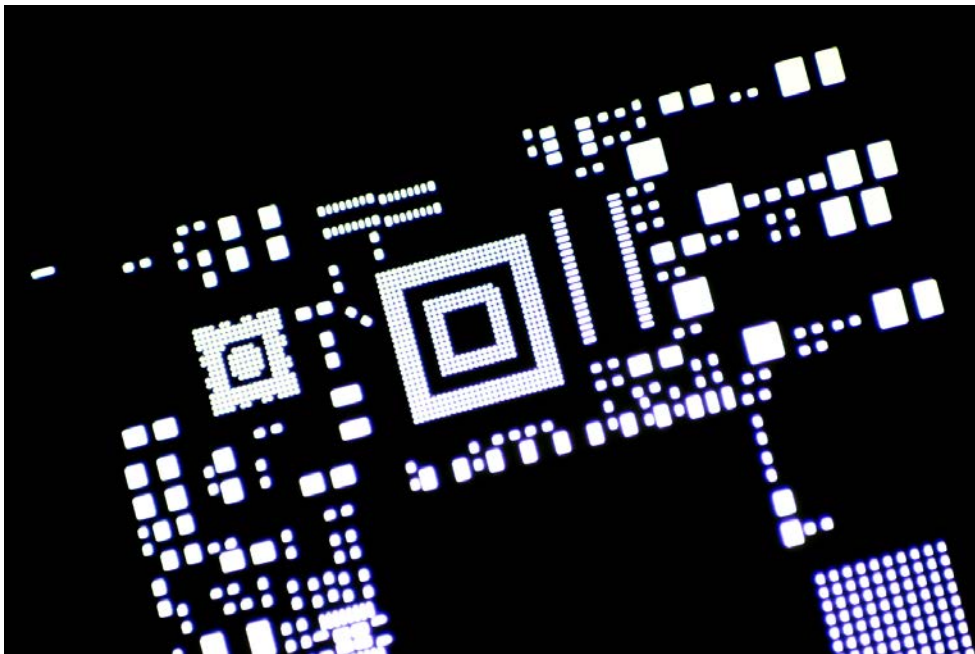


# AQUANOX<sup>®</sup> A8820

*Advanced Aqueous Stencil Cleaner*

AQUANOX A8820 is an engineered Micro Cell Technology (MCT™) cleaning fluid designed to remove wet solder paste and uncured adhesive from stencils used with the surface mount printing process.



*The information contained herein is based on available data from reliable sources and is accurate to the best of KYZEN Corporation's knowledge at the time of this publication. KYZEN makes no warranty, expressed or implied, of merchantability or fitness for a particular purpose, course of performance or usage of trade. The user is solely responsible for determining the suitability and completeness of such information for their particular application and for adopting appropriate safety precautions. Physical properties listed within are typical values based on samples tested and should not be construed as guaranteed analysis of any specific lot or as specifications for the product. Other factors may involve additional safety or performance considerations- refer to the KYZEN product Safety Data Sheet (SDS) for complete safety information. This data is not to be taken as a warranty or representation for which KYZEN assumes legal or financial responsibility.*

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## PRODUCT DESCRIPTION

Key factors to an effective stencil printing process include the feature sizes being printed, stencil design, solder paste, squeegee, vision system and printing machine. To achieve high yields, assemblers must factor in solder paste particle size, rheology, viscosity, release and cleanliness of apertures.

Greater than 50% of all defects come from stencil printing problems, most notably cleanliness of apertures from print to print. Solder paste has a tendency to stick to the bottom of the stencil due to stringing, bad gasketing, surface energy and pump out. To improve paste release, stencil coatings are applied to the stencil to decrease solder-stencil interaction and to increase wall smoothness, which decreases the amount of paste left in apertures.

Cleaning frequency directly correlates to board density, aperture size, solder paste properties and stencil design. Cleaning agents must be suitable for dissolving the flux without impacting stencil coatings, equipment materials of construction and/or stencil materials of construction.

AQUANOX A8820 rapidly dissolves solder paste fluxes while maintaining suitable material compatibility with stencil coatings, stencil materials of construction and cleaning machines. It is most commonly used to clean the stencil once removed from the stencil printer. A8820 effectively removes most uncured SMT adhesives and is non-flammable, low in odor and fast drying.

For optimal performance, AQUANOX A8820 should be run at 25% concentration with water at ambient temperatures. At this concentration, the Micro Cell Technology (MCT™) built into A8820 wets and rapidly dissolves the flux that holds the solder spheres into a paste. Upon dissolution of the flux, solder balls release from the apertures and drop to the bottom of the cleaning tank. In well-designed stencil cleaning equipment, the solder balls are caught in recirculation filters, greatly extending bath life.

AQUANOX A8820 is RoHS compliant and meets all REACH requirements to date. A8820 ships as a concentrated liquid product and is non-hazardous. Please reference the AQUANOX A8820 Material Safety Data Sheet for other safety and/or performance considerations.

## CHEMICAL AND PHYSICAL PROPERTIES

This KYZEN product is environmentally responsible and operator safe, when handled in accordance with good industrial hygiene and safety practices. *Table 1* summarizes important chemical and physical properties of this product.

Parameter	100% Concentrate	5% Dilution	25% Dilution	Special Values
Clarity	Clear			
Color	Colorless	Hazy. Will separate when stationary		
Odor	Mild			
Flash Point, °F/°C (TCC)	>200°F / >93°C			
Boiling Point, °F/C	291°F / 144.4°C			
Volatile Organic Compound (VOC) gm/L EPA Method 24	885 g/L			
Vapor Pressure, VOC Components, mmHg at 20°C	Not Applicable			
Chemical Oxygen Demand, (COD), mg/L (ppm)				214 mg/L <sup>1</sup>
pH	Not Applicable			
Specific Gravity	0.920 – 0.940			
Weight/gallon	7.8 lb			
Refractive Index, ° BRIX	45 - 55 °Brix			
MEQ to pH 8.3	Not Applicable			
MEQ to pH 4.0	Not Applicable			
Alkalinity Ratio	Not Applicable			
Non-volatile Residue (NVR) %	0.001%	0.00%		

<sup>1</sup> Value measured at 0.01% Dilution.

## PRODUCT USE DIRECTIONS

In general, wash concentration, wash temperature, equipment energy, wash time and rinsing are key elements of process optimization. Kyzen recommends the following process parameters for applications using this product:

- **Wash Concentration:** The optimal product concentration for cleaning wet solder paste and uncured SMT adhesives from stencil apertures is 25%.
  
- **Wash Temperature:** AQUANOX A8820 is designed to run at ambient temperatures of ~ 20°C
  
- **Equipment Energy**
  - **Spray in Air:** Aqueous spray-in-air cleaning equipment sprays AQUANOX A8820 cleaning fluid onto the stencil using automated arms.
  
  - **Ultrasonic:** With aqueous ultrasonic cleaning equipment, effective mixing is needed for the proper use of AQUANOX A8820. During the cleaning process, ultrasonic energy is used to release the solder balls from the apertures and dissolve the flux in the AQUANOX A8820 cleaning fluid.
  
- **Wash Time:** A typical wash cycle is 2-4 minutes.
  
- **Rinsing:** The stencil may be rinsed with water OR filtered AQUANOX A8820 cleaning fluid, noting that *effective filtration greatly increases bath life.*

## COMPATIBILITY INFORMATION- SUBSTRATES AND EQUIPMENT

All chemicals have the potential to adversely affect substrates and process equipment. As such, the effects of short-term exposure for substrates common to parts and assemblies and the effects of long-term exposure for materials of equipment construction must be considered. *Tables 2, 3 and 4* summarize known compatibility recommendations regarding the use of this product with specific substrates.

TABLE LEGEND		
<b>R-</b> Recommended	<b>NR-</b> Not Recommended	<b>T-</b> Test Before Use

Table 2: Plastics and Elastomers		
Brand Name	Generic Description	A8820
Delrin	Acetal	R
Acrylic	Acrylic	NR
Nylon	Synthetic Fiber	R
Lexan	Polycarbonate resin	T
Polystyrene	Polystyrene	R
Polyurethane	Polyester/Polyether	R
PVC	Polyvinyl Co-polymer	R
Black Rubber	Black rubber	R
Pure Gum Rubber	Gum rubber	R
Neoprene	Polychloroprene	R
Phenolics	Phenol	R
Teflon	Polytetrafluoroethylene	R
Kalrez	Perfluoro-Elastomer	R
Kynar	Polyvinyl fluoride	R
Aflas	Tetrafluoroethylene and Propylene	T
Tefzel	Ethylene/tetrafluoroethylene copolymer	R
Polypropylene	Polypropylene	R
Acculam	Epoxy glass	R
XLPE	Cross-linked polyethylene	R
Alathon	High density polyethylene	R
Viton A or B	Fluoroelastomer	NR
Low density polyethylene	Polyethylene	R
Ultem	Polyether imide	R
Silicone Rubber	Silicone Rubber	R
CPVC	Chlorinated Polyvinyl Chloride	R
Buna-S	Styrene Butadiene	NR
Buna-N	Styrene Nitrile Copolymer	NR
Ceramics	Composites	R
Glass	Glass	R

# COMPATIBILITY INFORMATION- SUBSTRATES AND EQUIPMENT

**Table 3: Metals and Alloys**

Substrate	A8820
2024 Aluminum- Bare	R
2024 Aluminum- Alclad	R
2024 Aluminum- Anodized	R
Black Anodized Aluminum	R
3003, 6061, 7075 Aluminum	R
7075 Aluminum- Alclad	R
Silver	R
Gold	R
Copper	T
1018 Steel	R
304 and 316 Stainless Steel	R
Titanium	R
Steel, Galvanized	R
Tin-Lead Based Alloys	R
Tin-Copper Based Alloys	T
Tin-Silver-Copper Based Alloys	R
Bismuth-Tin Based Alloys	R

*Metals, elastomers and plastics can vary greatly in quality. These compatibility recommendations are based on testing of commonly available materials. If your process uses materials that are of lesser quality than those tested by KYZEN, differences in compatibility may be noticed.*

**Table 4: Equipment**

**When considering long-term exposure for materials of equipment construction, the following materials are generally compatible with chemistries used for inline and batch cleaning systems:  
(listed in order of resilience)**

Type	Compatibility
EXHAUST	<i>Stainless Steel, Polypropylene, PVC or Galvanized Steel</i>
PUMP SEALS, O-RINGS, GASKETS	<i>Teflon , Teflon encapsulated or EPDM (EPR) Note: Viton is not recommended.</i>
PLUMBING LINES	<i>Stainless steel or Polypropylene</i>
CURTAINS	<i>Polypropylene or Reinforced Silicone (red)</i>
WINDOW / DOOR SEALS	<i>EPDM or Silicone (red)</i>
RTV	<i>Dow Corning 732 or similar high grade</i>

## BATH MAINTENANCE AND MONITORING

When a KYZEN bath solution is properly maintained, prolonged bath life can be expected. The results of a bath life study conducted with this product confirm the extended bath life experienced by many KYZEN users. Expended process baths can be a significant and expensive waste stream for facilities. Numerous factors can degrade bath performance, including depletion or imbalance of bath chemistries and buildup of contaminants from drag-in or other sources. Process bath life can be extended through simple process control and contaminant reduction techniques, resulting in significant waste reductions and cost savings.

**KYZEN recommends KYZEN TYPE IIA METHOD to monitor bath concentration.**

**KYZEN recommends NON-VOLATILE RESIDUE to monitor bath life.**

### NOTES AND COMMENTS

- Recommended procedures for bath life maintenance and monitoring are appended to this supplement.
- **SPER® Scientific** and **Atago® Pocket Pal-1** refractometers, including full procedures for using these refractometers, are available for purchase through your KYZEN Representative.
- Flux and solder pastes can contribute to Refractive Index readings. Many years of field experience have validated the effectiveness of refractive index to control most KYZEN products. The wide operating window provided by KYZEN technology tends to minimize the induced error that soils create over time. As soil load increases, refractive index charts should be adjusted to reflect the predictable soil levels in your cleaning process.
- KYZEN's **Bath Profile Kit** can help determine if an adjustment is needed by analyzing wash bath samples collected over the life of a SUMP charge. Please contact your KYZEN Representative for more information.
- KYZEN's Bath Profile Kit / PN# F00206 can help determine NVR and physical properties trends by analyzing six(6) wash bath samples collected over a determined time frame.
- A Single Sample Wash Bath Analysis / PN# F00212 is also available to test physical properties and NVR.
- There are two NVR methods available; The legacy, oven dry testing method as shown in the Application Note on Page 14 or the newest test method that uses the Mettler-Toledo HE53 Analyzer described on Page 15.
- Contact KYZEN Technical Support if you have any questions on wash bath monitoring or bath life testing.
- The Mettler-Toledo HE53 Moisture Balance Analyzer and its supporting items can be purchased direct from Mettler-Toledo or an authorized distributor.



## **SHELF-LIFE**

Retain samples are taken from every product batch and kept for a minimum of five years. Additionally, randomly selected retain samples of key products are maintained indefinitely. KYZEN determined the shelf life of our aqueous and non-aqueous products by closely monitoring the quality of product samples stored in these retain samples over time. The results of this study provided valuable information on the stability of our products over time.

**With few exceptions\*, KYZEN products are acceptable for use up to FIVE (5) years, when packaged in sealed containers of five gallons or greater.**

Conversely, it is more difficult to predict the long-term integrity of a product in containers holding less than five gallons, as well as unsealed containers of any size. Smaller product containers and unsealed containers are more susceptible to contamination and evaporation, which preclude extended expiration dates. Capping opened containers when not in use can minimize contamination and evaporation. Exceptions to shelf-life are clearly documented on product-specific Certificates of Compliance.

## **PRODUCT COLOR**

For all KYZEN products, *color does not indicate product quality*; therefore, color is not used as a quality control parameter or specification for final product evaluation. KYZEN products are made from a blend of raw materials, some of which are organic solvents derived from agricultural materials. After 30 years of collecting data on KYZEN products containing these raw materials, studies have shown that these materials can contribute to color variances in concentrated and diluted product, as well as slight color variations over time. These same studies confirm that while *color changes may occur, product quality is unaffected*. To assure product quality, KYZEN evaluates each lot of these raw materials to verify integrity before blending.

## **STORAGE**

Store this product in the original container at temperatures between 5-50°C / 41-122°F indoors, or out of direct sunlight. Most products have a freezing point much lower than water and a very high boiling point; therefore, most KYZEN products do not require any special handling to address temperature changes. KYZEN conducts freeze/thaw studies on all products to determine if product quality is affected by such factors and completes further testing if necessary. Following best practices always use the oldest inventory first and keep your stock rotating. *Exceptions to storage temperature requirements are clearly documented on product-specific Certificates of Compliance.*

## **HANDLING**

This product is environmentally responsible and operator safe, when handled in accordance with good industrial hygiene and safety practices. Refer to the Safety Data Sheet (SDS) regarding safe handling practices with this product. It is always a good practice to wear safety glasses or goggles whenever handling industrial chemicals.

## ENVIRONMENTAL CONSIDERATIONS

KYZEN products are generally compatible with common primary and secondary waste treatment processes; however, the addition of soils removed during the cleaning process can significantly escalate environmental concerns. These environmental considerations vary widely depending on the cleaning machine and the operating parameters of your particular cleaning process. As such, the selection of the cleaning agent must incorporate the inherent impact on air emissions, water discharges and waste generation from your facility. Each of these three environmental mediums may require a permit depending on the usage rate and existence of other air emissions, water discharges and waste generation at your facility.

### ***What are KYZEN's responsibilities for proper disposal?***

- The *United States OSHA Hazard Communication Standard* requires suppliers to provide a GHS compliant Safety Data Sheet (SDS) for all products.
- KYZEN is responsible for providing known information on toxicity testing, health hazards, waste disposal, safe work practices, protective equipment, material reactivity and flammability, etc.
- Note: All information needed to properly classify a product for disposal, wastewater treatment or discharge into a wastewater stream can be found in the product SDS, specifically in Sections Three (3), Nine (9), Twelve (12) and Thirteen (13). Therefore, KYZEN does not disclose proprietary, non-hazardous product constituents for this purpose.

### ***What are the end user's responsibilities for proper disposal?***

- It is the user's responsibility to seek guidance and rule interpretation from appropriate authorities before applying for any required permits. This is usually accomplished by providing a copy of the product SDS, supplied by KYZEN, to local authorities. Because local regulations are often more stringent than federal regulations, it is imperative for the user to consult with local regulatory agencies before starting a waste water discharge, or introducing new chemicals or chemical processes to an existing permitted waste water discharge stream.
- The three regulatory agencies that a user must review are federal (national), state (regional), and local. Each company must meet the minimum federal standards. The state regulations may be the same or even more restrictive than the federal. Finally, the local community's regulations will be at least as restrictive as state regulations.
- The discharge of any wastewater stream, both by total flow and by chemical make-up must conform to national, regional and local regulations in all nations. Such regulations vary from very strict limits with little derogation to relatively flexible conditions. Many nations, particularly in Europe, have very strict legal requirements dictated on a national scale, covering many aspects of waste water quality. Other nations have less comprehensive regulations, covering only the more important considerations. Local authorities may offer derogations to national legislation if the local treatment plant is able to handle the otherwise out-of-tolerance waste.

***The end user is ultimately responsible for compliance with all applicable regulations.***

*KYZEN is the industry leading provider of environmentally friendly cleaning chemistries and processes and contributes this knowledge and experience to a number of industry publications. For more detailed information on environmental considerations, please reference Section Nine (9) of the IPC-CH-65B Guidelines for Cleaning of Printed Boards and Assemblies, July 2011.*

**Your KYZEN Representative is available to assist you  
throughout your cleaning process.**

**KYZEN Technical Support**

**1-800-845-5524**

**[www.KYZEN.com](http://www.KYZEN.com)**

*Materials furnished under all KYZEN orders are manufactured in accordance with KYZEN Corporation specifications. KYZEN maintains documentation of conformance to these specifications, which is available for review upon request. All raw materials used in KYZEN products are obtained from suppliers on KYZEN's Approved Vendor List (AVL), pursuant to ISO certified standard operating procedures for raw material quality control.*

**KYZEN TYPE IIA TEST KIT PROCEDURE**  
AQUANOX® A8820 | AQUANOX® A8820D

USE PERSONAL PROTECTION EQUIPMENT | WASH SOLUTION IS HOT | TYPE II REAGENT POWDER MAY IRRITATE SKIN, EYES AND/OR NOSE

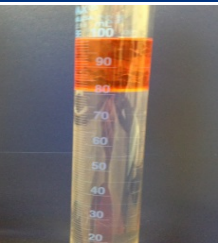


**STEP 1:** Add TWO (2) scoops of **KYZEN Type II Reagent** to a clean, dry KYZEN Graduated Cylinder.\* Allow wash pump/process mixer to run for FIVE (5) minutes for routine measurement. A new bath may need to run for up to SIXTY (60) minutes.

*\*A standard 100mL graduated cylinder may be used in place of the KYZEN Graduated Cylinder.*

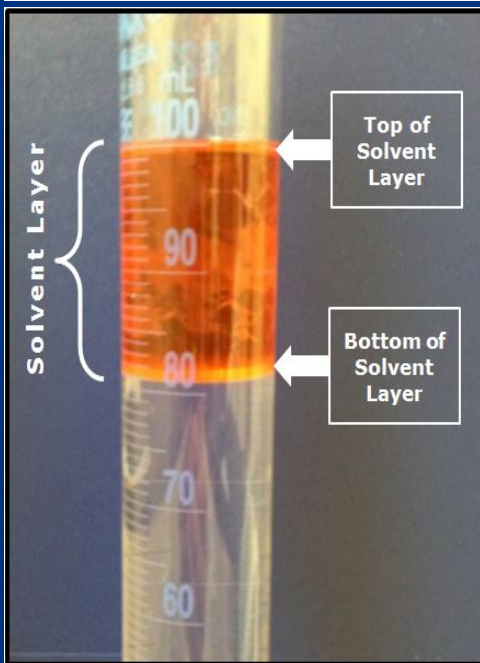


**STEP 2:** From the sample port, pull a 500mL sample to purge the sample line. Repeat if necessary to completely purge the sample line. Immediately fill the graduated cylinder with the bath solution directly from the sample port. *Do not fill the graduated cylinder above the highest gradation.* Cork the flask with an appropriately sized stopper. Holding the stopper in place, rotate the graduated cylinder 3 to 4 times to dissolve the reagent powder.



**STEP 3:** Immediately remove stopper. Wait FIVE (5) minutes for the sample to separate (split) in the graduated cylinder. Sample is complete when large bubbles completely rise to the surface.

- *Some small bubbles may cling to the glass or the solution may have a pink tint.*
- *Total volume may decrease as the solution cools in the cylinder, but will not affect split calculation.*



**STEP 4:** View the graduated cylinder at eye-level and note the **top meniscus** of the solvent layer in milliliters (mL) and the **bottom meniscus** of the solvent layer in mL. To determine the bath concentration, use these measurements in the following equation:

$$\text{Split Factor} = \frac{\text{Top Meniscus (mL)} - \text{Bottom Meniscus (mL)}}{\text{Top Meniscus (mL)}} \times 100$$

**EXAMPLE CALCULATION**

Top of Solvent Layer Measured: **99mL**

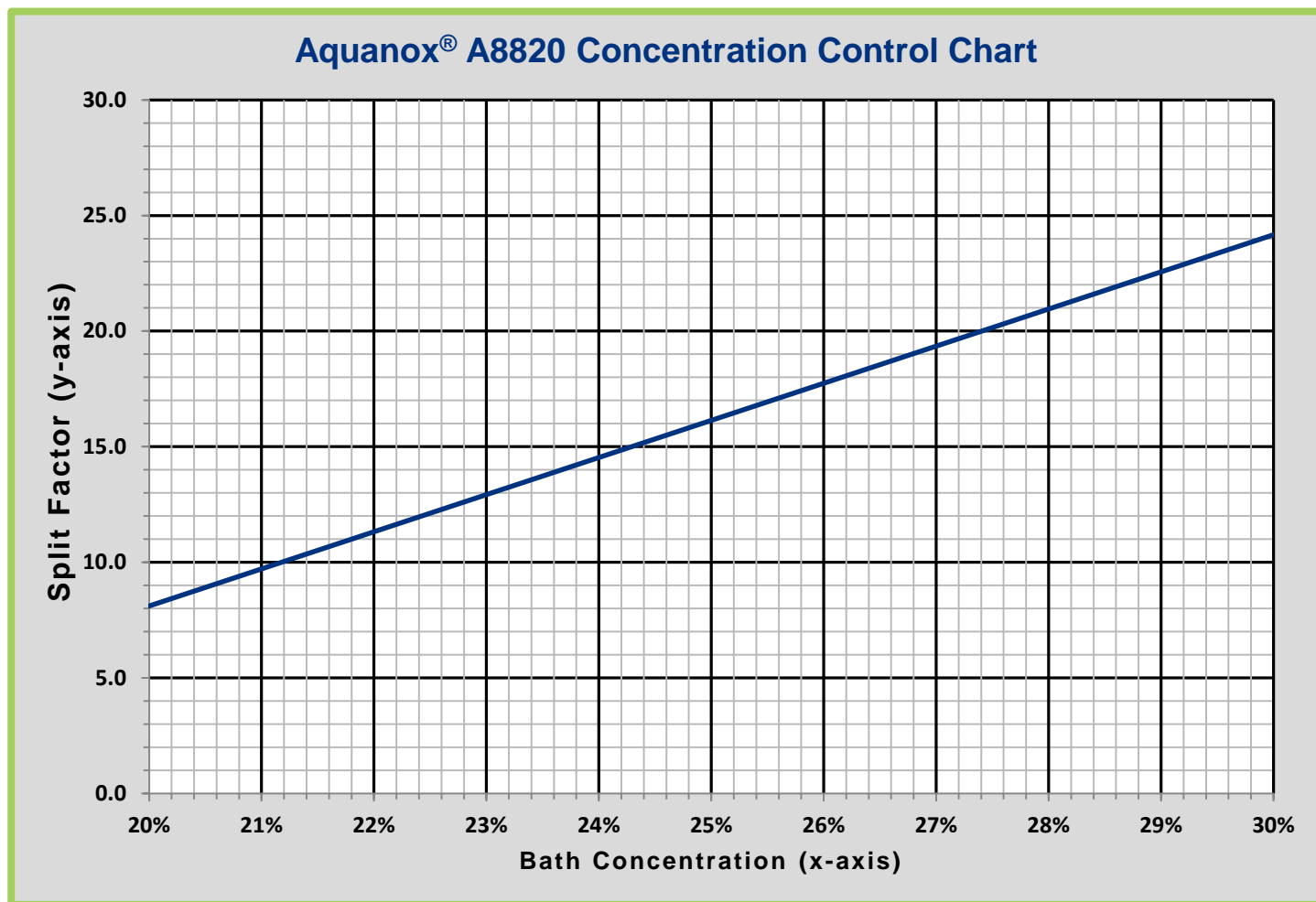
Bottom of Solvent Layer Measured: **81mL**

$$\text{Split Factor} = \frac{\text{Top Meniscus (99mL)} - \text{Bottom Meniscus (81mL)}}{\text{Top Meniscus (99mL)}} \times 100$$

**SPLIT FACTOR = 18 = 26.2%** Bath Concentration **CONVERSION CHART ON REVERSE SIDE**

### Aquanox® A8820 Concentration Conversion Chart

Find the calculated split volume on the y-axis and follow the chart to the right until you reach the blue trendline. The corresponding bath concentration is found on the x-axis, directly perpendicular to this intersection on the chart.



### ADDITIONAL INFORMATION

- Reference the Kyzen Type II Reagent MSDS for complete safety and performance considerations.
- A well-mixed bath solution is required for accurate measurement.
- If sample port is not available, pull solution from spray nozzles. Contact your Kyzen Representative to purchase a Sample Port Kit.
- Failure to clean and dry the graduated cylinder before use may decrease the accuracy of results.
- Using extra powder will not cause the solution to split more quickly and using excessive amounts of powder may cause inaccurate measurements.
- Do not shake the graduated cylinder after separation has occurred. This will cause a long delay for the solution to split again.
- The initial calibration of the Kyzen Graduated Cylinder is certified by the flask manufacturer and does NOT require further calibration.

W-824022 | REV A | A8820 Type IIA Procedures

## Non-Volatile Residue (NVR) Procedure

KYZEN recommends Non-Volatile Residue (NVR) testing for soil contaminant as a tool for bath life monitoring of certain KYZEN products. A sample of a used wash bath is placed into an aluminum weighing dish and dried at 105°C / 221°F for a minimum of four hours. The residue that remains in the dish is allowed to cool in a desiccator and is re-weighed. The weight of the bath residue is then compared to the residue of a virgin sample of the cleaning product at the same concentration and dried in the same manner.

### APPARATUS

Forced Air Oven set at 105°C / 221°F  
Aluminum weighing dish  
(See Tip Number 1 'Tips for Successful Use' at the end of the procedure)  
Analytical Balance  
Desiccator

### REAGENTS AND MATERIALS

Transfer pipettes  
Virgin sample of the product to be tested

### HAZARDS AND PRECAUTIONS

For specific safety information, reference the Material Safety Data Sheet for the product you are testing.

### STATISTICAL CONTROL

Samples should be analyzed in triplicate. The average of the three analyses is reported.

### CALCULATIONS

$$\%NVR = [(c-a)/b] \times 100$$

a = Initial weight of the aluminum dish, b = Initial weight of the sample, c = Weight of weighing dish and residue after heating

$$\% NVR \text{ resulting from soil contamination} = \%NVR \text{ of sample} - \% NVR \text{ of virgin sample}$$

### PREPARATION

- A. Set the forced air oven to 105°C / 221°F for a minimum of two hours to allow the temperature to stabilize.
- B. Place the aluminum weighing dishes to be used into the forced air oven at 105°C / 221°F for a minimum of one hour to dry.
- C. Place the dried weighing dishes into a desiccator and allow to cool.

### PROCEDURE

- A. Place a cool weighing dish on the analytical balance. Record the weight (*this is weight 'a'*).
- B. Tare the balance and add approximately 10 grams of sample to the weighing dish<sup>2</sup>. Record the weight of the sample to the nearest 0.0001g (*weight 'b'*).
- C. Place the dish in the oven at 105°C / 221°F for a minimum of four hours<sup>3</sup>. Remove the dish to a desiccator and allow to cool.
- D. Weigh the cooled dish on the analytical balance and record the weight to the nearest 0.0001g (*weight 'c'*).
- E. Repeat Procedure steps A through D a total of three times for both the sample and the virgin product.

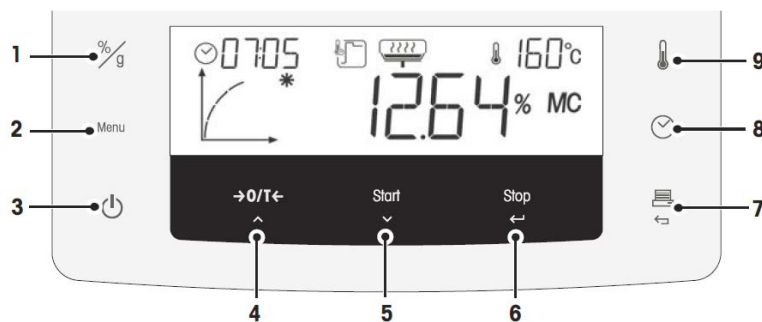
### TIPS FOR SUCCESSFUL USE

1. A beaker or ceramic dish can be used in place of the aluminum pan; however, these must be compatible with the cleaning product and able to withstand the required oven temperatures.
2. The amount of sample used for testing is not critical, but must be weighed accurately.
3. A dirtier bath will require longer than 4 hours to completely dry. To ensure that your sample is completely dry, return the sample to the oven for 30 minutes after taking the first weight. Cool in the desiccator and reweigh. Continue this until there is less than 5% change in the weight.

## NVR Measurement by HE53 Moisture Analyzer Method KYZEN® AQUEOUS PRODUCTS

**This Application Note provides instructions on how to use the Mettler Toledo HE53 Moisture Analyzer to measure the Non-Volatile Residue (NVR) of KYZEN® Aqueous Products.**

1. Follow instructions in Section 4 of the *HE53 Operating Instructions* to appropriately setup the moisture analyzer and prepare for measurement.
2. Program the moisture analyzer to the settings below to begin the measurement procedure.



- a. Press Menu [2]. Use the Up [4] and Down [5] arrows to select **PROG** and press Stop [6]. Again, using either of the arrows, select **RAPID** and press Stop [6]. This selects the RAPID DRYING MODE.
  - b. Press Thermometer [9]. Adjust temperature, using arrows, to **120°C** and press Stop [6].
  - c. Press Clock [8]. Use arrows to select **TIMED** and press Stop [6]. Use arrows to adjust to **1 hour** then press Stop [6].
  - d. Press %/g [1]. Use arrows to select **%DC** and press Stop [6]. The results will be displayed in % DRY CONTENT.
3. Place the empty sample pan in the sample pan handler and place the sample pan handler in the draft shield. Ensure that the tongue of the sample pan handler lies in the slot of the draft shield.
  4. Place the provided Glass Fiber Pad in the sample pan. *Note: the pads are designed for single use and a new pad should be used for each test in ensure accuracy of the test.*
  5. Close the heating module and press O/T [4] to tare.
  6. Open the heating module cover and add approximately 2 grams of sample directly to the Glass Fiber Pad in the sample pan.
  7. Close the heating module and press Start [5]. **The %NVR results will display on the screen when finished.**

*Condensation may collect and pool in the chamber- this is normal. Follow instructions in Section 9.1 of the HE53 Operating Instructions to clean and thoroughly dry equipment between each use.*