Scharlau

The wise choice

Aquagent®

The Scharlau comprehensive pyridine-free solutions range for a reliable Karl Fischer Titration

Karl Fischer titration is a well known and globally accepted method for water determination since the beginning of the 20th century. KF titration uses volumetric or coulometric titration to determine the water content in a wide variety of samples including chemicals, pharmaceuticals, food and oils. It is used both in industrial processes as well as in quality control laboratories.

The first KF reagents that were developed contained pyridine, which was assumed to be essential for the reaction. Further experiments demonstrated that pyridine could be replaced by other basic compounds, which were able to play the same role providing less toxicity.

Most of the pyridine-free reagents including our Aquagent®, contain imidazole instead of pyridine. Imidazole is a non-toxic base, has a good buffering capacity and allows fast and stable titration end-points.

Aquagent®: An outstanding product range

AQUAGENT® is the comprehensive product range of Scharlau pyridine-free volumetric and coulometric Karl Fischer reagents for water analysis. We offer a wide range of safe, reliable and easy-to-use pyridine-free solutions and standards to meet any requirement of modern laboratories for Karl Fischer titration.

Aquagent® comprises:

- Volumetric titration with One and Two-component reagents
- Coulometric titration with cells with and without diaphragm
- Water Standards

Suitable for the following applications:

- Ketones and Aldehydes
- Carbohydrates, Inorganic Salts and Proteins
- Oils and Fats
- Crude and related products
- Strong acids

Why to use Aquagent®

Water content can affect product quality, texture, shelf life, chemical stability and reactivity. So Aquagent® provides an accurate water content determination in volumetric and coulometric titration with unique performance.

- Less toxicity, more safety
- End point stability
- Accuracy and reproducibility
- Faster titration
- No bad and noxious smells
- Wide range of capacities
- Decreased environmental impact
- Wide applicability
- Outstanding quality: quality control under stringent standards, approved raw materials.
- Globally available: international sales network
- 30 years experience

Aquagent® providing you reliable results in volumetric and coulometric Karl Fischer titration

Two methods are available for the determination of water content based on the Karl Fischer reaction: a volumetric and a coulometric. The choice of the method depends primarily of the amount of water expected in the sample. Scharlau knows that the choice of the right product is a key factor in obtaining reliable and reproducible results.

Aquagent® volumetric solutions

In the case of higher water content (0,1- 100%), the volumetric titration is the method of choice. It is the most used for the volumetric titration of water, which is determined by measuring the required volume of Karl Fischer reagent required to reach the titration end-point. This endpoint is indicated by an excess of iodine and measured potentiometrically.
Scharlau supplies both one-component and two-component reagents for volumetric titration.

Aquagent® One-component

In one-component Karl Fischer titration, all substances involved in the reaction are mixed in one reagent: the titrant. The one-component reagents are user friendly and allow more flexibility in the choice of the more suitable solvent according to the type of sample; on the other hand, they must be frequently re-titrated due to the reactivity of their components.

Scharlau offers a range of one-component solutions suitable for general use as well as for specific applications.

GENERAL USE

Reagents:

Aquagent® Complet 2

A general purpose reagent for samples with low and medium water content. It titrates approx. 2 mg water/mL. Generally used together with methanol as a solvent.

Aquagent® Complet 5

A general purpose reagent for samples with high and medium water content. It titrates approx. 5 mg water/mL. Generally used together with methanol as a solvent.

DESCRIPTION	CAPACITY	ART. NO.
Aquagent® Complet 2	500mL	AQ00070500
	1L	AQ00071000
	2,5L	AQ00072500
Aquagent® Complet 5	500mL	AQ00030500
	1L	AQ00031000
	2,5L	AQ00032500

Solvents:

Methanol Dry

The sample must always be dissolved in a dry solvent to be titrated. The most common is dry methanol. If the sample is not soluble in methanol, any other dry solvent should be used (see ordering information on page 8).

Aquagent® Methanol Fast

An improved formulation for a faster KF volumetric titration.

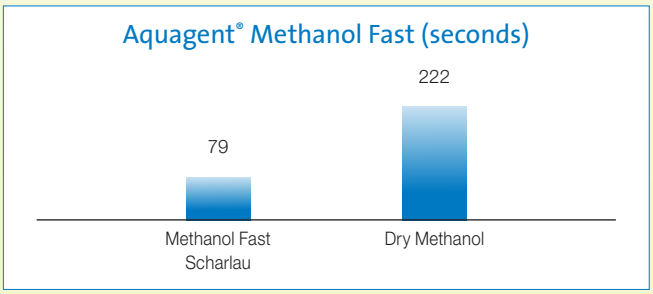
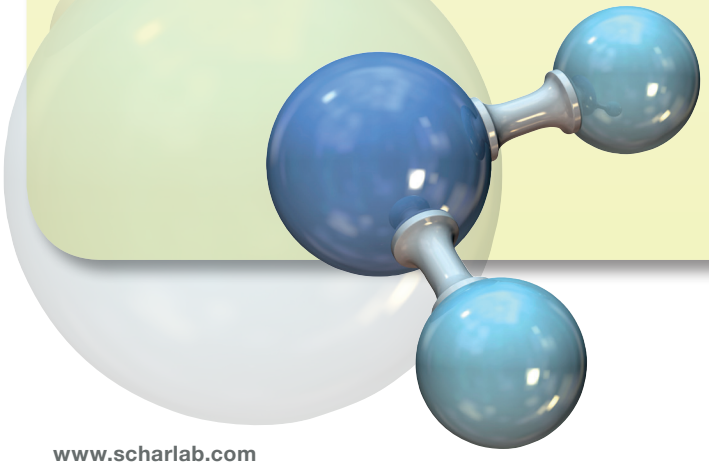


FIGURE 1: Shows the time to achieve the end-point in the KF volumetric one-component titration using different types of methanol solvent. Sample: 20 mg H_2O injection by weight.

DESCRIPTION	CAPACITY	ART. NO.
Methanol, dry (max. 0,005% H_2O), reagent grade	1L	ME03041000
	2,5L	ME03042500
Aquagent® Methanol Fast	1L	AQ00111000
	2,5L	AQ00112500



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Aquagent® volumetric solutions

Aquagent® One-component

SPECIFIC APPLICATIONS

Aquagent® Complet 5K for Aldehydes and Ketones

Aldehydes and ketones react with methanol releasing water as a by-product of this reaction. Hence, when the sample contains aldehydes or ketones erroneous results are obtained. To avoid this effect a specific reagent is needed: our Aquagent® Complet 5K. It is used in conjunction with Aquagent® Medium K, a specific solvent that does not contain methanol. It has a titre of 5 mg water/mL.

DESCRIPTION	CAPACITY	ART. NO.
Aquagent® Complet 5K	500mL	AQ00040500
	1L	AQ00041000

Aquagent® Buffer Acid

The Karl-Fischer reaction runs optimally at pH values between 5 and 7. When determining water in strongly acidic compounds, it is recommended to neutralize the working medium with our Aquagent® Buffer Acid.

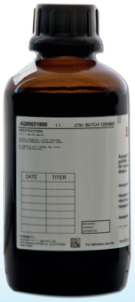
Aquagent® Medium K

Methanol reacts with both ketones and aldehydes and water is a by-product of these reactions. For this reason, when the sample contains aldehydes or ketones, methanol must be substituted by another solvent, our Aquagent® Medium K.

Dry formamide

Formamide improves the solubility of carbohydrates, proteins and inorganic salts. This solvent can be added to methanol in no more than 50% by volume.

DESCRIPTION	CAPACITY	ART. NO.
Aquagent® Buffer, acid	500mL	AQ00090500
	1L	AQ00091000
Aquagent® Medium K	500mL	AQ00050500
	1L	AQ00051000
Formamide, dry (max. 0,02% H_2O), reagent grade	1L	FO00281000



We add a label on each bottle of Aquagent® Complet, where the user can record reagent titration dates and obtained titre: **the whole titration history of each bottle at a glance.**

Aquagent® One-component reagents:

- High titration rate for fast analyses
- Ensure reproducible and consistent high quality results
- Flexibility: the solvent can be suited to the sample matrix
- Unlimited water capacity compared to two components reagent

Aquagent® Two-component

In two-component systems, the solvent component doesn't act just as a solvent medium, but also contains part of the reagents. This allows longer shelf-life and avoids the need for frequent re-titration.
The use of two component reagents is more expensive but presents advantages, compared to one-component reagents: faster titration, less consumption of titration reagents and better long-term stability of the reagents.

Scharlau offers a range of titrants and solvents which are suitable for general use as well as for specific applications.

GENERAL USE

Aquagent® Titrant 2
A general purpose reagent that contains iodine and methanol. Titre is aprox. 2 mg water/mL. Must be used in conjunction with Aquagent® Solvent.

Aquagent® Titrant 5
A general purpose reagent that contains iodine and methanol. Titre is approx. 5 mg water/mL. Must be used in conjunction with Aquagent® Solvent.

DESCRIPTION	CAPACITY	ART. NO.
Aquagent® Titrant 2	500mL	AQ00060500
	1L	AQ00061000
Aquagent® Titrant 5	500mL	AQ00010500
	1L	AQ00011000
	2,5L	AQ00012500

Scharlau offers several products to be used as the solvent-component in conjunction with Aquagent® Titrant:

Aquagent® Solvent
A general reagent that contains SO_2, imidazole and methanol. It must be used use in conjunction with Aquagent® Titrant.

DESCRIPTION	CAPACITY	ART. NO.
Aquagent® Solvent	1L	AQ00021000
	2,5L	AQ00022500

SPECIFIC APPLICATIONS

Aquagent® Solvent CM for Fats and Oils
Applications Solvent-component for titration of fats and oils. It contains chloroform, which improves solubility of long-chained hydrocarbons.

DESCRIPTION	CAPACITY	ART. NO.
Aquagent® Solvent CM	1L	AQ00081000
	2,5L	AQ00082500

Aquagent® Solvent OIL
Solvent-component for titration of fats and oils. It contains 1-hexanol and avoids the use of halogenated reagents.

DESCRIPTION	CAPACITY	ART. NO.
Aquagent® Solvent OIL	1L	AQ00101000

Aquagent® Two-component reagents:

- Faster titration in comparison to one-component reagents
- High accuracy for high quality results
- Titre more stable in comparison to one-component reagents

Coulometric Karl Fischer titration is indicated for low water content at ppm level (<0,1%) or for water determination of very expensive substances with a small sample amount. In coulometric titration, the iodine required for the reaction is formed at the electrode in the titration vessel itself by anodic oxidation. The water content is accurately calculated from the current used over a specific time period. The measuring cell contains an anode and a cathode compartment which can be separated by a membrane cell diaphragm. The titrators cells can therefore be with or without diaphragm.

Aquagent® Coulometric solutions

Scharlau offers a suitable AQUAGENT® for both cell types.

Aquagent® for cells with diaphragm

Anolyte:

Aquagent® Coulometric A Anolyte for coulometric KF titration (AQ0022)

Suitable for cells with diaphragm. This general purpose reagent contains methanol, chloroform, imidazole, sulphur dioxide. To be used in conjunction with AQ0023.

Aquagent® Coulometric Oil Anolyte for coulometric KF titration (AQ0025)

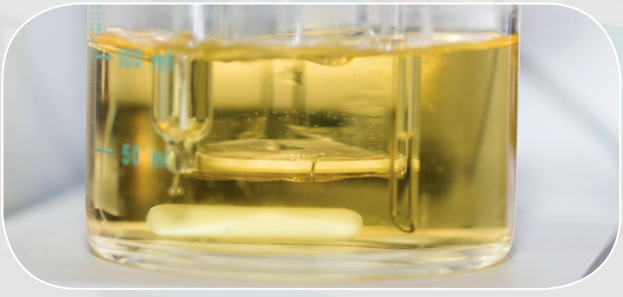
Suitable for cells with diaphragm. This general multipurpose reagent contains chloroform, imidazole, xylene sulphur and sulphur dioxide. Indicated for crude and related products. To be used in conjunction with AQ0023.

Catholyte:

Aquagent® Coulometric CG Catholyte for coulometric KF titration (AQ0023)

Suitable for cells with diaphragm. This general multipurpose reagent contains diethanolamine and methanol. To be used in conjunction with AQ0022 and AQ0025.

DESCRIPTION	CAPACITY	ART. NO.
Aquagent® Coulometric A, anolyte	500mL	**AQ00220500**
Aquagent® Coulometric Oil	100mL	**AQ00250100**
Aquagent® Coulometric CG, catholyte	100mL	**AQ00230100**



Aquagent® for cells without diaphragm

Aquagent® Coulometric AG, for coulometric KF titration (AQ0024)

Contains methanol, Imidazole, diethanolamine, sulphur dioxide and iodine.

DESCRIPTION	CAPACITY	ART. NO.
Aquagent® Coulometric AG	500mL	**AQ00240500**
	1L	**AQ00241000**

Scharlau Standards for Karl Fischer titration

Standards of a known water content are used to determine the factor of the reagents. They are more and more requested due to an increasing demand for more transparent and comparable results. Our Aquagent® product family includes:
Solid standards: sodium tartrate dihydrate, stable, non-hygroscopic, with a water content of 15,66%.
Liquid standards: Aquagent® Standard 1.0 for coulometric and Aguagent® Standard 10.0 for volumetric Karl Fischer titrations respectively. We pack our 1.0 and 10.0 standards in vials to maintain optimum conditions until they are opened. Each vial provides sufficient standard for one titration. Aquagent® Standard 5.0, suitable for daily titre control as well as for equipment validation.
Shelf life stable and included in the Certificate of Analysis.

DESCRIPTION	CAPACITY	ART. NO.
Aquagent® di-Sodium tartrate dihydrate*	25g	AQ0030025
	100g	AQ00300100
Aquagent® standard solution 1.0*	10 x 4mL	AQ00190040
Aquagent® standard solution 10.0*	10 x 8mL	AQ00200080
Aquagent® standard solution 5.0	100mL	AQ00210100
	500mL	AQ00210500

**Traceable to NIST*

Benefits of Aquagent®

- Highest quality results
- Increased safety
- Time saving
- Flexibility: many applications and wide range of capacities
- No unpleasant and noxious odours

Benefits of Scharlau

- Outstanding quality
- Globally available: international sales network
- 30 years experience

Aquagent® User Guide

	ME0304 Methanol, dry	AQ0011 Aquagent® Methanol Fast	AQ0005 Aquagent® Medium K	AQ0009 Aquagent® Buffer	FO0028 Formamide, dry	AQ0002 Aquagent® Solvent	AQ0008 Aquagent® Solvent CM	AQ0010 Aquagent® Solvent OIL	AQ0023 Aquagent® Coulometric CG
AQ0007 Aquagent® Complet 2	●	●		●	●				
AQ0003 Aquagent® Complet 5	●	●		●	●				
AQ0004 Aquagent® Complet 5K			●						
AQ0006 Aquagent® Titrant 2						●	●	●	
AQ0001 Aquagent® Titrant 5						●	●	●	
AQ0022 Aquagent® Coulometric A									●
AQ0025 Aquagent® Coulometric Oil									●

AQ0024 Aquagent® Coulometric AG	

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Ordering information

AQUAGENT® PRODUCT RANGE				CAPACITY	ART. NO.
Volumetric		Reagents	Aquagent® Complet 2	500mL	AQ00070500
				1L	AQ00071000
				2,5L	AQ00072500
			Aquagent® Complet 5	500mL	AQ00030500
				1L	AQ00031000
				2,5L	AQ00032500
			Aquagent® Complet 5K	500mL	AQ00040500
				1L	AQ00041000
		Solvents	Methanol, dry (max. 0,005% H_2O), reagent grade	1L	ME03041000
				2,5L	ME03042500
			Aquagent® Methanol Fast	1L	AQ00111000
				2,5L	AQ00112500
			Aquagent® Buffer, acid	500mL	AQ00090500
				1L	AQ00091000
			Aquagent® Medium K	500mL	AQ00050500
				1L	AQ00051000
			Formamide, dry (max. 0,02% H_2O), reagent grade	1L	FO00281000
		Titrants	Aquagent® Titrant 2	500mL	AQ00060500
				1L	AQ00061000
			Aquagent® Titrant 5	500mL	AQ00010500
				1L	AQ00011000
				2,5L	AQ00012500
		Solvents	Aquagent® Solvent	1L	AQ00021000
				2,5L	AQ00022500
			Aquagent® Solvent CM	1L	AQ00081000
				2,5L	AQ00082500
			Aquagent® Solvent OIL	1L	AQ00101000
Coulometric	Cells with diaphragm		Aquagent® Coulometric A, anolyte	500mL	AQ00220500
			Aquagent® Coulometric Oil	100mL	AQ00250100
			Aquagent® Coulometric CG, catholyte	10 x 5mL	AQ00230050
				100mL	AQ00230100
	Cells without diaphragm		Aquagent® Coulometric AG	500mL	AQ00240500
				1L	AQ00241000
Standards	Liquids		Aquagent® standard solution 1.0	10 x 4mL	AQ00190040
			Aquagent® standard solution 10.0	10 x 8mL	AQ00200080
			Aquagent® standard solution 5.0	100mL	AQ00210100
				500mL	AQ00210500
	Solids		Aquagent® di-Sodium tartrate dihydrate	25 g	AQ00300025
				100 g	AQ00300100


CERTIFICATE

Quality

Our company has an integrated management system according to ISO 9001: 2008 and ISO 14001: 2004.
A copy of the certificate is available on our website.

Transparency

You can access our online catalogue and get copies of CoA, TDS and MSDS whenever you need.

Scharlab S.L.
www.scharlab.com