

D CHROME

Context

Potassium Chlorate is a white crystalline substance (in pure form) and the most common chlorate in industrial use. It is manufactured using Potassium Chloride by an electrochemical process with the help of DC Current in the electrolytic cells. For the electrolysis, Mild Steel is used as cathode and Titanium is used as anode. 3-4 GPL (grams per liter) Sodium Dichromate is added to the electrolytic solution to prevent the corrosion of mild steel electrolytic tank and cathode. After electrolysis, Potassium Chlorate gets crystallized. The crystals are separated by centrifuging, washing, drying to reduce moisture and finally pulverized and packed.

Some amount of waste is generated during this process. For 1000 kg of Potassium Chlorate produced 10 kg of solid waste is generated which is separated and stored. The composition of this typical waste is as follows:

1. Chlorides as KCl	:	49.03%
2. Chlorates as KClO_3	:	9.86%
3. Calcium as Ca	:	2.60%
4. Magnesium as Mg	:	7.83%
5. Chromium as Cr	:	0.1106%
6. Water insoluble (In hot water)	:	29.44%

Problem Statement

The Chromium present in the solid waste is toxic. For the safe disposal of the waste sludge, choose any one of the following possible solutions:

1. Suggest ways for the treatment of waste sludge so that the Chromium level is brought down to 2 ppm and hence the solid waste could be disposed off as a hazard free material.

Clearly elaborate on

- The method used
- Cost involved
- Feasibility of the method in industries

2. Describe methods to convert chromium into a harmless material for making the waste suitable for direct disposal.

Clearly explain

- The method used
- The property of chemical compound or microorganism used
- Methods to produce the chemical compound/microorganism
- Cost involved
- Feasibility of the method in industries