

Measurement of Concentration of Supersaturated NaCl Solution in Salt Dissolvers at Electrolysis Plants

Industry: Chemical

Product: Inductive conductivity analyzers

Introduction

Control of sodium chloride (NaCl) concentration at a salt dissolver where solid salt is dissolved in water, is highly important because of the electrolysis efficiency. A conventional way of measuring the concentration of supersaturated NaCl solution had been performed by using non-contact type sensors (e.g., γ -ray density meter) since NaCl, impurities, and precipitates are in the solution. In this way, there were disadvantages such as troublesome maintenance and therefore, the radiation control is required for γ -ray density meter.

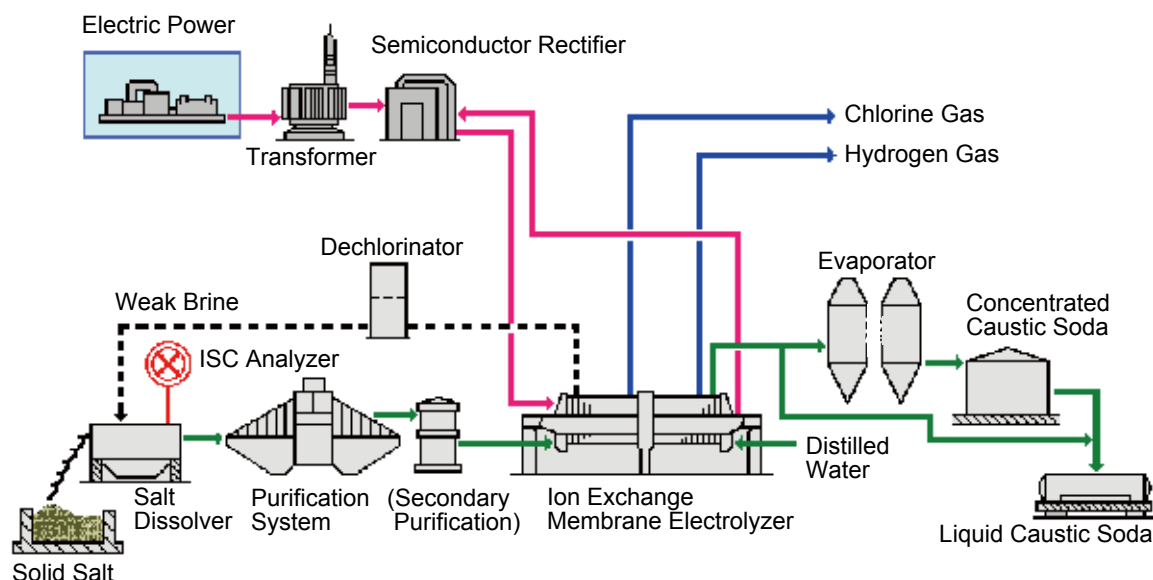
Responding to these backgrounds, the ISC202 inductive conductivity analyzer provides concentration reading and realizes to improve substantial maintainability, cost performance and measurement accuracy.

Expected Benefits

- Measures NaCl concentration in salt dissolvers
- Reduces operating costs

Process Overview

In an electrolysis plant, the solid salt is dissolved in water in a salt dissolver to make brine. This brine contains impurities, such as calcium, magnesium or sulfates, that decrease electrolysis efficiency. The brine is purified by removing these impurities before being fed to an electrolyzer, where the purified brine is electrolyzed to produce caustic soda and chlorine. The caustic soda solution produced at the cathode in the electrolyzer is concentrated in a multiple effect evaporator, as a result the concentration is increased from approximately 32% to 48%.



Solution Details

Measurement system

2-wire inductive conductivity system

Sensor

ISC40G(J)-GG-T1-□□

Flow-through holder

ISC40FF(J)-PJ

Transmitter

ISC202G-A-E

Dedicated distributor for transmitter

PH201G-A□*B

Utilities

ISC202G inductive conductivity transmitter

Power supply voltage: 17 – 40 V DC (from distributor)

Power consumption: 0.9 VA maximum

PH201G distributor

Power supply: 100 V: 20 to 130 V DC/80 to 138 V AC, 47 to 63 Hz

220 V: 120 to 340 V DC/138 to 264 V AC, 47 to 63 Hz

Power consumption: 24 V DC: approx. 200 mA

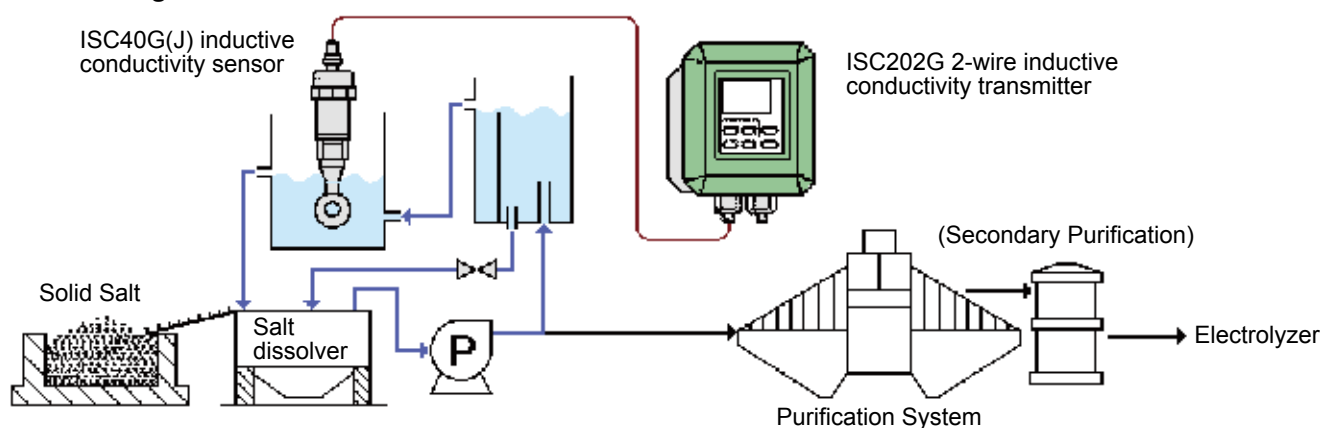
100 V AC: approx. 7 VA

220 V AC: approx. 11 VA

Notes

Sampling should be done in the supernatant liquid in a salt dissolver. The supernatant liquid is collected in a settling tank and then the supernatant liquid of the tank is transported to a measurement tank where the sensor is installed.

Installation Diagram



Field Data

1. Process conditions (salt dissolver)

Temperature: Approx. 65 °C

Pressure: Atmospheric pressure

Sample: Supersaturated brine

NaCl concentration control range: 200 to 360 g/L

↓
18.1 to 30 wt%*

* Depends on user's actual data of specific gravity.

2. ISC202G setting parameters

(Relationship between conductivity and concentration is based on the linear approximation of

$S = 16.3x$ that is obtained by actual measurement using SC72 Personal Conductivity Meter.)

- NaCl temperature compensation table is used
- Reference temperature setting: 25 °C
- Output setting: Code 04

Output (%)	Concentration (%)	Conductivity (mS/cm)
0	18	293
50	24	391
100	30	489

