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TECHNICAL DATA SHEET

S4FE-D™ Concentrate

CBRN Decontamination Surfactant • Powered by the Bind-It™ formulation

S4FE-D™ Concentrate is a near-neutral pH aqueous decontamination surfactant designed to remove chemical, biological and radiological contamination from surfaces, tools, equipment, and PPE without attacking the materials being cleaned. Diluted 10:1 with water to a ready-to-use working solution, it binds contaminants into its surfactant matrix so they lift off the surface and rinse away cleanly — rather than dissolving the contamination and risking redeposition. Originally developed by Laboratory Technologies, Inc. as the Bind-It™ formulation, S4FE-D Concentrate is in active use at university health physics programs, national laboratories, nuclear medicine departments, and radiopharmaceutical production sites.

PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Deep green liquid
Odor	Mild, soap-like
pH (as supplied)	~6.5 (near-neutral)
Density at 20 °C	~1.03 (relative density)
Viscosity	Moderately viscous liquid
Boiling point	100 °C (212 °F)
Flash point	Greater than 100 °C — not flammable
Water solubility	Completely miscible

COMPOSITION

S4FE-D Concentrate is a proprietary aqueous surfactant blend formulated to bind contaminants into its surfactant matrix for clean removal. The complete regulatory composition disclosure is provided in the current S4FE-D Safety Data Sheet (available from LTI or at www.labtechinc.com). Specific surfactant chemistry is trade-secret protected and is not disclosed beyond what regulatory requirements mandate in the SDS.

MECHANISM OF ACTION

Conventional decontamination chemistries, such as acids, bases and oxidizers, work by reacting with or dissolving the contaminant where it sits. That approach can drive contamination into the surface microstructure (microporosity in stainless steel, the oxide layer on aluminum, the grain boundaries of plated finishes) and can create byproducts of its own. S4FE-D™ takes a different approach: the contaminant is lifted off the surface and bound into the surfactant matrix, where it stays until it is rinsed or wiped away. The contamination leaves the workpiece, ends up in the rinsate or on the wipe, and does not redeposit. The same mechanism works on chemical, biological and radiological contamination, and it is why S4FE-D™ is safe on a wide range of materials, including aluminum and plated surfaces where acid-based chemistries cause real harm.

RECOMMENDED DILUTION AND APPLICATION

Standard working dilution: 10:1. Ten parts water to one part Concentrate. This is the working dilution for routine wipe cleaning, ultrasonic bath cleaning, and most surface decontamination applications. A 16 oz Concentrate pouch yields approximately 175 oz of working solution at the 10:1 ratio.

Water quality. Filtered, bottled, or distilled water is preferred. Tap water with significant mineral content can reduce the carrying capacity of the formulation — the surfactant binding matrix interacts with calcium, magnesium, and other dissolved

minerals, consuming capacity that would otherwise be available for contaminant capture. For routine work, tap water is acceptable; for critical applications, use filtered or distilled water.

Application methods:

- **Wipe cleaning —** apply working solution to the surface (manually or via spray bottle), allow approximately 60 seconds dwell time, wipe clean with an absorbent cloth or wipe. Repeat for heavily contaminated surfaces.
- **Ultrasonic bath cleaning —** the working solution can be used directly in an ultrasonic bath at the standard 10:1 dilution. The bath's cavitation lifts contamination off complex geometries (threaded holes, blind cavities, screen mesh, the inside surfaces of small enclosures) that wipe cleaning alone cannot reach. LTI bench-tested this configuration in a nuclear-medicine syringe-shield decontamination application; the chemistry performs as expected at the standard dilution.
- **Spill response —** apply working solution liberally to the affected area, allow brief dwell time, absorb with appropriate absorbent material, and dispose of it under the facility's procedures for the contaminant involved.
- **Final rinse —** a DI or distilled water rinse on critical surfaces is good practice for removing surfactant residue. Not strictly required for most applications.

MATERIALS COMPATIBILITY

Material	Compatible	Notes
Aluminum (incl. anodized)	**Yes**	Founding-design material — S4FE-D was originally developed to be safe on aluminum surfaces.
Stainless steel	**Yes**	All grades. No pitting or etching at any working dilution.
Chrome / common platings	**Yes**	Near-neutral pH does not attack the plating layer at grain boundaries.
Brass, copper, painted metals	**Yes**	Standard surfactant compatibility.
Glass, ceramic, porcelain	**Yes**	Trivially safe.
Most plastics	**Yes**	Acrylic, polycarbonate, polyethylene, PVC, and similar.
Most rubbers	**Yes**	Standard surfactant compatibility for routine contact.
Specialty elastomers	**Verify**	Hygroscopic specialty elastomers — some silicones and polyurethanes — can absorb water from the aqueous working solution on prolonged contact and exhibit temporary swelling. The effect typically reverses on drying. For uncertain materials, conduct a 24-hour patch test on a sacrificial piece.
Direct skin contact	**Yes**	No special measures are required for skin; rinse with water. Avoid the eyes (H319; eye protection recommended). For spot skin decontamination, use the S4FE-D™ Decontamination Wipes or D.I.R.T. towels; for routine personnel decontamination, use the S4FE-D™ Hand & Body Soap. Like any surfactant, repeated heavy use can dry the skin.

EFFECTIVE CONTAMINANT RANGE

S4FE-D™ Concentrate removes chemical, biological and radiological contamination. On the radiological side, it is effective across the radionuclides encountered in research, clinical, and emergency-response environments. The binding chemistry is not isotope-selective — it captures dispersed contamination regardless of nuclide identity. The categories below are representative examples, not an exhaustive list; in more than 30 years of use the chemistry has performed on every isotope it has been applied to.

- **Common nuclear medicine isotopes —** Tc-99m, F-18, I-131, I-125, Ga-68, Lu-177, Co-57, and similar
- **Calibration sources —** Cs-137, Na-22, Co-60, Ba-133, and others used routinely in health-physics work

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— **Actinides —** uranium, plutonium, americium, neptunium, thorium and their decay products. Binding chemistry is particularly important for actinide work, where redeposition risk on metal substrates is real and the surface microstructure can be permanently compromised by dissolving-chemistry approaches.

— **Beta emitters —** including high-energy beta emitters such as P-32, Sr-90/Y-90

STORAGE AND SHELF LIFE

Storage temperature	5 °C to 30 °C (40 °F to 85 °F) recommended. Avoid freezing and prolonged exposure to extreme temperatures.
Storage location	Cool, dry, well-ventilated. Keep containers tightly closed and labeled.
Light sensitivity	None significant under normal indoor storage.
Shelf life from manufacture	48 months (4 years) from date of manufacture
Mixed working solution	48 months when diluted with reverse-osmosis or distilled water. With tap water or deionized (DI) water, use within approximately one month — dissolved minerals and the chemistry of unbuffered DI water both shorten the working solution's usable life.

DISPOSAL

Dispose of unused product in accordance with applicable federal, state and local regulations. The rinsate from a decontamination operation carries whatever contamination was removed from the workpiece, so it is handled under the facility's procedures for that contaminant, whether chemical, biological or radiological. In most cases the waste stream's classification is set by the contaminant removed, not by the S4FE-D™ chemistry.

AVAILABLE FORMATS

S-0016-C	16 oz Concentrate, side-spout pouch — dilutes 10:1 with water to ~175 oz working solution
3 oz Refill	Single-use pre-measured pouch — refills exactly one 32 oz S4FE-D Ready-to-Use Spray bottle
Bulk sizes	1-gallon, 5-gallon pail, 15-gallon, 55-gallon drum, and 275-gallon IBC tote

For other S4FE-D formats — Ready-to-Use Spray, Decontamination Wipes, Hand & Body Soap, and pre-staged response kits — see the S4FE-D Product Family Summary or visit www.labtechinc.com.

SAFETY DATA SHEET

Hazard classification: H319, causes serious eye irritation (Eye Irritation 2A, signal word Warning). Eye protection is recommended; no special skin measures are required. Refer to the current S4FE-D Concentrate Safety Data Sheet (SDS) for complete regulatory composition disclosure, hazard classification, exposure controls, transportation information, and toxicological data. The SDS is available from LTI on request — contact sales@labtechinc.com — or download from www.labtechinc.com.

This Technical Data Sheet provides general guidance on S4FE-D™ Concentrate. Specific applications should be validated by the end user against their own materials, contamination types, and procedures. LTI is available to consult on application engineering for non-standard use cases — contact sales@labtechinc.com.