



# R.E.D. FACTS

## Inorganic Halides

### Pesticide Reregistration

All pesticides sold or used in the United States must be registered by EPA, based on scientific studies showing that they can be used without posing unreasonable risks to people or the environment. Because of advances in scientific knowledge, the law requires that pesticides which were first registered years ago be reregistered to ensure that they meet today's more stringent standards.

In evaluating pesticides for reregistration, EPA obtains and reviews a complete set of studies from pesticide producers, describing the human health and environmental effects of each pesticide. The Agency imposes any regulatory controls that are needed to effectively manage each pesticide's risks. EPA then reregisters pesticides that can be used without posing undue hazards to human health or the environment.

When a pesticide is eligible for reregistration, EPA announces this and explains why in a Reregistration Eligibility Decision (RED) document. This fact sheet summarizes the information in the RED for sodium bromide and sodium chloride, which made up the reregistration case called Inorganic Halides.

### Use Profile

Sodium bromide is used as a microbiocide to control algae, bacteria and fungi in pasteurizer and cannery cooling water recirculation systems, pulp and paper mill water systems, and ornamental ponds and aquaria. It also is an active ingredient in pesticide products used to repel moths from clothing, and fleas from pets and their sleeping quarters. Products are formulated as liquid or solid soluble concentrates, tablets or granules. Sodium bromide has been used for many years in medicine as a sedative.

Sodium chloride is one of two active ingredients in a disinfectant used to treat feeding and watering appliances, equipment and premises in poultry operations. Sodium chloride is also the sole active ingredient impregnated into polyethylene which is placed around gardens as a barrier to slugs and snails.

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## Regulatory History

Sodium bromide was first registered as a pesticide in the U.S. in 1975. Currently, 32 pesticide products contain the active ingredient sodium bromide.

Products containing sodium chloride were first registered as pesticides in the U.S. in 1954. At present, 2 pesticide products contain sodium chloride as an active ingredient.

## Human Health Assessment

### Toxicity

**Sodium bromide** is of low acute oral and moderate dermal toxicity, and has been placed in Toxicity Category III for these effects. (Category I indicates the highest and Category IV the lowest degree of acute toxicity.) It causes mild eye and skin irritation, and for those effects it has been placed in Toxicity Category IV.

The human health effects of bromides following oral exposure are well known. The bromine salts have a depressant effect on the nervous system when administered at levels of 1 to 2 grams per day. This effect is slowly reversed when treatment is stopped.

**Sodium chloride** is of low acute oral toxicity and causes moderate eye irritation; it has been placed in Toxicity Category III for these effects. It causes mild skin irritation and for this effect has been placed in Toxicity Category IV.

Sodium chloride, known as salt, sea salt and table salt, is abundant in nature. It is used primarily to season or preserve food and is consumed by people daily, especially in commercially prepared and preserved foods. Consumption of more than the minimum daily requirement of salt may contribute to high blood pressure in some populations.

### Dietary Exposure

Dietary exposure to sodium bromide and sodium chloride is not expected to occur as a result of their pesticidal uses. None of the currently registered pesticide products involve food or feed uses, and no tolerances (residue limits in food) are established for these pesticides as a result of these uses.

### Occupational and Residential Exposure

The potential for mixer/loader/applicator exposure exists primarily from fogging- or misting-type applications of the disinfectant containing sodium chloride, and from handling the liquid formulation of sodium bromide. These exposures are considered minimal or low, however, and do not pose human toxicity concerns.

### Human Risk Assessment

The risk from occupational exposure to sodium bromide and sodium chloride is considered to be minimal. Their toxicity (or lack of toxicity) in humans is well documented. No additional hazard or exposure data are required for reregistration eligibility. Based on the low toxicity, minimal

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exposure risk and limited pesticidal uses of sodium bromide and sodium chloride, the risks to humans are considered negligible.

## **Environmental Assessment**

EPA did not perform an environmental assessment of sodium chloride. The registered uses result in insignificant exposure to the environment. Sodium chloride occurs abundantly in the natural environment. It is a component of seawater, and is in the diets of most terrestrial animals. Although it can be toxic in large amounts, especially to freshwater aquatic organisms, the use of sodium chloride as registered will not result in any significant exposure to non-target organisms in the environment.

The following assessment addresses sodium bromide only.

### **Environmental Fate**

Sodium bromide itself has no pesticidal activity. It dissociates in water to sodium and bromide ions. Activators such as chlorine and sodium hypochlorite react with the bromine ion to form hypobromous acid, which is the actual pesticide. The chemistry of hypobromous acid has been well documented in the literature.

When used in cooling towers and water systems, sodium bromide effectively controls algae, bacteria and fungal slime. It is injected into the service water with or after an activator (either chlorine gas or sodium hypochlorite), producing the active disinfectant hypobromous acid, an effective microbiological control treatment. As hypobromous acid passes through a heat exchange unit, it is converted back to bromide ion and water. Discharge of hypobromous acid is limited by the National Pollutant Discharge Elimination System (NPDES) permit program.

The Agency conducted a Tier Ic Estimated Environmental Concentration (EEC) model for hypobromous acid, to demonstrate the maximum concentration likely to occur immediately downstream from an industrial (point source) discharge site. EECs were calculated for both "high exposure case" and "typical" sites. The worst case EEC for all use sites tested was 450 parts per billion (ppb), and the typical sites ranged from 0.38 to 0.75 ppb. These estimated concentrations are discussed in relation to ecological effects, below.

### **Ecological Effects**

Sodium bromide is practically non-toxic to upland game birds and waterfowl on both an acute oral and a dietary basis. However, sodium bromide as hypobromous acid is highly toxic to freshwater fish, aquatic invertebrates and estuarine and marine organisms.

In two aquatic residue monitoring studies conducted at powerplants on the Potomac River in Maryland, bromine as hypobromous acid measured at the point of discharge exceeded the levels of concern for estuarine species in one study, and for all aquatic species in the second study. Significant

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residue levels were detected 80 meters downstream; residues were no longer detectable between 80 and 130 meters downstream.

### **Ecological Effects Risk Assessment**

As discussed earlier, EPA conducted a Tier Ic EEC screening model for hypobromous acid to estimate the maximum concentration that occurs immediately downstream from an industrial point source discharge site. The results for the high exposure case are comparable to the amounts detected in the two Potomac River aquatic residue studies, one of which showed high concentrations of hypobromous acid as far downstream as 80 meters. Based on these studies, the Agency presumes risk to freshwater and estuarine fish and invertebrates at the point of discharge and downstream to 80 meters.

However, the modeling results for "typical" sites are well below the levels of concern for fish and invertebrates. These results indicate that sodium bromide can be used at typical sites without impact most of the time. Since the discharge of hypobromous acid is limited by the NPDES permit program administered by EPA's Office of Water, the Agency will be able to control the discharge of hypobromous acid on a site-by-site basis so that toxic levels are avoided.

Based on this modeling, EPA also presumes a risk to endangered freshwater and estuarine/marine organisms in "worst case" situations. However, "typical" discharge levels are below those of concern for endangered species.

### **Additional Data Required**

EPA has sufficient generic data to support reregistration of all products containing sodium bromide. Due to the nature of the pesticide and the amount of information available in the public literature, EPA required no generic data for reregistration of sodium chloride.

EPA is requiring product-specific data including acute toxicology, chemistry and efficacy studies, as well as revised Confidential Statements of Formula and revised labeling, for reregistration of pesticide products containing sodium bromide and sodium chloride.

### **Product Labeling Changes Required**

The labels of all registered pesticide products containing sodium bromide and sodium chloride must comply with EPA's current pesticide labeling requirements. In addition, all products containing sodium bromide must contain the following effluent discharge statement:

"This product is toxic to fish and aquatic invertebrates. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other water unless in accordance with the requirements of a National Pollution Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this

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product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of EPA."

**Regulatory  
Conclusion**

The use of currently registered pesticide products containing sodium bromide and sodium chloride as labeled and specified in the RED document will not pose unreasonable risks or adverse effects to humans or the environment. Therefore, all uses of these products are eligible for reregistration.

These products will be reregistered once the product-specific data, revised (if necessary) Confidential Statements of Formula and revised labeling are received and accepted by EPA.

**For More  
Information**

EPA is requesting public comments on the Reregistration Eligibility Decision (RED) document for the Inorganic Halides (sodium bromide and sodium chloride) during a 60-day time period, as announced in a Notice of Availability published in the Federal Register. To obtain a copy of the RED document or to submit written comments, please contact the Pesticide Docket, Public Response and Program Resources Branch, Field Operations Division (H-7506C), Office of Pesticide Programs (OPP), US EPA, Washington, DC 20460, telephone 703-305-5805.

Following the comment period, the Inorganic Halides RED document will be available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161, telephone 703-487-4650.

For more information about EPA's pesticide reregistration program, the Inorganic Halides RED, or reregistration of individual products containing sodium bromide or sodium chloride, please contact the Special Review and Reregistration Division (H-7508W), OPP, US EPA, Washington, DC 20460, telephone 703-308-8000.

For information about the health effects of pesticides, or for assistance in recognizing and managing pesticide poisoning symptoms, please contact the National Pesticides Telecommunications Network (NPTN). Call toll-free 1-800-858-7378, between 8:00 am and 6:00 pm Central Time, Monday through Friday.