

Karl Fischer Titration



Karl Fischer Titrators

Compact Volumetric

Compact Coulometric

Titration Excellence



One Click[®] Water Determination

Simple & Secure

METTLER TOLEDO

Know Your Water Content In One Click[®]

How do you guarantee the quality and shelf life of your pharmaceutical products? What's the best way to check if a lubricant is still able to protect against wear? Water content can give you important information about your product. Karl Fischer titration is the specific standard method for the determination of water content and gives accurate and precise results within minutes. With METTLER TOLEDO Karl Fischer titrators your operators need only to press one button to run a water determination!

Simple and fast operation



The Touchscreen user interface is optimized for direct access to routine tasks and provides clear information to the user. One unique Homescreen for each user with their own Shortcut buttons offers One Click access to all routine tasks. It's easy to feel right at home from the start, which reduces learning time and increases data security.

Safe handling of chemicals



Contact with Karl Fischer reagents should always be avoided. The Solvent Manager takes care of filling, draining and exchange of the reagents. It is fully controlled by the titrator which offers One Click access to all tasks. LevelSens additionally increases security by monitoring solution and preventing overflow in the waste bottle.

Flexible and secure data management



METTLER TOLEDO Titrators offer a broad range of possibilities to handle your data. Choose whether to export as CSV, PDF or XML files. Devices such as printers or memory sticks can be connected via the USB port and are automatically recognized. For full data security LabX[®] titration PC software supports the user in every action performed with the titrator. All results are stored in the LabX database.



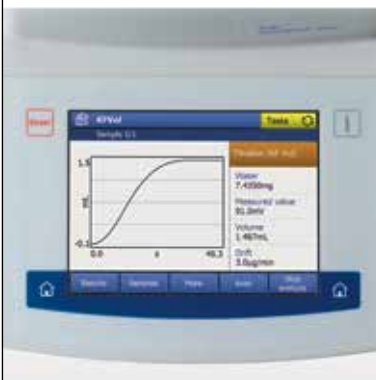
METTLER TOLEDO takes into account the variability of requirements from different industries and offers an optimal range of instruments and methods to cope with any sample. Decades of experience in the determination of moisture or water content enables METTLER TOLEDO an advantage in providing the answer to any question.

The Generalists

For Water Determination up to 100%

The Volumetric Compact Karl Fischer Titrators have been designed for a wide range of water content applications: determinations from 100 ppm to 100% water – fast and precisely. The titration vessel is optimized to retain a low drift value and offers the possibility to determine the water content of liquid, solid and gaseous samples.

Full information and direct access



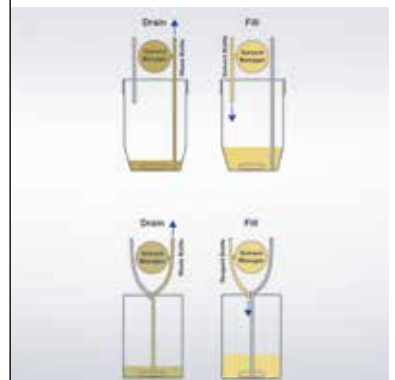
Improving the ease of use of an instrument means keeping the user fully informed on what is happening while offering all possible task choices as directly as possible. The online screen always shows the condition of the titration vessel and offers a direct One Click[®] for every important task. When a method is started, the user can easily type in the sample size and can see immediately how much water has already been processed. Clear information and direct operation are key factors for simple and secure operation.

Security with intelligent burettes



Is the correct titrant installed? Is the concentration right? Has the concentration determination expired? All this information is stored on the burette chip and the titrator automatically verifies all parameters when a titration is started. Errors occurring during the installation of resources are now a thing of the past. Be assured with the Plug & Play feature, safe titration could not get any simpler.

Simple and secure solvent monitoring



The solvent needs to be replaced regularly in order to guarantee consistently correct results. The Solvent Control supports the user by monitoring different parameters. Even when an instrument is running on Standby the Solvent Control is active and automatically starts conditioning of the fresh solvent after exchange. With minor user interaction the system is always kept in optimum condition ready to ensure a quick, accurate result whenever required.



Water regulates the product characteristics - determined easily with our Compact Volumetric KF Titrators

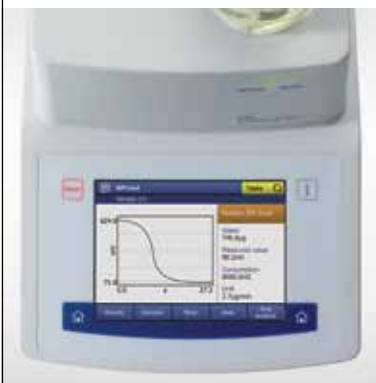
Polyols are raw materials for the production of a big variety of polyurethane-based products obtained by polymerization reaction with Di-Isocyanates. An example is foams, which can be used for sound insulation. It is important to know the exact water content of the polyol, since the water reacts with the isocyanate groups to form CO₂. The CO₂ regulates the degree of expansion of the foam, i.e., it determines the product characteristics. Therefore the water content is an important indicator, which can be easily and precisely determined by volumetric Karl Fischer titration.

The Specialist

For Low Water Content Up to 5%

Accuracy and precision is improved further if the titrant is not added with a burette, but produced directly in the solution with a current applied by a generator cell. This also makes a titrant concentration determination obsolete. The Compact coulometric Karl Fischer Titrators offer particularly fast and precise titration of samples with a low water content from 1 ppm to 5%. The titration vessel is made completely from glass which ensures a uniquely low drift and hence makes the most accurate and precise results possible.

Fast results and direct operation with large Touchscreen



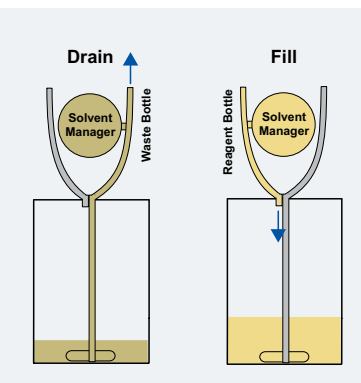
The Coulometer keeps the user informed on the cell condition and makes all tasks (e.g., sample and drift determination) available to be started with One Click®. If the expected water content is known, the optimum sample weight can be calculated. The Online Screen offers all ongoing information for the titration and direct access to all data and tasks that further accelerates the complete workflow.

Most convenient without diaphragm



Handling of different reagents for catholyte and anolyte can be complicated and expensive. For most samples the generator cell without diaphragm offers more convenience in use. No catholyte is needed and the anolyte can be exchanged with the Solvent Manager on One Click®. Only a few samples still require a cell with diaphragm, which is clearly explained in the METTLER TOLEDO applications brochure.

Always in good shape thanks to Reagent Control



The reagents play an important role in the coulometric Karl Fischer titration. The Reagent Control keeps an eye on the important parameters so that once the maximum capacity is reached the user is prompted to replace the reagents. Contact with any of the reagents is avoided and the user always has an optimal system, ready to use and prepared to generate correct, repeatable results.



Low water content of oils – easy with the METTLER TOLEDO Coulometers

In the Service department of an engine producer, all oils, lubricants and fuels used in the engine are tested for water content. If the result exceeds 500 ppm (0.05%), the parts in contact with the liquid are checked for corrosion. The simple water content determination saves significant time and money, as only the risky parts need further investigation. The prevention of corrosion protects the engine from failure, which is crucial, for example, in aircraft.

The Universal Solution for Karl Fischer and Other Titration Applications

Titration varies much between different users, applications or industries. The Titration Excellence line has been designed with the utmost modularity in mind so that it can even match unique requirements perfectly. Each piece of the titration system can be chosen and combined into an easy to use, powerful and compact instrument. With the METTLER TOLEDO Excellence titrators modularity is not just a slogan, but a clear concept that includes simple and secure water determination.

Efficient and secure titration solution



Whenever more than one person works on the same instrument, user security plays an important role. On Titration Excellence, specific rights can be assigned to different user groups. With a login password, only eligible users have the ability to work with the instrument. This high level of security makes working more efficient, as every user only sees the buttons he needs.

General and Karl Fischer titration in one device



More than 500 general titration applications can be combined with volumetric and coulometric Karl Fischer. With Titration Excellence T9 you are able to execute different analysis in parallel on the same instrument. Titration Excellence means a two-in-one instrument and offers the utmost application power with simplest operation and using minimum bench space.

Controlled Homogenization



Solid samples which do not dissolve in the Karl Fischer solvent can be added to the titration vessel and ground with a Homogenizer. The Homogenizer speed is controlled by the Excellence titrator via the RS-interface and documented. This guarantees maximum security and full GLP-compliance. Special chemicals for extraction are avoided using the Homogenizer for grinding.



Powerful parallel titration of active ingredient and water content

The content determination of many pharmaceutical substances is analyzed using titration and often corrected with the water content. The Titration Excellence T9 system takes care of the complete analysis, thanks to its parallel Titration feature. The water content value is saved in the Result Buffer and automatically used for the calculation of the API content.

Elegant Automation

For Many Kinds of Samples

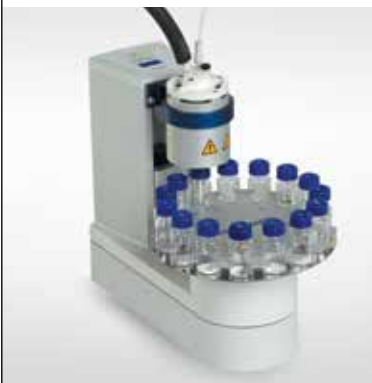
Gas phase extraction is the perfect solution for samples that are unable to be directly added into the titration vessel. In this process samples are placed into a sample boat or vial and moved to the oven or sample rack. When heated to the sample specific temperature (up to 300 °C), the water evaporates and is transported into the titration vessel by a constant flow of dry air or nitrogen.

Gas phase extraction

This approved application allows easy and accurate water determination of solid or viscous samples, for example:

- Substances releasing water only at elevated temperatures: plastics in powder or granular form
- Substances causing side reactions with Karl Fischer reagents: oxidizing inorganic salts
- Substances causing problems in the titration vessel due to their consistency: fibrous or pasty substances
- Substances poorly soluble or insoluble: lubricants, wool, dough, tar or coal

Time saving automation and improved repeatability



The Stromboli Karl Fischer sample changer enables 14 samples to be titrated in an unattended operation mode. The unit is fully controlled by the titrator and automatically recognized whenever connected. A predefined method can easily be started for a simple series measurement.

The simple solution



METTLER TOLEDO's DO308 drying oven allows safe and easy oven application for single samples. The manual oven DO308 assures accurate water determination combined with simple handling.



Simple, clever mechanism

The robust design of Stromboli's sample handling mechanism ensures worry-free processing of samples and correct results. The vial is lifted with a heating plate and moved into the oven. Constant heating from all sides assures even temperature distribution. The water released by the sample is transferred to the titration vessel via the applied gas flow. The vial's specially designed rubber seal ensures no vapor loss.

Reliable Results Through the Complete Life Cycle

The basis of reliable results is set long before the daily routine: evaluation and selection of a suitable titration system as well as proper installation and training on correct operation. Appropriate maintenance and regular calibration guarantee accuracy and repeatability on a long-term as well as fulfilling the increasing demands of regulatory requirements. At each phase, METTLER TOLEDO accompanies you and offers competent support and the right tools to ensure that your investment is lasting and risks are minimized.



GTP™
Good Titration Practice™

Good Evaluation

- Which is the parameter of interest: moisture or water content or dynamic vapor sorption analysis?
- Is volumetric or coulometric titration appropriate?
- Is combination with general titration needed?
- Which application, which method?
- How many samples are to be determined: is automation necessary?
- What reagents are ideal for this sample?
- Which accessories make sense?

METTLER TOLEDO has an excellent knowledge in any kind of moisture and water content determination, therefore offers the appropriate products to fulfill every analysis task.



Moisture determination by
Halogene Moisture Analyzers



Moisture determination by
loss on drying method



Water determination by
Karl Fischer Titration



Dynamic vapor sorption by
TGA Sorption Analyzer System

Good Installation

Proper installation, professional implementation into operation and user training are key factors for good titrations right from the start. Equipment qualification and/or validation accompanied by the suitable documentation are reasonable complements in many cases. METTLER TOLEDO supports you with a variety of service products and services for these purposes:

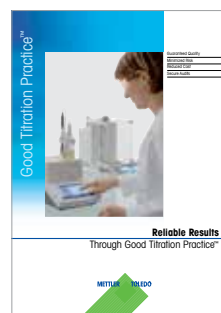


- **IPac:** Initial Qualification Package comprising: Installation Qualification (IQ), Operational Qualification (OQ), recommendation for Performance Qualification (PQ) and the definition of the Maintenance Qualification (MQ).
- **EQPac:** Equipment Qualification Package containing: comprehensive IQ, OQ, definition of PQ, establishing of MQ as well as the expandable logbook for monitoring the equipment and keeping the instrument records through the entire lifetime.
- **EduPac:** Under the watchful eye of our specialist, this training package helps you familiarize yourself with the titrator, and ensures you understand the basics through practical exercises.
- **Software Validation:** The LabX® validation manuals I&II make system validation straightforward and complete. The two manuals contain all the information, instructions and forms you need in order to satisfy any regulatory body.

Good Routine

Achievement of good titration results relies on three key parameters: the instrument, its correct operation and service:

- The instrument's intelligence checks its own parameters as concentration limits, solvent and reagent lifetime or service intervals and reminds the user if any action is necessary. User interference is reduced to the minimum.
- Users are trained in sample preparation, operation and maintenance, what is recorded e.g. in the qualification documentation. The monograph "Good Titration Practice™ in Karl Fischer Titration" gives valuable tips and hints. The Karl Fischer Applications brochure and the user information magazine UserCom give additional information about samples and applications.
- METTLER TOLEDO offers tailored service contracts to maintain the system, to make sure the results remain reliable for years and to support you in fulfillment of regulatory requirements.



► www.mt.com/gtp



For Every Purpose the Perfect Match

Model Overview



**Compact Volumetric
KF Titrators**



Compact KF Coulometers

Feature comparison table		V10S	V20S	V30S	C10S	C20S
		The Individu- alist	The Routine Titrator	The KF Specialist	The Individu- alist	The Routine Titrator
One Click® Titration	User specific Homescreen with Shortcuts	•	•	•	•	•
	Shortcuts per user	4	12	12	4	12
	Solvent or Reagent Control	-	-	•	-	-
Hot Plug & Play	Solvent Manager	•	•	•	•	•
	Burette recognition with titrant and titer	•	•	•	-	-
	External Dosing Unit	-	-	•	-	-
	USB printer	•	•	•	•	•
	Memory stick	•	•	•	•	•
	USB barcode reader	-	•	•	-	•
Security	LevelSens	-	-	•	-	-
	LogStraight Fingerprint Reader	-	-	•	-	-
Automation	Stromboli oven sample changer	-	-	•	-	-
User Management	"Expert – Routine" user groups	-	-	•	-	-
	Fully flexible	-	-	-	-	-
Methods and series	Potentiometric titrations	-	-	-	-	-
	External Extraction / Dissolution	-	-	•	-	-
	Bromine Index determination	-	-	-	-	-
	"if...then" conditions in methods	-	-	-	-	-
	Number of samples per series	120	120	120	120	120
	Preprogrammed METTLER TOLEDO methods	-	-	11	-	-
	Max. number of user methods	5	5	100	5	5
Task list	User defined calculations	-	-	•	-	-
	Number of tasks	-	-	10	-	-
	Number of tasks running in parallel	-	-	-	-	-
Online Help		•	•	•	•	•
Parallel titration		-	-	-	-	-
Status Light™		-	-	-	-	-
Data Export / Printing	USB, Ethernet, PDF	•	•	•	•	•
Languages		English / German / French / Spanish / Italian / Chinese				
PC software	LabX® Titration Express and Server	-	•	•	-	•
Homogenizer		-	-	TTL	-	-
Service	IPAC	•	•	•	•	•
	EQPAC	-	•	•	-	•



Titration Excellence

C30S The KF Specialist	T5 Convenient & Versatile	T7 Flexible & Expandable	T9 Intelligent & Powerful
•	•	•	•
12	24	24	24
•	•	•	•
•	•	•	•
-	•	•	•
-	•	•	•
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•	•	•	•
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-	•	•	•
•	-	•	•
•	•	•	•
-	-	-	•
120	300	300	300
11	>30	>40	>40
100	100	100	100
•	•	•	•
10	10	10	30
-	-	7	8
•	•	•	•
-	-	-	•
-	•	•	•
•	•	•	•
/ Russian / Polish / Korean / Portuguese			
•	•	•	•
TTL	TTL	RS / TTL	RS / TTL
•	•	•	•
•	•	•	•

Accessories Overview

Software



PC software
LabX® Titration Server
LabX® Titration Express

Printer



USB printer



USB-P25
compact paper roll
printer

Analytical balances



XPE or XSE series
analytical balances

Burettes



DV1000 series
with volumes of 1,
5, 10 or 20 mL



External Dosing Unit
to add auxiliary
reagents

Security



LogStraight
Fingerprint Reader



LevelSens
Prevents from waste
overflow and warns
the user when
bottles run dry.

Gas phase extraction ovens



D0308
manual oven



Stromboli
oven sample changer

Homogenizer



Adapter Set
for Kinematica or
IKA Homogenizers



TBox DR42
for use of a homoge-
nizer controlled by TTL

Sampling device



Visco Spoon™
for viscous samples

Thermostatable vessel



For KF titration at elevated or reduced
temperature

Titration Excellence Karl Fischer kit (Volumetric or Coulometric)



Including Solvent Manager, titration stand,
vessel, sensor, tubes and all accessories
(only for Titration Excellence)



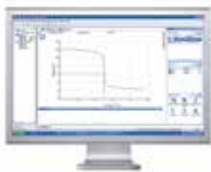
Service and Support

Feel secure in the knowledge that your Titration Excellence system is installed and qualified according to the quality standards that apply in your company. Ask for one of the qualification products offered by your local METTLER TOLEDO representative in the form of service and accompanying documentation.



Titration Automation

Titration puts a high demand on automation due to the large range of sample types and numbers. METTLER TOLEDO automation solutions can run the entire analysis process automatically – from sample preparation to the titration itself and then finally through cleaning/conditioning of the sensor and accessories.



LabX® PC software

This market-approved titration software offers full control over your titration systems, secure database archiving, efficient result management with control charts and individual search filters, rapid and clear method development for new applications, and complete traceability by providing user management, audit trail, method history and electronic signature.

www.mt.com/titration

For more information

One Click is a Registered Trademark of METTLER TOLEDO in Switzerland, the European Union, Russia and Singapore.
LabX is a Registered Trademark of METTLER TOLEDO in Switzerland, USA, China, Germany and a further 13 countries.

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Environmental management system according to ISO 14001.



"European conformity". The CE conformity mark provides you with the assurance that our products comply with the EU directives.