

Pollution and safety in process industries

The bulk of the solids in distiller waste in the soda ash plant is made up of chloride. This arises from the fact that the waste contains all the chloride from the salt used, chlorine is not utilized in the process.

Calcium chloride in solution permeates the soil bed and contaminates sources of water supply. Only to a very limited extent is any portion of the waste allowed by municipal authorities to be sent to rivers or any public waterways and that only after complete settling. Also fish in the river were killed by the calcium chloride and the free lime carried in the liquor.

The preparation of chlorine gas or hydrochloric acid from calcium chloride in the waste went no longer be considered workable in view of the present more economical methods for preparing such materials.

Waste Disposal: Large volumes of liquid wastes containing suspended and dissolved solids are produced in an ammonia – soda plant. The largest volume occurs from the distiller operation where for every ton of product soda ash, nearly 10 m³ of liquid wastes are produced, containing about one ton of calcium chloride, one-half ton of sodium chloride, and other soluble and insoluble impurities. Traditionally this liquid waste, after settling of suspended solids in large basins, was discharged into local waterways. In the United States, federal guidelines, suggesting limits on suspended solids and pH of liquid wastes discharged to local waterways, are used in the development of local discharge permits. The guidelines also specified no discharges from new ammonia – soda ash plants. Although processes have been proposed to reduce or eliminate waste streams, it is felt that in the United States, with its abundant reserves of natural ash, the guidelines will prohibit installation of new ammonia – soda plants. In addition to regulations governing liquid wastes, local restrictions have been placed on gaseous emissions from soda ash plants to protect air quality. The cost to comply with the environmental regulations and the increasing operating costs relative to natural ash have contributed heavily to the shutdown of synthetic soda ash plants in the United States.

HEALTH AND SAFETY

Exposure to soda ash is ordinarily not hazardous but soda ash dust may produce temporary irritation of the nose and throat. Although some become accustomed to working in ht dust and suffer relatively little discomfort, others are allergic to alkaline materials and develop a condition of dermatitis. Tests have shown that dermal effects due to soda ash range from a transient reddening and inflammation to mild burns to abraded skin areas. The skin irritations experienced by workmen exposed to soda ash dust in hot weather are usually more severe because soda ash is likely to dissolve in perspiration.

Soda ash is corrosive to the eyes. It produces severe corneal, iridal, and conjunctival effects (tissue destruction). Soda ash is harmful if ingested and may be corrosive to the lining of the stomach. A private communication has indicated that the acute oral LD₅₀ on for soda ash is 2.8 g/kg.

Potential Health Effects of Soda ash

Eye: Contact with eyes may cause severe irritation, and possible eye burns.

First aid: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately

Skin: Contact with skin causes irritation and possible burns, especially if the skin is wet or moist.

First aid: Get medical aid. Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion: May cause irritation of the digestive tract.

First aid: Do not induce vomiting. If victim is conscious and alert, give 2-4cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation: May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema.

First aid: Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear

Chronic: Prolonged or repeated inhalation may cause nosebleeds, nasal congestion, erosion of the teeth, perforation of the nasal septum, chest pain and bronchitis.

Handling and storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Avoid ingestion and inhalation.

Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.