1. Identification

Product identifier **Aluminum Etch 16:1:1:2**

Other means of identification None.

Recommended use of the chemical and restrictions on use

Recommended use Industrial use.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer/Supplier CMC Materials; 870 North Commons Drive; Aurora, IL 60504; United States

Telephone +1.630.375.6631

Manufacturer/Supplier CMC Materials; Amber Business Centre; Riddings Alfreton Derbyshire DE55 4DA; United Kingdom

Telephone +44 (0) 1773 844200

E-mail steve.grundy@cmcmaterials.com

Manufacturer/Supplier CMC Materials; 300 Throckmorton, Suite 1900; Fort Worth, Texas 76102; United States

Telephone +1.817.761.6100

Manufacturer/Supplier CMC Materials; Les Vieilles Hayes; 50620 Saint Fromond; France

Telephone +33 (0) 2 33 75 64 00

E-mail francesds@cmcmaterials.com

Manufacturer/Supplier CMC Materials; 9 Tuas View Lane; Singapore 638826

Telephone 65.3163.6666

Manufacturer/Supplier CMC Materials; Via Umbria 4; 20098 San Giuliano Milanese (MI); Italy

Telephone +39 02 988381 / +44 (0) 1773 844200

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Emergency phone number

3E Global Incident Response Hotline

Singapore +65 3158 6734

Asia-Pacific +1.760.476.3960

International +1.760.476.3962

Access code 333035

CHEMTREC For Dangerous Goods Incidents ONLY (spill, leak, fire, exposure or accident), call CHEMTREC 24/7 at:

Singapore 800.101.2201

International +1.703.741.5970

2. Hazards identification

GHS classification

Physical hazards	Corrosive to metals	Category 1
Health hazards	Acute toxicity, oral	Category 4
	Acute toxicity, dermal	Category 4
	Skin corrosion/irritation	Category 1
	Serious eye damage/eye irritation	Category 1
	Specific target organ toxicity following single exposure	Category 3 respiratory tract irritation
Environmental hazards	Not classified.	

GHS label elements, including precautionary statements

Pictograms

Signal word Danger

Hazard statements May be corrosive to metals. Harmful if swallowed. Harmful in contact with skin. Causes severe skin burns and eye damage. May cause respiratory irritation.

Precautionary statement

Prevention Do not breathe mist/vapours. Wash thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection.

Response IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTRE/doctor.

Storage Not assigned.

Disposal Not assigned.

Other hazards which do not result in classification None known.

Supplemental information None.

3. Composition/information on ingredients

Substance or mixture Mixture

Chemical name	Common name and synonyms	CAS Number	Concentration (%)
Phosphoric acid		7664-38-2	75 - < 78
Acetic acid		64-19-7	1 - 5
Nitric acid		7697-37-2	1 - 5

Composition comments All concentrations are in percent by weight unless otherwise indicated.
Components not listed are either non-hazardous or are below reportable limits.

4. First-aid measures

Inhalation Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a poison control center or doctor for further treatment advice.

Skin contact Take off immediately all contaminated clothing. Rinse skin with water/shower. Call a physician or poison control centre immediately. Chemical burns must be treated by a physician.

Eye contact Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician or poison control centre immediately.

Ingestion Call a physician or poison control centre immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Most important symptoms/effects, acute and delayed Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. May cause respiratory irritation.

Indication of immediate medical attention and special treatment needed Provide general supportive measures and treat symptomatically. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Keep victim warm. Keep victim under observation. Symptoms may be delayed.

General information If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

5. Fire-fighting measures

Suitable extinguishing media Water spray. Dry chemical. Carbon dioxide (CO2).

Unsuitable extinguishing media Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical In case of fire and/or explosion do not breathe fumes. During fire, gases hazardous to health may be formed. Combustion products may include: carbon oxides, nitrogen oxides, phosphorus oxides. Contact with metals may evolve flammable hydrogen gas.

Fire fighting equipment/instructions Move containers from fire area if you can do so without risk. Use water spray to cool unopened containers. Dike fire control water for later disposal. Avoid discharge into drains, water courses or onto the ground.

Special protective equipment and precautions for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Specific methods Use standard firefighting procedures and consider the hazards of other involved materials.

General fire hazards By heating and fire, toxic and corrosive vapours/gases may be formed.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not breathe mist/vapours. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Environmental precautions Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

Methods and materials for containment and cleaning up This product is miscible in water. Prevent entry into waterways, sewer, basements or confined areas.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb spillage to prevent material damage. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water. Retain and dispose of contaminated wash water.

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.

7. Handling and storage

Precautions for safe handling Do not breathe mist/vapours. Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Avoid prolonged exposure. When using, do not eat, drink or smoke. Provide adequate ventilation. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Avoid release to the environment. Wash contaminated clothing before reuse. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities Store locked up. Store in a cool, dry place out of direct sunlight. Store in a well-ventilated place. Store in corrosive resistant container with a resistant inner liner. Store in tightly closed container. Keep only in the original container. Store away from incompatible materials (see section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

Singapore. PELs. (Workplace Safety and Health (Permissible Exposure Levels of Toxic Substances) Order)

Components	Type	Value
Acetic acid (CAS 64-19-7)	STEL	37 mg/m3
		15 ppm
	TWA	25 mg/m3
		10 ppm
Nitric acid (CAS 7697-37-2)	STEL	10 mg/m3
		4 ppm
	TWA	5.2 mg/m3
		2 ppm
Phosphoric acid (CAS 7664-38-2)	STEL	3 mg/m3
	TWA	1 mg/m3

Control parameters/Occupational exposure limits

US. ACGIH Threshold Limit Values

Components	Type	Value
Acetic acid (CAS 64-19-7)	STEL	15 ppm
	TWA	10 ppm
Nitric acid (CAS 7697-37-2)	STEL	4 ppm
	TWA	2 ppm
Phosphoric acid (CAS 7664-38-2)	STEL	3 mg/m3
	TWA	1 mg/m3

Appropriate engineering control measures	Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection	Wear approved chemical safety goggles. Wear face shield if there is risk of splashes.
Skin protection	
Hand protection	Wear appropriate chemical resistant gloves. Recommended use: Glove material: Neoprene. Use gloves with breakthrough time of >480 minutes. Minimum glove thickness 0.75 mm. Glove material: Viton/Butyl. Use gloves with breakthrough time of >480 minutes. Minimum glove thickness 0.30 mm. Suitable gloves can be recommended by the glove supplier.
Other	Wear appropriate chemical resistant clothing. The following protective clothing is recommended: apron, boots, coveralls, protective sleeves.
Respiratory protection	When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. Selection and use of respiratory protective equipment should be in accordance with Singapore Standard SS 548:2009. Appropriate respirator selection should be made by a qualified professional. Recommended use: Chemical respirator with acid gas cartridge. High concentration: Supplied-air respirator with a full facepiece that is operated in a pressure-demand or other supplied air mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance	
Physical state	Liquid.
Form	Clear liquid.
Colour	Clear.
Odour	Not available.
Odour threshold	Not available.
pH	1.51
Melting point/freezing point	< -20 °C (< -4 °F)
Initial boiling point and boiling range	145.3 °C (293.54 °F) (100.6 kPa)
Flash point	103.5 °C (218.3 °F)
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Explosive limit - lower (%)	Not applicable.
Explosive limit – upper (%)	Not applicable.
Vapour pressure	17.54 mmHg
Vapour density	2.9 (Air = 1)
Relative density	1.59 (water=1) (20 °C (68 °F))
Solubility(ies)	
Solubility (water)	Miscible in all proportions at ambient lab temperature.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other data	
Density	1.522 g/cm³
Explosive properties	Not explosive.

Oxidising properties Not oxidising.

10. Stability and reactivity

Reactivity Reacts violently with strong alkaline substances. This product may react with reducing agents. May be corrosive to metals.

Chemical stability Material is stable under normal conditions.

Possibility of hazardous reactions Contact with metals may evolve flammable hydrogen gas.

Conditions to avoid Contact with incompatible materials.

Incompatible materials Water, moisture. Bases. Strong oxidising agents. Reducing Agents. Metals. Alcohols.

Hazardous decomposition products Irritating and/or toxic fumes and gases may be emitted upon the product's decomposition.

11. Toxicological information

Information on likely routes of exposure

Inhalation May cause irritation to the respiratory system.

Skin contact Causes severe skin burns. Harmful in contact with skin.

Eye contact Causes serious eye damage.

Ingestion Causes digestive tract burns. Harmful if swallowed.

Acute toxicity Harmful in contact with skin. Harmful if swallowed.

Components	Species	Test Results
Nitric acid (CAS 7697-37-2)		
Acute		
Inhalation		
Vapour		
LC50	Rat	> 2.65 mg/l, 4 hr

Symptoms Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. May cause respiratory irritation.

Skin corrosion/irritation Causes severe skin burns.

Serious eye damage/eye irritation Causes serious eye damage.

Respiratory or skin sensitisation

Respiratory sensitisation Not a respiratory sensitiser.

Skin sensitisation This product is not expected to cause skin sensitisation.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity Not classifiable as to carcinogenicity to humans.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure May cause respiratory irritation.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful.

Other information Prolonged exposure may cause chronic effects.

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However: Because of the low pH of this product, it would be expected to produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems.

Persistence and degradability The product contains inorganic compounds which are not biodegradable.

Bioaccumulative potential

Octanol/water partition coefficient log Kow

Acetic acid (CAS 64-19-7) -0.17

Mobility in soil The product is completely soluble in water. Expected to be mobile in soil.

Other adverse effects	The product may affect the acidity (pH-factor) in water with risk of harmful effects to aquatic organisms.

13. Disposal considerations

Disposal methods/information	Consult authorities before disposal. Do not allow this material to drain into sewers/water supplies. Dispose of contents/container in accordance with local/regional/national/international regulations.
Special precautions	Dispose in accordance with all applicable regulations.

14. Transport information

ADR

UN number	UN3264
UN proper shipping name	CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Phosphoric acid; Acetic acid)
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Label(s)	8
Hazard No. (ADR)	80
Tunnel restriction code	(E)
Packing group	II
Environmental hazards	No
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

RID

UN number	UN3264
UN proper shipping name	CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Phosphoric acid; Acetic acid)
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Label(s)	8
Packing group	II
Environmental hazards	No
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

ADN

UN number	UN3264
UN proper shipping name	CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Phosphoric acid; Acetic acid)
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Label(s)	8
Packing group	II
Environmental hazards	No
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

IATA

UN number	UN3264
UN proper shipping name	Corrosive liquid, acidic, inorganic, n.o.s. (Phosphoric acid; Acetic acid)
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Label(s)	8
Packing group	II
Environmental hazards	No
ERG Code	8L
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number	UN3264
UN proper shipping name	CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Phosphoric acid; Acetic acid)
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Label(s)	8
Packing group	II
Environmental hazards	
Marine pollutant	No
EmS	F-A, S-B
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not established.

15. Regulatory information

Safety, health and environmental regulations specific for the product in question

This safety data sheet was prepared in accordance with Singapore Standard Specification for Hazard Communication for Hazardous Chemicals and Dangerous Goods Part 3: Preparation of Safety Data Sheets (SDS) (SS 586: Part 3: 2014) as amended.

Prior Informed Consent (PIC) Substances (Environment Protection and Management Act, 2nd Schedule, Part 1, Jul. 1, 2013)

Not regulated.

Chemical Weapons Prohibition (Act)

Not applicable.

Environmental Protection and Management (Hazardous Substances) Regulations

Acetic acid (CAS 64-19-7)	1000 kg
Nitric acid (CAS 7697-37-2)	1000 kg 50 kg
Phosphoric acid (CAS 7664-38-2)	0 kg

Environmental Public Health Act

Not applicable.

Misuse of Drugs Act

Controlled Narcotic Drugs (Misuse of Drugs Act, First Schedule, Part I, II & III, as amended)

Not regulated.

Drug Precursors (Misuse of Drugs Act, Third Schedule, Parts I & II, as amended)

Not regulated.

Controlled Specified Drugs (Misuse of Drugs Act, Fourth Schedule, as amended)

Not regulated.

Temporarily Listed Drugs (Misuse of Drugs Act, Fifth Schedule, as amended)

Not regulated.

International regulations

Montreal Protocol

Not applicable.

Stockholm Convention

Not applicable.

Rotterdam Convention

Not applicable.

Kyoto Protocol

Not applicable.

Basel Convention

Not applicable.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes

Country(s) or region	Inventory name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information

References HSDB® - Hazardous Substances Data Bank
IARC Monographs. Overall Evaluation of Carcinogenicity

Issued by Not available.

Prepared by

Title Sharlene Parry, Product Stewardship Manager

Disclaimer CMC Materials cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

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Key/legend ADN: European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways.
ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road.
CAS: Chemical Abstract Service.
IARC: International Agency for Research on Cancer.
IATA: International Air Transport Association.
IBC: Intermediate Bulk Container.
IMDG: International Maritime Dangerous Goods.
MARPOL: International Convention for the Prevention of Pollution From Ships.
RID: Regulations concerning the International Carriage of Dangerous Goods by Rail.
STEL: Short-Term Exposure Limit.
TWA: Time Weighted Average.