



THE USE OF CO₂ MONITORING IN THE CONSERVATION AND RIPENING OF FRUITS

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Nothing says summer like biting into a juicy, perfectly ripe strawberry. A bright red package, with a soft, sweet aroma and a firm texture are all the signatures of a strawberry at its optimum ripeness. However, with just a day or two more, a fruit that may have been a delightful treat can become a mushy, flavourless mess and home to mould.

The difference in the eating experience of well-ripened fruits and either under or over-ripe specimens is so dramatic that perceived ripeness has a strong influence on consumer purchasing behaviour and the probability of them purchasing a fruit.¹ As there may be a significant time period between fruit picking and its arrival on the supermarket shelf, it is important to control the ripening process for fruits so they can be sold in their prime.²

Mechanisms of Ripening

The ripening process is a natural part of the maturation of fruits to obtain their optimal flavour, quality, and textural properties. This involves a series of changes in the composition of the fruit, including the conversion of starch to sugar, that are triggered by a cascade of chemical and biochemical reactions in the fruit.³

The involvement and producing of chemicals during ripening means that the process can be controlled by changing the atmospheric composition surrounding the fruit. One of the most widely used chemicals for speeding up the ripening process is ethylene, so much so that it is known as 'the ripening hormone'.⁴ Ethylene is naturally produced by ripening fruits where it can trigger biochemical cascades and physiological responses such as the aging and shedding of petals or additional growth in some cells. Some fruits, such as bananas, produce large amounts of ethylene which can have detrimental effects on the lifetimes of fruit stored alongside them.

Carbon Dioxide and Ripening

Ethylene though is not the only chemical species that drives the lifecycles of fruit. Carbon dioxide (CO₂) is another by-product of the ripening process and controlling CO₂ concentrations can be used not to adjust the rate of the ripening process and help tune some of the properties and characteristics of the final fruit.⁵

For example, with kaki fruit, under-ripened fruit can taste very astringent and unpleasant but their firmer texture is better suited

to transportation and risks less damage to the flesh of the fruit. By ripening the kaki with a carbon dioxide atmosphere, the improved flavour of the ripe fruit can be achieved while maintaining the solidity of the unripened fruit. Controlling the CO₂ atmospheric concentrations is also used for many oranges and citrus fruits where it can help change the colour of the fruit from an unappetising green to orange without impacting the flavour.

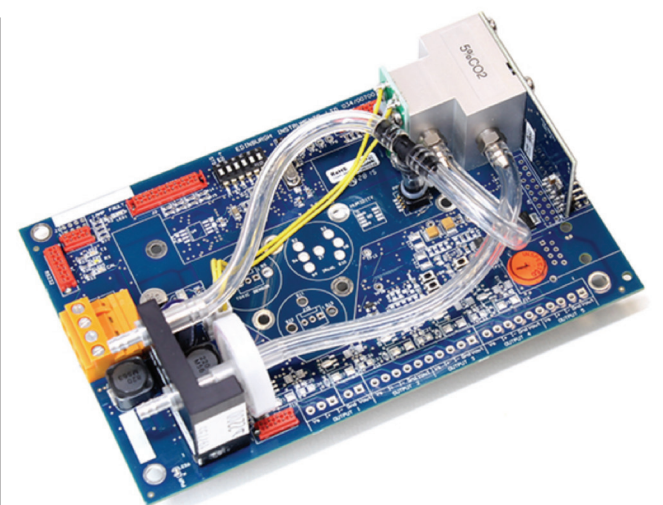
As well as ripening, careful control of CO₂ and oxygen (O₂) levels can help with preservation and freshness. As fruits continue to 'breathe' and produce various gases, the atmospheric concentrations can change with time. For apples, use of controlled CO₂/O₂ atmospheres can mean the fruit flavour and quality remains nearly unchanged for as long as nine months after harvesting.⁶

Sensing Solutions

Maintaining optimal CO₂ concentrations is a complex task that requires highly sensitive online monitoring with feedback loops for optimisation. For this, Edinburgh Sensors are the market leaders with over forty years of experience developing highly sensitive, rapid response near-infrared sensors for detection of hydrocarbon gases and CO₂.

Depending on the exact needs, Edinburgh Sensors offers a range of CO₂ sensors including the Gascard NG⁷, Guardian NG⁸, the IRgaskiT⁹, and the Gascheck.¹⁰ Of these, the Gascard NG offers a huge amount of flexibility in its set-up, monitoring options and integration into connected systems.

There are two versions of the Gascard NG available. It can be purchased either as the stand-alone card or as the Boxed Gascard¹¹, that contains the Gascard NG card inside but in a pre-built housing to minimise installation and set-up time. Given the low concentrations of CO₂ and O₂ that are often optimal for controlled atmospheric preservation of fruits (for apples, between 2 – 6 % of CO₂ and 2 – 3 % of O₂) then the high sensitivity and accuracy of these sensors are essential for this application.



Gascard NG

For example, The Gascard can detect CO₂ concentrations in the range of 0 – 5000 ppm. It is also able to work under realistic temperature and humidity conditions and is capable of providing accurate readings over humidity conditions spanning 0 – 95 %. Another powerful feature of the Gascard NG is that, by using RS232 communications, the Gascard can be integrated with other control or data logging devices easily and there is also with the option for onboard LAN support where required. This means it is relatively straightforward to set up feedback systems to constantly monitor, log and adjust the atmosphere around the fruit, ensuring the produce is always at its best.

With the ability to reduce waste – ripening fruit may overripen other nearby fruit – optimise ripening at the time of sale and improve product quality, Edinburgh Sensors instruments offer cost-efficient and high-quality devices for online monitoring of CO₂ levels.

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Author Contact Details

Edinburgh Sensors • 4 Bain Square, Kirkton Campus, Livingston EH54 7DQ, UK • Tel +44 (0) 1506 425 300
• Email: sales@edinst.com • Web: www.edinburghsensors.com



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Smart sensing electronic just got smarter

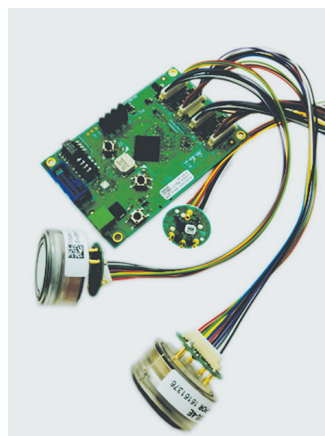
Membrapor has completely redesigned its universal circuitry for electrochemical sensors. Due to the new power management the energy consumption has been drastically minimised and additionally, it was possible to reduce the operating voltage. In the case of missing supply voltage the sensors are put into a safe state. With the new software, calibration and temperature compensation is easier than ever before. One main feature has remained: With MembraSens you can use also 4-electrode sensors.

MembraSens' main circuit board has 1 to 4 programmable AFEs (Analogue Front Ends). The PCB has the circuitry for 3 electrode sensors (1 signal) and 4 electrode sensors (2 signals). The smart AFEs enable the operation of the whole range of toxic gas sensors. MembraSens stores configuration, calibration and temperature compensation into the AFE's EEPROM (Electrically Erasable Programmable Read Only Memory). MODBUS RTU controls digital communication for monitoring AFE signal, configuration and calibration. Bus operation with up to 247 Membrasens is possible, this unit communicates via RS-485 interface (TIA/EIA-485). The circuitry can be powered from 4 volts (4...36 VDC) and will monitor the condition of the sensors in power-off mode, including maintenance of electrical bias.

This highly versatile new format offers extensive signalling possibilities: there are various models for ppm calculation, including hydrogen compensation and models for temperature compensation. Operators can be alerted in situations where the alarm thresholds have been exceeded. Calibration is possible with and without gas at anytime and zero point calibration is possible directly on mainboard with buttons.

More information online: ilmt.co/PL/L4n9

For More Info, email: 48770pr@reply-direct.com



Intrinsically safe low flow pump for chemical exposure monitoring launched



Casella has launched its advanced and lightweight low flow pump, the VAPex. The elite low flow pump is the ideal solution for seamless reporting on employee's levels of chemical exposure, saving occupational hygienists' crucial time in their working day.

In 2018, the United Nations stressed the importance of improving the prevention of chemical exposures at work, with The International Labour Organization (ILO) estimating that one worker dies every 30 seconds from exposure to toxic chemicals, pesticides, radiation and other hazardous substances.

The VAPex, with a flow rate of 20mL to 500mL/min, is intrinsically safe and assists occupational hygienists in the measurement of chemical exposure levels such as Volatile Organic Compounds (VOCs).

The pocket-sized sampling device allows the user to easily carry the pump around a site, equipped with a run time of over 34 hours under typical operating conditions. In addition, the VAPex pump is designed with three LED lights that indicate the pump battery's status from a distance, preventing any unexpected charge failures that might disrupt monitoring activity.

A headache for many occupational hygienists is the time it takes to transfer their written notes and sample data collected on site. However, using the VAPex Plus in conjunction with Casella's Airwave App via Bluetooth, occupational hygienists have access to an easy to use system that enables the operator to record their notes and input data instantaneously, using a tablet or mobile device. The Airwave App can also be used to check the pump remotely, saving time by preventing the need to disturb the wearer of the pump.

Tim Turney, Technical Product Manager at Casella explains, "Our new VAPex low flow pump is designed to make chemical exposure assessments easier and quicker for hygienists concerned with the health of employees. The VAPex is designed with a robust screen on top and great backpressure capability meaning multiple tubes can be tested at the same time, providing a pain-free monitoring solution."

Casella's VAPex is available from May 2019. Casella is dedicated to reducing occupational health and environmental risks and supporting businesses with their monitoring and analysis needs.

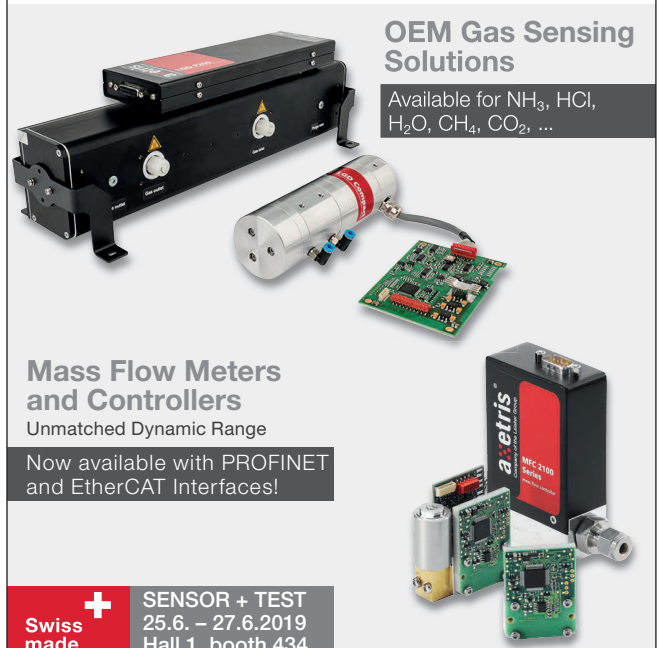
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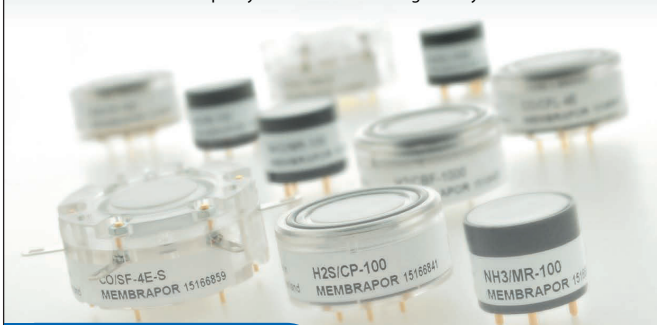
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