1. MIXING DIRECTIONS FOR ALCONOX DETERGENTS

Dilute detergent (see chart below) using warm (about 120°F or 50°C) or hot (about 140°F or 60°C) water. Ambient temperature water may be acceptable, especially for presoak. For difficult soils, use very hot water (above 150°F or 65°C) and use double the recommended amount of detergent. When cleaning solution may be reused, make up fresh solutions frequently as needed.

Product	Form	Dilution (%)	Rec'd Amount: (a)oz/gal, (b)gram/l, (c)ml/l	Min Wash Temp.	Usual Wash Temp	Protective Gloves	Eye Protection
Alconox	powder	1	(a) 1¼, (b) 10	Ambient	Warm	Desired	Desired
Terg-A-Zyme	powder	1	(a) 1¼, (b) 10	Ambient	Max 130° F	Desired	Desired
Liqui-Nox	liquid	1	(a) 1¼, (c) 10	Ambient	Warm	Desired	Desired
Citranox	liquid	1-2	(a) 1-3, (c) 10-20	Ambient	Hot	Required	Required
Detergent 8	liquid	2-5	(a) 2-6, (c) 20-50	Ambient	Hot	Required	Desired
Luminox	liquid	2-5	(a) 2-6, (c) 20-50	Ambient	Hot	Required	Desired
Alcojet	powder	1	(a) 1¼, (b) 5-10	Warm	Hot	Required	Desired
Det-O-Jet	liquid	1	(a) 1, (c) 5-10	Ambient	Hot	Required	Required
Alcotabs	tablet	-	(1 tablet per use)	Ambient	Ambient	N/A	N/A
Citrajet	liquid	1-2	(a) 1-3, (c) 10-20	Ambient	Hot	Required	Required
Tergajet	powder	½-1	(a) ½-1¼, (b) 5-10	Warm	Hot	Required	Desired
Solujet	liquid	½-1½	(a) 1¼, (c) 5-10	Ambient	Hot	Required	Required

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2. SOAKING

Recommended Products: ALCONOX, LIQUI-NOX, CITRANOX, CITRAJET, TERG-A-ZYME, ALCOJET, DET-O-JET, LUMINOX, TERGAJET, SOLUJET AND DETERGENT 8

Typical Use: To clean small items - hospital catheters and tubes, small metal parts-and large tank interiors, including pharmaceutical and other blending tanks. An excellent pre-treatment method for loosening soils and preventing drying- especially for labware or medical instruments-prior to further cleaning.

Advantages: Very little physical effort or expense.

Concerns: Extremely dirty articles or difficult soils may require further cleaning.

Directions: Soak, completely submerged in solution, until clean. This may take several hours, depending on the type of soil. Remove and rinse thoroughly (see Rinsing below).

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3. MANUAL CLEANING

Recommended Products: ALCONOX, LIQUI-NOX, CITRANOX, CITRAJET, TERG-A-ZYME, ALCOJET, DET-O-JET, LUMINOX, TERGAJET, SOLUJET AND DETERGENT 8

Typical Use: For cleaning small articles such as medical examination instruments, labware or circuit boards, and large articles such as process equipment.

Advantages: Versatile, inexpensive, effective.

Concerns: Time consuming and labor-intensive. May not be effective on difficult-to-reach areas requiring pre-soak, ultrasonic, or machine cleaning.

Directions: Make up cleaning solution as in mixing directions, or use undiluted detergent on a warm, wet cloth or sponge for non-abrasive scouring. Clean as follows:

- Wet the article with solution by dunking or using a soaked cloth or sponge.
- Clean with a cloth, sponge, cotton swab, brush or pad that agitates surface soils without marring the surface.
- Rinse thoroughly (see Rinsing below). Wear gloves, eye protection, and other safety equipment if recommended.

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4. ULTRASONIC CLEANING

Recommended Products: ALCONOX, LIQUI-NOX, CITRANOX, CITRAJET, TERG-A-ZYME, ALCOJET, DET-O-JET, LUMINOX, TERGAJET, SOLUJET AND DETERGENT 8

Typical Use: To clean large batches of articles or for fast, convenient cleaning.

Advantages: Fast, effective, penetrating cleaning.

Concerns: Capital cost, material tolerance for ultrasonic agitation.

Directions: Make up detergent solution in a separate container.

- Add cleaning solution, run machine for several minutes, to degas solution and allow heater to come up to temperature.
- Place groups of small articles in racks or baskets.
- Align irregularly shaped articles so the long axis of any part faces the ultrasonic transducer (usually the bottom).
- Immerse articles to be cleaned for 2-10 minutes, or longer, as needed. Remove and rinse thoroughly (see Rinsing below).

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5. CLEAN-IN-PLACE

Recommended Products: ALCONOX, LIQUI-NOX, CITRAJET, CITRANOX, TERG-A-ZYME, ALCOJET, DET-O-JET, LUMINOX, TERGAJET, SOLUJET AND DETERGENT 8

Typical Use: For pipe, tank, and filtration systems.

Advantages: Assures clean systems without disassembly.

Concerns: Good circulation in system.

Directions: Make up cleaning solution as in mixing directions.

- circulate solution slowly for at least 1/2 hour. Allow several hours for large systems (thousands of gallons), especially with ambient temperature water.
- Drain by pumping in one full system capacity of water.
- Rinse by circulating and draining at least two times the system's water capacity. Some filtration units may require more rinsing.

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6. MACHINE WASHERS

Recommended Products: ALCOJET, DET-O-JET, LUMINOX, DETERGENT 8, TERGAJET, SOLUJET AND CITRAJET

Typical Use: For high-volume cleaning using washer-sanitizers, warewashers, conveyor-washers, or spray and pressure washers.

Advantages: Fast, effective, high volume cleaning.

Concerns: Capital cost, article's ability to withstand machine washing conditions.

Directions: Load articles into racks so that open ends face towards spray nozzles. Place difficult-to-clean articles with narrow necks and openings near the center of the rack, open-side down, preferably on special racks with spray nozzles pointing directly into them. Minimize touching between articles.

- Group small articles in baskets to prevent dislodging by spray action.
- Use only low foaming detergent as per machine manufacturer dose instructions. If no instructions, use a 1% solution or 1 oz. per gallon of wash water. Use more or less as needed.
- Use hot water (above 140^{o} F or 60^{o} C). Most machines have at least three rinse cycles (see Rinsing below). Refer to machine manufacturer's directions.

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7. AUTOMATIC SYPHON PIPETTE WASHING

Recommended Product: ALCOTABS

Typical Use: Washing pipettes in laboratories.

Advantages: Effective batch pipette cleaning.

Concerns: Pre-soak pipettes for best results.

Directions: Completely immerse pipettes immediately after use in a pre-soak solution. When ready to clean:

- Drop an ALCOTAB into bottom of washer.
- Place pipettes in holder into the washer.
- Turn on cold or warm water at a rate that will fill the washer and completely cover all pipettes, then drain to the bottom during each cycle.
- Run water until ALCOTAB has completely dissolved, continue running water to rinse thoroughly (may take an hour to complete washing and rinsing). For analytical or tissue culture work use distilled or deionized water for final rinse.

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8. RINSING

Don't neglect the rinse! Use ambient, warm, or hot water. A running water rinse directly contacting all surfaces for at least 10 seconds on each surface is desirable. If not practical, use a series of three or more agitated soak rinse tanks or at least two counter-flow cascade rinse tanks. For large surfaces, several passes with a clean cloth or sponge soaked with rinse water followed by a clean, dry, absorbent wipe can work. In machine cleaning, after washing there should be at least three rinse cycles. Tap water is suitable for many rinsing applications.

- Give **medical and surgical instruments** a final rinse in distilled or deionized water.
- In laboratories, rinse **tissue culture and analytical ware** with deionized or distilled water.
- Rinse **trace organic analytical ware** in distilled or organic-free water.
- Give **trace metal or inorganic analytical ware** a final rinse with deionized water.
- Rinse **pharmaceutical equipment** according to good manufacturing practice- with whichever is required: potable, deionized, distilled, sterile, pyrogen-free or injectable water.
- Rinse **electronic circuit boards** and non-conducting electronic devices with deionized water.

- **Sensitive optical or precision manufactured parts** may require final rinses in deionized or distilled water.
- **Food processing equipment** must be rinsed with potable water.

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9. DRYING

Drying can effect residues and corrosion. Impurities from rinse water can be deposited during evaporation. To minimize this, dry with techniques that physically remove rinse water from the substrate such as absorbent wiping, forced air or air knives, azeotropic solvent drying such as isopropyl alcohol final rinse and dry, or vacuum drying that may also evaporate residues. Water, and particularly high purity rinse water can be corrosive to metal substrates during heated and air drying. The use of physical removal drying techniques or the addition of corrosion inhibitors (with the tolerance of corrosion inhibitor residues) to the rinse water can help minimize corrosion.

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10. BATH LIFE EXTENSION AND CONTROL

For the highest levels of critical cleaning only freshly made up solutions should be used for cleaning to avoid any potential for cross contamination. For industrial critical cleaning applications high levels of cleaning can still be achieved with extended bath life. In general, a pH change of 1 pH unit towards neutral indicates an exhausted cleaning solution. Bath life can be extended by physical filtration of particulates and cooling and settling of sludge and skimming of oils. Bath life can be extended by adding one half as much detergent of the initial load after partially depleting the cleaning life of a bath. Under frequent daily use, detergent solutions can rarely be used more than a week even with these bath life extension techniques. Conductivity, pH and % solids by refractometer can be used to control bath detergent concentration.

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11. CORROSION INHIBITION

Corrosion during cleaning is accelerated by the same things that accelerate cleaning: heat, aggressive chemicals, time, and agitation. In approximate order of importance, to reduce metal corrosion concerns, use less heat, lower pH detergents, shorter cleaning time, and less agitation. In general use the mildest pH detergent to limit metal corrosion. Higher pH detergents such as SOLUJET or DETO-JET have special corrosion inhibitors that allow their use with aluminum. SOLUJET and CITRAJET have inhibitors that allow their use on a broad range of sensitive metals without leaving filming amine residues. In approximate order of importance, in general to reduce plastic corrosion, use less aggressive cleaners that have less solvent or surfactant character or use lower concentrations of those cleaners, use lower cleaning temperatures, use less contact time, and finally use less agitation. With aqueous cleaning metal corrosion can occur during rinsing and drying. Corrosion inhibitors can be added to rinse water provided that any associated inhibitor residue does not interfere with the surface being cleaned. Keeping the surfaces cleaned hot with hot rinse water and using rapid heat or vacuum drying can accelerate drying and minimize metal corrosion. Forced air-drying and air knives that physically remove rinse water can minimize drying corrosion. Drying with hot oxygen-free gas such as nitrogen can also control corrosion during drying. With mild steel you can have “flash rusting” when you rinse with hot water and dry with hot air. In some instances, by lowering the water temperature or drying temperature, corrosion can be avoided on mild steel. For instance in a case where flash rusting on mild steel had been occurring using 150°F rinse water and ambient air drying, rust was avoided by using 120°F in place of the 150°F rinse water. For the most sensitive steel, you can clean with an inhibited cleaner followed by an isopropyl alcohol rinse or using a corrosion inhibitor added to the rinse water.