CRITICAL PROCESS FILTRATION, INC.

Bacteria Control in Soft Drink Production

Bacteria, yeasts, molds and other organisms can be found everywhere, even in soft drinks. They can find their way into the process through raw materials, sweeteners, the facility environment, even on packaging materials. Organisms can be partially controlled through cleaning and operating procedures, but no cleaning method can prevent environmental organisms from re-entering the equipment as soon as the cleaning process is completed.

Even though soft drinks seem like a nutrient rich solution that is attractive to microorganisms, low pH drinks with high carbonation levels will kill most bacteria that get into the final package. A few bacteria may survive, but are usually inhibited from growing because of the harsh environment.

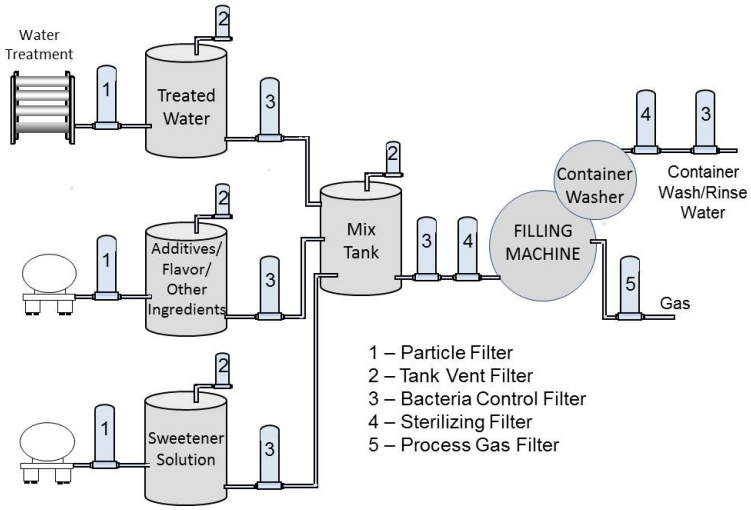
Soft drinks that are not carbonated and have less acidic pH levels, such as sports drinks or flavored waters, lack protection against spoilage organisms. Therefore, barriers such as filters should be installed to block contamination of the drinks by bacteria and other organisms.

Food Safety Practices

Several regulations regarding the safe production of food and beverage products have been in place for many years. There are also industry practices, often treated as regulatory requirements, that help assure food safety. Taken together, they provide guidance on the best ways to produce safe and good tasting products.

Three acronyms are frequently seen associated with soft drink and other food and beverage production. They are Good Manufacturing Practice (GMP), Good Hygienic Practice (GHP), and Hazard Analysis and Critical Control Point (HACCP). If these regulations and practices are followed, product contamination is highly unlikely. Part of each is the use of technologies such as filters to insure against microorganisms entering final product packages.

Figure 1 - Soft Drink Filtration Examples



Organisms of Concern

Yeasts are the most common organism found in carbonated beverages, because they can tolerate low pH and carbonation. Molds cannot grow in carbonated beverages, but may be found in sports drinks and other non-carbonated drinks. Bacteria can also contaminate soft drinks, especially those having some natural fruit juice as an ingredient. In particular, lactic acid bacteria (LAB) can be carried by the fruit juice into the process. Even non-carbonated drinks that are pasteurized can have thermo-acidophilic bacteria (TAB) remain in the product and cause spoilage.

More information on the types of organisms that might be found in soft drinks can be found in an article by Dorota Kregiel of the Institute of Fermentation Technology and Microbiology in Lodz, Poland. The article, titled "Health Safety of Soft Drinks: Contents, Containers, and Microorganisms", can be accessed at http://dx.doi.org/10.1155/2015/128697.

Application Summary

Choosing the Bacteria Removal Filter

The most critical filters in Figure 1 are the final, "Sterilizing" filters (housings marked 4). These filters remove the target organisms. The goal is to remove whatever might create flavor, aroma or safety issues while also preserving the flavor and aroma of the final product. However, the system shown has filters before the final filter. These filters are explained below, but their role is to control the level of organisms from all potential sources as well as extend the life of the final filter by capturing particles and larger organisms that might prematurely clog that final filter.

The filters used to capture microorganisms are almost always membrane filters with pore size ratings of 0.45 microns or 0.22 microns. Processors may choose the smaller pore size to assure capture of all bacteria, including the vegetative forms of some species, but there is a risk that some flavor or aesthetic elements of the product will also be captured by membranes with 0.22 micron pores. For that reason, 0.45 micron membranes are used by many bottlers.

Protecting Bacteria Removal Filters

The filter housings marked 1 and 3 in Figure 1 hold prefilters that remove larger particles and reduce the amount of organic content in ingredients as well as the final product. Housing 1 usually contains depth media based filters to remove sediment and visible particles. Housing 3 is most often a "bioburden reduction" membrane filter designed to capture most, but not all bacteria and reduce the bacterial load that must be removed by the final filter. The filters are chosen based on the particle and organic content that must be removed. Highly loaded liquids may use multiple stages of prefilters, though only 2 stages are shown here.

Filter Options

The filters chosen must be compatible with the fluid being filtered. The particle sizes and organisms targeted for removal also need to be considered. Finally, assure that the filters are designed to function after whatever disinfection or sterilization process will be used.

Critical Process Filtration has several filter options, as shown in the table below. These filters are available as cartridge filters and disposable capsule filters as well is in flat disc form for laboratory scale testing.

Contact Critical Process Filtration for help determining the best filter options for you, or visit us at www.criticalprocess.com for more information and to access datasheets with more detailed information on all of our products.

Figure 2 – Critical Process Filtration's pleated filters are available in a wide variety of configurations to fit existing housings

Filter Options for Bacteria Control in Soft Drink Production

Process Area	Filter Application	Filter Function	Critical Process Media*
Bioburden Control and Sterilizing	Large Organism Removal	Remove particles and larger organisms like yeasts and molds	GD, PD
	Bioburden Reduction	Remove most bacteria from the liquid stream to meet quality requirements	CWPS, PVWL, NC, NM, PS
	Bacteria Removal (Sterilizing)	Remove all bacteria from the stream	PS, NC, NM
Vent Filtration	Particle and Bacteria Removal	Prevent airborne contaminants from reaching tank contents	PVWB, TM

*Media Codes
GD = Pleated Fiberglass Depth Media
NC = Charged Nylon 6,6 Membrane
PVWB = High Capacity Hydrophobic PVDF Membrane
PD = Pleated Polypropylene Depth Media
NM = Nylon 6,6 Membrane
PVWL = High Capacity Hydrophilic PVDF Membrane
CWPS = High Capacity PES Membrane
PS = Polyethersulfone Membrane
TM = PTFE Membrane

Visit our website or contact us for more information and to access datasheets on all of our products.

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