Refinery Application Note
Sour Water Stripper (SWS)

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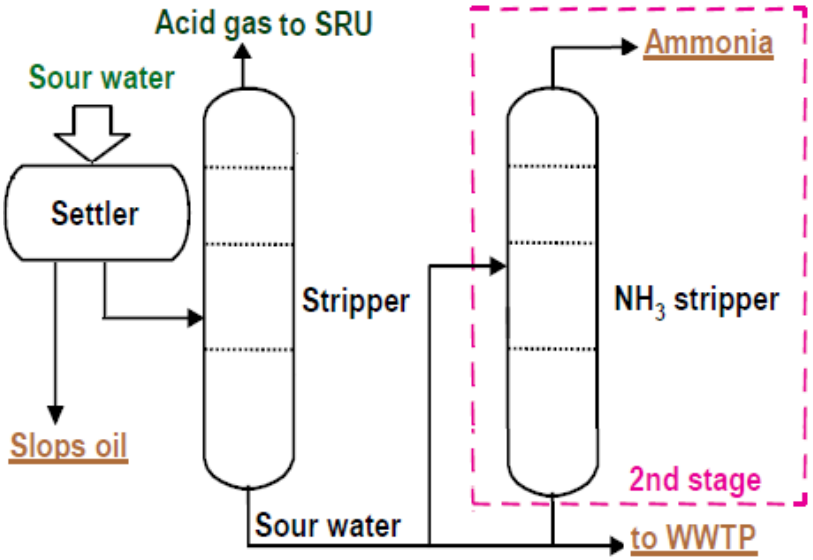


Application Overview

Sour water is waste water generated from refining processes using steam or water. Sour water is characterized by high ammonia (NH_3) and hydrogen sulfide (H_2S) content, as well as phenol and hydrogen cyanide. Before sour water can be resued or disposed of (eg. crude desalter water), it must be treated in the sour water stripping unit.

Single-stage sour water strippers are most common. The sour water is heated to strip the hydrogen sulfide and ammonia from the water. Sour gas is routed to the sulfur recovery unit (SRU) while the liquid is sent to effluent.

Two-stage sour water strippers can also be used to achieve lower hydrogen sulfide and ammonia concentrations in the stripped water. The first column operates at a lower pH to remove hydrogen sulfide. The second column is more alkaline to remove ammonia.



Simplified SWS Process Flow Diagram

Operational Challenges

Ammonia is most efficiently removed above pH 10 to avoid ammonium formation which cannot be stripped. However, the optimal pH for hydrogen sulfide removal is below pH 5. Since many refineries compromose using pH 8, neither ammonia nor hydrogen sulfide are stripped as effectively as they could be.

Acidic compounds (phenols, hydrogen cyanide) adversely affect ammonia stripping, while alkaline compounds (amines, excess caustic) negatively impact hydrogen sulfide stirpping. Effective pH control is difficult without truly understanding the sour water buffer capacity (alkalinity).

Caustic addition is important for heat-stable salt (eg. thiocyanate) neutralization on ammonia stripping. But excess caustic can permanently bind hydrogen sulfide into solution, which has adverse effects downstream in the WWTP.

The risk of calcium and magnesium scaling, as well as corrosion from acidic compounds are other areas of concern.

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Liquid Monitoring

Ammonia
- Ensure Effective Process Control
- Meet WWTP Influent Specifications

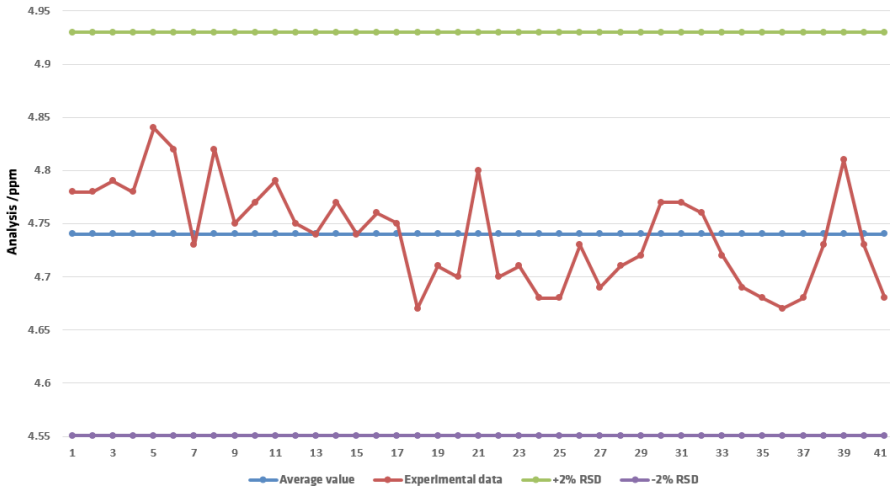
Hydrogen Sulfide
- Ensure Effective Process Control
- Meet WWTP Influent Specifications

Phenol
- Indicator of Corrosive Heat Stable Salts
- Meet WWTP Influent Specifications

Hydrogen Cyanide
- Prevent Corrosive Thiocyanate Formation
- Meet WWTP Influent Specifications

Caustic
- Prevent Excess Caustic H_2S Issues
- More Effective Buffer Control Than pH

Performance Guaranteed



H_2S Analysis With ± 2% f.s. Repeatability by Argentometric Titration (UOP 163)

Online Benefits
- Identify & Avoid Expensive Process Upsets
- Fewer Personnel for Grab Sample Testing
- Minimize Human Error (Sampling / Testing)
- Better Caustic Injection & Steam Usage Control
- Optimize Environmental Compliance

AccuSeries-LPA Advantage
- Certified ATEX / IECEx Zone 2 *Without* a Purge
- Compatible Components Minimize Maintenance
- g/l Calibration Ranges for Thorough Reporting
- ppb Resolution for Accurate Process Control
- Multi-Parameter & Multi-Stream for Fast ROI



AccuSeries-LPA Wet-Chemistry Online Analyzer

Galvanic Difference
- 35+ Years of Experience in Difficult Applications
- Global Sales, Consumables, & Service Support
- Custom Engineering to Customer Requirements
- Methods of Analysis to Match Laboratory SOP
- One-Stop-Shop for Gas & Liquid Online Analyzers

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