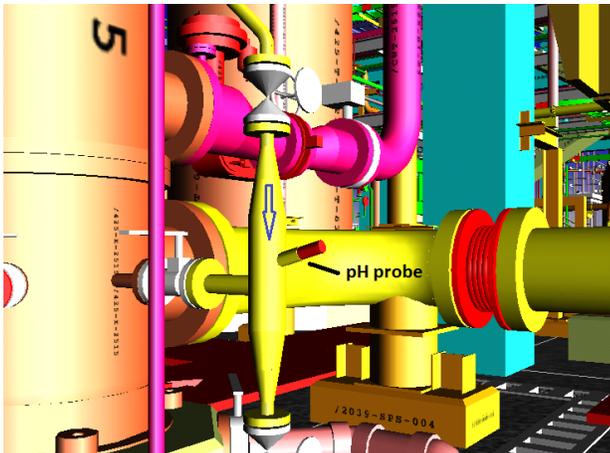


pH in Strong Chlorate (Electrolytic cooler)

Industry: Chemical
Product: PH450G

Introduction

Sodium chlorate is an inorganic compound with the chemical formula NaClO_3 . It is a white crystalline powder that is readily soluble in water. It is hygroscopic. It decomposes above $300\text{ }^\circ\text{C}$ to release oxygen^[4] and leave sodium chloride. Several hundred million tons are produced annually, mainly for applications in bleaching paper.



Commercial Use

The main commercial use for sodium chlorate is for making chlorine dioxide (ClO_2). The largest application of ClO_2 , which accounts for about 95% of the use of chlorate, is in bleaching of pulp. All perchlorate compounds are produced industrially by the oxidation of solutions of sodium chlorate by electrolysis.

Sodium chlorate may be used to control a variety of plants including morning glory, canada thistle, johnson grass, bamboo, Ragwort, and St John's wort. The herbicide is mainly used on non-crop land for spot treatment and for total vegetation control on areas including roadsides, fenceways, and ditches. Sodium chlorate is also used as a defoliant and desiccant.

Application Overview

Industrially, sodium chlorate is produced by the electrolysis of a hot sodium chloride solution:



In chemistry and manufacturing, **electrolysis** is a method of using a direct electric current (DC) to drive an otherwise non-spontaneous chemical reaction. Electrolysis is commercially highly important as a stage in the separation of elements from naturally occurring sources such as ores using an electrolytic cell. The voltage that is needed for electrolysis to occur is called the decomposition potential.

This reaction progresses in heat (at least 70 degrees Celsius), and controlled pH. In lower temperature or with high pH another reaction progresses:



The Chloralkali process is an industrial process for the electrolytic production of sodium chlorate. It can also be synthesized by passing chlorine gas through a solution of sodium hydroxide. It is then purified by crystallization.

Typical process details:

Fluid	Strong Chlorate (Composition :NaCl 8%,NaClO ₃ 36%,Na ₂ Cr ₂ O ₇ 0.3%,Water Balance. NaOCl 2 to 5 gpl, pH 5 to 7)
Press Nor/Max	1.1 / 1.8 kg/cm ² (g)
Temp Nor/Max/Min	85 / 90 / 25 deg.C
Design Parameters:	Pressure - FV/6.11 kg/cm ² (g) & Design temperature- 117 deg.C
Density	1330 kg/m ³ @ N.O.C
pH Nor/Max/Min	(5.8-6.2) / 6.8 / 4.5
Installation	Insertion type
Insertion Length	Minimum 60 mm

Typical problems:

Frequent cleaning

Remedies:

Use of differential sensor

Product Recommendations

SC24 sensor from Yokogawa is the perfect sensor for this application. Cleaning is probably not necessary for SC24 sensor because of its design. pH electronics is required with two high impedance inputs like Flexa series or PH450 series.

SC24 is possible if the salt content is stable during the pH control step.

Features:

The SC24V is a differential pH sensor. This means that the reference is not a (liquid) junction but a glass sensor which does not respond to pH changes (within the applicable range of the sensor). Therefore the sensor is truly maintenance free and the output voltage of the sensor depends only on the salt concentration of the process.

The sensor responds to pH changes rather than analyzes the accurate pH value. In that sense it is best to describe the sensor as pH control sensor rather than pH measuring sensor.

A rule of thumb is that a change in salt concentration of +/- 25% has an effect of less than 0.1pH on the pH reading.

4 wire pH converter:



Type: 4 wire type

Features

- Easy touchscreen operation
- Trending display up to 2 weeks

Alternately:

2 wire pH transmitter:



Type: 2 wire type

Features

- Dual sensor measurement on 2-wire type analyzer;

Tangible benefit: Save down time in cleaning, repeated calibration, improve end product quality.