

Palintest

Water Analysis Technologies

Validation of fresh produce wash water sanitizers

This guide is designed for managers responsible for technical, quality, compliance or auditing of food safety in fresh fruit and vegetable production.





Introduction

Global fresh fruit and vegetable exports were worth \$106bn in 2016 and the trend is for increased growth. The UN forecasts global population to rise to 9.7 billion in 2050. This increase in population is driving a rapidly increasing need for expansion in food production and processing.

Despite these huge growth figures, food safety and process efficiency remain top priorities for producers, who are continually squeezed to both reduce cost and boost output.

Major risks for fresh produce processing companies



Food safety



Maintaining product integrity



Ensuring product traceability



Reputation



Water usage and cost



Chemical usage and cost

Food safety is a top priority amongst food producers, retailers and consumers.

Disinfection & Sanitation

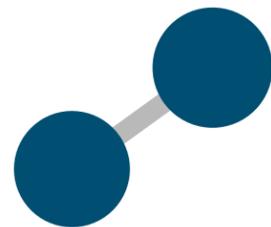
Fresh produce washing and sanitising

Produce washing, primary and secondary, is the removal of soil, debris and other contaminants. These can be decaying plant tissue, residues from irrigation water or even fecal matter from birds, insects and other animals

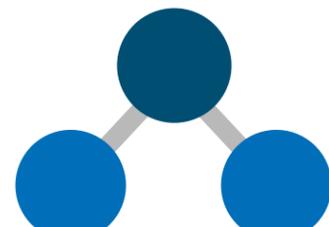
Sanitising is treating water with an agent that is designed to prevent cross-contamination during washing.

When properly controlled, washing and sanitising has the potential to reduce the overall microbial load of fresh produce.

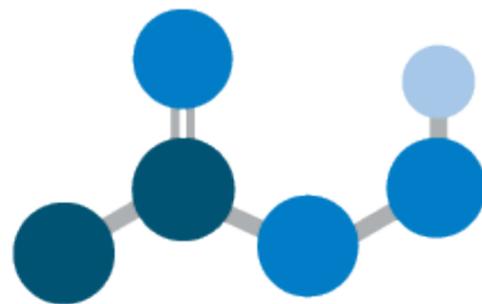
The main sanitisers considered appropriate for fresh produce wash disinfection are:



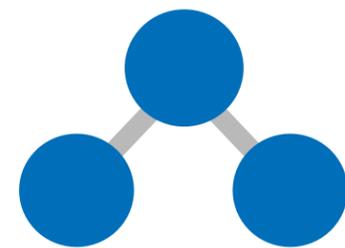
Chlorine



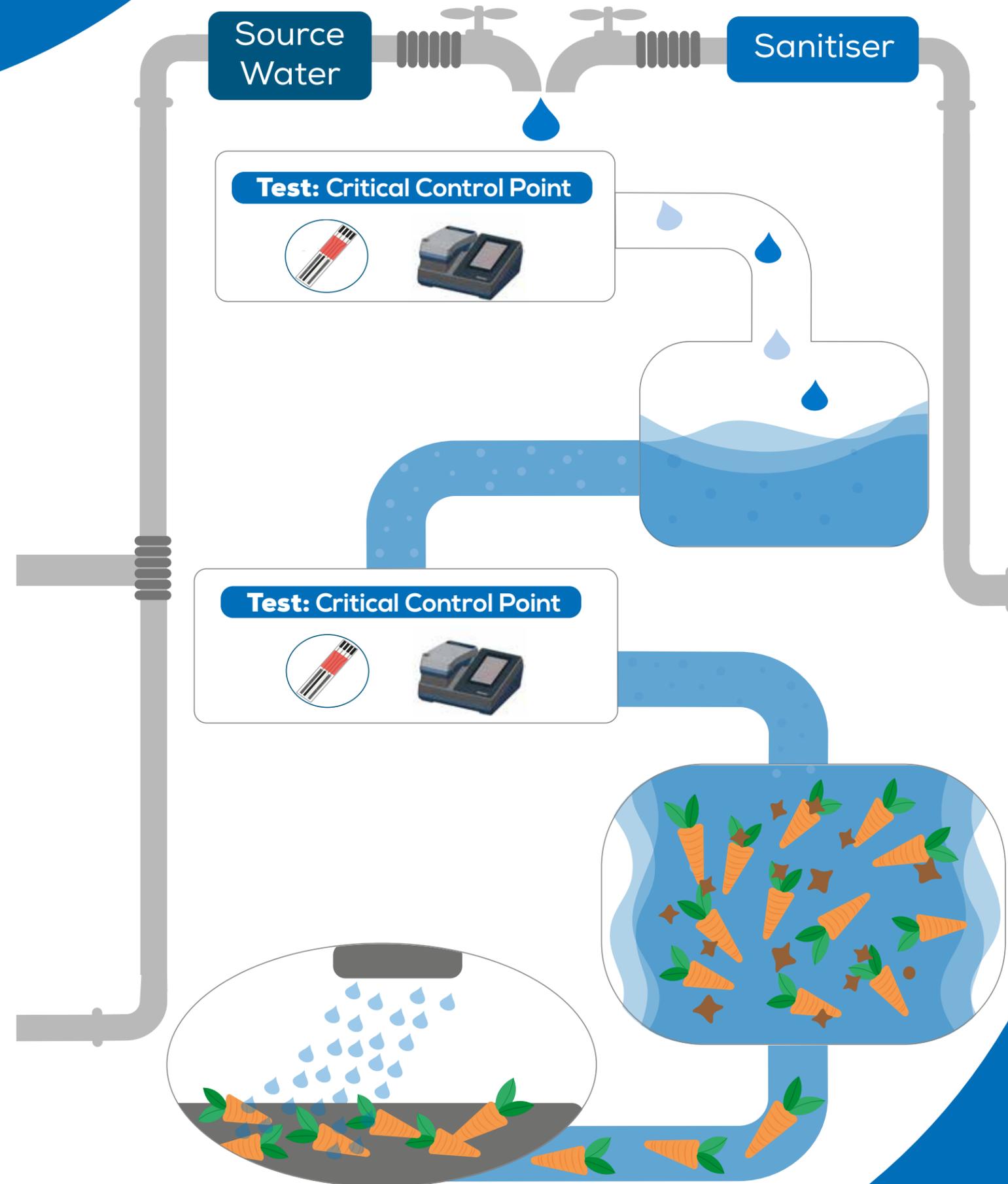
Chlorine Dioxide



Peracetic Acid



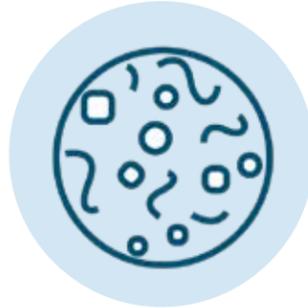
Ozone



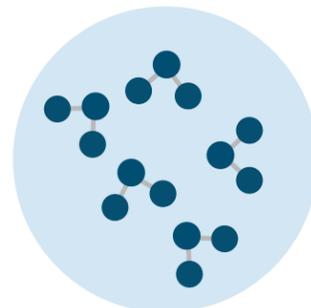
Choosing a sanitiser depends on:



Wash system design



Number of microbes in the water



Regulations for disinfection by-products



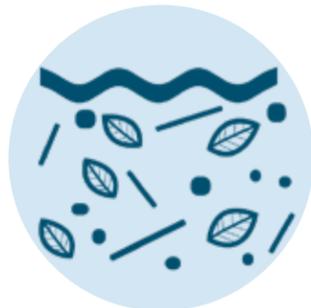
Nutritional value of the final produce



Sensory value of the final produce



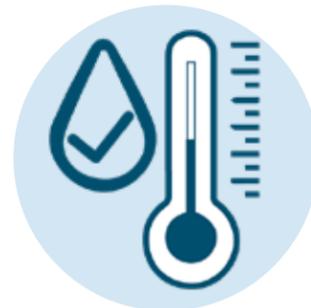
Consumer safety



Amount of organic material in the water



Wash water quality



Desired wash water temperature



Worker safety



Overall food safety



Cost

Chlorine

Chlorine sanitiser products are widely used due to its effectiveness and relatively low cost. However, chlorine is strongly affected by pH, temperature and cleanliness of the wash water, and therefore needs to be carefully monitored.

The efficacy of chlorine is reduced with increasing turbidity and is less effective on certain biofilms and microbes. In addition light and metals can cause breakdown of chlorine.

More chlorine is required in dirty water because chlorine is de-activated by organic matter. The amount of this de-activation is known as the chlorine demand.

Kemio Disinfection

The next generation measurement platform



✓ Chlorine

✓ PAA

✓ Chlorine dioxide

Turn over for our disinfection testing solutions Pages 10-12

Chlorine dioxide

Chlorine dioxide is a gas used to sanitise various food and beverage wash systems. It is around 2.5 times more active than hypochlorite based sanitizers, and is less affected by pH and organic matter compared to chlorine.

Chlorine dioxide is highly effective as a sanitiser meaning a lower residual is usually sufficient for treatment.

Chlorine dioxide is less corrosive than chlorine, but can lead to potentially harmful disinfection by-products including chlorite.

With effectiveness at lower residuals it is important to regularly monitor concentrations of chlorine dioxide to ensure the system remains in operational limits.

Peracetic acid (PAA)

The use of peracetic acid, also known as peroxyacetic acid or PAA, has grown in use as a sanitiser.

Approvals from the US Environmental Protection Agency (EPA), U.S. Food and Drug Administration (FDA) together with food safe disinfection by-products, support the use of PAA in fresh produce washing applications.

PAA is effective against a broad spectrum of microbes and remains active when the organic matter load is high. It is effective even at low temperatures.

For fresh produce treatment PAA is typically applied between 30 ppm and 80 ppm in wash water, with higher concentrations used for surface sanitation. PAA at high concentrations can be hazardous to the health of workers, and therefore should be handled with care and monitored regularly.



Ozone

Ozone is a colourless gas that is a strong oxidizer. It is highly effective at killing microbes but is not suitable for all fresh produce processing systems due to operational limitations.

Ozone is quickly broken down to oxygen in contact with water, and is de-activated rapidly by organic matter. Once de-activated, there is no residual control for microbes, and ozone becomes ineffective. The effectiveness is strongly determined by contact time and residual concentration.

Ozone can be hazardous to the health of workers, and therefore should be handled with care and regularly monitored.

Disinfection Testing Solutions

Kemio Disinfection



Kemio is the next generation measurement platform.



SMARTER



SAFER



TRACEABLE

Testing for

Chlorine	0.02 - 10 mg/L free chlorine 0.05 - 75 mg/L total chlorine
Chlorine (high range sensor)	0.1 - 25 mg/L free chlorine 1 - 500 mg/L total chlorine
Chlorine Dioxide	0.02 - 50 mg/L
Chlorite	0.02 - 50 mg/L
Peracetic Acid (PAA)	0.02 - 2000 mg/L

Kemio utilises a sophisticated electrochemical technique which removes complexity for the user, generating **repeatable and reliable results** each time.

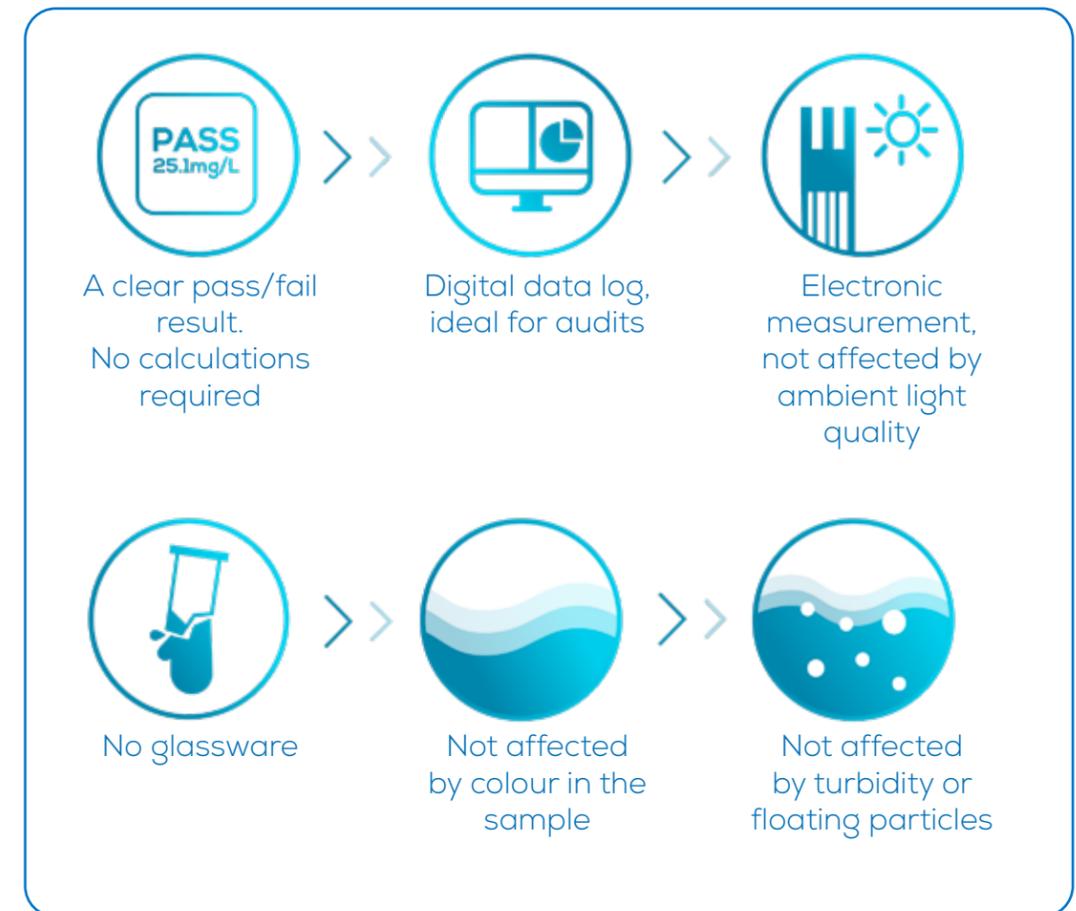
Helping to **improve operational efficiency**, by reducing labour time and minimizing disruption, by performing disinfection validation at the point of use.

Go paperless, **protect your data** and be prepared for audits. Kemio includes a fully traceable data log with your test specific information.

Kemio is **suitable for all users**, ready straight out of the box, with **no training required**

Kemio delivers the results you need from a method you can trust.

Advantages over other methods



How it works

Kemio is powered by patented, single-use sensors which generate an electrical current by reacting with chemicals in the water sample.



Kemio measures this electrical signal to determine the concentration of chemical in the sample.

The simple test method minimizes potential user errors to ensure repeatable and reliable results.

Colorimetric Solutions

Our compact photometers utilize photometric analysis, providing reliable results for a range of disinfectants and water quality indicators. For our full range visit www.palintest.com

Compact Chlorometer Duo

Use photometric technology to measure concentrations of free, combined and total chlorine.

0 - 5 mg/L free chlorine
0 - 10 mg/L total chlorine



Compact ClO₂+ Meter

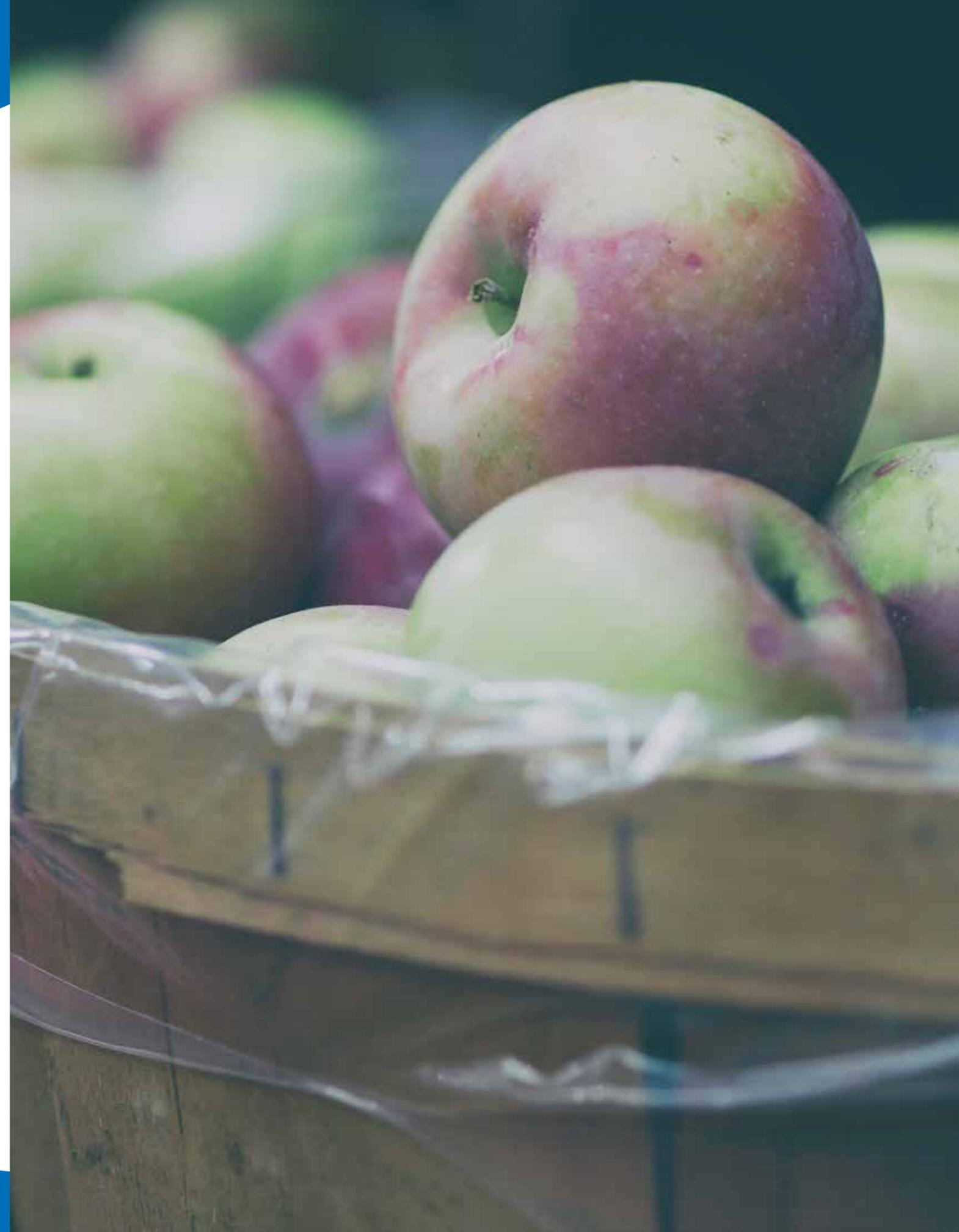
Small, portable unit for measuring concentrations of chlorine and chlorine dioxide.

0 - 10 mg/L chlorine dioxide
0 - 5 mg/L chlorine

Compact Ozone Meter

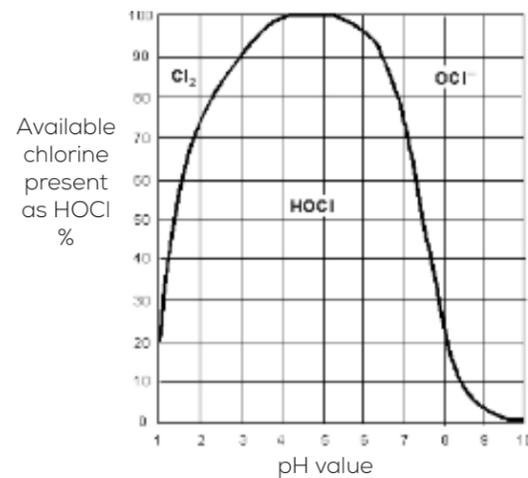
Uses digital photometry combined with the DPD method to measure concentrations of ozone

0 - 3 mg/L ozone



Importance of pH

Effective disinfection with chlorine is directly linked to the pH of the wash water. Monitoring and controlling pH ensures maximum safety and optimal disinfection efficiency.



With a range of functionality, there is a Palintest pH Meter to suit all user requirements and budget. Palintest's pH Meters include the following:

- ✓ Rugged construction – waterproof and battery powered
- ✓ Simple to use and validate – automatic buffer recognition and temperature compensation
- ✓ Full range of calibration standards and spares

Features	Pocket pH Meter	Micro 600 pH Meter	Micro 800 pH Meter
Operating Range	-1 to 15	0 to 14	-2 to 16
Resolution	0.01	0.01	0.01
Temperature Range	0 to 50°C	0 to 100°C	-10 to 110°C
Automatic Temperature Compensation	●	●	●
Automatic Buffer Recognition	●	●	●
Maximum Number of Buffers	3	5	5
Replaceable Electrode	●	●	●
Benchtop Stand		●	●
ORP Mode		●	●
Result Storage		Result 'Hold'	500 data sets
Calibration Reminder			●

Turbidity is a measure of the cloudiness of the water, caused by suspended solids that scatter light. These suspended solids might be soil or organic debris brought in with the produce, or recycled as part of the wash system. Increasing turbidity can be an indicator of many water quality issues and can present issues in sanitising wash waters, including declining efficacy of sanitiser.

An increase in turbidity can:

- Provide surface area for microorganisms
- Reduce sanitizer efficacy
- Reduce efficiency of UV disinfection

Early detection of increasing turbidity can help to stop a minor issue developing further and can improve water quality management practices on fresh produce wash lines.

Turbimeter Plus

Identify critical water quality indicators in a matter of seconds.



✓ Rapid two stage measurement process, identifying potential water quality issues in 5 seconds

✓ Employing unique Quadoptix technology with four individual measurement points for increased reliability

✓ IP67 waterproof certified with a waterproof USB socket, suitable for food processing environments.



Microbiology

Managing the risks associated with fresh produce production is a combination of effective sanitiser application and validation of risk mitigation using pathogen testing techniques. The unique Colitag™ approach to Total Coliform and *E. coli* is designed with simplicity and reliability built in.

Unique Colitag™ features include:

- ✓ Fast results – available in 16 hours when operated in accelerated mode
- ✓ Flexibility and simplicity – read results anywhere in the standard 18 – 48 hour window, positive results indicated by yellow colour (Total Coliform) or fluorescence (*E. coli*)
- ✓ Reliable results – USEPA-approved method, unique formulation minimises false-negatives in chlorinated samples

Available in either Presence/Absence or Most Probable Number (MPN) formats, Colitag™ offers a simple approach to validation of wash water safety.

colitag™



MPNplate™

The MPNplate™ device is supplied in packs of 100 with each device individually wrapped in sterile packaging. Reports up to $\geq 2,400$ cfu/100mL



Palintest

Water Analysis Technologies



A **Halma** company

www.palintest.com

Palintest HQ

Palintest House
Kingsway, Team Valley
Gateshead
Tyne & Wear NE11 0NS
UK

+44 191 491 0808
sales@palintest.com

Palintest Australia

1/53 Lorraine Street
Peakhurst Business Centre
Peakhurst
NSW 2210
Australia

+61 1300 13 15 16
palintest@palintest.com.au

Palintest China

Room 1711
Fanli Mansion
22 Chaowai Street
Chaoyang District
Beijing 100020, PRC

+86 10 6588 6200
china@palintest.com

Palintest USA

400 Corporate Circle
Suite J
Golden
CO 80401
USA

+1 859 341 7423
info@palintestusa.com