

# OxiTop<sup>®</sup>-IDS BOD and more

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SALES GMBH & CO KG



a xylem brand

# WTW Webinar Series



**June 25**

How to monitor BOD  
with OxiTop  
(Part #1)



**July 7**

Online Wastewater  
Monitoring of COD/BOD  
With Spectral Sensors



**July 9**

How to monitor BOD  
with OxiTop  
(Part #2)



**July 14**

Photometry basics  
& Automated Chemistry  
Analyzers



## Dr. Klaus Reithmayer

- Born and living in Munich/Bavaria/Germany
- Married, two (adult) daughters
- Mineralogist (Diploma) (Ludwig-Maximilians-Universität Munich)
- PhD thesis in high-pressure crystallography (Ludwig-Maximilians-Universität Munich)
  
- More than 20 years experience in electrochemistry (lab and process), since 15 years also respirometry
- Since 2001 with WTW/Xylem Analytics
- Senior Product Manager for Lab Echem products and OxiTop®



## Poll Question #1

What is your professional background?



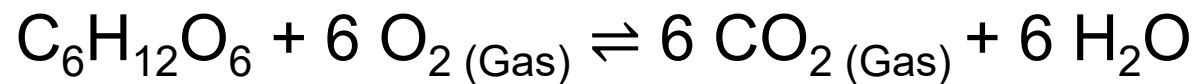


## Poll Question #2

What is your professional focus?

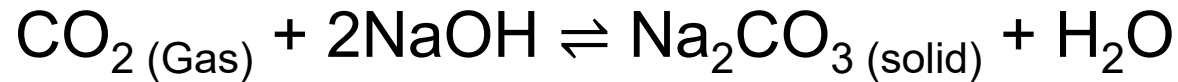
# Respirometry – Basic principle of degradation of organic carbons

Micro organisms need oxygen for their metabolism.  
When digesting carbons they produce carbon dioxide



# Principle of respirometry

The absorption of carbon dioxide in a closed vessel leads to a pressure decrease.



Since 1997 – a unique product

# OxiTop® Control - BOD and degradation tests





# OxiTop® Control

## IR Interface



OC 100: **“BOD-Routine”**: Single bottles, GLP, AutoTemp Function

**“BOD-Standard”**: administration of maximum 12 parallel samples with GLP-statistics/averaging, AutoTemp Function selectable

OC 110: **“BOD-Routine”** / **“BOD-Standard”** as OC 100

**“BSB-Special”**: Administration of parallel samples  
Parameter  $V_{tot}$ ,  $V_{pr}$ ,  $p_{at}$ ,  $T$  freely selectable

**“Pressure-p”**: Pressure measurement 500 - 1350 hPa

But now:

OxiTop<sup>®</sup> goes IDS: OxiTop<sup>®</sup>-IDS – more than BOD



OxiTop<sup>®</sup>-IDS



OxiTop<sup>®</sup>-IDS/B

# More than BOD...

## Enhanced Firmware (update) Multi 3620 or 3630 IDS

- Integration of old controller functions with new user interface
- Adjustment to menu structure of 36x0
- Switching between EChem applications and OxiTop®
- Comprehensive functions: BOD standard, BOD Special, Pressure
- Data acquisition via USB memory stick, MultiLab® Importer (without USB adapter!)

# OxiTop®- IDS: Now with the Multi 36x0 IDS

## Overview

<b>Measuring mode</b>		<b>Explanation</b>
<b>BOD</b>		<ul style="list-style-type: none"><li>● Measurement of up to 12 parallel sample processes per overall sample for a BOD<sub>x</sub> (x = 0.5h ... 180d)</li><li>● Automatic sample statistics with averaging</li><li>● The <i>AutoTemp</i> function can be switched on</li></ul>
	<i>BOD standard</i>	<ul style="list-style-type: none"><li>● The measuring range and sample volume can be selected from seven fixed combinations.</li><li>● The incubation temperature is 20 °C</li></ul>
	<i>BOD special</i>	<ul style="list-style-type: none"><li>● <i>Measuring range, Dilution 1 +, Sample volume and Bottle volume</i> can be freely adjusted</li><li>● The incubation temperature (5 °C to 40 °C) can be set up</li></ul>
<b>Pressure p</b>		<ul style="list-style-type: none"><li>● Pure pressure measurement</li><li>● Measuring range:<ul style="list-style-type: none"><li>– 500 ... 1250 hPa (OxiTop® i/OxiTop®-IDS)</li><li>– 500 ... 1500 hPa (OxiTop®-IDS /B)</li></ul></li><li>● A <i>Warning difference pressure</i> can be set</li></ul>



# OxiTop®- IDS: Now with Multi 36x0 IDS

## Basic Hierarchy

- **Set:** Upper level including definition of measurement mode (BOD, BOD Special, Pressure, measurement period, AutoTemp, availability etc.) of one or more samples which belong together, physically e.g. a stirring platform with 6 or 12 bottles
- **Sample:** Sub part of a set, e.g. samples of inlet or outlet samples, measuring parameters (e.g. measuring range) can be defined individually
- **Head:** Measuring unit belonging to a sample! Values among one sample will be used for statistical averaging.

**Advantage: Programming of all heads before starting the measurement, then doing the final sample preparation.**

# OxiTop®- IDS: Now with Multi 36x0 IDS

## OxiTop Set Administration: A maximum of 100 heads can be managed

- Maximum 12 sets
- A set consists of maximum 12 samples
- Each samples has maximum 12 IDS heads

Set name: Default is date and an index, could be changed  
(figures and letters, max. 8 characters):

Set name	Status	Number of measured values	Maximum number of measured values	Measuring mode, Duration	End date of the measurement
190216-1	✓	5/5	BOD5	21.05.2019	
190216-2		360/360	BOD5	21.05.2019	
190216-3		6/7	BOD7	23.05.2019	
190217-1		4/4	BOD4h	17.05.2019	
190220-1		4/20	BOD20	12.06.2019	
190220-2		360/360	BOD5	21.05.2019	
RED_F113-1		1/5	p5	25.05.2019	
190223-1		137/360	BOD30m	23.05.2019	

79 Free measuring heads

New 28.05.2019 08:00 Delete

### 1 Set name

- Check mark (✓ = finished):  
when the data of the measuring head have been transmitted to the meter at the end of the specified *Duration*

### 2 Status of the set

Number of measured values / maximum number of measured values

### 3 Type (Measuring mode, Duration)

### 4 End date of the measurement

### 5 <F1>/[New] (creates a new set)

### 6 <F2>/[Delete] (deletes the highlighted set)

# OxiTop<sup>®</sup>- IDS: Now with Multi 36x0 IDS

## Sample

Determination on maximum 12 samples (simultaneous determination with averaging)

*Sample description*

*Measure mode*

*Individual settings (range, settings for BOD Special)*

Set 190216-1				
A-1	✓	4000 mg/l	BOD5	1/1
A-2		357 mg/l	BOD5	2/3

79 Free measuring heads

28.05.2019 08:00 Delete

Annotations: 1 points to the set name, 2 points to the sample rows, 3 points to the status line, 4 points to the info icon, 5 points to the delete button.

- 1 *Set name*
- 2 *Sample name*, measured value, type, OxiTop<sup>®</sup>-IDS measuring heads called up/number of OxiTop<sup>®</sup>-IDS measuring heads in the sample;
  - Check mark (✓ = finished) next to *Sample name* : when the data of the measuring head have been transmitted to the meter at the end of the specified *Duration*
  - Asterisk (\* = *Warning difference pressure* exceeded) next to measured value: if the *Warning difference pressure* is exceeded in at least one OxiTop<sup>®</sup>-IDS measuring head of the sample (only for *Measuring mode: Pressure p*)
- 3 Status line (number of OxiTop<sup>®</sup>-IDS measuring heads that can yet be registered)
- 4 <F1>/[i]: the graphic evaluation of the OxiTop<sup>®</sup>-IDS measuring heads of the highlighted sample is displayed.
- 5 <F2>/[Delete] (deletes the highlighted sample)

# OxiTop®- IDS: Now with Multi 36x0 IDS

## Overview of heads in a sample

1	2	3	4
12	✓	020190001	123 mg/l
13		020190015	125 mg/l
21		020190123	127 mg/l

79 Free measuring heads

5 **i** 28.05.2019 08:00 Delete 6

- 1 *Sample name*
- 2 Number of the OxiTop®-IDS measuring head (set at the OxiTop®-IDS measuring head)
  - Check mark (✓ = finished):  
when the data of the measuring head have been transmitted to the meter at the end of the specified *Duration*
- 3 Series number of the OxiTop®-IDS measuring head
- 4 Measured value  
(last value transmitted by the measuring head in the specified interval)
  - Asterisk (\* = *Warning difference pressure exceeded*):  
if the *Warning difference pressure* in the OxiTop®-IDS measuring head is exceeded (only for *Measuring mode: Pressure p*)
- 5 <F1>/[**i**]: the LED at the highlighted OxiTop®-IDS measuring head lights up red for a short time
- 6 <F2>/[Delete]: deletes the highlighted OxiTop®-IDS measuring head from the sample



# OxiTop<sup>®</sup>- IDS: Now with Multi 36x0 IDS

## New: Power Saving Mode

Set	
Measuring mode	BOD special
Set name	190228-1
Duration	17 d
Settings	
<b>i</b> BOD5 End date 23.02.2019	
AutoTemp, GLP	
V_P 432 ml	
79 Free meas. heads	
Sample	15.03.2020 08:00

Go to settings and press  
MENU-ENTER

Settings	
GLP	on
AutoTemp	on
Alarm diff. pressure	500 hPa
Man. temperature	22°C
LED	on
Number of measured values	Standard
Eco mode (radio)	on
Radio connection from	08:00
Radio connection until	12:00
79 Free meas. heads	
15.03.2020 08:00	

Eco mode „on“:  
If desired selct time span  
for „radio adverstising“

# OxiTop<sup>®</sup>- IDS: Now with Multi 36x0 IDS

## Power Saving Mode

- If Eco mode “off”: 100 days continuous battery power
  - If availability set to 3 h/day: 2 years continuous power
  - If availability set to 0.5 h/day: about 5 years continuous power
  - Availability is indicated by magenta flashing LED
- 
- Note: maximum measuring interval is 180 days

# OxiTop®- IDS: Now with Multi 36x0 IDS

## Example: Programming a set

190216-1	✓ 5/5	BOD5	21.05.2019
190216-2	360/360	BOD5	21.05.2019
190216-3	6/7	BOD7	23.05.2019
190217-1	4/4	BOD4h	17.05.2019
190220-1	4/20	BOD20	12.06.2019
190220-2	360/360	BOD5	21.05.2019
RED_F113-1	1/5	p5	25.05.2019
190223-1	137/360	BOD30m	23.05.2019

79 Free measuring heads

New 28.05.2019 08:00 Delete

Press <F1> [New]

GLP	on
AutoTemp	on
Alarm diff. pressure	500 hPa
Man. temperature	22°C
LED	on
Number of measured values	Standard
Eco mode (radio)	on
Radio connection from	08:00
Radio connection until	12:00

79 Free meas. heads

15.03.2020 08:00

Measuring mode	BOD special
Set name	190228-1
Duration	17 d
Settings	
<b>i</b> BOD5 End date 23.02.2019	
AutoTemp, GLP	
V_P 432 ml	
79 Free meas. heads	
Sample	15.03.2020 08:00

Open with <F1>/[Sample] Adjustments for sample

# OxiTop®- IDS: Now with Multi 36x0 IDS

## Defining the sample

Sample	
Sample name	A-1
Calculation	Meas. range
continue	
<b>i</b> Type BOD5, End date 23.02.2019	
Mb 395 mg/l, V_P 432 ml	
V_F 510 mg, 1+1, 22 °C	
p = 800 mbar.	
AutoTemp	
79 Free measuring heads	
Meas. head	28.05.2019 08:00
New	

Settings	
Measuring range	395 mg/l
Bottle volume	510 ml
Sample volume	164 ml
Dilution 1 +	1
28.05.2019 08:00	

Leave with ESC



# OxiTop<sup>®</sup>- IDS: Now with Multi 36x0 IDS

## Entering a head

Meas. head

38 12345678

Reject measuring head

Accept measuring head

28.05.2019 08:00

2

1

- 1 Number of the OxiTop<sup>®</sup>-IDS measuring head (entered at the OxiTop<sup>®</sup>-IDS measuring head)
- 2 Series number of the OxiTop<sup>®</sup>-IDS measuring head

**For allocating a head press the right button until the LED flashes green**

**Repeat until you have all heads for a sample**

**If desired select a new sample and repeat**

# OxiTop<sup>®</sup>- IDS: Now with Multi 36x0 IDS

**Example: Set for OECD 301 F, double determination (2 heads in one sample)**

- **Sample with substance and seed**
- **Sample without substance but seed**
- **Dilution water**
- **Abiotic control**

**Makes at least 8 heads in four samples**

# OxiTop<sup>®</sup>- IDS: Now with Multi 36x0 IDS

## Starting the Measurement

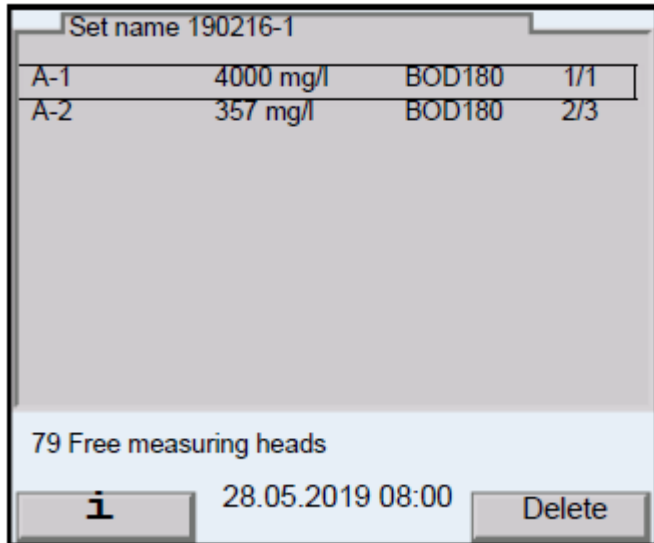
- Using **<ESC>** or *continue* to change to *Set*
- *Start Measurement* will start all heads
- Time between Meter and head swill be synchronized

When LEDs are on, they start flashing **magenta**, when *AutoTemp* is on, the display shows *AutoTemp*

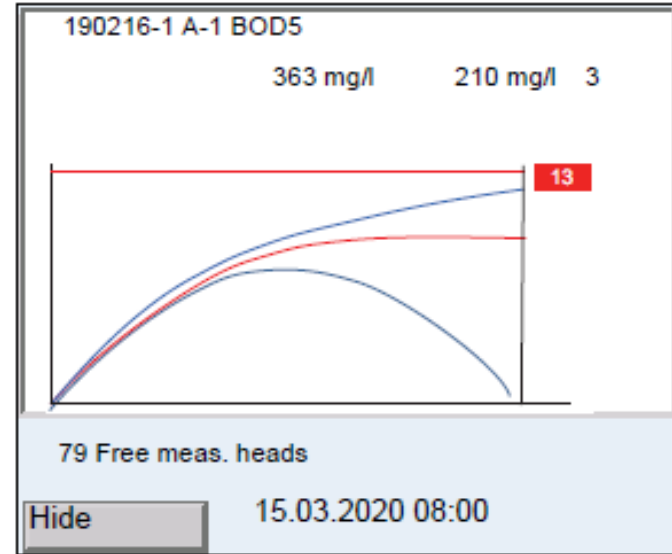
**Attention: When the measurement has been started no change of settings is possible anymore!**

# OxiTop®- IDS: Now with Multi 36x0 IDS

## Getting the data



**View on sample screen**



**View on curves**

Data transfer:

- Sample by sample (averaging(!)), will still be added for pressure mode)
- Via USB Stick as csv data file (fastest way), MultiLab® Importer to a PC

# OxiTop®- IDS: Now with Multi 36x0 IDS

## Getting the data (print out from MultiLab® Importer)

I18					
A	B	C	D	E	F
1	Set:	200429-1			
2	Sample:	BUSL-1	Current date:	29.04.2020	
3			Finished:	Yes	
4	Type:	BOD5	Measuring range [mg/l]:	800	
5	Start date:	29.04.2020	Start time:	15:05:30	
6	End date:	04.05.2020	Number of measuring heads:	3	
7	GLP:	Off	AutoTemp:	Off	
8	Bottle volume [ml]:	510,0	Sample volume [ml]:	97,0	
9	Target number of measured values:	300	Actual number of measured values:	300	
10	Mean value [mg/l]:	0,0	SD [mg/l]:	0,0	
11	Dilution 1 +:	0	Temperature [°C]:	20	
12	Height [m]:	562	Air pressure [hPa]:	947	
13					
14					
15		Head	1	2	3
16		ID	309	418	1
17		Serial no.	23454377	23454377	23454377
18	No.	Time [sec]	mg/l	mg/l	mg/l
19		0	0,0	0,0	0,0
20		1	0,3	0,0	0,0
21		2	0,0	0,1	0,1
22		3	0,2	0,1	0,0
23		4	0,0	0,0	0,0
24		5	0,2	0,0	0,1
25		6	0,1	0,1	0,1
26		7	0,2	0,2	0,1
27		8	0,2	0,2	0,1
28		9	0,1	0,0	0,0
29		10	0,1	0,0	0,0
30		11	0,2	0,1	0,0
31		12	0,2	0,1	0,0
32		13	0,0	0,1	0,0
33		14	0,2	0,0	0,0
34		15	0,2	0,1	0,1

# BOD and aerobic degradation

All kinds of aerobic degradation (BOD/OECD...):



Measurement BOD/aerobic tests, OECD (duration up to 180 d)

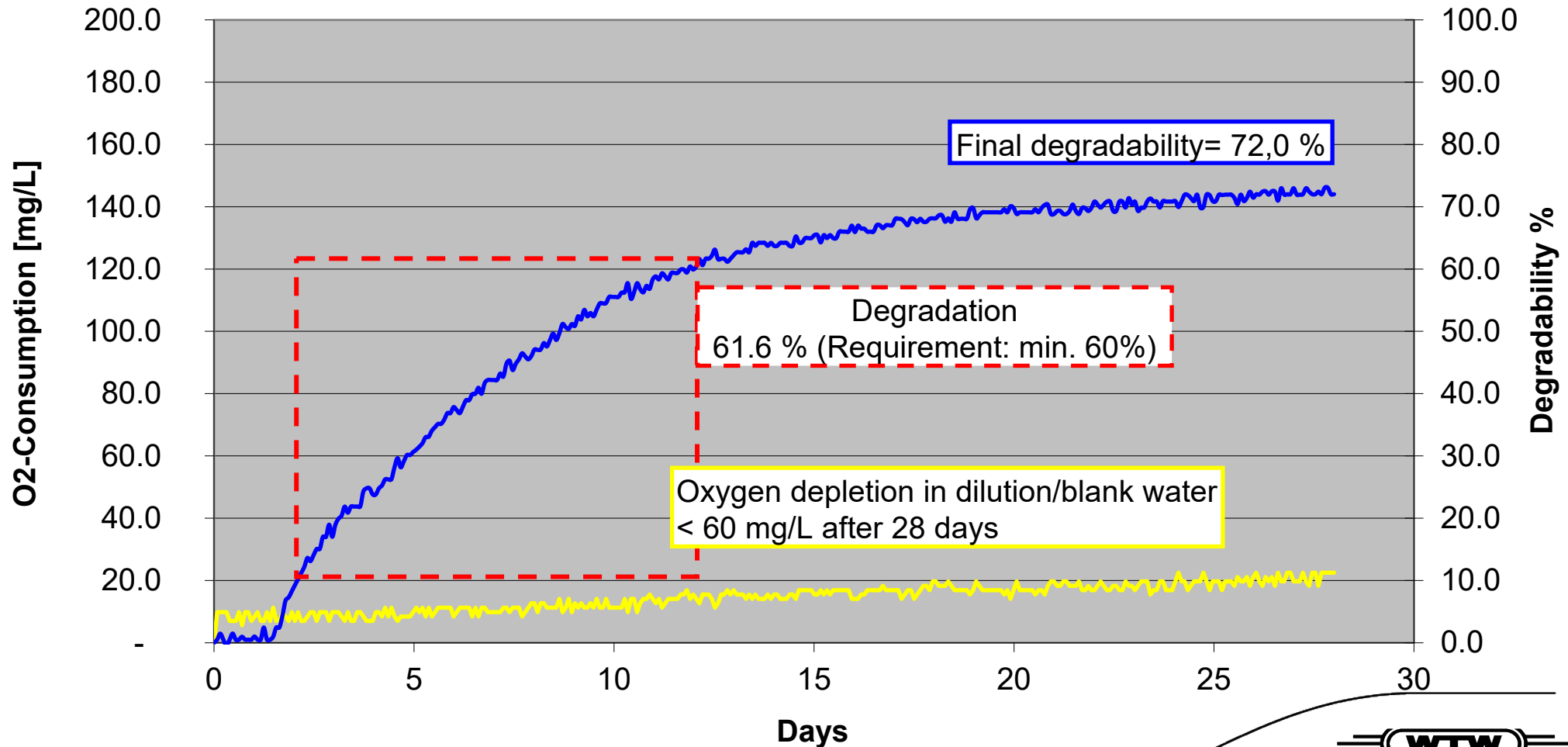
- OxiTop<sup>®</sup>-IDS IS 6/IS 12

Measurement (OECD)

- OxiTop<sup>®</sup>-IDS A 6 (good degradability)
- OxiTop<sup>®</sup>-IDS A 12 (low degradability)

# Application example: OECD 301F

1-Octanol





# Soil respiration

Soil respiration (soil with low activities up to AT4 (bio-mechanically treated waste):



Low activity  
(bottle volume  
500 ml)  
OxiTop®-IDS B6



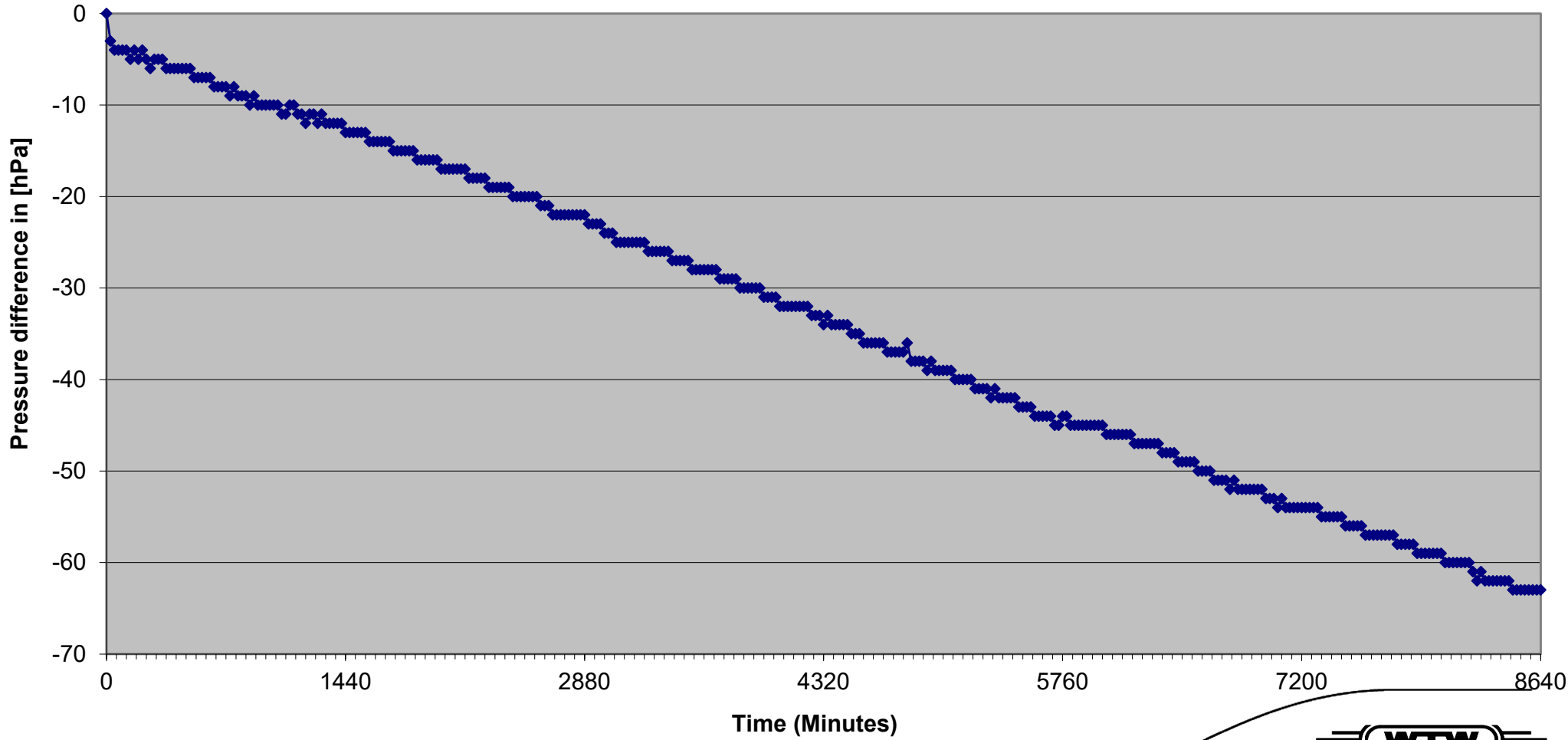
Soils with medium to  
high activity  
OxiTop®-IDS B6M



Bio mechanically  
treated waste (AT4)  
OxiTop®-IDS B6M 2.5

# Soil respiration

## Soil respiration



# Anaerobic Measurements and Biogas

## OxiTop<sup>®</sup>-IDS/B

- Corrosion proof pressure sensors
- Pressure range up to **1500 hPa**
- Part of following sets: OxiTop<sup>®</sup>-IDS AN 6/AN 12
- **More Safety**: Active over pressure warning (Display/red blinking LED!)



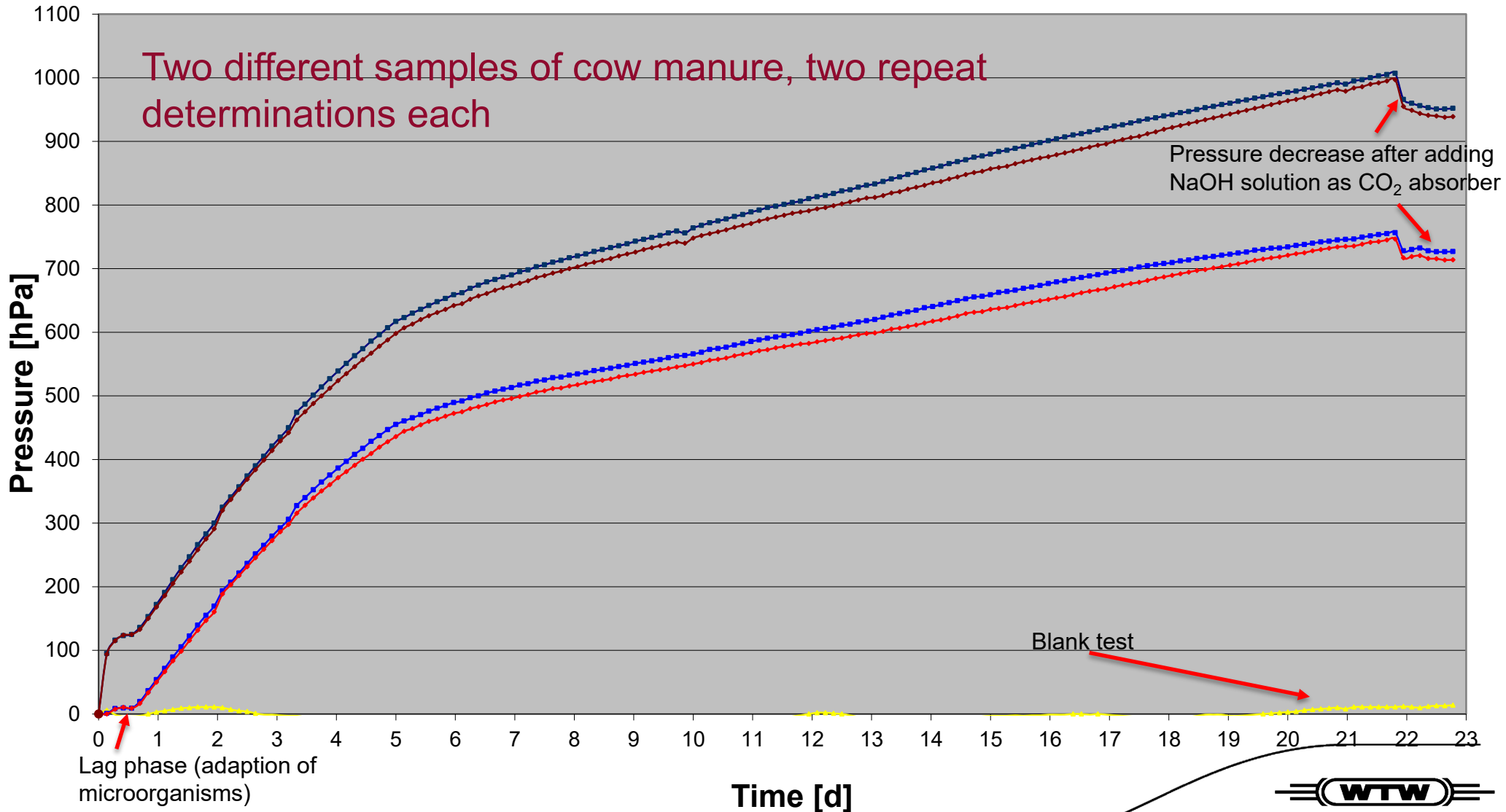
# Anaerobic Measurements and Biogas

## Example of biogas compositions:

Methan	40 - 75 %
Carbon dioxide	25 - 55 %
Water vapor	0 - 10 %
Nitrogen	0 - 5 %
Oxygen	0 - 2 %
Hydrogen	0 - 1 %
Ammonia	0 - 1 %
Hydrogen peroxide	0 - 1 %
<b>Hydrogen sulfide</b>	<b>0 - 1 %</b>

# Example for a Biogas Measurement

## Cow manure



# A new feature: OxiTop®- IDS: Not only with the Multi...

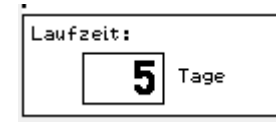
- Easy to identify: Use the manual ID-No.



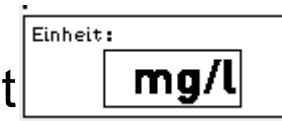
- Simply select:



- Duration 1 – 7 days



- Unit of the result: mg/l, hPa, ΔhPa, digit

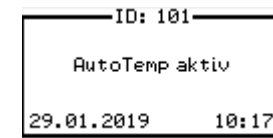


- Sample volume (ml): 22.5 43.5 97 164 250 365 432



- Start the measurement:

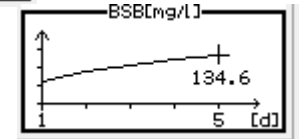
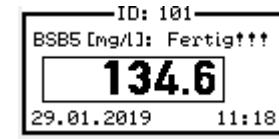
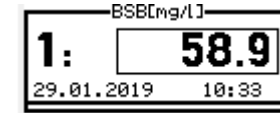
- AutoTemp is running



# A new feature: OxiTop®- IDS: Not only with the Multi...

## - Checking the measurement:

- Call-up intermediate results
- Read out of curves
- Receiving final results
- Terminate the measurement



## - More convenient settings

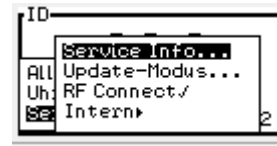
- Languages (D, E, F, Sp)
- Illumination
- Control-LED (Blue: Measuring, Magenta: Wireless advertising (only when ECO-Mode is On), Green: Done, Red: Attention)
- Display off time
- ID assignment (also valid for IDS measurement)



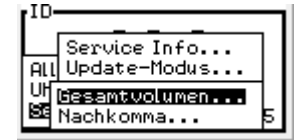


# A new feature: OxiTop<sup>®</sup>- IDS: Not only with the Multi...

- Setting date/time:
- **Additional points: Update for wireless heads!**



- Menu „Internal“: Bottle Volume (Attention!)
- Special function: OxiTop<sup>®</sup> PT test program



# Everything else stays as it is????



## Almost:

All OxiTop<sup>®</sup>-C accessories, consumables and replacement parts will remain for sale: Bottles, vessels, absorbents, stirring platforms (IS 6, IS 12, IS 6-Var now in cosmic grey), thermostatic cabinets, etc.

The following heads will be supplied as replacement until end of 2020:

OxiTop<sup>®</sup>-C, OxiTop<sup>®</sup>-C 2, OxiTop<sup>®</sup>-C/B

All sets are without meters!

Separate instruction manual for Multi 36x0 IDS for OxiTop<sup>®</sup>-IDS! (download or part of Multi 36x0 IDS WL sets!)

# Some technical specs....

<b>OxiTop®-IDS/OxiTop®-IDS/B</b>	
Pressure range (hPa)	500 to 1250 resp. 500 to <b>1500</b>
BOD measurement range (mg/l)	0 to 4000 mg/l (with Multi 36x0 up to 400.000 mg/l)
Selectable measuring range (day)	1 to 7 with Multi 36x0: 0,5 h to 180 days)
Selectable sample volume (ml)	22.7 ; 43.5 ; 97.0 ; 164 ; 250 ; 365 ; 432 (freely selectable with Multi 36x0 IDS)
Display	LCD graphic, backlit
Control LED	RGB
Battery	1 x ½ AA Lithium (LS 14250)
Operation lifetime (Eco mode settings)	Availability 24 h/day: 100 days continuously 3 h/day: about 2 years continuously 0.5 h/day: up to 5 years continuously
Capacity	Up to 100 heads

# Overview about existing sets...

New		Comment
209714	OxiTop®-IDS IS 6	Extension set
209716	OxiTop®-IDS IS 12	Extension set
209713	OxiTop®-IDS Set 12	Basic Set, 6 bottles
209711	OxiTop®-IDS Set 6	Basic Set, 12 bottles
209700	OxiTop®-IDS	Single head
209701	OxiTop®-IDS/B	Single head, biogas
209702	OxiTop®-IDS 2	Two single heads
209704	OxiTop®-IDS 6	Six single heads
Multi 3620 IDS SET WL or Multi 3630 IDS SET WL	2FD56W or 2FD57W	Meter with two channels
		Meter with three channels
209721	OxiTop®-IDS A6	Aerobic set, 6 bottles (1 L)
209723	OxiTop®-IDS A12	Aerobic set, 12 bottles (250 mL)
209725	OxiTop®-IDS AN6	Anaerobic set, 6 bottles (1 L)
209727	OxiTop®-IDS AN12	Anaerobic set, 12 bottles (250 mL)
209729	OxiTop®-IDS B6	Soil respiration, 6 bottles (0.5 L)
209732	OxiTop®-IDS B6M-2.5	Soil respiration, 6 vessels (1.0 L)
209731	OxiTop®-IDS B6M	Soil respiration, 6 vessels (2.5 L)

Note:  
Sodium hydroxide pellets NHP 600 have to be ordered separately!

# Summary – Reasons for buying OxiTop®-IDS

- Maximum versatility for aerobic and anaerobic degradation
- Ease-of-use
- Modular system: change accessories – change application
- Robust and long-term stable measuring principle – pressure measurement
- Low cost of ownership
- Easy switch to Echem parameters by adding IDS sensor
- Data acquisition via PC



## Poll Question #3

Do you want someone from Xylem to contact you to discuss OxiTop sensors?

# Questions?

## Contact us:

**Xylem APAC & MEA**

[info.apac@xyleminc.com](mailto:info.apac@xyleminc.com)

**Klaus Reithmayer**

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