Total Organic Carbon (TOC) Analyzer

Total Organic Carbon Analyzer Test Method and Its Principle

In Part II of The People's Republic of China Pharmacopoeia (2010 edition) issued by the state pharmacopoeia commission, both online and offline methods are recommended. For the general requirements of the test instrument of total organic carbon, there are a variety of methods that can be used for the determination of total organic carbon. These technologies, as long as meeting the following conditions, can be used for the determination of total organic carbon in water

(1) The determination technology of total organic carbon should be able to distinguish between inorganic carbon and organic carbon, and be able to rule out the interference of inorganic carbon for the determination of organic carbon

(2) It should meet the requirements of system suitability test

(3) It should have enough detection sensitivity (the minimum detection limit is that the carbon content is equal to or less than 0.05 mg/L in every liter)

To test the concentration of organic matter in sample, the organic molecules must be decomposed and converted to be measurable single molecule form, so the organic matter must be oxidized into carbon dioxide and the resulted carbon dioxide will be measured. At present, there are four types of oxidation methods: first, burning method; Second, photo-oxidation method; Third, wet oxidation; Fourth, photochemical method.

The testing methods of organic carbon after oxidation include two kinds of subtraction and direct method.

Among them, the expression of subtraction method is TOC = TC - TIC, that is, total organic carbon is the difference between total carbon (TC) and inorganic carbon (TIC).

The oxidation method used by TA-1.0 Analyzer is photo-oxidation method:

$H_2O + h\nu\ (185nm) \rightarrow OH\bullet + H\bullet\ OH\bullet + \text{organic matter} \rightarrow CO_2 + H_2O$

The measuring way for carbon dioxide is subtraction method: TOC = TC — TIC

System Adaptability Verification

System Adaptability Verification is a kind of test method to inspect the oxidation ability of TOC analyzer, where the computation formula is as follows:

The instrument response efficiency (%)= ((rss - rw)/(rs - rw)) * 100%

Where:

rss —— response value of 1-4 benzoquinone reference solution;

rs —— response values of sucrose reference solution;

rw —— blank response value of water to detect total organic carbon;

The condition that the instrument passes the test

85% < response efficiency < 115%

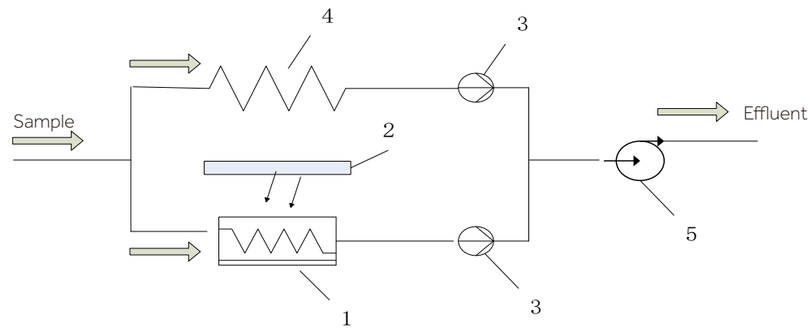
Off-line Monitoring System TA-1.0

The product uses the electrical conductivity difference detection technology, with high accuracy and short response time. The instrument completely conforms to the requirements of the national pharmacopoeia, and it can meet the offline testing requirements for the deionized water such as pharmaceutical water (injection water and purified water) and ultrapure wate



Working Principle

This instrument adopts the principle of ultraviolet catalytic oxidation, to oxidize the organic matter in the sample into carbon dioxide, where the test of carbon dioxide test uses the direct conductivity method, to determine the total organic carbon content through the test of the difference between the total carbon content in the sample after oxidation reaction and the total inorganic carbon content in the sample without oxidation, i.e., the total organic carbon (TOC) = total carbon (TC) - total inorganic carbon (TIC)



1. The rotating quartz glass tube coated with titanium dioxide; 2. UV lamp; 3. Conductivity sensor;
4. Delay coil; 5. Peristaltic pump

Features

- There is no need of nitrogen, oxygen, acid reagent and oxidant, so the operation is simple and the cost is low
- The intelligent level is high, as it is equipped with automatic sampler, and the system suitability validation can be done automatically
- It is in conformity with the test scheme as specified in the new edition of state pharmacopoeia
- It can be used in off-line laboratory, to meet the test and cleaning validation for organic carbon injection water and purified water
- It has the limit alarm design, and when the test sample exceeds the prescribed limit, the instrument makes automatic alarm

Parameters

Power Supply	100 – 240 VAC, 50HZ, 120W
Conductivity Detection Range	0.055us/cm-8.000us/cm
Measure Range	0.001mg/L~1.0 mg/L (1~1000ppb)
Accuracy	±3%
Resolution	0.001mg/L
Analyzing Time	Continues Analyzing
Response Time	5mins
Measuring Limit	0.001 mg/L
Sample Temperature	1-99°C
Applied Range	Offline in the Laboratory/Cleaning Validation
Authority Management	User name and password login/ to meet FDA 21CFR PART 11 requirements
Audit trail	Custom-made
Print Function	External Printer
Historical Records	>=3years
Data Copy	USB disk to export the data
Display Screen	Color Touch Screen
Weight	8.5KG
Dimension (mm)	400*240*270

Total Organic Carbon (TOC) Analyzer

Features

- With a 10 Inch Touch screen, can control to 8 sets of detection unit
- Query history by time
- Best data stability
- The diameter of inlet and outlet water pipe is 1mm Teflon tube, equipped with 50 quick connector
- The detection principle of ultraviolet static oxidation
- Ultra low detection limit
- RS-485 communication interface
- Matching micro printer, can be printed in real time

Application Domain

The system can be used to detect TOC concentration of purified water and injection water and deionized wate in the pharmaceutical industry; online monitoring of water system in pharmaceutical industry, Ultra pure water preparation system for semiconductor industry and water processing and power plant deionized water preparation process. It also used for detection of the semiconductor industry, power plants, scientific research units, laboratories and other ultrapure water's TOC

Parameters

Measuring Range	1μg/L~1000μg/L
Conductivity Detection Range	0.055μS/cm ~6.000μS/cm
Measuring Limit	1 μg/L
Measuring Precision	±5%
Response Time	Within 30 min
Repeatability Error	≤ 3%
Dimension (mm)	400*240*310
Range Drift	±5%
Sample Temperature	0~100℃
ambient Temperature	10~60℃
Relative Humidity	≤ 85%
Sample Speed Inside	0.5ml/min
Linearity	< 3%
Power Supply	220V±10%
Mains Frequency	50Hz±1Hz
Rated Power of Test Unit	50W

TOC Standard Sample Liquid

2010 pharmacopoeia appendix Ⅷ R has strict rules for the water to check total organic carbon and the preparation of reference solution, requiring that the calibrated instrument should be used for on-line monitoring or off-line laboratory determination for the water system, this requiring that the calibration and system System Adaptability Verification must be carried out regularly for the TOC analyzer.Based on the strong technical strength of the Academy of Military Medical Sciences, the configuration of the Total Organic Carbon (TOC) Analyzer Calibration Kit launched by us has reached the international leading level. It not only meets the requirements of the 2010 edition of the Pharmacopoeia but also complies with the relevant regulations of the U.S. Food and Drug Administration (FDA)

Matters Needing Attention

- One-time use is advised when the bottle is opened each time
- Because the validity of the reagent itself is shorter, please buy according to the need, to avoid unnecessary loss
- This kit is sold in a complete set, temporarily not sold by pieces
- Different packaging may be customized according to requirements

Parameters

NB-gc001	125ml Zero Water /1Bottle	NB-gc002	40ml Zero Water/1Bottle
	125ml 0.5ppmSucrose/1Bottle		40ml0.5ppmSucrose/1Bottle
	125ml0.5ppm1, -4 benzoquinone/1Bottle		40ml0.5ppm1,-4 benzoquinone/1Bottle

UV Lamp

Matters Needing Attention

- It can't directly illuminate to a person's skin, especially a person's eyes
- Please wear sterile gloves before using and use alcohol to wipe the quartz tube
- Do not use your hand to directly contact with the tube
- Please contact the manufacturer in time of use

Features

- This product is imported from abroad with original packaging
- It is in line with the electrical interface definition of the international electrotechnical standards association
- Service voltage: 12VDC
- The effective service life of 3000--- 5000 hours for the quartz tube can be ensured
- It is compatible with the oxidation unit of TOC analyzer from abroad
- Wavelength: 185nm and 145nm dual-wavelength