Thetawet

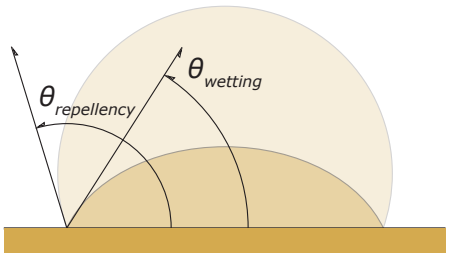
Short-chain fluorosurfactants

Applications

- Wetting
- Leveling
- Gloss development
- Surface modification
- Extreme environments

Theta: Fluorochemical Technology

The Greek Letter ***θ (Theta)*** represents the contact angle formed by a liquid at the phase boundary where a solid, liquid, and gas intersect. The measurement of ***θ*** quantifies both wetting and repellency. The manipulation and control of ***θ*** is critical in the design of effective oil, water, and stain repellents, and the reduction of surface tension necessary for improved coating and cleaning performance.



$\theta_{decreasing}$: increased wetting, adhesiveness

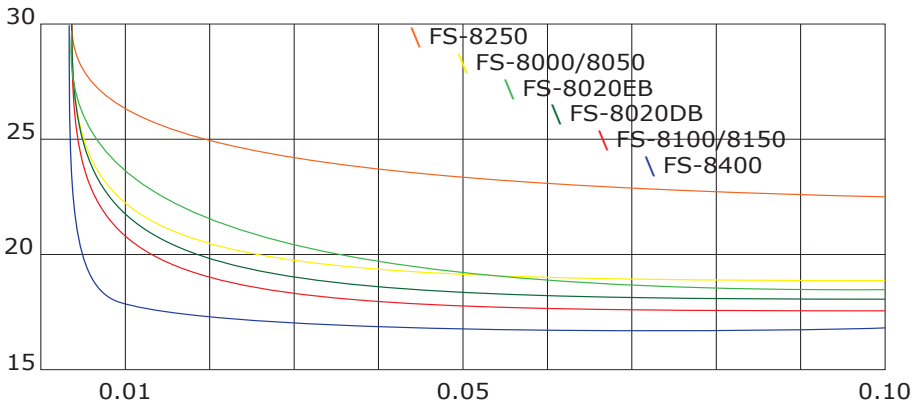
$\theta_{increasing}$: increased repellency

With ***Theta*** as the performance measure for surfactant wetting and surface protection repellency, ***ICT*** has named its new short-chain fluorochemical technology ***Theta*** and its surfactants ***Thetawet:***

Thetawet	Ionic Type	Form	% Solids	Diluent
FS-8000	Nonionic	Solid mp<55°C	100	None
FS-8050	Nonionic	Liquid	50	Water
FS-8020DB	Anionic	Liquid	30	Water/glycol ether DB
FS-8020EB	Anionic	Liquid	30	Water/glycol ether EB
FS-8100	Nonionic	Turbid liquid	100	None
FS-8150	Nonionic	Turbid liquid	25	Water
FS-8200	Anionic	Solid mp<55°C	100	None
FS-8250	Anionic	Turbid liquid	28	Water
FS-8400	Amphoteric	Liquid	20	Water/glycol

Thetawet FS-series short-chain fluorosurfactants are exceptional wetting agents efficient at low end-use concentrations, that through extensive ***ICT*** research and process optimization, deliver performance on-par with long-chain alternatives. Often used along with traditional and specialty surfactants, ***Thetawet FS***-series short-chain fluorosurfactants deliver maximum performance and efficiency.

Aqueous Surface Tension, duNoüy ring, Wt.% actives, dynes/cm @25°C



Ross-Miles Foam (ASTM D1173-53), mm, @25°C, 0.1% actives in water			
Thetawet	*Initial*	*3 minutes*	*10 minutes*
FS-8000	185	160	155
FS-8020DB	86	72	70
FS-8020EB	22	20	20
FS-8050	185	160	155
FS-8100	65	57	55
FS-8150	65	57	55
FS-8200	Insol.	-	-
FS-8250	12	8	6
FS-8400	65	57	54

Thetawet FS-series short-chain fluorosurfactants find use in applications ranging from Oil Field brine foaming to controlled foam clean-in-place systems.

In films and coatings, ***Thetawet FS***-series products reduce surface defects, improve gloss development, and impart anti-block, soil resistance and weatherability.

Thetawet
Short-chain fluorosurfactants

Fluorosurfactants are a class of specialty surfactants demonstrated for use in applications where traditional hydrocarbon surfactants either can't deliver the required levels of performance needed in wetting, leveling, liquid penetration or foam generation...at any concentration, or lack the chemical or thermal stability to perform in harsh environments. The exceptional efficiency of fluorosurfactants for performance at very low levels relative to hydrocarbon surfactants allows for lower overall surfactant use, and often as the most cost effective solution in actual use.

This Application Guidance table is designed to help with the selection process. Suggested use levels are given on a weight percent, "as supplied," basis, and so ranges are given which allow for the difference in the concentrations of each product recommended for a specific end use.

Application Guidance

Application	Use	FS-8000/ FS-8050	FS-8020EB/ FS-8020DB	FS-8100/ FS-8150	FS-8200/ FS-8250
Paints/Coatings	wetting	0.01-0.10	0.05-0.15	0.01-0.05	0.05-0.15
	leveling/gloss	0.02-0.15	0.1-0.3		0.1-0.3
	anti-blocking				0.05-0.25
Inks/Graphic Arts	wetting/leveling	0.1-0.15	0.1-0.2		
	dye leveling		0.25-0.5		
Adhesives	wetting/leveling	0.05-0.1		0.05	0.05-0.10
	semi-release				0.20-0.50
Caulks	leveling	1.0-1.5	1.0-2.0		
	soil resistance		1.5-2.0		
Metals Technology	anticorrosion				0.30-0.50
	degreasers	0.05-0.1	0.1-0.2		
	etching baths	0.05-0.1		0.01-0.25	
Cleaning Technology	alkaline cleaners	0.05-0.25		0.05-0.15	0.1-0.3
	glass cleaners	0.01-0.05		0.01-0.05	
	automotive cleaners	0.1-0.2	0.15-0.25		0.10-0.20
	solvent degreasers	0.01-0.1		0.05	
	acid cleaners	0.1-0.2		0.05-0.1	
	hair conditioners				0.10-0.25
	scale removal	0.5-1.0	1.0	0.25-0.5	
	clean-in-place	0.01-.01			0.05-0.25
Polymer Technology	fluoropolymer wetting	0.5-2.0	0.1-0.2	0.1-1.0	
	mold release		1.0-2.0		1.0-2.5
	polymer wetting	0.1-0.15	0.1-0.2	0.05-0.1	
Foaming Technology	aqueous foaming	0.01-0.2			
	brine foaming	0.1-0.5			
	reduced foaming				0.15
Stability to Extremes	strong acids	0.01-0.1		0.01-0.1	0.01-0.10
	strong bases	0.05-0.2		0.05-0.2	0.1-0.2
	oxidizing conditions	0.2-0.5		0.1-0.5	

ICT manufactures the ***Theta series*** products utilizing short-chain, telomer-based fluoroalkyl intermediates that don't contain the long-chain perfluorinated chemicals (PFC's) associated with PFOA and PFOA precursors. The ***Theta series*** products comply with the US EPA 2010/15 PFOA Stewardship Program.

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