytical balance:

High-speed weighing and a clean solution thanks to Smart-Grid and ErgoClips for increased productivity and undisturbed routine operations.

www.mt.com/xs-analytical

Industrial Weighing



SSPS: Small-Scale Production System:

A Small Scale Production System for the Production of High Value Compounds and Intermediates. With the SSPS, METTLER TOLEDO provides a powerful tool supporting all necessities of Kilo Lab Production assuring accurate, safe and reliable process control.

www.mt.com/ssps



Process Weighing Solutions:

Optimize your plant efficiency with the smart weight transmitter IND130. Connect your load cells over Profibus® DP, Allen-Bradley RIO or RS232 directly to your PLC or DCS for batching, filling, tank/hopper weighing, and for inventory control.

www.mt.com/industrial



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