



Continuous Benzene-Specific Monitoring

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Unrivalled detection^{ion}.

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Benzene Industrial Exposure



- Oil refineries
- Chemical & Petrochemical Plants
- Offshore installations, Fracking operations
- Coke works
- Storage, distribution & use of gasoline or benzene
- Foundries, during casting using benzene catalysts



Benzene in Fuels



Exposure Limits for Various Fuels

Chemical	ACGIH TWA
Benzene	0.5 ppm (Carcinogen)
Diesel Fuel	12 ppm
Jet Fuel	30 ppm
Gasoline	300 ppm

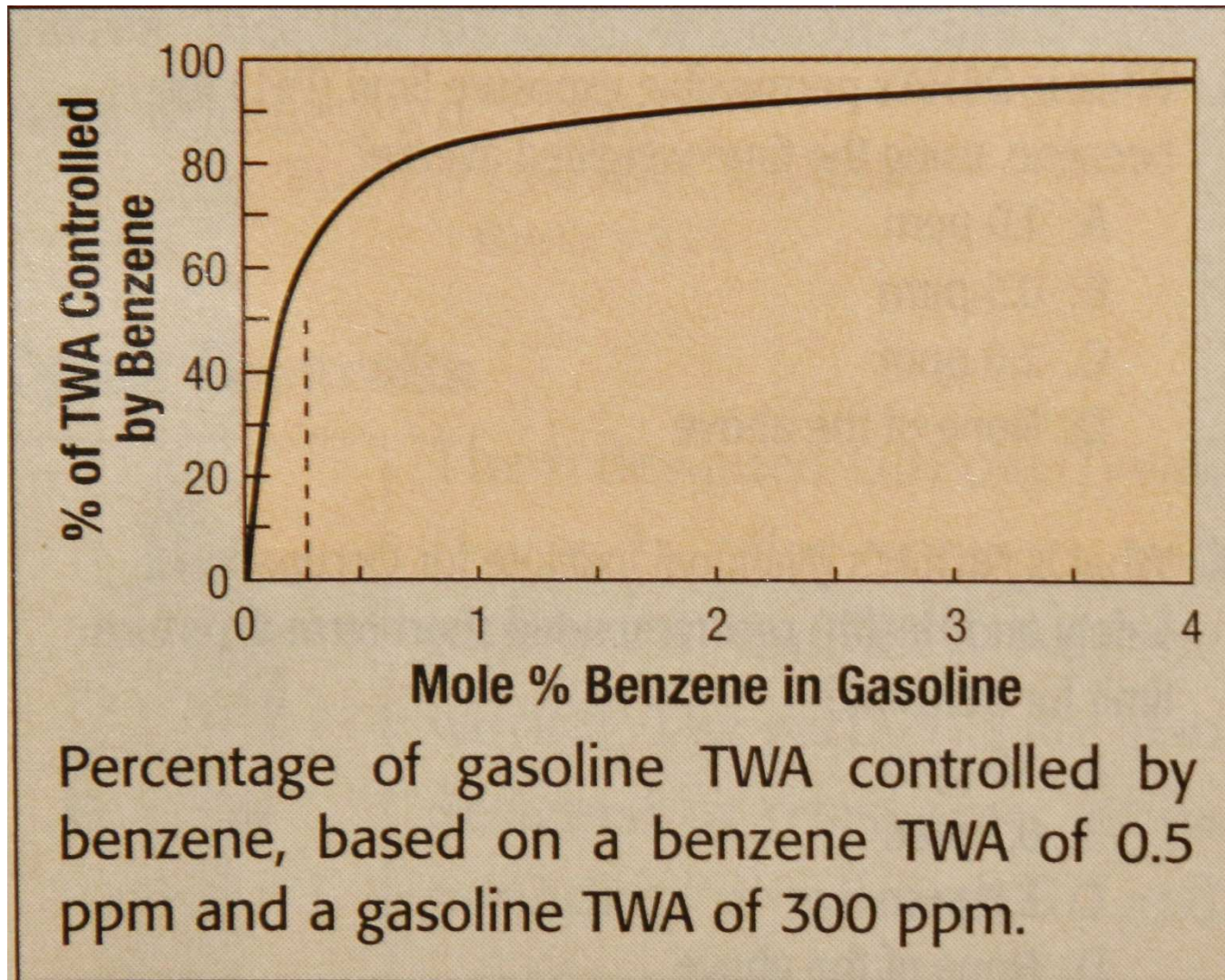
Benzene in Fuels



Mixture TWA Calculation

$$TWA_{\text{total}} = \frac{1}{\frac{f_{\text{benzene}}}{TWA_{\text{benz}}} + \frac{f_{\text{gasoline}}}{TWA_{\text{gas.}}}}$$

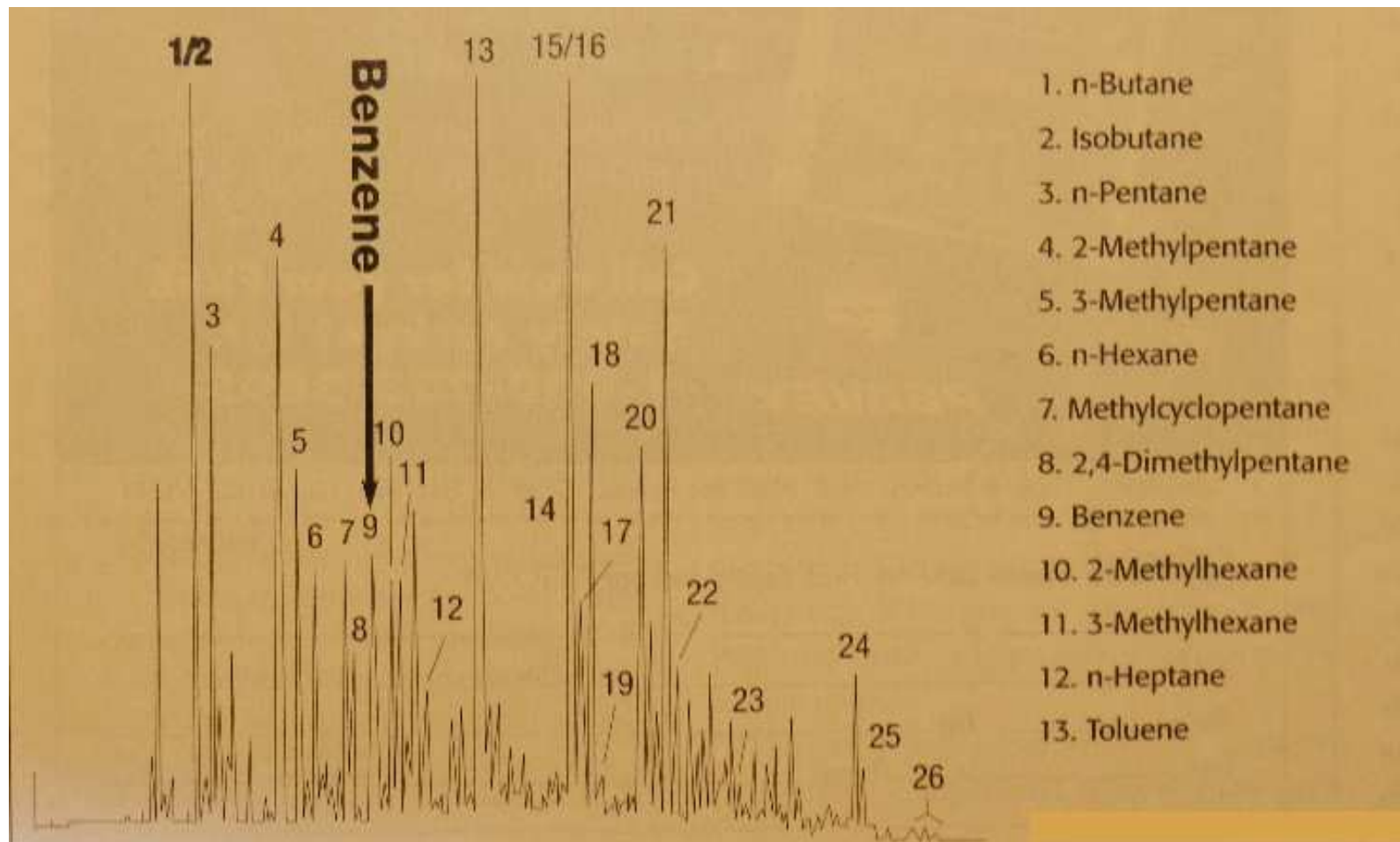
Benzene in Gasoline



Benzene in Gasoline



Typically 0.5 – 2% Difficult to measure selectively



Tiger Select PID/Tube can measure:

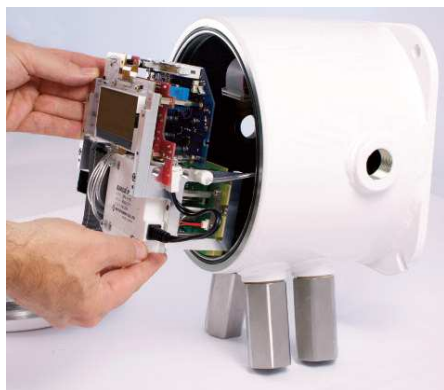


- **No Tube: Continuous ppb levels of VOCs for screening**
- **Insert Tube: Benzene-specific readings**
 - **Single Point and 15-minute STEL**





TITAN Continuous Benzene- Specific Monitor



Unrivalled detect^{ion}.

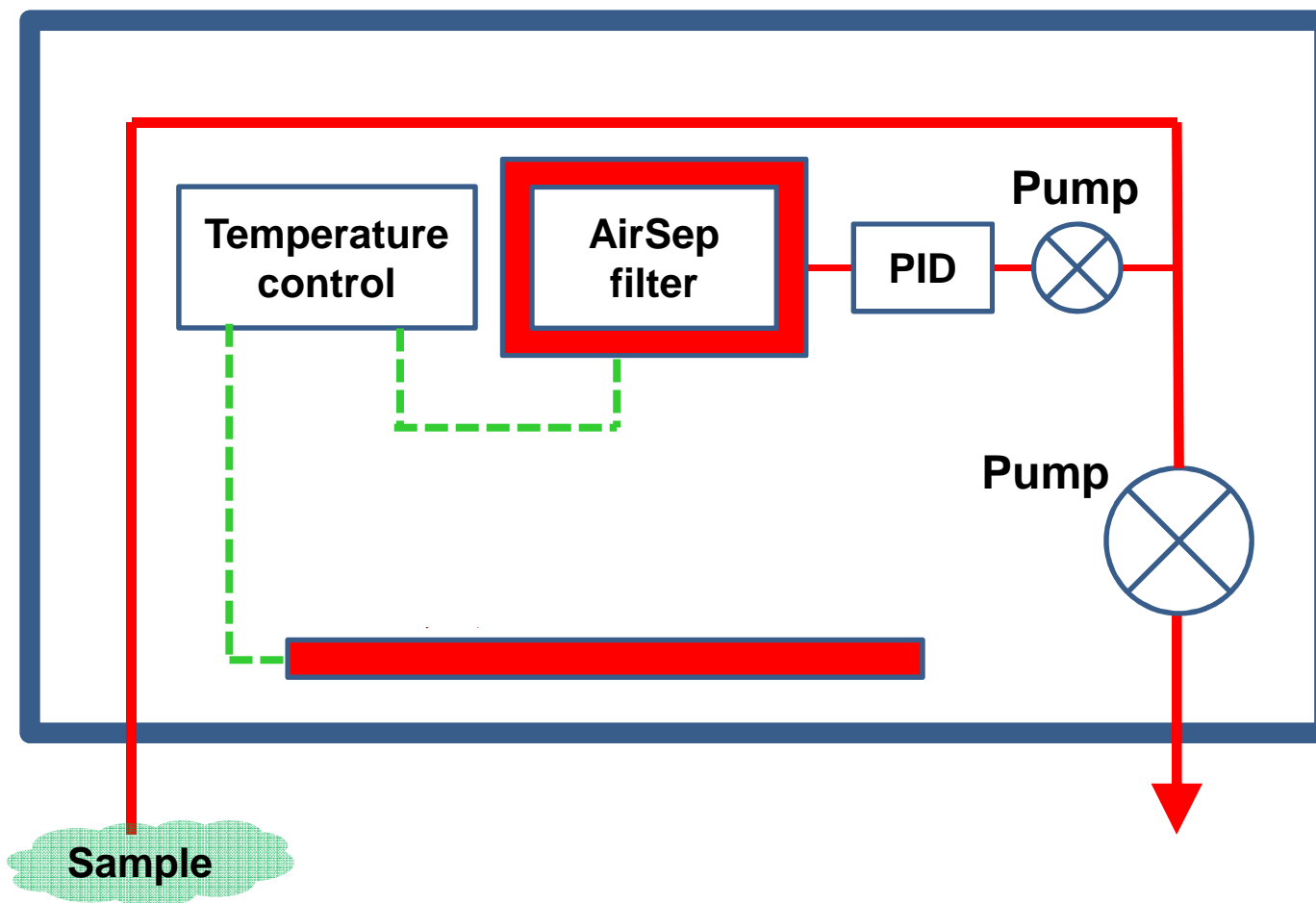
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Benzene Specific Measurement Methods with DL near 0.5 ppm



Method	Time	DL	Cost	Other
Tubes: Manual	10-20 min	0.5 ppm	¢	Single Point
Tubes: Draeger CMS	10 min	0.2 ppm	¢¢	Single Point
PID w/Filter Tube	1-3 min	0.1 ppm	\$	Single Point
Portable GC	5-10 min	0.1 ppm	\$\$	Single Point
Titan Separator	1 min	0.1 ppm	\$\$\$	Continuous
Portable IR	<1 min	2 ppm	\$\$\$	Continuous
GC: On-Line	1 hour	0.01 ppm	\$\$\$\$	Semi-Contin.
GC: Lab Analysis	1-10 days	0.01 ppm	\$\$\$\$	Off-site
Portable IMS	1 min	0.01 ppm	\$\$\$\$	Not Intr. Safe.

How TITAN works



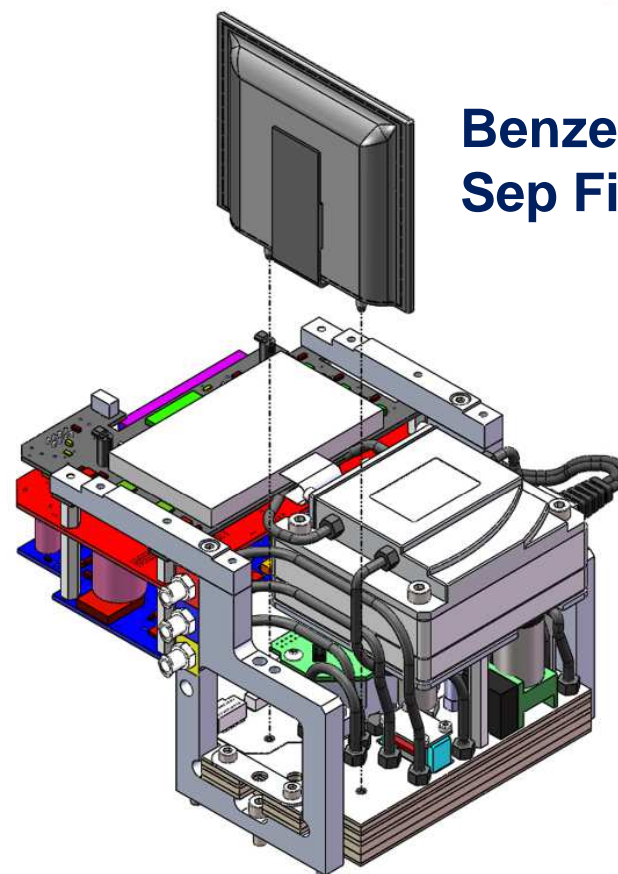
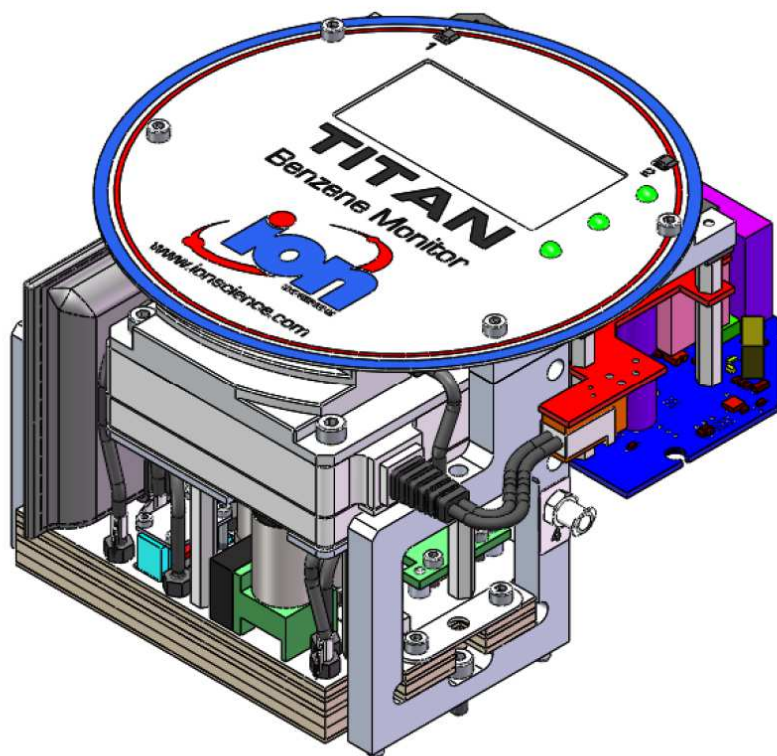
Control of temperature is critical, therefore TITAN has two independent

A second heater accurately controls the temperature of the Benzene separation (Air-Sep) filter tube.

How TITAN works

A sample is periodically taken to be analysed for benzene content

TITAN Servicing the Detector Module

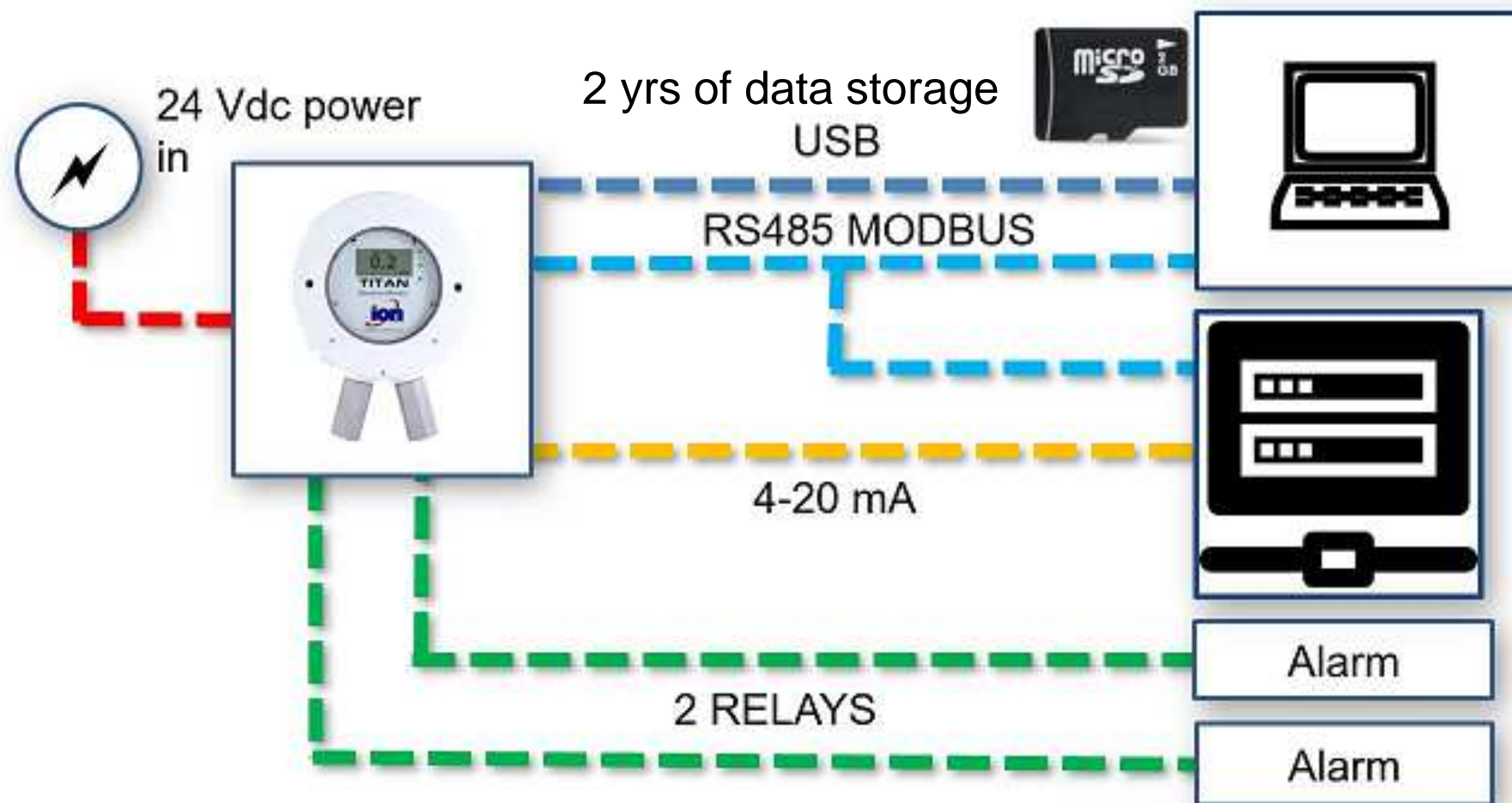


Benzene
Sep Filter

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Titan Connectivity



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Performance

Sensor type	10.6 eV PID with selective filtering
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Measuring gas	Benzene specific
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Detection range	0-20 ppm
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Lower limit of detection	0.1 ppm
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Accuracy	± 0.05 ppm or $\pm 10\%$ (whichever is greater)
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Measuring frequency	Once per minute
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Selectivity

No Interference by:

100 ppm toluene

100 ppm ethylbenzene or xylene

100 ppm cyclohexane* or n-hexane**

100 ppm undecane

100 ppm gasoline

100 ppm naptha (wide cut or light)

50 ppm methyl ethyl ketone

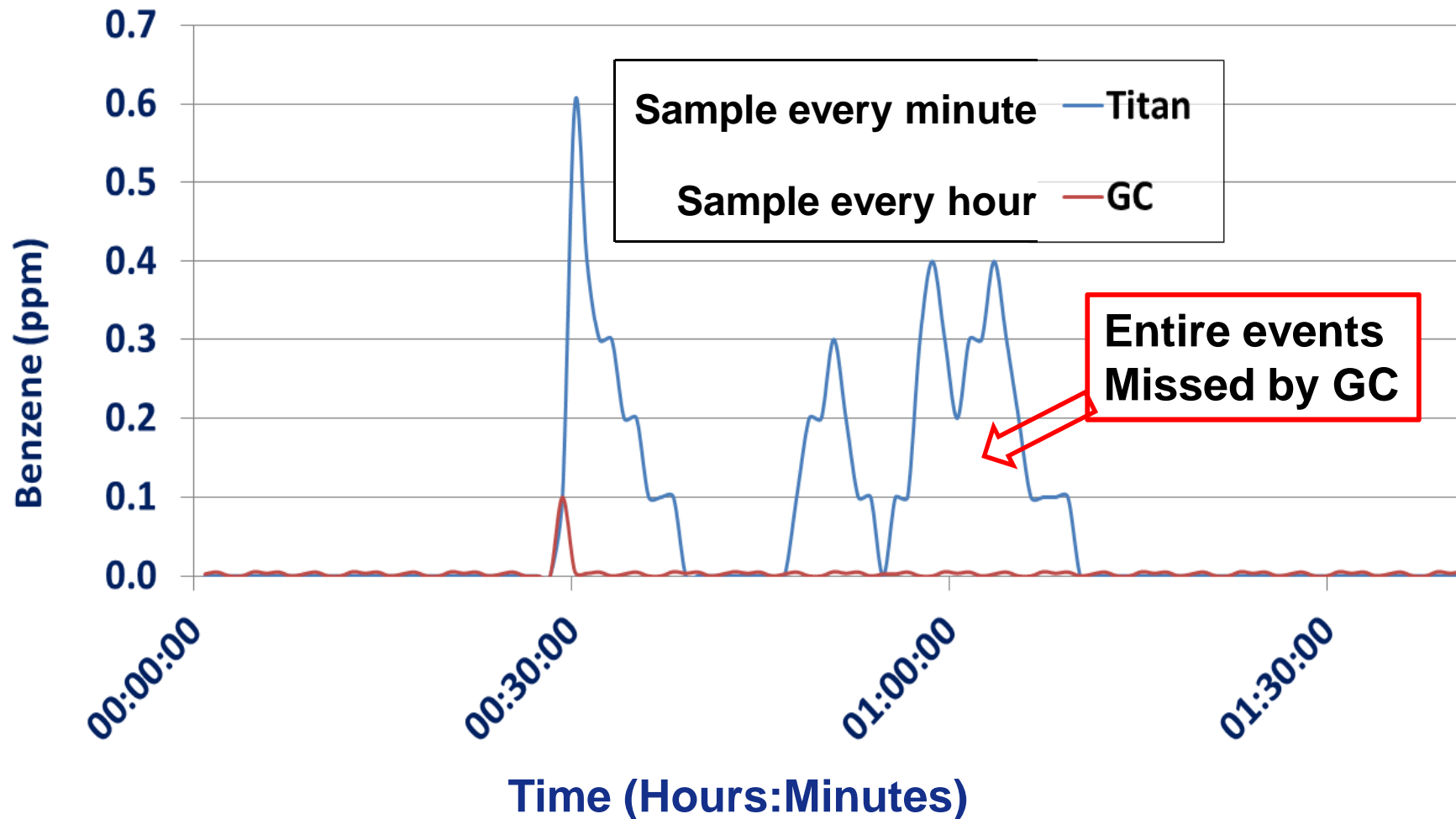
Vol % level methane**

Mixture of: 10 ppm toluene, 10 ppm xylenes, 10 ppm hexane, 10 ppm cyclohexane, 10 ppm ethanol

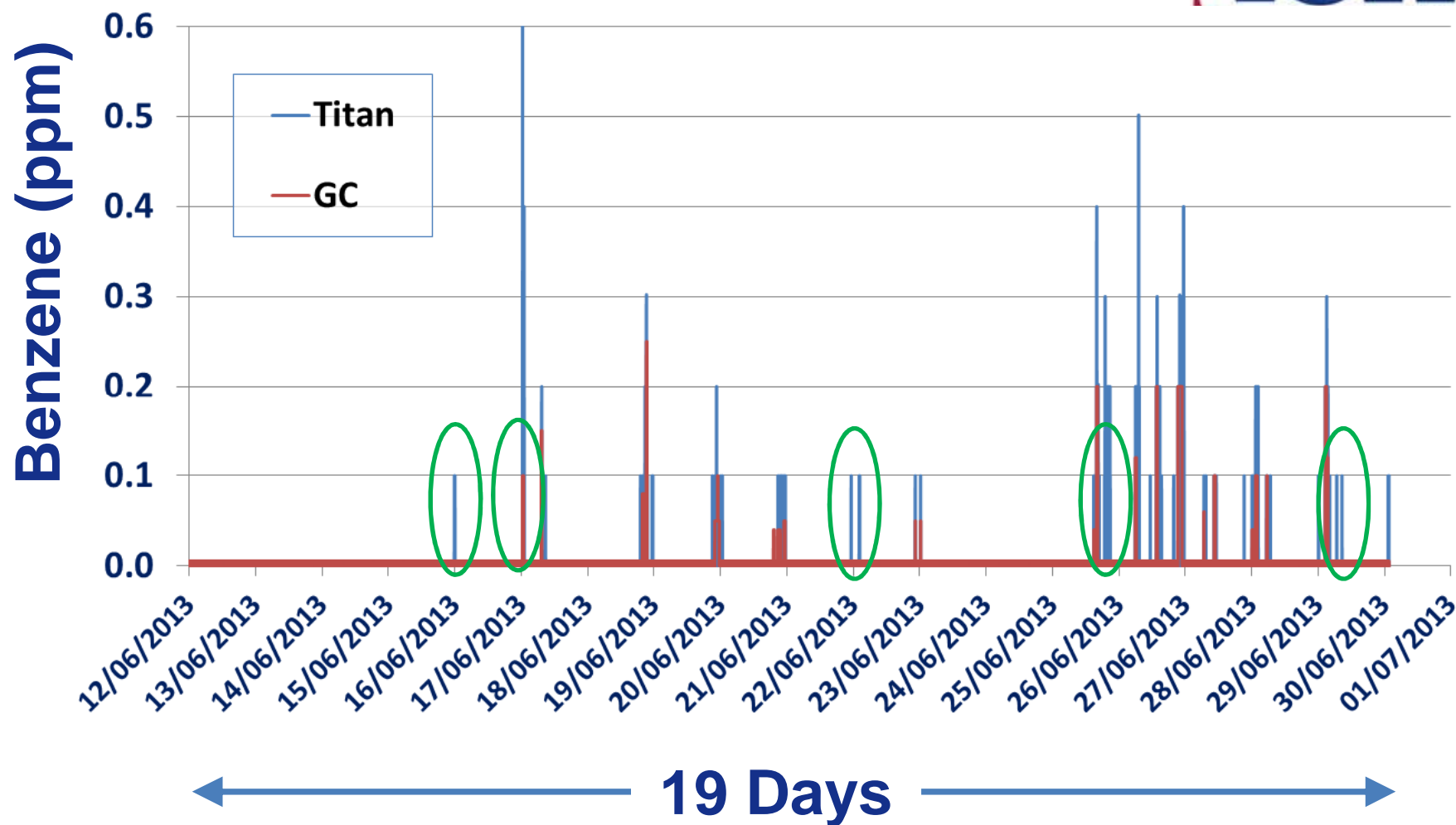
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The Importance of Continual Monitoring



The Importance of Continual Monitoring



Technical Specifications



Hazardous approval

ATEX / IECEx: Ex d II B+H2 Gb

Temperature Range

(-20 °C to +60 °C)

Ingress protection

IP65

Humidity

0-99% RH (non condensing)

Minimum service period

Benzene, Carbon & Dust Filter: 6 months
PID lamp & sensor grid: 1 year

Weight

15 Kg

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Technical specifications



Power

19Vdc @ 4.0A
24Vdc @ 3.2A
32Vdc @ 2.4A

Communication

4-20mA
RS485 Modbus half and full duplex
USB (when lid removed)
Relay x2 (24 Vdc @ 1.25 A max)

Data storage

ON board MMC minimum 2 years

Sample flow

200 ml/min

Gas sample line

10 meters (optional)

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The End



Thank you

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