

*Maintaining High Quality by Measuring and Controlling Liquid Density*

**Industry:** Chemical  
**Product:** Liquid Density Meter

## Introduction

Caustic soda (sodium hydroxide) is an important basic material in the chemical industry and is mainly produced by the electrolysis of soda. There are two types of electrolysis processes: the diaphragm method and the ion-exchange membrane method; the latter is becoming mainstream because of its lower energy consumption and higher product quality. Both methods involve evaporating the solution after the electrolysis process to make concentrated caustic soda. This process is where the concentration is measured. Using the fact that there is a nearly linear relationship between the liquid density and the concentration, the concentration can be determined by measuring the liquid density.

The DM8 Vibration Type Liquid Density Meter has high sensitivity and stability and can be used to ensure highly accurate control. The DM8 ensures high product quality through stable and accurate measurement of liquid density as well as reducing operating costs.

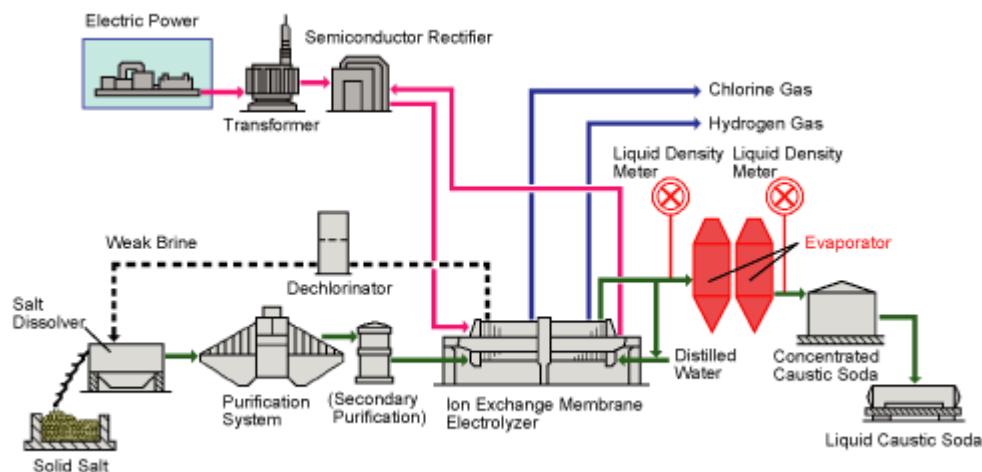
## Process

The solid salt is dissolved in water and impurities in the salt are removed. The purified solution is fed to an electrolyzer, where the solution is electrolyzed to produce caustic soda and chlorine. The concentration of the caustic soda solution produced at the cathode in the electrolyzer is approximately 32%. The solution is concentrated in a multiple effect evaporator to a product level of approximately 48%.

In the ion-exchange membrane method, one density meter is installed before the evaporator to control the steam temperature and pressure of the evaporator so that the concentration of the caustic soda is kept constant. Another density meter is installed after the evaporator for the purpose of controlling the product quality.

## Features

- \* The vibration density measurement principle allows high accuracy and resolution.
- \* The structure is maintenance free.
- \* The detector is more compact compared to other manufactures'



## Product Recommendations

Sensor- VD6 Liquid Density Detector  
Analyzer- DM8C Liquid Density Converter

DM8C Converter



VD6D Detector

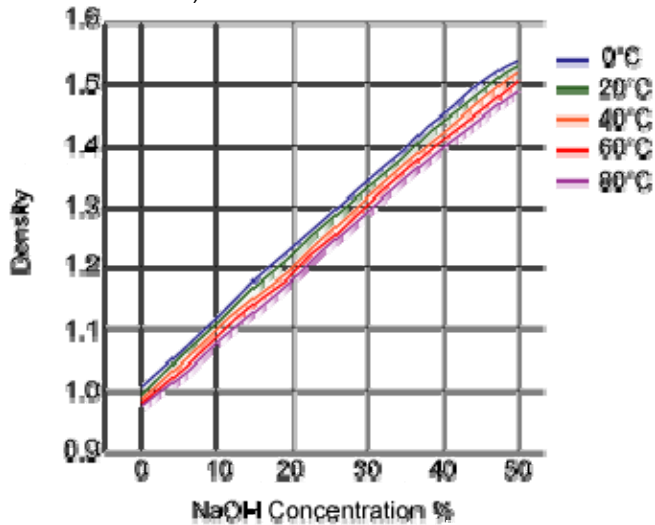


## Field Data

1. Process Conditions

| Measurement point  | Before evaporator              | After evaporator             |
|--------------------|--------------------------------|------------------------------|
| Temperature        | 70 to 80°C                     | 150 to 170°C                 |
| NaOH concentration | 20 to 35%                      | 40 to 48%                    |
| Density            | 1.25 to 1.35 g/cm <sup>3</sup> | 1.4 to 1.5 g/cm <sup>3</sup> |

2. Relationship between concentrations and the density of caustic soda (Source: International Critical Table)



## Notes

Literature data of the concentration and density characteristics of caustic soda are mostly based on a NaOH solute only. The characteristics may change if the solution contains solutes other than NaOH. For the conversion of density to concentration, make a calibration curve by using the actual sample. For more information contact the Yokogawa Analytical Marketing Department.