



Novec™ 4200

Electronic Surfactant

Introduction

3M™ Novec™ 4200 Electronic Surfactant is an anionic fluorochemical surfactant in a 25% aqueous solution with low metal content, typically < 500 ppb of each specified metal. Novec 4200 surfactant provides low surface tensions in buffered HF (BHF)/buffered oxide etch (BOE) solutions, as well as some other aqueous solutions.

For buffered HF etching, Novec 4200 surfactant provides:

- Improved wetting
- Filterability
- Low effective concentrations
- Low foaming
- Little or no effect on the etch
- Limited surface adsorption

On the basis of toxicity testing conducted on Novec 4200 surfactant and life cycle analysis of its intended applications, 3M characterizes Novec 4200 Electronic Surfactant as sustainable technology. Detailed EHSR data on this product is available from 3M.

3M™ Novec™ 4200 Electronic Surfactant Regulatory Summary

- Novec 4200 surfactant is in compliance with TSCA by virtue of a Low Volume Exemption notice. The use of this as a surfactant in buffered oxide etch applications in semiconductor fabrication is allowed. Proper exposure control can be managed by use of personal protective equipment (PPE) as suggested in the Material Safety Data Sheet (MSDS).
- PFBS-based surfactants are not included in the U.S. EPA's PFAS *Final Significant New Use Rule* (Perfluoroalkyl Sulfonates; Significant New Use Rule, 67 Fed. Reg. 72, 854, Dec. 9, 2002).

3M™ Novec™ 4200 Electronic Surfactant Typical Applications

- Buffered HF (BHF) solutions/Buffered Oxide Etch (BOE)

Material Description

Ingredients	Novec 4200
Ammonium Fluoroalkylsulfonamide	25% by weight
Water	75% by weight

Typical Physical Properties

All values determined at 77°F (25°C) unless otherwise specified.

Not for specification purposes

Properties	Novec 4200
Appearance	Clear, colorless liquid
Specific gravity	1.14 (9.51 lbs./gal, 1.14 kg/l)
Type	Anionic
Composition (by weight)	25% ammonium fluoroalkylsulfonimide 75% water

Metal Impurities

Not for specification purposes.

Novec 4200 surfactant contains <500 ppb of each of the following metals:

Al Ba Ca Cr Cu Fe K Li
Mg Mn *Na Ni Pb Sr Ti Zn

*<750 ppb

3M™ Novec™ 4200 Electronic Surfactant Surface Tension

All values determined at 77°F (25°C) unless otherwise specified.

Not for specification purposes

Surface Tension of Novec 4200 Surfactant Solutions (dynes/cm)

Solvent	Amount of Novec 4200 surfactant by weight based on active content			
	0 ppm	100 ppm (0.01%)	200 ppm (0.02%)	500 ppm (0.05%)
7:1 Buffered HF (BHF)	86	<22	<21	<19
500:1 Buffered HF (BHF)	93	<18	<18	<18

Solvent	Amount of Novec 4200 surfactant by weight based on active content		
	0 ppm	500 ppm (0.05%)	2000 ppm (.2%)
Water	73	57	37
18.5% Hydrochloric acid	63	31	21*
40% Nitric acid	54	43	31
50% Sulfuric acid	67	26	21*
10% Potassium hydroxide	77	49	29
85% Phosphoric acid	78	34*	27*
100:1 Dilute HF	71	32	<18
500:1 Dilute HF	71	24	<18

* Not fully soluble

Product Safety and Handling

Novec 4200 surfactant is intended for use in semiconductor wafer fabs.

Recommended disposal of the 25% aqueous solution of Novec 4200 surfactant is high temperature incineration.

For additional product safety and handling information, please read the product label and Material Safety Data Sheet before using this product.

Resources

For additional technical information on Novec 4200 electronic surfactant in the United States, call 3M Electronics Markets Materials Division:

800 810 8513

For other 3M global offices, and information on additional 3M Electronic Materials products, visit our web site: www.3m.com/electronicmaterials

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Electronic Markets Materials Division

Building 21-1W-10
900 Bush Avenue
St. Paul, MN 55106
800-251-8634

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