

# Karl Fischer Reagents ROTI® Hydroquant



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# Karl Fischer Reagents

## Karl Fischer Reagents ROTI®Hydroquant

There are two established Karl Fischer methods of calculating the water content of a substance: Volumetric analysis and coulometric analysis. Which method is chosen depends primarily on the water content that the sample is expected to have. Making the right choice is vital for obtaining reliable and reproducible results. Carl ROTH offers compatible reagents for both of these methods.



### Volumetric Reagents

Karl Fischer volumetric analysis is recommended if the water content of a sample ought to be between 0,1 % and 100 %. Volumetric analysis is performed by measuring the amount of Karl Fischer reagent that needs to be added to a substance until the end point of the titration has been reached. In alcoholic solutions, water reacts 1:1 with iodine in the presence of sulphur dioxide. Methanol and sulphur dioxide form an acid ester that is neutralised by the base (e.g. imidazole, hereafter referred to as „RN“ for simplicity).



In the titration process, iodine is added which reacts with water to be reduced to colourless iodide:



This reaction continues until there is no water left. The end point is determined by a change in colour due to a surplus of iodine and measured using a potentiometer.

### Single-component Reagents

Single-component reagents contain all the substances required for the Karl Fischer reaction in a single solution. They are easy to use and provide for a high level of flexibility when choosing a solvent for the sample type. The high reactivity of the components means that the titre for single-component reagents must always be determined before titration is carried out. Reactions with standard reagents containing methanol are not possible for samples that contain aldehydes or ketones, as the methanol will react with them to produce extra water in a secondary reaction. Carl ROTH offers methanol-free reagents that are suitable for substances containing aldehydes and ketones.

Product name	Purity	General application	Art. No.	Pack Qty.
Karl Fischer ROTI®Hydroquant Working Medium K	for KF titration, for aldehydes and ketones	Solvent component. For use with article number 5211.	5215.1	1 l
Karl Fischer ROTI®Hydroquant C5 K	5 mg H <sub>2</sub> O/ml, for KF titration, for aldehydes and ketones	Single-component reagent. For use with article number 5215.	5211.1	1 l
Karl Fischer ROTI®Hydroquant C2	2 mg H <sub>2</sub> O/ml, pyridine-free	Single-component reagent. For use with article number T193.	T194.1	1 l
Karl Fischer ROTI®Hydroquant C5	5 mg H <sub>2</sub> O/ml, pyridine-free	Single-component reagent. For use with article number T193.	T190.1	1 l
Karl Fischer methanol ROTI®Hydroquant D	for KF titration, dry	Solvent component. For use with article number T194 or T190.	T193.1 T193.2	1 l 2.5 l

### Two-components Reagents

In two-component systems, the substances crucial for the reaction are separated, with some in the solvent component and some in the titration component. Separating the substances gives the system a longer shelf life and means that the titre needs to be determined less frequently.

Product name	Purity	General application	Art. No.	Pack Qty.
Karl Fischer ROTI®Hydroquant S	for KF titration	Solvent component. For use with article number X947 or T191.	T192.1	1 l
Karl Fischer ROTI®Hydroquant S CM	for KF titration	Solvent component. For use with article number X947 or T191.	5218.1	1 l
Karl Fischer ROTI®Hydroquant T2	2 mg H <sub>2</sub> O/ml, pyridine-free	Titration component. Two-components reagent. For use with article number T192 or 5218.	X947.1	1 l
Karl Fischer ROTI®Hydroquant T5	5 mg H <sub>2</sub> O/ml, pyridine-free	Titration component. Two-components reagent. For use with article number T192 or 5218.	T191.1	1 l

For additional product data and safety information, see our current catalogue or at [www.carlroth.com](http://www.carlroth.com)

Table illustrating the uses of Karl Fischer ROTI®Hydroquant volumetric reagents:

Titration components	Solvent components			
	Methanol (T193)	Working medium K (5215)	S (T192)	S CM (5218)
C2 (T194)	X			
C5 (T190)	X			
C5 K (5211)		X		
T2 (X947)			X	X
T5 (T191)			X	X

# Karl Fischer Reagents

The volumetric Karl Fischer reagents are suitable for water contents between 0,1 % and 100 %. Free water and water of hydration can be determined, respectively. Our solutions are based on methanol and free of pyridine.

#### Using single-component reagents:

Add methanol to the reaction vessel and titrate to dryness with the C-component. Then add the sample and titrate again to dryness.

#### Using two-component reagents:

Add solvent S to the reaction vessel and titrate to dryness with the T-component. Then add the sample and titrate again to dryness.

## Standards

Water standards with a defined water content are required to determine the titre for the reagents used. Either a solid or a liquid standard can be chosen.

### Liquid:

#### Karl Fischer ROTI®Hydroquant water standard 0.1 0,1 mg H<sub>2</sub>O/g

Water standard for KF coulometry.

UN no. 1307 · ADR 3 III · WGK 2

 **Danger**

H226-H304-H312+H332-H315-H319-H335-H373

Art. No.	Pack Qty.	Packaging	Pack.
1KPT.1	10 unit(s)	10 x 8 ml ampoules	glass

#### Karl Fischer ROTI®Hydroquant water standard 5.0 5,0 mg H<sub>2</sub>O/ml

Water standard for KF volumetry

UN no. 1993 · ADR 3 III · WGK 2

 **Danger**

H226-H302+H312+H332-H304-H315-H318-H335-H336-H373

Store under inert gas.

Art. No.	Pack Qty.	Packaging	Pack.
1KPX.1	500 ml	500 ml	glass

#### Karl Fischer ROTI®Hydroquant water standard 1.0 1 mg H<sub>2</sub>O/g

Water standard for KF coulometry.

UN no. 2222 · ADR 3 III · WGK 2


 **Warning** H226

Art. No.	Pack Qty.	Packaging	Pack.
9971.1	10 unit(s)	10 x 4 ml ampoules	glass

#### Karl Fischer ROTI®Hydroquant water standard 10.0 10 mg H<sub>2</sub>O/g

Water standard for KF volumetry

UN no. 1993 · ADR 3 III · WGK 2

 **Danger** H226-H304-H315-H318-H335-H336-H373

Art. No.	Pack Qty.	Packaging	Pack.
5219.2	10 unit(s)	10 x 8 ml ampoules	glass

### Solid:

#### Karl Fischer ROTI®Hydroquant standard sodium tartrate dihydrate

≥99 %, for KF titration

Primary standard substance for Karl Fischer titration.

Water standard for KF volumetry.

WGK 1

Art. No.	Pack Qty.	Packaging	Pack.
5229.1	100 g	100 g	glass

# Karl Fischer Reagents

## Coulometric Reagents

Karl Fischer coulometric titration is suitable for substances with a low water content (i.e. <0,1 %) and, for example, for expensive substances that can only be examined in small quantities.

In the coulometric titration process, the iodine required is produced directly in situ at the electrode in the reaction vessel through the anodic oxidation of iodide. Hydrogen is produced at the cathode. The measuring cell contains an anode and cathode chamber, which can be separated by a diaphragm. This means that the titration cell can be equipped with diaphragms or be diaphragm-free.

Carl ROTH offers suitable reagents for both models.



### For cells with diaphragms:

#### Anolyte:

Product name	Purity	General application	Pack.	Art. No.	Pack Qty.
Karl Fischer ROTI®Hydroquant coulo A	for KF titration, coulometric	Anolyte for cells with diaphragm. Use with Karl Fischer ROTI®Hydroquant coulo CG (9861).	glass	<b>9957.1</b>	500 ml
Karl Fischer ROTI®Hydroquant coulo AK	for KF titration, coulometric, for aldehydes and ketones	Anolyte for cells with diaphragm. Use with Karl Fischer ROTI®Hydroquant coulo CG-K (1KPP).	glass	<b>1KPN.1</b>	500 ml
Karl Fischer ROTI®Hydroquant coulo Oil	for KF titration, coulometric	Anolyte for cells with diaphragm. Use with Karl Fischer ROTI®Hydroquant coulo CG (9861).	glass	<b>9960.1</b>	100 ml

#### Catholyte:

Product name	Purity	General application	Pack.	Art. No.	Pack Qty.
Karl Fischer ROTI®Hydroquant coulo CG	for KF titration, coulometric	Catholyte for cells with diaphragm. Use with Karl Fischer ROTI®Hydroquant coulo A (9957) or coulo Oil (9960).	glass	<b>9861.1</b>	100 ml
Karl Fischer ROTI®Hydroquant coulo CG-K	for KF titration, coulometric, for aldehydes and ketones	Catholyte for cells with diaphragm. Use with Karl Fischer ROTI®Hydroquant coulo AK (1KPN).	glass	<b>1KPP.1</b>	10 unit(s)

### For cells without diaphragms:

Product name	Purity	General application	Pack.	Art. No.	Pack Qty.
Karl Fischer ROTI®Hydroquant coulo AD	for KF titration, coulometric	Single-component reagent for cells without diaphragm	glass	<b>1KPL.1</b>	500 ml
Karl Fischer ROTI®Hydroquant coulo AG	for KF titration, coulometric	Single-component reagent for cells without diaphragm	glass	<b>9854.1</b>	500 ml

For additional product data and safety information, see our current catalogue or at [www.carlroth.com](http://www.carlroth.com)

### Table illustrating the uses of Karl Fischer Roti®Hydroquant coulometric reagents:

	coulo CG (9861)	coulo CG-K (1KPP)	
coulo A (9957)	X for cells with diaphragms.		
coulo Oil (9960)	X for cells with diaphragms.		
coulo AK (1KPN)		X for cells with diaphragm, for aldehydes and ketones.	
coulo AD (1KPL)			Can be used without additional reagents. For cells without diaphragms.
coulo AG (9854)			Can be used without additional reagents. For cells without diaphragms.

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