PRODUCE WASHING

INTRODUCTION

Proper food handling and implementation of the HACCP (Hazard Analysis and Critical Control Points) management system is important to ensure the fresh produce we consume is safe to eat and free from dangerous pathogens. This not only protects our health and well-being but also avoids costly recalls for suppliers. From small farms to large industrial operations, wash water is used to eliminate food-borne illnesses and remove dirt and debris. Even the water used to irrigate crops must be disinfected to prevent contamination before harvesting.

Wash water is considered a Critical Control Point and is used in processes such as:

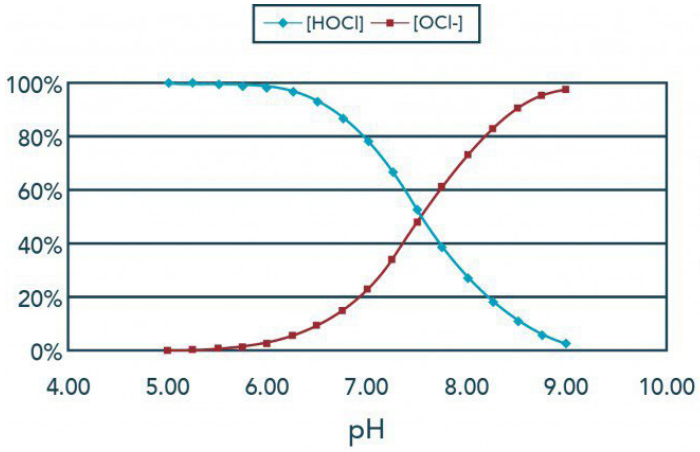
- Pre-cooling operations
- Ice injections
- Wash and Dip Tanks
- Flume wash systems
- Spray wash systems

MONITORING PRODUCE WASH WATER

The wash water must be monitored to ensure it contains proper levels of disinfectant. A common disinfectant is sodium hypochlorite (NaOCl) due to its low cost and effectiveness against a wide range of contaminants. In water, chlorine forms hypochlorite ions (OCl–) and hypochlorous acid (HOCl), with hypochlorous acid being the more effective disinfectant. Together these are called free chlorine, which is measured in parts per million (ppm). An amperometric sensor can be used to directly measure ppm of free chlorine. Free chlorine reacts with organic and inorganic substances to form combined chlorine, creating byproducts such as chloromines. It is important to monitor the wash water, either by sample measurement or continuous online measurement, to ensure enough free chlorine is present to react with any contaminants. For example, a standard wash cycle may have three stages, with 100 ppm, 50 ppm, and 5 ppm of free chlorine, respectively. The pH of wash water should also be monitored since it influences sanitizer effectiveness. As pH rises, the availability of hypochlorite ions making up free chlorine increases, while the availability of the more effective hypochlorous acid decreases. If pH is above 8.0, the chlorine loses the majority of its disinfection capabilities. As pH drops, more hypochlorous acid is available and disinfection effectiveness increases. As pH drops to very low values, free choline will exist as chlorine gas, which is very hazardous. Target pH is 7.0, with an acceptable range for wash water of 6.5 – 7.5 pH.

INSTRUMENTATION

There are a variety of electrochemical sensors available utilizing a glass bulb or flat glass membrane to directly measure pH. Chemicals such as muriatic acid (HCl) or citric acid (C6H8O7) are added to the wash water to control and stabilize the pH value. Chlorine is not the only disinfectant used in produce wash water. Others such as bromine, ozone, and hydrogen peroxide can also be used. A different approach is needed to monitor this wide range of options. Since all chemicals mentioned above are oxidizers, ORP (oxidation reduction potential) can be used to monitor the activity of sanitizer rather than the concentration of each one in particular. Oxidation level is measured in millivolts and relates to the activity level of sanitizer present. A value of approximately 750 mV is sufficient to kill microbes such as E. coli, yeast, and mold. Even though an ORP sensor does not directly measure sanitizer concentration, it provides an accurate indication of sanitizer effectiveness. These electrochemical sensors use a platinum measuring surface to detect ORP.



pH > 8	Limited effectiveness
pH < 6	Corrosive, compatibility issues

DESIGNED AND ASSEMBLED IN CALIFORNIA, USA

11751 MARKON DRIVE • GARDEN GROVE, CA 92841 • 714.895.4344 • WWW.SENSOREX.COM