

## Application Memo

# Hydrochloric Acid in Pickling Solution

|                    |                                   |
|--------------------|-----------------------------------|
| Industry           | Inorganic chemical industry       |
| Instrument         | Automatic potentiometric titrator |
| Measurement method | Neutralization titration          |
| Standards          |                                   |

## 1. Overview

Various pickling solution like hydrochloric acid, sulfuric acid or mixed acid of hydrochloric and nitric acid is used to remove a “scale” (oxide layer) formed on a steel sheet or steel products after heat treated or “rust” on a discarded steel or iron products. Likewise, the acid bath is used to remove the oxidation film before the plating process. The concentration of hydrochloric acid in the pickling solution is measured in this example. By knowing the acid concentration, the pickling solution can be controlled to the required acid level for effective pickling.

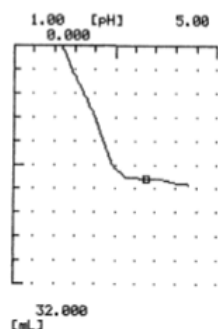
## 2. Apparatus

|           |  |
|-----------|--|
| Main unit | Automatic potentiometric titrator (preamplifier STD)   |
| Electrode | pH Glass electrode<br>Mercury sulfate reference electrode<br>(Internal solution: 1.0M potassium sulfate)<br>Temperature compensation electrode |

## 3. Reagents

|         |  |
|---------|--|
| Reagent | 1mol/L sodium hydroxide solution         |
| Solvent | Water (Ion exchanged or distilled water) |

## 4. Example



—Titration curve—

| —Measurement results— |            |            |                   |
|-----------------------|------------|------------|-------------------|
|                       | Sample (g) | Titer (mL) | Concentration (%) |
| 1                     | 3.0009     | 17.9056    | 21.844            |
| 2                     | 3.0191     | 18.0557    | 21.894            |
| 3                     | 3.0022     | 17.9214    | 21.854            |
| Average               |            |            | 21.864            |
| SD                    |            |            | 0.0265            |
| RSD(%)                |            |            | 0.121             |

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