



## Water in Heavy fuel

### Karl Fischer application

#### Product group

Petroleum products

#### General Information concerning the product group

##### Petroleum products

Petroleum products are mixtures of long-chain or aromatic hydrocarbons. They are hardly soluble in methanol. Water determination by Karl Fischer therefore requires the addition of solubilisers. For light oils, long-chain alcohols are suitable. For dissolving of heavier oils toluene, xylene or chloroform are added. For the volumetric titration specific KF solvents for oils are available. Due to the very low water concentration titrants with a low factor (2 mg/ml or 1 mg/ml) are recommended.

During coulometric determination without diaphragm 20% solubiliser can be added to the working medium, or 40% solubiliser to the analyte in the case of coulometry with diaphragm.

Note that oils are often heterogeneous compounds with uneven distribution of water and should thus be homogenised (e.g. with Ultra-Turrax) prior to KF determination.

Additives in oils can cause side reactions during KF determination. Here, the direct coulometric analysis is not possible, the volumetric titration only conditionally. As an alternative, the KF oven technique can be utilised in combination with coulometry, whereby the release of water is best achieved at temperatures between 120 and 140 °C.

#### Special Information concerning the sample and the methods

Water determination of heavy fuel can be carried out directly by means of the volumetric method. Toluene and chloroform are suitable solubilisers. Specific solvents for oils are available for one and two component titration. The sample may also be dissolved externally in toluene prior to analysis.

#### Titration one component system

##### Reagents

Titrant:	Aquastar - CombiTitrant 5	188005	
	One component reagent for volumetric Karl Fischer titration, 1 mL = approx. 5 mg water		
or	Aquastar - CombiTitrant 2	188002	
	One component reagent for volumetric Karl Fischer titration, 1 mL = approx. 2 mg water		
Solvent:	Aquastar - CombiSolvent oils	188020	50 mL
	Solvent for volumetric Karl Fischer titration with one component reagents for oils		

##### Titration parameters

Stirring time: 60 sec.

Default titration settings, e.g.:

$I(\text{pol}) = 20 - 50 \mu\text{A}$ ,  $U(\text{EP}) = 100 - 250 \text{ mV}$

Stop criterion: drift < 20  $\mu\text{L}/\text{min}$

##### Sample size

5 mL

##### Procedure

The titration medium is first placed into the cell and titrated dry by means of the titrant. Then the sample is added with a syringe (exact sample weight determination by weighing of syringe before and after injection) or volumetric

pipette and the titration is started. For complete dissolution of the sample a stirring time of 60 seconds is recommended.

## Titration two component system

### Reagents

Titrant:	Aquastar - Titrant 5	188010	
	Titrant for volumetric titration with two component reagents, 1 mL = approx. 5 mg water		
or	Aquastar - Titrant 2	188011	
	Titrant for volumetric titration with two component reagents, 1 mL = approx. 2 mg water		
Solvent:	Aquastar - Solvent oils & fats	188016	40 mL
	Solvent for volumetric Karl Fischer titration with two component reagents for oils & fats		
and	Toluene	108325	10 mL
	as solubiliser		

### Titration parameters

Stirring time: 60 sec.

Default titration settings, e.g.:

$I(\text{pol}) = 20 - 50 \mu\text{A}$ ,  $U(\text{EP}) = 100 - 250 \text{ mV}$

Stop criterion: drift < 20  $\mu\text{L}/\text{min}$

### Sample size

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### Procedure

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## Ordering Information

Product	Catalog No.
Toluene for analysis EMSURE® ACS,ISO,Reag. Ph Eur	108325
CombiTitrant 2 one component reagent for volumetric Karl Fischer titration 1 ml □ ca. 2 mg H <sub>2</sub> O Aquastar™	188002
CombiTitrant 5 one-component reagent for volumetric Karl Fischer titration 1 ml □ ca. 5 mg H <sub>2</sub> O Aquastar™	188005
Titrant 5 titrant for volumetric Karl Fischer titration with two component reagents 1 ml □ ca. 5 mg H <sub>2</sub> O Aquastar™	188010
Titrant 2 titrant for volumetric Karl Fischer titration with two component reagents 1 ml □ ca. 2 mg H <sub>2</sub> O Aquastar™	188011
Solvent Oils & Fats Solvent for volumetric Karl Fischer titration with two component reagents for oils and fats Aquastar™	188016
CombiSolvent Oil Solvent for volumetric Karl Fischer titration with one component reagents for oils Aquastar™	188020