infoPoint

Pyridine-free Karl Fischer reagents

Aquametric is the range of pyridine-free Karl Fischer reagents from PanReac AppliChem for an accurate water content determination using volumetric or coulometric systems.

Main advantages

- **Safe:** Low toxicity and pyridine free.
- **Speed:** Fast titrations and saving of time.
- **Reliable:** Stable endpoints ensure accurate
- and reliable results.
- **Long Shelf Life:** Up to 5 years depending on the reagent.

Volumetric determination

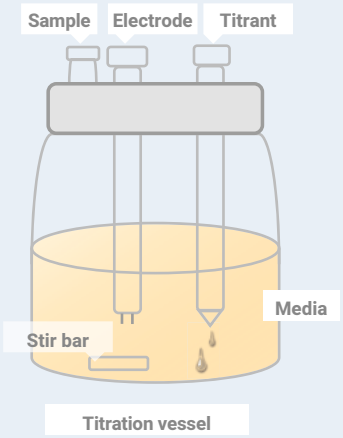
For samples with a water content greater than 0.1%. The amount of water is determined by volumetry, based on a redox reaction (Iodine-Iodide) sensitive to very low moisture levels.

$I_2 + SO_2 + 2H_2O$ — Brown color

$2HI + H_2SO_4$ — Pale yellow color

In presence of a base and a solvent (i.e. imidazole and methanol)

The amount of iodine consumed in the titration is proportional to the water content of the sample. The end point is detected by a double platinum polarized electrode.



There are two ways to perform this reaction: **with one component reagents or with two components.**

One component reagents

All the necessary reagents to perform the reaction (iodine, sulphur dioxide and imidazole) are present in the titrant reagent: **AQUAMETRIC Composite.**

The media generally used with these reagents is dry methanol.

Main advantages

- **Easy to use:** All in one
- **Flexibility to select the appropriate solvent** (as media) to extract the water from the sample

Two component reagents

The reagents to perform the reaction are separate in two components:

- **AQUAMETRIC Titrant:**
  Contains iodine dissolved in methanol
- **AQUAMETRIC Solvent:**
  Medium that contains the rest of necessary compounds (imidazole and sulphur dioxide in methanol)

Main advantages

- **High stability and shelf life**
- **Faster titration and high accuracy**

Volumetric determination

Choose the suitable reagents

AQUAMETRIC—Volumetric Titrations				
Product name	**Medium**	**Titrant**	**Product code**	**Pack sizes**
One component reagents				
Standard procedure				
AQUAMETRIC Composite 2		✓	285813.1611	1 L
AQUAMETRIC Composite 5		✓	285812.1610	500 mL
		✓	285812.1611	1 L
		✓	285812.1612	2.5 L
Methanol dry (max. 0.005% water) - Karl Fischer's Reagent (Reag. Ph. Eur.) , ACS, ISO	✓		481091.1611	1 L
	✓		481091.1612	2.5 L
Ketones and aldehydes				
AQUAMETRIC Composite 5K		✓	285814.1611	1 L
AQUAMETRIC Working Medium	✓		285821.1611	1 L
Industrial oil				
AQUAMETRIC Composite 2		✓	285813.1611	1 L
AQUAMETRIC Composite 5		✓	285812.1610	500 mL
		✓	285812.1611	1 L
		✓	285812.1612	2.5 L
AQUAMETRIC Solvent Oil B	✓		286154.1611	1 L
Two component reagents				
Standard procedure				
AQUAMETRIC Titrant 2		✓	285816.1611	1 L
AQUAMETRIC Titrant 5		✓	285815.1611	1 L
		✓	285815.1612	2.5 L
AQUAMETRIC Solvent	✓		285817.1611	1 L
	✓		285817.1612	2.5 L
Food oils and fats				
AQUAMETRIC Titrant 2		✓	285816.1611	1 L
AQUAMETRIC Titrant 5		✓	285815.1611	1 L
		✓	285815.1612	2.5 L
AQUAMETRIC Solvent CM	✓		285819.1611	1 L
	✓		285819.1612	2.5 L

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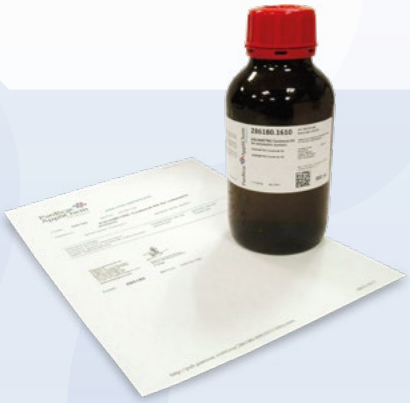
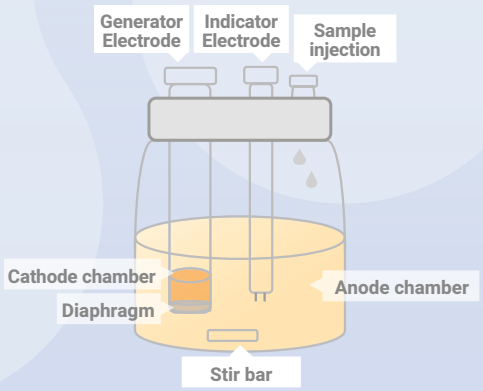
Coulometric determination

For samples with a water content less than 0.1%. It needs two electrode's cell to work:

- **Indicator electrode:** Detects the moisture
- **Generator electrode:** Transmits a very low electric current causing the iodide oxidation into iodine. The iodine required for the reaction with the water in the sample is generated in situ (in the titration beaker) using a reagent solution containing iodide.





I^- Iodide → When water is detected / Generation in situ → $I_2 + H_2O$ Iodine → I^- Iodide

A measuring system of the current generated in the titration is used to determine coulometrically the amount of water.

There are two different types of coulometric cells: those with and those without a diaphragm.

Cells with diaphragm

The anode chamber is separated from the cathode chamber with a diaphragm. Oxidation of I^- to I_2 occurs at the anode and the reduction of protons to H_2 occurs at the cathode. **Two reagents are needed:**

- **AQUAMETRIC** Coulomat A o AG for the anode chamber
- **AQUAMETRIC** Coulomat CG for the cathode chamber

Main advantage

- **Highest accuracy**

Cells without diaphragm

The anodic and cathodic compartments are not separated and only one reagent, the anolyte, is needed. **The reactions are performed in the same electrolyte:**

- **AQUAMETRIC Coulomat AG**

Main advantage

- **More convenient**

AQUAMETRIC—Coulometric Titrations				
Product name	**Anolito**	**Catolito**	**Product code**	**Pack sizes**
Cells with diaphragm				
Standard procedure				
AQUAMETRIC Coulomat A	✓		286181.1610	500 mL
AQUAMETRIC Coulomat AG	✓		286180.1610	500 mL
AQUAMETRIC Coulomat CG		✓	287192.2504	10x5 mL
Cells without diaphragm				
Standard procedure				
AQUAMETRIC Coulomat AG	✓		286180.1610	500 mL

PanReac AppliChem ITW Reagents

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aquametric

IP-035EN;202212

The AQUAMETRIC line is completed with...

Water Standards

They are used to calculate the titre of AQUAMETRIC Karl Fischer reagents for volumetric titration and to check the reliability of water determination using the coulometric method. They are NIST traceable.

Dry Solvents

For special applications other solvents are used (instead of or mixed with methanol). Here we show some of the most common solvents, with very low water content, used in volumetric systems.

WATER STANDARDS				
Product name	**Volumetric**	**Coulometric**	**Product code**	**Pack sizes**
Karl Fischer Water Standard 1.0 mg/g (Reag. Ph. Eur.)		✓	395459.2522	10x10 mL
Karl Fischer Water Standard 10 mg/g (Reag. Ph. Eur.)	✓		395458.2522	10x10 mL
Sodium Tartrate 2-hydrate (Reag. Ph. Eur.) standard for volumetry, ACS	✓		241719.1608	100 g

DRY SOLVENTS		
Product name	**Product code**	**Pack sizes**
Ethanol absolute dry (max. 0.02% water)	481086.1611	1 L
Pyridine dry (max. 0.01% water) (Reag. Ph. Eur.) , ACS	481457.1611	1 L

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