

Control of Oil Contamination in Aqueous Cleaning Equipment using the TOC-5000A

Industrial machinery parts, after cutting, are cleaned in aqueous cleaning equipment to remove any oily residues, and among cleaning devices, aqueous cleaning equipment is generally regarded to be the least problematic both from environmental and safety standpoints.

The functionality of cleaning devices is diminished when contaminated by oils, so periodic addition or full replacement of detergents are carried out to preserve full functionality. In order to reduce running costs and to limit the amount of the detergent-added effluent, which requires troublesome disposal processes, it is necessary to achieve the proper concentration of detergent in the washing vessel. For these reasons a quantitative control on detergent concentration is required. Here we introduce an example of using the TOC analyzer to control the operation of such cleaning device.

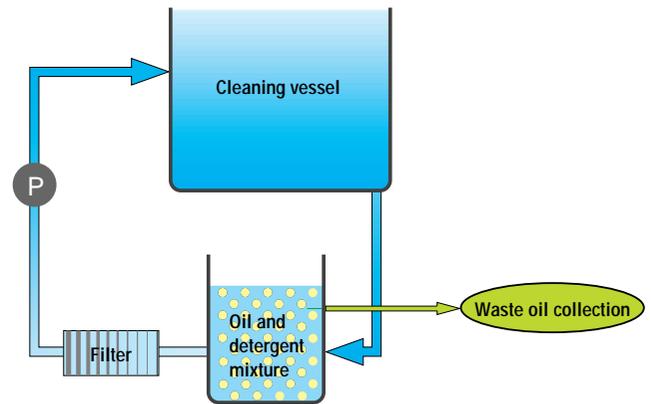
Purpose

A certain amounts of oily contaminant are added to the cleaning solution and the TOC-5000A is used to measure how the total carbon value (TC) responds to the oily contaminant.

Measuring Conditions

Shimadzu Total Organic Carbon Analyzer: TOC-5000A
 Item to be measured: TC
 Sample: Sample 1: x10 dilution of a general oil cleaning solution
 Sample 2: Sample 1 + 3% kerosene
 Sample 3: Sample 1 + 3% drawing oil

As these samples exceeded the TOC-5000A measurement range, they are further diluted by a factor of 100. Those samples containing oils showed separation into an oily layer and detergent layer if left to stand for a while, so a magnetic stirrer was used to mix the samples while the measurement was carried out.



Results

Sample	TC value (%C)
Sample 1	4.863
Sample 2	7.280
Sample 3	6.931

The measurement results have been corrected to account for the x100 dilution factor. The peak data for samples 1, 2 and 3 are shown in Figs. 1, 2 and 3, respectively.

Sample 2 had 3% kerosene dissolved in the cleaning solution, and had a TC increase of 49.8% compared to sample 1 (cleaning solution).

Sample 3 had a TC increase of 42.6% compared to sample 1.

As the introduction of even a small amount of oil into the cleaning solution is showed apparently in the measured TC values, it can be said that the TOC-5000A is useful in controlling deterioration of the cleaning solution.

Benefits

The following results are achieved by using the TOC-5000A:

1. Rapid analysis allows processing of many samples;
2. Even if the type of oil or detergent varies, **the TOC analyzer detects all types of organics;**
3. Operation is easy;
4. Measurement is accurate;
5. Both batch analysis and fully automated on-line analysis (optional) are possible, with selection depending on the measurement intervals and form of control required;

We have received reports from plants actually using the TOC analyzer to control operation of their oil cleaning vessels with good results.

Application in Other Fields

There are many applications for total organic carbon analysis using the TOC-5000A, and here are a few examples:

- Monitoring of TOC for recycled water plant.
- Deterioration measurement of etching solutions;
- TOC measurement of hydroponic farming solutions;
- Management of boiler water;
- Evaluation of cleanliness of surface-polished pipes.

Please contact us for any other potential applications.

Features of the TOC-5000A

1. The combustion method achieves extremely high sensitivity.
2. All kind of organic compounds are measured at a high detection rate.
3. Sample injection system with high precision and flexibility.
4. With the use of a low temperature combustion system, the life time span of the catalyst and combustion tube is extended.
5. The large LCD allows an abundant display of information and easy operation.
6. Versatile data processing functions.

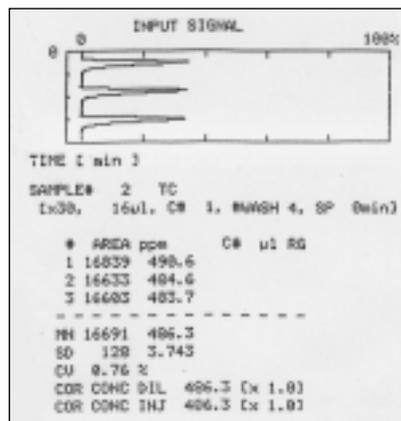


Fig.1 Sample 1 (10% detergent)

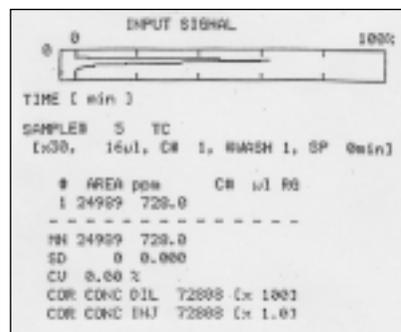


Fig. 2 Sample 2 (3.0% kerosene)

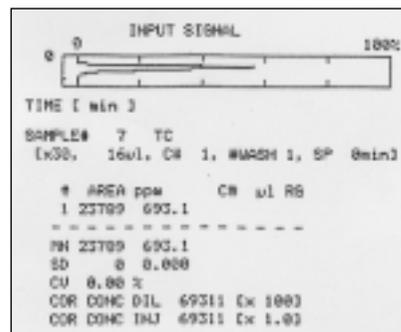


Fig. 3 Sample 3 (3.0% drawing oil)



SHIMADZU CORPORATION. International Marketing Division
3. Kanda-Nishikicho 1-chome, Chiyoda-ku, Tokyo 101-8448, Japan
Phone: 81(3)3219-5641 Fax: 81(3)3219-5710 Cable Add.: SHIMADZU TOKYO

SHIMADZU SCIENTIFIC INSTRUMENTS, INC.
7102 Riverwood Drive, Columbia, Maryland 21046, U.S.A.
Phone: 1(410)381-1227 Fax: 1(410)381-1222 Toll Free: 1(800)477-1227

SHIMADZU DEUTSCHLAND GmbH
Albert-Hahn-Strasse 6-10, D-47269 Duisburg, F.R. Germany Phone: 49(203)7687-0 Fax: 49(203)766625

SHIMADZU (ASIA PACIFIC) PTE LTD.
16 Science Park Drive #01-01 Singapore Science Park, Singapore 118227, Republic of Singapore
Phone: 65-778 6280 Fax: 65-779 2935

SHIMADZU SCIENTIFIC INSTRUMENTS (OCEANIA) PTY. LTD.
Units F, 10-16 South Street Rydalmere N.S.W. 2116, Australia
Phone: 61(2)9684-4200 Fax: 61(2)9684-4055

SHIMADZU DO BRASIL COMERCIO LTDA.
Rua Cenno Sbrighi, 25, Agua Branca, Sao Paulo, CEP 05036-010, BRAZIL
Phone: (55)11-3611-1688 Fax: (55)11-3611-2209

SHIMADZU (HONG KONG) LIMITED
Suite 1028 Ocean Center, Harbour City, Tsim Sha Tsui, Kowloon HONG KONG
Phone: (852)2375-4979 Fax: (852)2199-7438

Overseas Offices
Istanbul, Beijing, Shanghai, Guangzhou, Shenyang, Chengdu, Moscow

URL <http://www.shimadzu.com>