



APPLICATION NOTE

7.03 WATER & ENVIRONMENT

SAC 254 / DOC (UV)

SAC 254 (SAK 254) is measured with a [Kemtrak DCP007](#) and can be correlated to DOC, COD and TOC, simplifying the measurement of organics in potable and wastewater treatment processes.

APPLICATION

The measurement of the spectral absorption coefficient SAC 254 provides you with information on the load of the raw water with dissolved organic carbon. This is also known as UV absorption or dissolved organic carbon (DOC).

UV absorption measurement in raw water and after flocculation / sedimentation serves as an indicator of the purification performance of the treatment stage.

DOC measurement after activated carbon filtration gives information on the saturation of the activated carbon. This DOC measurement enables you to regenerate the activated carbon in time.

On-line monitoring of the DOC at the outlet of the water works usually has an alarm function and helps to ensure process safety.

Municipal sewage water plants use activated carbon or ozone to selectively remove trace substance / micro pollutants from the waste water (4th purification stage). With a DOC measurement before and after the purification stage, you can precisely dose activated carbon powder or ozone.

Dissolved organic substances in water are normally derived from biological substances and processes. These organic substances can reduce the efficiency of water treatment processes and lead to new toxic substances.

A high load of these organic substances:

- Require removal with coagulation, flocculation, and sedimentation
- Contribute to color and taste issues
- Reduce the effectiveness of UV disinfection processes
- Form chlorinated disinfection by-products such as THMs (trihalomethanes) or haloacetic acids

Because SAC 254 detection measures the dissolved substances, it logically complements turbidity detection (which doesn't). Like turbidity for solids, the SAC 254 is also a cumulative parameter, i.e. it is a global measure of all absorbent substances present in the water.

INSTALLATION

A [Kemtrak DCP007 UV analyzer](#) with a measurement wavelength normally with 254nm measurement wavelength. To compensate for sample turbidity and window fouling however a reference wavelength of 400nm is used to compensate for sample turbidity. At this wavelength no absorption is caused by the dissolved organic substances so the difference between the two readings, which is calculated in the control unit, is the desired absorbance of the dissolved organic substances alone.

Dependent on the range the optical pathlength could be a few mm up to 200mm but normally 10-100mm is used to measure ppm DOC.

In some application we could measure both dissolved organic carbons and turbidity.

OPL mm	Absorbance at 254nm		DOC - correlation factor		
	AU	SAC 254	2	3	4
100	1	10	5	3.3	2.5
	2	20	10	6.7	5
	3	30	15	10	7.5
50	1	20	10	6.7	5
	2	40	20	13.3	10
	3	60	30	20	15
10	1	100	50	33.3	25
	2	200	100	66.7	50
	3	300	150	100	75
5	1	200	100	66.7	50
	2	400	200	133.3	100
	3	600	300	200	150
2	1	500	250	166.7	125
	2	1000	500	333.3	250
	3	1500	750	500	375

Because the factor can vary as a result of seasonal or other changes in the organic matter present, it is advisable to review the correlation regularly with laboratory measurements. This table shows the measuring ranges resulting from the proportionality factor found.

With a [Kemtrak DCP007 UV analyzer](#) it is easy to adjust the calibration factor with the quick cal function or have multiple calibrations depending on the matrix.

Note: OPL – Optical pathlength

