



JEFFADD[®] MW

Multifunctional Amines
for Metalworking Fluids

Distributed by:



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HUNTSMAN

Enriching lives through innovation



JEFFADD[®] MW

Multifunctional Amines for Metalworking Fluids

Metalworking Fluids

As the metalworking industry advances, the need for longer lasting and higher performing metalworking fluids has grown, while stricter regulations and safety concerns have limited available additives. This has created a need for multifunctional components capable of increasing performance efficiently. Today's formulators are looking for single components with a broad range of benefits to meet their customer's needs and distinguish their product line.

Role of JEFFADD[®] MW Amines

Amines are used for pH buffering, alkalinity, and corrosion control in the fluid which can affect the output of the metalworking process. Careful selection of an amine is critical to achieving the desired fluid performance. Formulators must account for environmental, health & safety concerns in addition to performance criteria. Huntsman's JEFFADD[®] MW series of amines go beyond buffering and introduce a broad range of benefits to help meet the specific needs of your customer.

Learn more at

www.huntsman.com/metalworking



FEATURES & BENEFITS

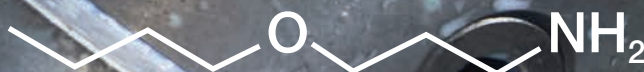
- Easy to formulate
- Inherently low foaming
- Helps extend fluid life & pH stability
- Good buffering capacity
- Source of alkalinity
- Low to mild aluminum staining
- Low vapor phase aluminum staining
- Ferrous corrosion protection
- Good tramp oil rejection

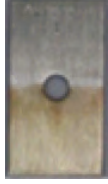








JEFFADD® MW-781 Amine

JEFFADD® MW-781 amine is a strong primary amine that has both hydrophilic and hydrophobic properties. An easy-to-formulate amine, it is inherently low-foaming and shows excellent performance in synthetic metalworking fluids.

FEATURES & BENEFITS

- Strong primary amine
- Low-to-mild staining amine salts on aluminum
- Low vapor phase staining on aluminum
- Inherently low foaming
- Excellent tramp oil rejection in synthetics
- Source of alkalinity
- Extends fluid life by enhancing pH stability
- Acts as coupling agent



ALLOY	1.5% MW-781 + Dodecanedioic Acid	1.5% MW-781 + Isononanoic Acid	1.5% MW-781 + Boric Acid
Al 2024			
Al 6061			
Al 7075			

Salts of MW-781 have mild to low staining on aluminum

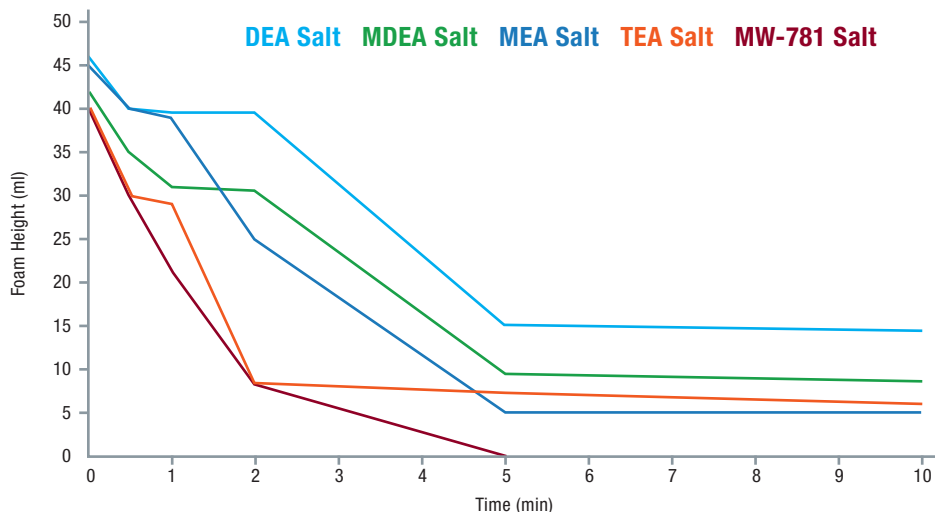
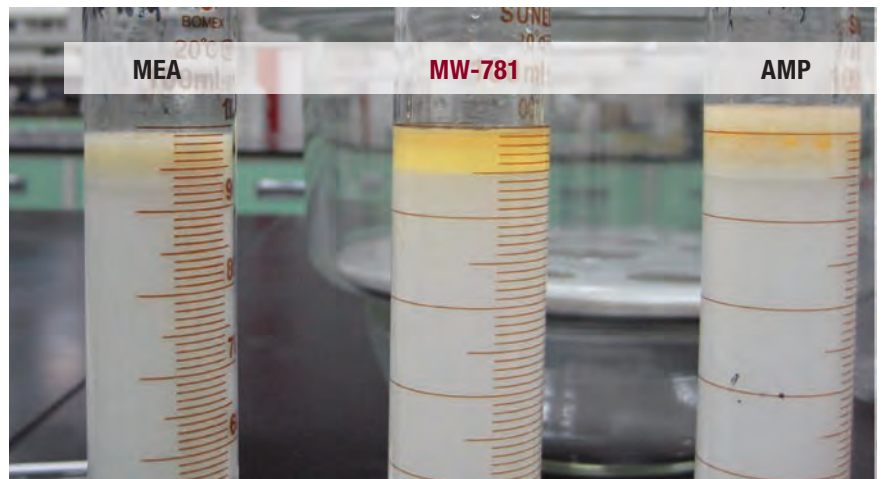
Optimal performance with dodecanedioic acid for broad range of aluminum alloys

MW-781 borate shows no staining on Al 6061

Clear separation of oil

Prevents emulsification of tramp oil which increases fluid life and performance

Excellent for fully synthetic cutting fluids that need low foaming



MW-781 is itself inherently low foaming

Salts of MW-781 are low in foaming compared to other aminoalcohols

Lower foaming occurs when using MW-781 in combination with a reverse EO:PO block copolymer

JEFFADD[®] MW-740 Amine

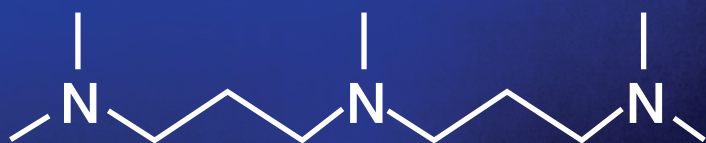
JEFFADD[®] MW-740 amine is a tertiary amine that can be used in a variety of water-miscible metalworking formulations.

JEFFADD[®] MW-750 Amine

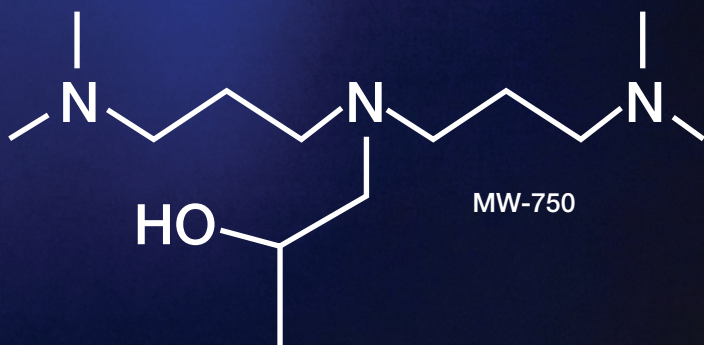
JEFFADD[®] MW-750 amine imparts alkalinity and is a good pH buffer for multiple metalworking formulations.

FEATURES & BENEFITS

- Tertiary amines
- Mild staining on aluminum
- Inherently low foaming
- Source of alkalinity
- Globally registered
- Easily formulated
- Extends fluid life by enhancing pH stability
- Good ferrous corrosion protection




MW-740



MW-750



AMINE	1.5% Aqueous Amine	1.5% Amine + Dodecanedioic Acid	1.5% Amine + Boric Acid
MW-740			
MW-750			
Specialty Amine 1			

Amines themselves show mild staining on aluminum (Al 7075 shown)

Amine solution (no acid) shows mild staining on aluminum

Excellent for multi-metal applications

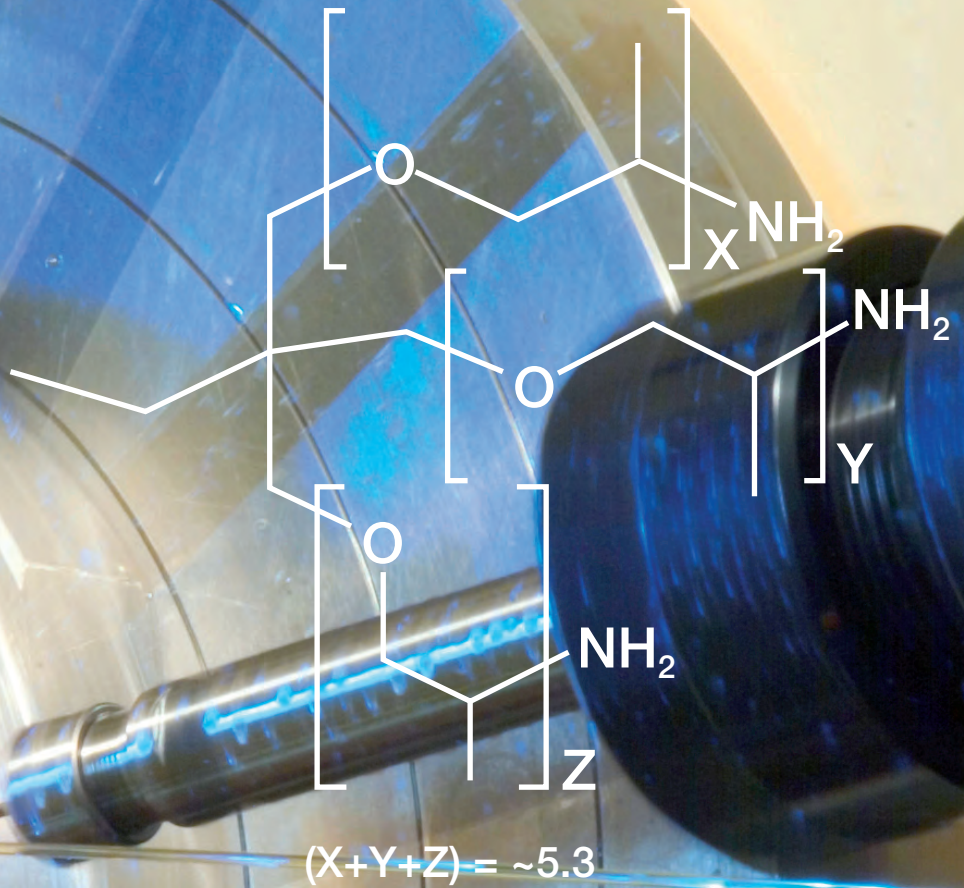
Better pH buffering when compared to benchmark Specialty Amine 1

Products are easily formulated and provide more alkalinity compared to similar amines

	MW-740	MW-750	Specialty Amine 1
pH buffering, mL 0.1 N HCl			
pH 8 - 10	8.0	6.5	4.6
pH 8 - 9	3.6	3.0	0.8
Total Alkalinity, mg KOH/g	836.8	678.9	478.0

AMINE	Rust Break Point of Amine + Dodecanedioic Acid		Rust Break Point of Amine + Tricarboxylic Acid	
MW-740	1.50%	2.00%	1.50%	2.00%
MW-750	2.00%	2.50%	1.00%	1.50%

Both MW-740 and MW-750 demonstrate good corrosion inhibition with a tricarboxylic acid and dodecanedioic acid



JEFFADD® MW-703 Amine

JEFFADD® MW-703 amine is a tri-functional primary amine used in water-miscible metal-working fluids. This polyetheramine can be applied to various types of cutting and forming fluids to enhance the performance of a formulation. It is low in odor, viscosity and vapor pressure, making it easy to handle and use.

FEATURES & BENEFITS

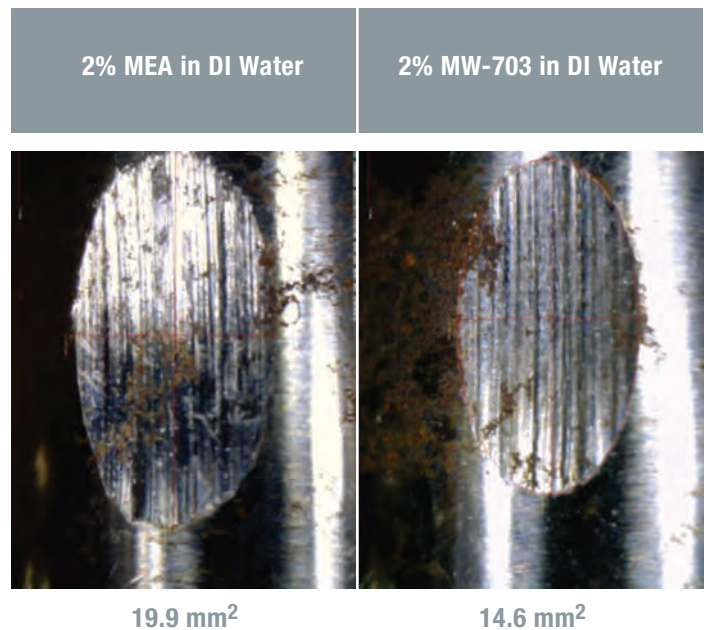
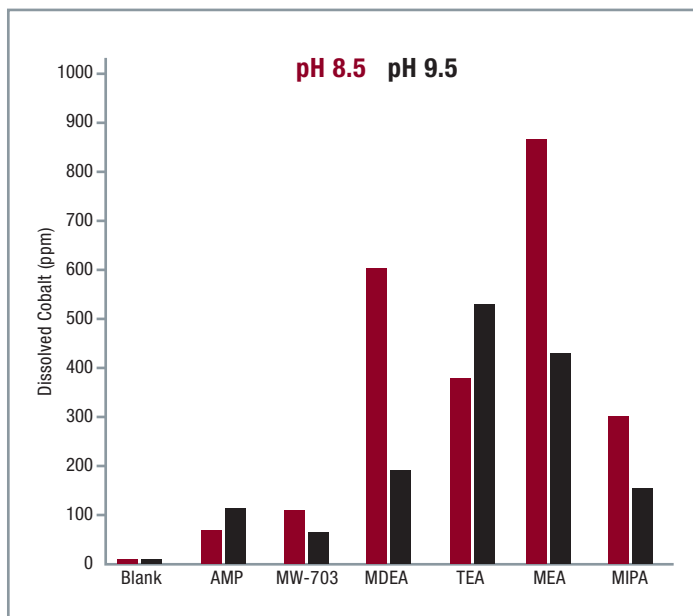
- Inherently low foaming
- Low staining on aluminum
- Low tendency to leach cobalt and copper
- Source of alkalinity
- Imparts some lubricity to the formulation
- Extends fluid life by enhancing pH stability
- Globally registered

AMINE	1.5% Aqueous Amine	1.5% Amine + Tricarboxylic Acid	1.5% Amine + Sebacic Acid	1.5% Amine + Boric Acid
MW-703				
Specialty Amine 1				
Specialty Amine 2				

Low staining on aluminum (Al 7075 shown) compared to similar amines

No staining on aluminum in combination with boric acid

Uniform performance in combination with a range of carboxylic acids

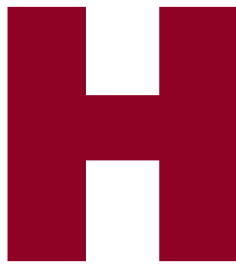


MW-703 shows comparable cobalt leaching to AMP and better performance than other amino alcohols

Similar leaching results are observed in tests with copper

MW-703 can impart some lubricity to the formulation, reducing the need for other additives

Formulating with MW-703 gives multiple benefits such as lubricity, alkalinity and low staining on aluminum to create unique multi-metal fluids



Huntsman is a global producer of key additives used throughout the metalworking industry, and we are committed to producing the highest quality amines, surfactants and related chemicals. Our customers benefit from in-depth expertise and global technical support.



Chemical Type	Alkalinity Control	Corrosion Inhibitor	Emulsifier	Lubricity Additive	Coupling Agent	Low Foaming	Application	Huntsman Product Line
								EO = Emulsified oil SS = Semi-synthetic fluid SY = Synthetic fluid
Amines	●	●					EO, SS, SY	MEA, TEA, MDEA, & DGA™ agent
Specialty Amines	●	●				●	EO, SS, SY	JEFFADD® MW amines
Polyetheramines		●		●		●	EO, SS, SY	JEFFAMINE® polyetheramines
Amine Ethoxylates			●				EO, SS	TERIC® 16M, 18M & SURFONIC® PEA-25, T series surfactants
Fatty Acid Ethoxylates			●	●			EO, SS	SURFONIC® MW-100 additive, CO series & TERIC® SF, OF series surfactants
Fatty Alcohol Ethoxylates			●		●		EO, SS, SY	SURFONIC® L12, L24 & TERIC® 12A, 13A, 17A series surfactants
Fatty Alcohol Alkoxyates			●		●	●	EO, SS	SURFONIC® LF, P, & TERIC® BL series surfactants
Nonylphenol Ethoxylates			●			●	EO, SS, SY	SURFONIC® N & TERIC® N series surfactants
EO:PO Block Copolymers			●			●	SS, SY	SURFONIC® POA-L & TERIC® PE series surfactants
Reverse EO:PO Block Copolymers			●	●		●	SY	SURFONIC® POA series surfactants
Synthetic Sodium Sulfonates		●	●			●	EO, SS	SURFONIC® SM series surfactants
Phosphate Esters		●	●	●			EO, SS	SURFONIC® PE series surfactants
Functional Fluids				●		●	SY	JEFFOX® WL series surfactants
Polyethylene Glycols					●		SS, SY	PEG & POGOL™ series glycols





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www.huntsman.com/performance_products



About Huntsman

Huntsman Corporation is a publicly traded global manufacturer and marketer of differentiated chemicals with 2016 revenues of approximately \$10 billion. Our chemical products number in the thousands and are sold worldwide to manufacturers serving a broad and diverse range of consumer and industrial end markets. We operate more than 100 manufacturing and R&D facilities in approximately 30 countries and employ approximately 15,000 associates. For more information about Huntsman, please visit the company's website at www.huntsman.com.

Huntsman Performance Products

Performance Products brings together innovation and world-leading process technologies to produce more than 2,000 components used to formulate products that enhance people's lives:

- **Amines:** Largest global producer of specialty amines used in composites, coatings, fuel and lube additives, and gas treating
- **Maleic Anhydride:** The leading global producer and supplier into areas such as unsaturated polyester resins, food, oil additives and coatings
- **Surfactants:** Integrated producer of a wide range of products for home and personal care, oilfield, agriculture, and process industries
- **Ethylene and Derivatives:** Highly integrated manufacturer of ethylene, ethylene oxide, ethylene glycol and other derivatives

The division has 14 manufacturing plants and had 2016 revenues of USD 2.1 billion.

www.huntsman.com/performance_products

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