WATER, DISSOLVED ORGANIC MATERIAL

Typical end products
Alcohols, proteins, sugars, fats, beer and other food and beverage products.

Chemical curve: R.I. per g/L COD at Ref. Temp. of 20°C

Introduction

The Food, Beverage and Brewing industries use high quantities of water and generate high-organic strength wastewater. Organic pollutants are problematic to the environment as their decomposition process consumes the oxygen contained in the receiving water. The oxygen in the water can be consumed at a greater rate than it can be replenished, causing oxygen depletion and severe consequences to the stream ecology.

Organic pollutants from the food and beverage industry include oils and fats, alcohol, proteins and carbohydrates.

Wastewater generated from the production needs to be monitored to ensure compliance with environmental regulations. Major pollutants are often defined by Chemical Oxygen Demand (COD) or Total Organic Carbon (TOC). Organics monitoring helps food and beverage facilities to detect quickly and accurately the carbon content in their wastewater streams. Excess organics can incur fines and penalties. In severe cases the plant can even be closed.

Application

Food and beverage facilities, e.g. breweries, progressively try to minimize their environmental load by monitoring and treating their effluent before discharge. TOC and COD are the most common parameters used for water quality.

It is difficult to achieve an efficient operation of the wastewater plant because of the constant changes in the influent properties. To avoid these load shocks to the treatment plant, the effluents from the process are commonly stored in collection tanks.

At that point, the water is analyzed and treated according to its organic content. For example, water with a low COD content is sent to the treatment plant, while the water with a high COD is treated in a reactor first.

Traditional COD and TOC testing methods are off-line and time consuming, rendering them unsuitable for real-time control. While TOC can be measured on-line by conductivity and non-dispersive infrared (NDIR) based methods, these analyzers are expensive to maintain and calibrate, resulting in frequent breakdowns in their operation.

Food and beverage facilities require a reliable and inline measurement of organics content in the effluents. Real-time control and monitoring of the effluent provide the wastewater treatment plant with instant warning of exceptional loads and help to optimize its operation.

Instrumentation and installation

The K-Patents Process Refractometer PR-43 provides reliable and continuous measurement to estimate the pollutant content in the water from the production facilities. The refractometer’s measurement is accurate and requires no recalibration.
The K-Patents refractometer measures the refractive index of the effluents providing instant information on the amount of dissolved solids. The refractive index technique has proven to be a successful method for effluent monitoring as it has good correlation with COD and TOC values.

Typical measurement range is 0-10000 ppm (COD or TOC). The K-Patents refractometer provides Ethernet and 4-20 mA output signals that can be connected to the process controller for real-time control. For instance, alarms can be set at 6500 ppm and the pump shut-off at 7500 ppm. The alarms are a reliable method for indicating a large amount of dissolved solids (high organics) to the treatment plant.

Similarly, the refractometer can be installed in the discharge lines within the production facilities. Water of suitable quality can be recycled to reduce costs and the demand of water supply. Moreover, the integration of continuous water quality monitoring in the production areas provides real-time alarm of product losses allowing quick corrective actions.

The K-Patents refractometer is installed directly at the dispersing pipe’s outlet of the effluent sewer. The refractometer can read 0-1 % total dissolved solids that correlates with 0-10000 ppm TOC scale.

With the K-Patents refractometer’s reliable and real-time measurement, the wastewater plant can adjust their operation for the incoming load, reduce the treatment cost, and increase their efficiency to meet the environmental regulations.

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<tr>
<th>Instrumentation</th>
<th>Description</th>
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<tr>
<td>K-Patents Sanitary Compact Refractometer PR-43-AC</td>
<td>For hygienic installations in small pipe line sizes of 2.5 inch and smaller. The PR-43-AC refractometer is installed in the pipe bend. It is angle mounted on the outer corner of the pipe bend directly, or by a flow cell using a 3A Sanitary clamp, I-clamp or Variline® connection.</td>
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<tr>
<td>K-Patents Process Refractometer PR-43-GC</td>
<td>is a compact refractometer for smaller pipe sizes in general industrial applications. Available in 2 inch and 2.5 inch process connections and via reducing ferrule in 1.5 inch process connection. The refractometer is installed directly in a pipe elbow by an L coupling connection or in a straight pipe via a Wafer flow cell or a Pipe flow cell.</td>
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| User Interface | Selectable multichannel MI, compact CI or a web-based WI user interface options allow the user to select the most preferred way to access and use the refractometer measurement and diagnostics data. |

| Measurement range | Refractive Index (nD) 1.3200 – 1.5300, corresponding to 0-100 Brix. |