

SIDS INITIAL ASSESSMENT PROFILE

CAS No.	7447-40-7
Chemical Name	Potassium chloride
Structural Formula	K-Cl

RECOMMENDATIONS

The chemical is currently of low priority for further work.

SUMMARY CONCLUSIONS OF THE SIAR**Human Health**

Potassium chloride is an essential constituent of the body for intracellular osmotic pressure and buffering, cell permeability, acid-base balance, muscle contraction and nerve function.

Acute oral toxicity of KCl in mammals is low (LD50 = 3020 mg/kg bw). In humans, acute oral toxicity is rare because large single doses induce nausea and vomiting, and because KCl is rapidly excreted in the absence of any pre-existing kidney damage. Usual therapeutic doses of potassium for oral solution-adults are 1.5-3 g/day to prevent depletion, and 3-7.5 g/day for replacement. For repeated dose toxicity, a NOAEL at 1820 mg/kg bw/day in rats, and a NOAEL > 80 mmol KCl/day (approx. 85 mg/kg bw/day) in humans can be retained. A threshold concentration for skin irritancy of 60 % was seen when KCl in aqueous solution was in contact with skin of human volunteers. The threshold concentration when applied to broken skin was 5 %.

No gene mutations were reported in bacterial tests, with and without metabolic activation. However, high concentrations of KCl showed positive results in a range of genotoxic screening assays using mammalian cells in culture. The action of KCl in culture seems to be an indirect effect associated with an increased osmotic pressure and concentration. Therefore KCl, do not have any direct relevance in the intact body were such concentrations can not occur. Further studies using *in vivo* systems are not considered necessary under SIDS.

No evidence of treatment-related carcinogenicity was observed in rats administered up to 1820 mg KCl/kg body weight/day through the food in a 2 year study.

A developmental study revealed no foetotoxic or teratogenic effects of KCl in doses up to 235 mg/kg/day (mice) and 310 mg/kg/day (rats). No fertility study has been located. Based on the extensive amount of knowledge on KCl intake, regulation and effects in the human body, and on a worst case exposure estimate (see Exposure), no further testing of fertility is considered required under SIDS.

Gastro-intestinal irritant effects in humans caused by KCl administrated orally have been reported at doses from about 31 mg/kg bw/day. One epidemiological investigation among potash miners disclosed no evidence of predisposition of underground miners to any of the diseases evaluated, including lung cancer.

Environment

KCl as inorganic salt is not subjected to further degradation processes in the environment. In water, potassium

chloride is highly water soluble, and readily undergoes dissociation. In soil, transport/leaching of potassium and chloride is affected by the clay minerals (type and content), pH, and organic matter.

In short-term acute toxicity tests with fish, daphnia and algae the following results were found (lowest test result values): *Ictalurus punctulus* 48h-LC50 = 720 mg/l; *Daphnia magna*: 48h-LC50 = 177 mg/l; *Nitzschia linearis*: 120 h-EC50 = 1337 mg/l. A chronic reproductive test with the invertebrate *Daphnia magna* gave a LOEC of 101 mg/l. All the studies compiled on the acute and chronic aquatic toxicity were > 100 mg/L. Thus it is concluded that KCl is not hazardous to freshwater organisms. Taking into considerations the background concentrations of KCl in seawater (380 mg/l K⁺ and 19,000 mg/l Cl⁻), it is concluded that there is no reason for further investigations of KCl on marine species. The low concern for the environment is supported by the absence of a bioaccumulation potential for the substance.

In plants, potassium is one of the three major nutrients and chloride is an essential micronutrient. The potassium requirement for optimal plant growth is in the range 2-5 % of the plant dry weight of vegetative parts. In most plant species the Cl requirement for optimal growth is in the range of 0.2-0.4 mg/g dry matter.

Potassium in plants is important for the osmotic and ionic regulation, plays a key role in the water homeostasis, and is closely connected with processes involved in the protein synthesis. In higher plants, potassium affects photosynthesis at various levels. Cl is also essential for the photosynthesis in plants, and has important functions in the osmotic regulation. An adequate supply of potassium and chloride in plants tends to improve the plant's resistance towards several diseases.

Exposure

World-wide production figures for KCl exceed 1 million metric tons/year. Virtually all commercial KCl is extracted from natural sources of the substance. More than 90 % of the total KCl consumption is used for fertilizer production. Production of potassium hydroxide accounts for more than 90 % of the non-fertilizer or industrial uses of KCl. Other non-fertilizer uses of KCl include food/foodstuff additives, supplement of animal feed, pharmaceutical products, laboratory chemicals, deicing agents and photo chemicals.

KCl is ubiquitous in the environment, occurring in minerals, soil and sediments, and natural waters. KCl is also present as a major and essential constituent in animals and plants. The main human exposure to KCl is the normal dietary intake (2-4 g K and 3.5-9 g Cl), and indirect exposure via the environment (drinking water).

Specific occupational exposure limits (OELs) and actual exposure levels in the mining, refining, fertilizer and other industries have not been found. Assuming 100 % body retention breathing from a working atmosphere containing 10 mg/m³ KCl (in accordance with the TWA value for "Particulates Not Otherwise Classified"), a worker's daily inhalation dose for KCl was calculated to 140 mg (worst case).

NATURE OF FURTHER WORK RECOMMENDED

No recommendation.