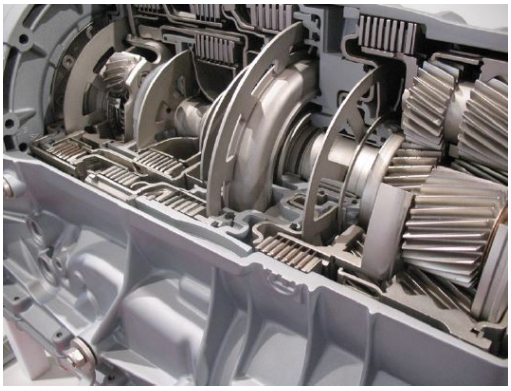
KYZEN
Where Science and Care Converge.

TECHNICAL SUPPLEMENT

METALNOX® M6314

Mild Alkaline All-Metal Cleaner

METALNOX® M6314 is a safe, all-purpose aqueous cleaner, specifically designed to clean a broad range of both water soluble and insoluble oils. It is a very low solids product and is often used without a rinse, even prior to coating.



- **Multi-Metal Safe; Frequently Used for Brass and Aluminum**
- **Low Foam, Low VOC Cleaner**
- **Rinses Completely Leaving a Clean Bright Surface**
- **Contains Corrosion Inhibitors for Steel to Prevent Flash Corrosion**
- **Personnel & Environmentally Friendly**

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PRODUCT DESCRIPTION

METALNOX M6314 is a liquid cleaning concentrate for removing oil, grease, emulsions and lubricants commonly used in metal industries. As an effective final cleaner, M6314 is suitable for use on ferrous metals, non-ferrous metals, stainless steel, chrome steel, aluminum, hard metals and HSS-parts.

For pre-cleaning, METALNOX M6314 efficiently removes various cutting and protecting oils and protects ferrous and non-ferrous metals with a minimal corrosion protective layer which prevents corrosion of metal surfaces during any follow up machining process prior to final cleaning.

METALNOX M6314 can be used for the pre-cleaning of metals prior to coating when used in a combined cleaning coating system to prepare the surface for a long-term seal coat application prior to powder coating.

METALNOX M6314 is suitable for all spray cleaning and ultrasonic systems. The low foaming qualities of M6314 make it ideal for use in monorail type spray wash systems and high pressure manual wash cleaning bays. M6314 is used at temperatures ranging from 125 °F / 51°C to 180°F / 82°C. In high pressure spray applications, M6314 is completely non-foaming above 135°F / 51°C.

The corrosion inhibitors engineered in METALNOX M6314 bond at the molecular level, leaving no visible film, and will typically survive clean water rinsing of up to four minutes exposure, without degrading corrosion protection. If additional protection is needed, M6314 can be added at 2 - 4% in the rinse water. For long term corrosion protection (conservation), KYZEN offers a selection of wet and dry film products. Consult your KYZEN representative for more information.

METALNOX M6314 is also a safe cleaning solution for cleaning machined plastic parts, optical devices, glass, plastic dunnage and trays.

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.

Table 1: Typical Chemical and Physical Properties

Parameter	100% Concentrate	5% Dilution	25% Dilution	Special Values
Clarity	Clear			
Color	Straw			
Odor	Faint			
Flash Point, °C (TCC)	None to boiling			
Boiling Point, °F/C	>200°F / >93°C			
Volatile Organic Compound (VOC) gm/L EPA Method 24	28 g/L			
Chemical Oxygen Demand, (COD), mg/L (ppm)				12.1 [1]
pH	>12	11.0 – 12.5		10.7 [2]
Specific Gravity	1.00 – 1.08			
Weight/gallon	8.6 lbs			
MEQ to pH 8.3	0.10 – 0.60			
MEQ to pH 4.0	0.35 – 0.75			
Alkalinity Ratio	1 : 1.6			
Non-volatile Residue (NVR) %	9.9%	0.50%	2.48%	

[1] Value measured at 0.01% Dilution.
[2] Measured at 10 g/L dilution.

PRODUCT USE DIRECTIONS

METALNOX M6314 is designed for use in both spray and immersion washers. In general, cleaning tool, wash concentration, wash temperature, wash exposure time and rinse exposure time are five key elements of process optimization. KYZEN recommends the process parameters below for the majority of applications using M6314. More difficult cleaning applications should be tested at KYZEN's Applications Lab to identify optimum process parameters.

1. **Cleaning Tool:**
   - Spray in air cabinet, rotary drum, monorail and conveyer tunnel washers.
   - Ultrasonic
   - Immersion/vertical agitation and rotary basket parts washers.
2. **Wash Concentration:**

• Spray in air:	3 – 10%
• Ultrasonic:	7 – 12%
• Immersion:	7 – 12%

3. **Wash Temperature:**

• Spray in air:	130 - 165°F (54°C - 71°C)
• Ultrasonic:	130 - 165°F (54°C - 71°C)
• Immersion:	130 - 165°F (54°C - 71°C)

4. **Wash Exposure Time**

• Spray in air:	30 - 90 seconds
• Ultrasonic:	1.5 - 5 minutes
• Immersion:	1.5 - 5 minutes

5. **Rinse Exposure Time**

• Spray in air:	30 - 90 seconds
• Ultrasonic:	1.5 - 3 minutes
• Immersion:	1.5 - 3 minutes

Additional Process Notes:

1. METALNOX M6314 works best when the cleaning agent is added to the wash tank using an automated injection system. KYZEN offers the following automated chemical injection units:
   - Chemtroller
     - A proportioning piston pump automatically adds the cleaning agent and water make-up based on a pre-set ratio.
   - Conductivity-Controlled Metering Pump
     - Automatically adds the cleaning agent based on a signal from a conductivity meter.

2. When using METALNOX M6314 in immersion systems, with non-water-soluble oils, the wash stage should be equipped with a skimmer, overflow weir, or some other means of removing the oil from the surface of the wash bath.

3. Water based corrosion inhibitors designed to protect steel, such as KYZEN® CP90S, can be used in the rinses to provide long-term protection for ferrous metals. However, care should be taken as corrosion inhibitors, while effective on steel, will often leave a visible film on brass parts.

4. METALNOX M6314 is received as an aqueous concentrate. Follow all personal protection levels shown in the SDS.

5. **Degassing Requirements:** Degassing is a term used to describe the removal of dissolved gasses from a liquid in an ultrasonic cleaning tank. Dissolved gasses reduce the effectiveness and power of an ultrasonic cleaner, since these gasses provide a cushioning effect on the ultrasonic waves generated. However, the dissolved gasses within the fluid are largely removed in the first few minutes of ultrasonic activity. In most cases, ultrasonic cleaners can be used immediately after changing cleaning fluids. When an ultrasonic cleaner is activated after a fresh batch of cleaning fluid has been added, one will notice a huge veil of very fine bubbles rising to the surface from every area of the cleaning fluid. The audible sound generated by the ultrasonic system is also deadened at this time, and the system does not produce the typical sound that the ultrasonic cleaner will produce when the fluid is degassed. Once the veil of bubbles rises to the surface, sound begins to increase in volume, and ultrasonic surface activity begins to generate. At this point, the ultrasonic cleaning system is capable of ultrasonic cleaning. Degassing for extended periods may be required on very large ultrasonic cleaning tanks with liquid capacities over 100 gallons. These tanks may require more than a few minutes to generate effective ultrasonic cleaning activity. Once a fluid is degassed by ultrasonic activity or heating of the cleaning fluid, it does not need to be degassed again. Therefore, degassing is only an issue when cleaning fluids are exchanged with new fluid.

6. **Spot-Free Rinse:** [1]The following data will help you decide if you require a spot free rinse. If you do, it should also help determine which system is best suited for you in order to generate spot free water. First, what are spots? Spotting is the residue of dissolved solids that are left behind when a water droplet evaporates. The higher the total dissolved solids (TDS) are in the water, the worse the spotting. How? As water stops sheeting (running) off a surface it forms little half-moon shapes in a process we commonly refer to as beading up. (It technically is the formation of a meniscus, which has to do with surface tension and wetting ability). If you think of that bubble as a small mountain and remember how gravity works the way a spot forms is obvious. So is the reason it always looks like a small donut so to speak. As the bubble evaporates the solids (which don't evaporate) the solids settle out in the shape of the bottom of the bubble. Since many of these solids are actually salts, it also becomes obvious why soft water will often spot more than hard water, since softening, after all, merely replaces metallic ions with sodium (salt) ions. This is generally why water softening alone probably should not be used for pretreatment in powder operations. We don't need the sodium ions on the parts nor do we need the spotting received from the sodium ions. Check with your chemical supplier to get a water analysis to know for sure. How much (many) of these total dissolved solids do you need to have spotting? At about 40 to 50ppm (parts per million) you will see spots on dark parts. At about 75ppm you will see spotting on glass and chrome and at about 150ppm you will see spotting on all surfaces. What is the normal TDS of water? According to some recent trade journals, we average between 250 and 300ppm TDS in the United States. That means that in the average water supply in the United States, if you require a spot free part, you will have to treat the water. The final rinse set point is the key parameter of cleanliness.

[1] http://www.finishing.com/library/cleanforpowder.html

COMPATIBILITY INFORMATION- SUBSTRATES AND EQUIPMENT

All chemicals have the potential of adverse effects on 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 elastomers and substrates. These compatibility recommendations are based on Internet research of M6314's products major formulation materials and internal KYZEN testing on the product as a whole of commonly available materials. Elastomers and plastics can vary greatly in quality For the most accurate results on long-term exposure of your materials, KYZEN is available to perform additional testing.

Table 2: Plastics and Elastomers

Brand Name	Generic Description	M6314
Delrin™	Acetal	A
Acrylic	Acrylic	E
Nylon	Synthetic Fiber	A
Lexan	Polycarbonate resin	C
ABS Plastic	Acrylonitrile butadiene styrene	C[1]
PEEK	Polyetherether Ketone	E
PVC	Polyvinyl Co-polymer	A
Natural Rubber	Black rubber	A
NORYL®	PPO™ resin and polystyrene.	A
Neoprene	Polychloroprene	A
PPS (Ryton®)	Polyphenylene sulfide	A
PTFE (Teflon™)	Polytetrafluoroethylene	A
Kalrez® 4079	ASTM D395B: FFKM (FFPM)	A
Kynar	Polyvinyl fluoride	A
Aflas®	Tetrafluoroethylene and Propylene	A
Tefzel	ETFE (ethylene-tetrafluoroethylene)	A
Polypropylene	Polypropylene	A
Hypalon®	Chlorosulfonated Polyethylene (CSPE)	E
Chemraz®	Perfluoroelastomer (FFKM)	E
Alathon	High density polyethylene	A
Viton A or B	Fluoroelastomer	A
Viton GF	Fluoroelastomer	A
Low density polyethylene	LDPE	A[2]
Kel-F® / Neoflon®	PolyChloroTriFluoroEthylene (PCTFE)	A
Silicone Rubber	Silicone Rubber	A
CPVC	Chlorinated Polyvinyl Chloride	A
Buna-S	Styrene Butadiene	A
Buna-N	HNBR / Styrene Nitrile Copolymer	A
Ceramics	AI203 Composites	A
EPDM	Ethylene Propylene Diene Monomers	A

COMPATIBILITY INFORMATION-SUBSTRATES AND EQUIPMENT

Table 3: Metals and Alloys	
Substrate	**M6314**
2024 Aluminum- Bare	A[2]
2024 Aluminum- Alclad	A
2024 Aluminum- Anodized	A
3003, 6061 and 7075 Aluminum	A
7075 Aluminum- Alclad	A
Brass_C360, Arsenical, High Tensile	A
Bronze	A
Copper	A
1018 Steel	A
Steel, All ASTM, SAE & EN 10027	A
304 and 316 Stainless Steel	A
Hastelloy™ Alloy-C	A
Magnesium	E
Titanium	A
Cast Aluminum	A

Ratings - Chemical Effect

A - Excellent

B - Good: Minor Effect, slight corrosion, or discoloration.

C - Fair: Moderate Effect, not recommended for continuous use. Softening or loss of strength, and swelling may occur.

D - Severe Effect: Not recommended for any use.

E – Test / Information not available.

Explanation of Footnotes

1-Satisfactory to 72^{O}F (22^{O}C)

2-Satisfactory to 120^{O}F (48^{O}C)

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.	
Type	**Compatibility**
EXHAUST	*Hastelloy™ Alloy-C., PVC, CPVC, PP*
PUMP SEALS, O-RINGS, GASKETS	*Teflon™ , Kalrez, VITON GF, EPDM (EPR), Aflas®*
PLUMBING LINES	*Hastelloy™ Alloy-C, PVC, CPVC*
CURTAINS	*Silicone, VITON GF*
WINDOW / DOOR SEALS	*VITON GF*
Wash Tanks, pumps, machine walls.	*Hastelloy™ Alloy-C, 304 & 316 SST*

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. Actual field results show that this chemistry, when properly maintained, may last indefinitely as most often the bath is changed out due to mechanical reasons, rather than chemical failure.

KYZEN recommends Conductivity and/or the Dropper Titration Method to monitor bath concentration.

NOTES AND COMMENTS:

- Recommended procedures for bath life maintenance and monitoring are appended to this supplement.
- **Oakton CON6+ Conductivity meter**, including full procedures for use and calibration of this instrument, are available for purchase through your KYZEN representative.
    - PN# FF16016 _ Oakton Kit Con 6 Deluxe Conductivity Meter
- **Dropper Titration** kit is available for purchase through your KYZEN representative.
    - PN# F00201 _ Dropper Titration Kit / Alkaline

SHELF-LIFE, PRODUCT COLOR, STORAGE AND HANDLING

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-live 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 25 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 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.

APPENDIX

- **Percent Concentration Conductivity Charts**
- **Percent Concentration Dropper Titration Method**

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

KYZEN Technical Support

1-800-845-5524

www.KYZEN.com

For more information on the regulatory compliance of KYZEN products, please visit www.KYZEN.com/compliance

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.

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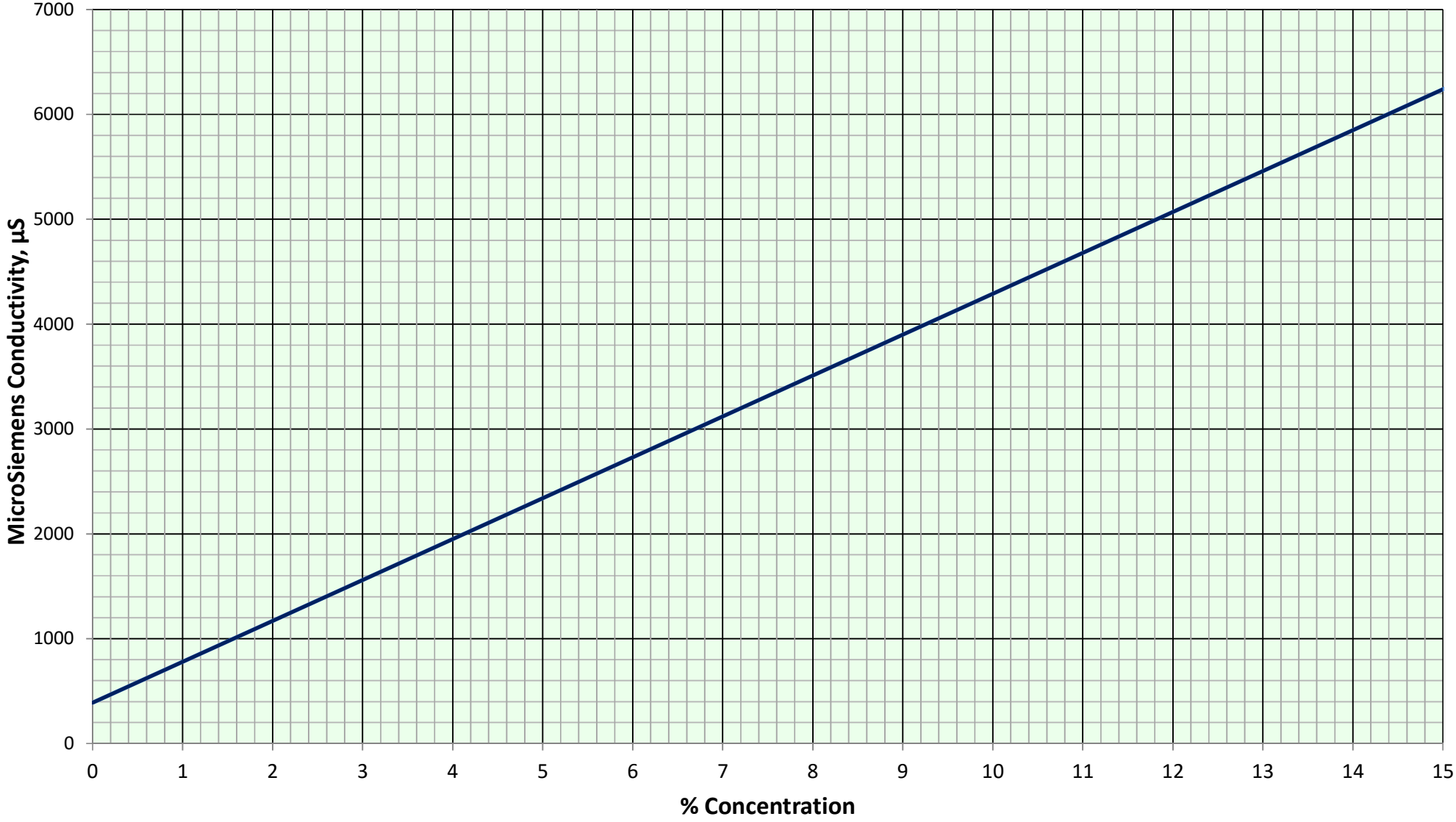
%Concentration of METALNOX M6314 by Conductivity when prepared using tap water MicroSiemens, µS



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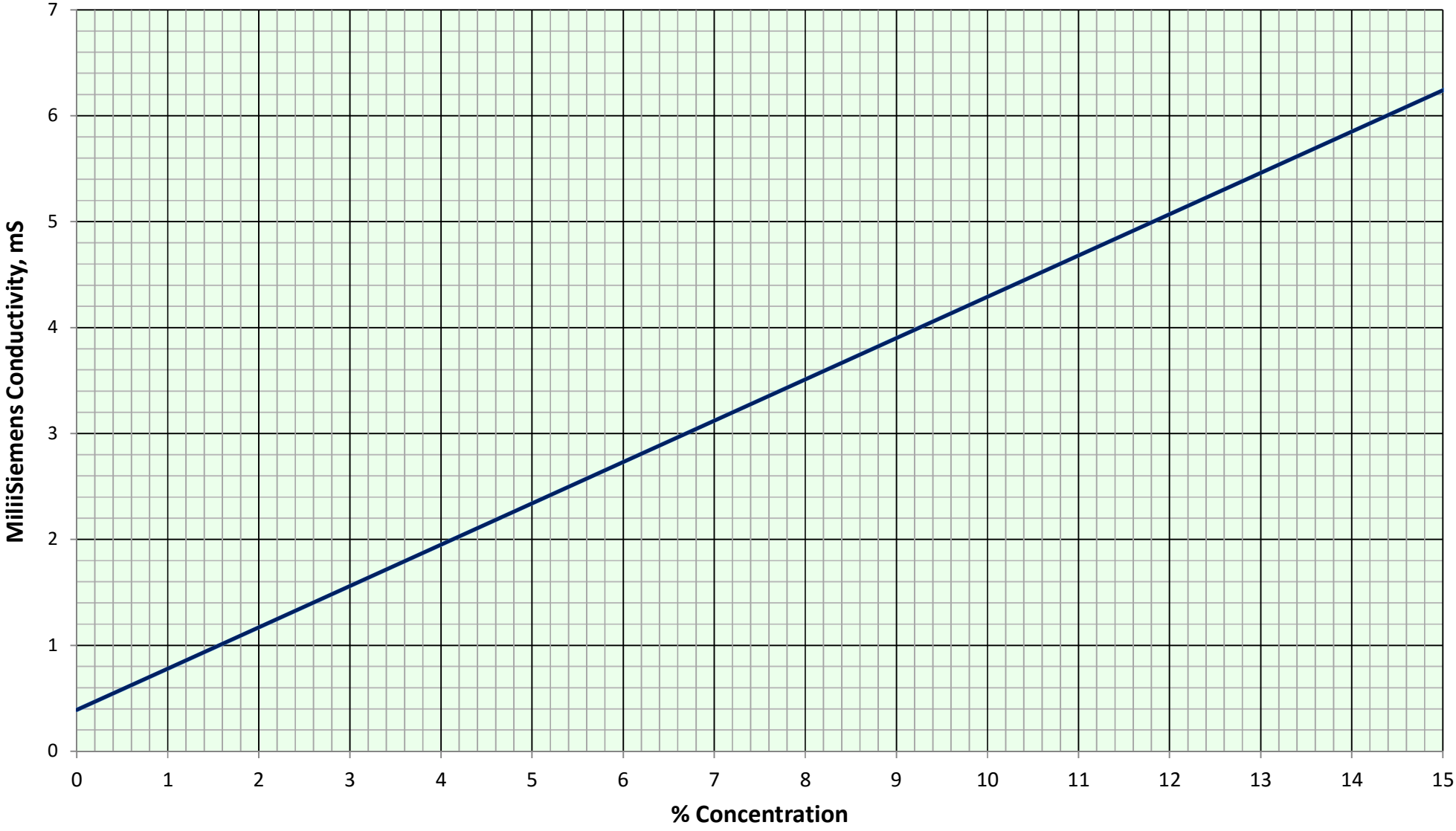
%Concentration of METALNOX M6314 by Conductivity when prepared using tap water MilliSiemens, mS



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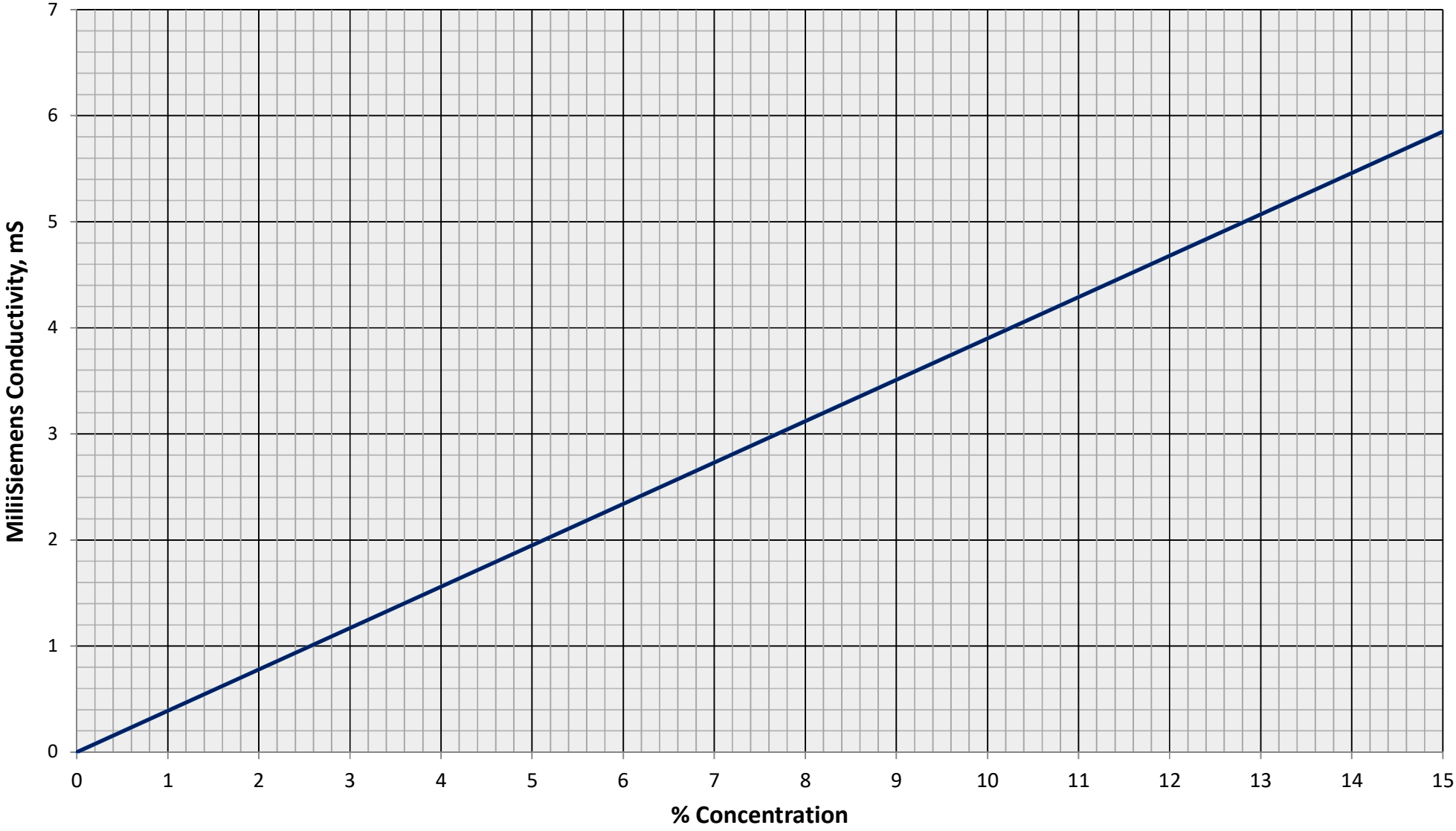
Concentration of METALNOX M6314 by Conductivity when prepared using deionized or RO water



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KYZEN ALKALINE TITRATION TEST KIT

METALNOX® M6314 Bath Maintenance Procedure

This procedure defines the equipment and test methods used to measure and maintain bath concentration using the KYZEN Alkaline Titration Test Kit.

REAGENTS AND MATERIALS

INDICATOR- Phenolphthalein
TITRANT- 0.5N Hydrochloric Acid Graduated Cylinder or Syringe Erlenmeyer Flask- 50mL

HAZARDS AND PRECAUTIONS

- Wear appropriate Personal Protective Equipment (PPE), including safety glasses and gloves
- For specific safety information, reference the Material Safety Data Sheet for each reagent

PROCEDURE

1. Using a cup, take approximately 500mL of cleaning solution from a thoroughly agitated tank.
2. Using a graduated cylinder or syringe, transfer a **10 mL** sample to an Erlenmeyer flask.
3. Dilute sample with water to the 50mL mark to make the endpoint easier to see. Volume is not critical.
4. Add **2 - 10 drops** of **INDICATOR** as needed to get good color development**.** Solution will turn pink.
5. While swirling the solution, hold the **TITRANT** bottle exactly vertical to the flask. Add **TITRANT** drop-wise until the pink color just disappears. (Note: pink color may return after a short while.)
6. Record the number of drops of **TITRANT** used.

CALCULATION

Bath concentration can be calculated using the formula on left or by referencing the concentration chart on the right.

%Concentration = (#T)(Factor)

#T = Number of Drops of **TITRANT** Used

Factor = 1.16

# Drops	% Conc	# Drops	% Conc
1	1.2	16	18.6
2	2.3	17	19.7
3	3.5	18	20.9
4	4.6	19	22.0
5	5.8	20	23.2
6	7.0	21	24.4
7	8.1	22	25.5
8	9.3	23	26.7
9	10.4	24	27.8
10	11.6	25	29.0
11	12.8	26	30.2
12	13.9	27	31.3
13	15.1	28	32.5
14	16.2	29	33.6
15	17.4	30	34.8