POISON CHEMISTRY - THALLIUM SULFATE

Sometimes referred to as ‘the poisoner’s poison’, thallium sulfate is colourless, odourless, and tasteless. It is slow-acting, and difficult to diagnose.

HISTORY

Thallium was discovered in 1861 by William Crookes, and its toxicity was quickly noted. It is especially toxic in its bivalent compounds, including thallium sulfate, acetate, and carbonate.

In the late 1800s, thallium sulfate was used to treat some medical conditions, including syphilis, gonorrhoea, & gout. The side effects meant that it was not widely used, however.

Thallium sulfate was often employed as a rodenticide and insecticide, making it easy for would-be poisoners to obtain. Its usage in rat poisons has been banned in many countries since the 1970s, however.

Tl_2SO_4

THALLIUM (I) SULFATE

MEDIAN LETHAL DOSE: 10-15mg/kg

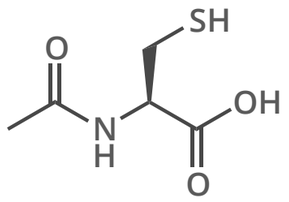
TREATMENT

$Fe_7(CN)_{18}$

PRUSSIAN BLUE

NaI

SODIUM IODIDE



N-ACETYLCYSTEINE

No substance can remove thallium which has already been absorbed, but Prussian blue and sodium iodide help remove unabsorbed thallium from the intestinal tract. As thallium binds to sulfhydryl groups, N-acetylcysteine has also been suggested as a treatment.

EFFECTS

CONSTIPATION

ABDOMINAL PAIN

VOMITING & NAUSEA

PAIN IN EXTREMITIES

‘MEES’ LINES’ ON NAILS

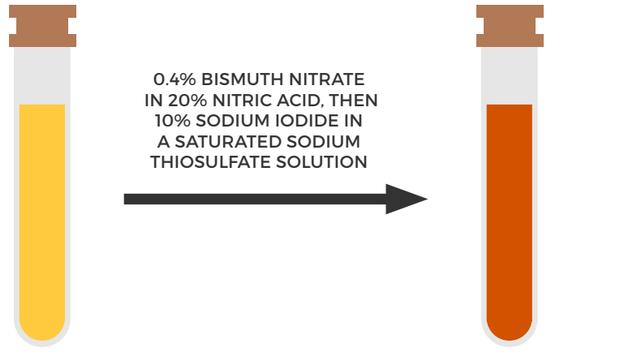
HAIR LOSS

INCREASED HEART RATE

CONVULSIONS, COMA & DEATH

Initial symptoms indistinct. Large doses kill before some effects are apparent, but with lower doses, hair loss occurs 2-3 weeks after poisoning. Damage to nerves, causing pain, is also characteristic. Toxicity is due to the similarity between potassium & thallium ions.

DETECTION



Qualitative testing for thallium in urine can be carried out as detailed above, though this method can produce false positive results. More common is the use of atomic absorption photospectrometry of a urine sample, which uses absorption of light to identify thallium.