Clean-in-Place Analysis Applications [OMA-300-CIP]

Applied Analytics Application Note No. DS-001F — Revised 24 June 2013

Application Summary

Analyte: Trace impurities in a cleaning solvent (e.g. water, methanol)

Detector: OMA-300 Process Analyzer (using UV-Vis / SW-NIR dispersive absorbance spectrophotometer)

Process Stream: Cleaning solvent

Introduction

Clean-in-Place (CIP) is a method commonly used to clean the interior surfaces of production equipment. In the process, cleaning solvents such as methanol or water are circulated to sanitize walls, pipes, tanks, etc. To satisfy regulations, the wash must effectively remove all active ingredients from previous production run.

CIP is a stage of significant downtime; production will be stalled until the process is complete. Plants that still use a set duration or depend solely on swab tests are suffering unnecessary downtime and costs. Allowing CIP to run longer than it needs to is an oversight that wastes production time and CIP solvents.

Using an OMA system, the wash cycle is validated in real time. An active ingredient (the substance which is being eradicated) will typically show distinct absorbance curves in the UV-Vis or SW-NIR ranges; the OMA monitors this absorbance to measure the current concentration of active ingredient X in the effluent celaning solvent (rinse water). When the threshold concentration is reached in the continuously drawn rinse water sample, the OMA immediately notifies the user or external system. This functionality reduces unneeded CIP downtime and removes dependency on labor-intensive swab tests.

OMA Benefits

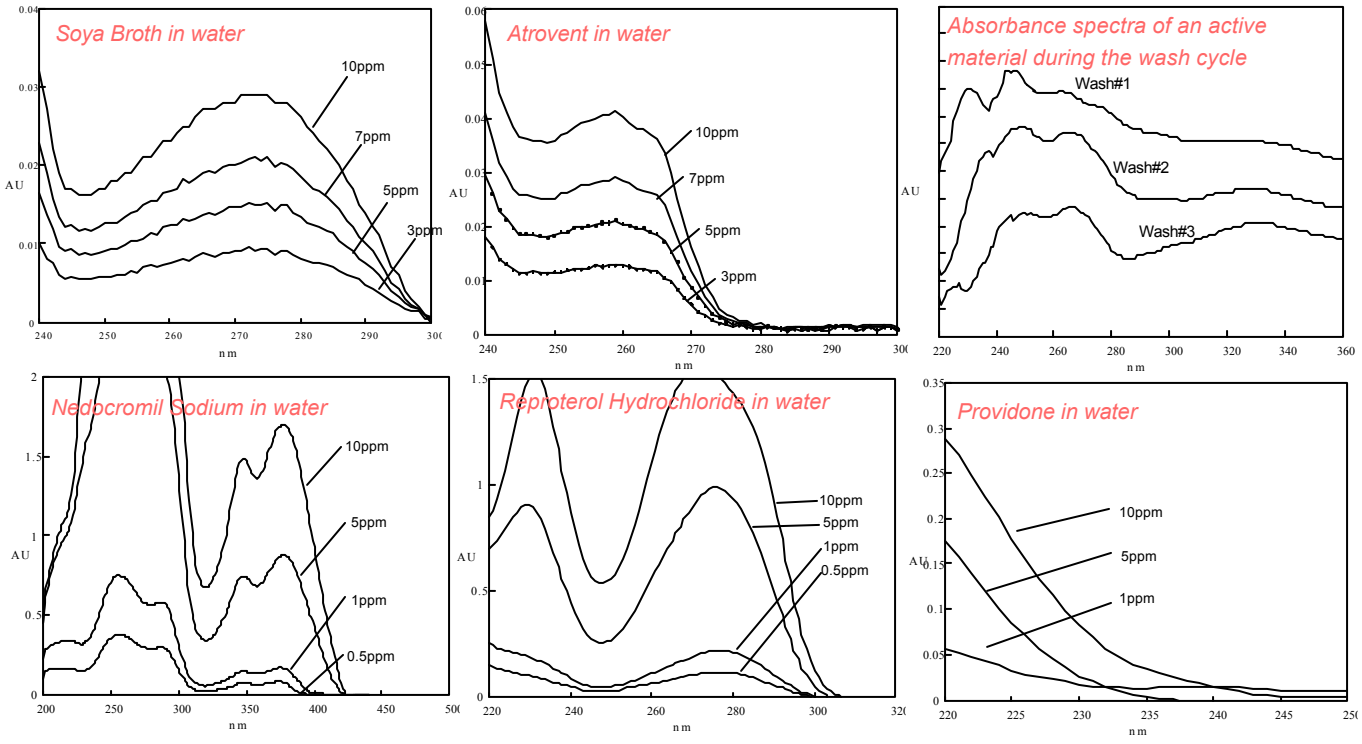
- Automates real-time validation of Clean-in-Place wash process
- Faster response than alternative technologies (e.g. ion mobility)
- Rugged, solid state build with no moving parts — modern design for low maintenance
- Long-lifespan xenon light source (avg. 5 years)
- Specialized sanitary flange sample flow cell
- Optional remote access

Sanitary Flange Flow Cell

The OMA for Clean-in-Place analysis uses a special low cell design with sanitary quick-clamp flanges. The flow cell is constructed from 316L stainless steel with a path length dependent upon the measurement application.

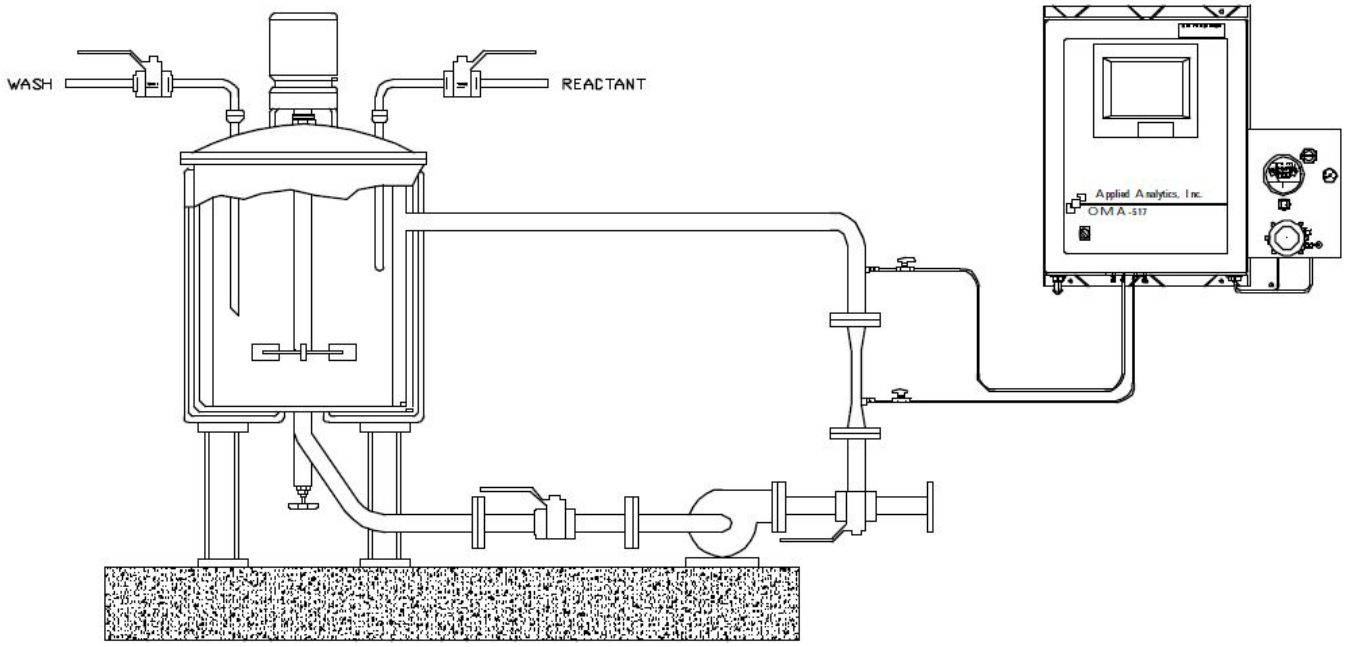
Absorbance Curves of Example Active Ingredients

These spectra visualize how the OMA correlates the concentration of a unique active ingredient to the level of its absorbance curve in the sample.



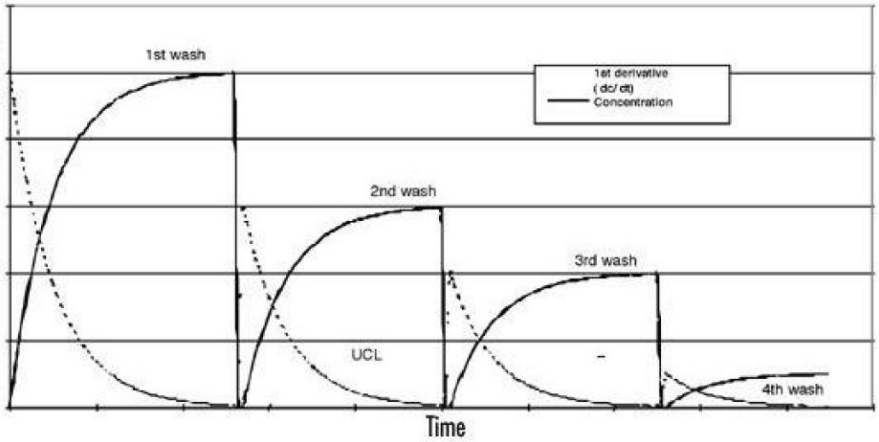
Clean-in-Place Application Schematic

Some of the recycled solvent is diverted to a small bypass flowing through the sanitary flange flow cell. After reaching a steady state concentration in the flow cell, a new batch of cleaning solvent is loaded and the process is repeated until the impurity concentration reaches the next preset threshold value.



Clean-in-Place Timing Diagram

The concentration of the active ingredient in the solvent increases until it reaches a plateau, signaling the end of the wash. The 1st derivative of the concentration with time (dc/dt) approaches zero when the process reaches steady state.



Further Reading

Subject	Location
OMA-300 Process Analyzer Data sheet	http://www.a-a-inc.com/documents/AA_DS001A_OMA300.pdf
Advantage of Collateral Data Technical Note	http://www.a-a-inc.com/documents/AA_TN-202_CollateralData.pdf

Headquarters + Manufacturing
Applied Analytics, Inc.
Burlington, MA | sales@a-a-inc.com

North America Sales
Applied Analytics North America, Ltd.
Houston, TX | sales@appliedanalytics.us

Europe Sales
Applied Analytics Europe, SpA
Milan, Italy | sales@appliedanalytics.eu

Asia Pacific Sales
Applied Analytics Asia Pte. Ltd.
Singapore | sales@appliedanalytics.com.sg

Middle East Sales
Applied Analytics Middle East (FZE)
Sharjah, UAE | sales@appliedanalytics.ae

Brazil Sales
Applied Analytics do Brasil
Rio de Janeiro, Brazil | sales@aadbl.com.br

India Sales
Applied Analytics (India) Pte. Ltd.
Mumbai, India | sales@appliedanalytics.in