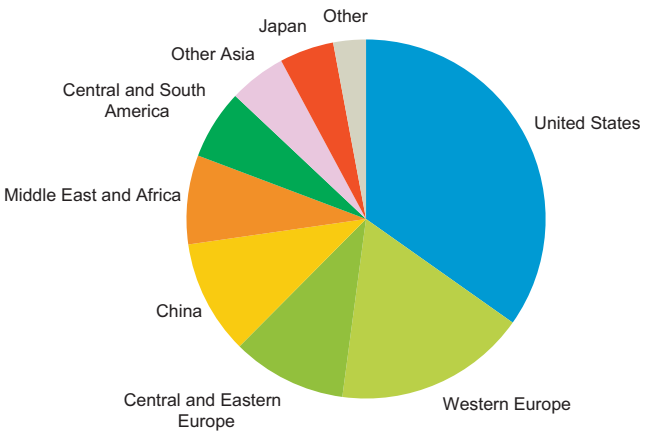
Abstract

Sodium, calcium, potassium, and lithium hypochlorite are strong oxidizing agents used for bleaching, sanitation, and disinfection. On a consumption basis, sodium hypochlorite accounted for 91% of total global hypochlorite use, with calcium hypochlorite at 9%. Lithium and potassium hypochlorite account for a negligible share.

The global market for all disinfectants, including chlorine-based disinfectants, is increasing as a result of growing concerns over the spread of infectious diseases. As a result, the role played by chlorinated disinfectants is related to health and social issues, and less dependent on the general economy.

The following pie chart shows world consumption of sodium hypochlorite:

World consumption of sodium hypochlorite—2015



Source: IHS

Sodium hypochlorite is commonly referred to as liquid chlorine bleach throughout the world. In the United States, it is used principally as a laundry bleach or household cleaner. Use of household bleach has increased during the past few years, with growing concerns over infectious diseases. Mold and mildew became an issue on the US Gulf Coast as a result of hurricane damage. Consumption of sodium hypochlorite in laundry bleach applications currently accounts for 67% of use, with disinfectant use accounting for the remaining 33%.

Global demand for sodium hypochlorite for household use is projected to grow at about 1.5% annually during 2015–20. This compares with a projected growth in global demand for all disinfectants and microbials of 3–5% annually during 2015–20 for both household and industrial uses. Much of this growth is related to consumer concern over foodborne pathogens and outbreaks of influenza. Highly publicized outbreaks have generally been the result of lapses in proper sanitation techniques in food and beverage processing. In the food industry, sodium hypochlorite is used mainly as a disinfectant to sanitize food preparation equipment; it also finds use in fruit and vegetable processing; pork, beef, and poultry production; fish processing; and in aquaculture, where it is used for the sanitation of shrimp/fish ponds. Aquaculture production has been growing at 5–6% annually since 2000 and is forecast to continue at that pace for the next five to ten years. All regions are seeing this growth, but Asia is the largest, accounting for nearly 88% of global production.

Globally, industrial applications for sodium hypochlorite are forecast to grow at a rate of 1.9% annually during 2015–20 but will vary by region. The leading application is municipal/industrial water treatment disinfection, which accounted for about 62% of total industrial consumption.

The World Bank estimates that 783 million people globally lack access to safe drinking water, 2.5 billion lack adequate sanitization, and a considerable percentage of the world's hospital beds are populated by people who have contracted

waterborne diseases. Furthermore, if present consumption rates continue, in 25 years, the world will be using 90% of all available freshwater. As a result, desalination and water reuse will become a more important source of freshwater. Currently, there are over 16,000 desalination plants in the world, in at least 140 countries. There are over 100 water reuse facilities. Both will require reliable disinfection technologies, some of which include sodium hypochlorite either in pre- or posttreatment to prevent biological fouling within the system itself or the distribution system. At present, nearly 75% of all global desalination capacity is in the Middle East, Persian Gulf, and North Africa. In the past five years, reverse osmosis (RO) has become the leading desalination technology, replacing multistage flash distillation. Most plants installed in Saudi Arabia, Kuwait, and the United Arab Emirates use distillation. Most plants in the United States rely upon RO and vapor compression. Four states account for most of US capacity—Florida, California, Arizona, and Texas. Consumption of sodium hypochlorite is forecast to continue to grow.

The largest world market for calcium hypochlorite is swimming pool sanitization, which accounts for about 44% of its total consumption. Use for disinfection and aquaculture applications is forecast to continue to grow rapidly, in particular in Asia.

All regions require increased levels of disinfection because of growing population demands. Global production of fish, crustaceans, and other aquaculture has grown dramatically since 1970, increasing from 32.4 million metric tons in 2000 to 70.9 million metric tons in 2014. Asia is the leading producer of aquaculture, accounting for about 88% in 2014, with China being the largest producer at just over 60%.

Lithium hypochlorite finds use primarily as a shock treatment in pools with vinyl liners, fiberglass, painted pools and spas.

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