415 Technical Data Sheet
Ferric Chloride

415-Liquid

Description

The 415 *Ferric Chloride* is an etchant solution for printed circuit board and photoengraving processes.

Features and Benefits

- **Photoengraving Grade—42° Baume**
- **Ready to use without dilution**

ENVIRONMENT
RoHS Compliant
No-VOC

Usage Parameters

Properties	*Value*
Shelf Life	3 y

Temperature Ranges

Properties	*Value*
Storage Temperature Limits [a)]	16 to 27 °C [60 to 80 °F]

a) Cool, dry, and well-ventilated area recommended.

Properties of 415

Properties	*Value*
Color	Dark red-brown
Odor	Slight iron/acidic
Viscosity for a 40% solution	12 cP
pH	<2
Solution Strength	38 to 42%
Percent (wt/wt) of Hydrochloric Acid (HCl)	<1.0%
Density	41.6% Baume to 45% Baume
Specific Gravity @17.5 °C [63.5 °F]	1.43
Boiling Point	110 °C [230 °F]
Freezing Point	-50 °C [-58 °F]
Crystallization @-26 °C [-15 °F]	37% $FeCl_3$
@-12 °C [10 °F]	40% $FeCl_3$

Compatibility

Chemical—Ferric chloride reacts strongly with metals.

Storage

Store between 16 and 27 °C [60 and 80 °F] in a dry area. Store in plastic container. Do NOT store in metal containers.

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Health and Safety

Please see the 415 **Safety Data Sheet** (SDS) for further details on transportation, storage, handling, safety guidelines, and regulatory compliance.

Application Instructions

For best results, follow the procedure below. If further directions for etching or making a printed circuit board (PCB), consult the photofabrication process guide available free from your dealer.

1. Fully immerse copper board in solution.
2. Agitate until etching action is complete.

To speed up etching:

- Warm the ferric chloride solution between 35 to 55 °C [95 to 131 °F].

ATTENTION! Do NOT heat ferric chloride solution above 55 °C [131 °F].

NOTE: Dilution is not recommended.

Packaging and Supporting Products

Cat. No.	*Packaging*	*Net Volume*		*Packaged Weight*	
415-500ML	Bottle	475 mL	1 pt	7.5 kg	16.5 lb
415-1L	Bottle	945 mL	1.99 pt	9 kg	19.8 lb
415-4L	Bottle	4 L	1.06 gal	6.12 kg	13.4 lb
415-20L	Pail	20 L	5.3 gal	28.3 kg	62.3 lb

Related Products and Etching Kits

- *Economy Etching Kit*: Cat. No. 416-ES
- *Photofabrication Kit*: Cat. No. 416-K
- *Professional Etching Kit*: Cat. No. 416-E

Technical Support

Please contact us regarding any questions, suggestions for improvements, or problems with this product. Application notes, instructions and FAQs are located at www.mgchemicals.com.

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Disclaimer

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