MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name	**FA512**
Version #	01
Issue date	24-March-2014
Revision date	-
Supersedes date	-
CAS #	Mixture
Product code	338
Product use	Friction material, disc brake pad.
Manufacturer information	
Manufacturer/Supplier	Federal-Mogul World Headquarters 26555 Northwestern Highway Southfield, Michigan 48033 USA
Contact person:	msds.request@federalmogul.com
Emergency Telephone:	24hr EP (INFOTRAC): 1-800-535-5053 International: (001) 352-323-3500

2. Hazards Identification

Physical state	Solid.
Appearance	Solid (article).
Emergency overview	Low hazard for recommended handling by trained personnel. Dust can be created by the machining of finished products.
OSHA regulatory status	Under some use conditions, this material may be considered to be hazardous in accordance with OSHA 29 CFR 1910.1200.
Potential health effects	
Routes of exposure	Not relevant, due to the form of the product in its manufactured and shipped state.
Eyes	Dust may irritate the eyes.
Skin	The ingredients may be released as general dust from the product by operations such as overheating, burning, machining, abrading, or riveting. Dust may irritate skin.
Inhalation	The ingredients may be released as general dust from the product by operations such as overheating, burning, machining, abrading, or riveting. Dust may irritate the respiratory system. Inhalation of powder or fumes may cause metal fume fever. Inhalation may lead to deposition in lung and in sufficient quantities produce baritosis.
Ingestion	The ingredients may be released as general dust from the product by operations such as overheating, burning, machining, abrading, or riveting. May cause discomfort if swallowed.
Target organs	Eyes. Respiratory system. Skin. Lung. Kidneys. Liver.
Chronic effects	The ingredients may be released as general dust from the product by operations such as overheating, burning, machining, abrading, or riveting. May cause lung damage. May cause damage to the liver and kidneys.
Signs and symptoms	Exposed individuals may experience eye tearing, redness, and discomfort.
Potential environmental effects	Not relevant, due to the form of the product in its manufactured and shipped state.

3. Composition / Information on Ingredients

Components	CAS #	Percent
Barium sulphate	7727-43-7	10 - 30
Zirconium dioxide	1314-23-4	10 - 30
Graphite	7782-42-5	5 - 10
Calcium carbonate	471-34-1	3 - 7

Components	CAS #	Percent
Copper	7440-50-8	3 - 7
Mica	12001-26-2	3 - 7
Wollastonite	13983-17-0	1 - 5
Antimony sulfide	1345-04-6	1 - 5
Aramid fiber	26125-61-1	1 - 5
Calcium hydroxide	1305-62-0	0.01 - 1

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

The ingredients may be released as general dust from the product by operations such as overheating, burning, machining, abrading, or riveting. This product contains a variety of ingredients all of which have become part of a bound system both physically and chemically and do not necessarily exhibit the properties of the individual components.

4. First Aid Measures

First aid procedures

Eye contact Dust in the eyes: Immediately flush with plenty of water for up to 15 minutes. Remove any contact lenses and open eyelids wide apart. Get medical attention if irritation develops and persists.

Skin contact Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention if irritation develops and persists.

Inhalation Move injured person into fresh air and keep person calm under observation. If necessary, seek hospital and take along these instructions.

Ingestion If swallowed, rinse mouth with water (only if the person is conscious). Get medical attention if any discomfort continues.

Notes to physician Treat symptomatically.

General advice Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire Fighting Measures

Flammable properties This product is not flammable.

Extinguishing media

Suitable extinguishing media Use fire-extinguishing media appropriate for surrounding materials.

Unsuitable extinguishing media None.

Protection of firefighters

Specific hazards arising from the chemical By heating and fire, toxic vapors/gases may be formed.

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

Fire fighting equipment/instructions Use standard firefighting procedures and consider the hazards of other involved materials.

Hazardous combustion products Carbon dioxide. Carbon monoxide. Metallic fumes.

General fire hazards This product is not flammable. Will burn if involved in a fire.

6. Accidental Release Measures

Personal precautions Use explosion-proof electrical equipment if airborne dust levels are high. Avoid dust formation. Avoid inhalation of dust and contact with skin and eyes. Wear necessary protective equipment. See Section 8 of the MSDS for Personal Protective Equipment.

Environmental precautions Avoid discharge into drains, water courses or onto the ground. Collect and dispose of spillage as indicated in Section 13 of the MSDS.

Methods for containment In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

Methods for cleaning up Collect powder using special dust vacuum cleaner with particle filter or carefully sweep into closed container. Do not vacuum clean unless vacuum cleaners are equipped with HEPA filter. For waste disposal, see Section 13 of the MSDS.

7. Handling and Storage

Handling Provide adequate ventilation. Avoid dust formation. Avoid inhalation of dust and contact with skin and eyes. Use work methods which minimize dust production. See Section 8 of the MSDS for Personal Protective Equipment. Observe good industrial hygiene practices.

Storage Store in tightly closed original container. Avoid conditions which create dust. Protect against direct sunlight. Store away from incompatible materials.

8. Exposure Controls / Personal Protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Antimony sulfide (CAS 1345-04-6)	TWA	0.5 mg/m3	
Barium sulphate (CAS 7727-43-7)	TWA	10 mg/m3	
Calcium hydroxide (CAS 1305-62-0)	TWA	5 mg/m3	
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Graphite (CAS 7782-42-5)	TWA	2 mg/m3	Respirable fraction.
Mica (CAS 12001-26-2)	TWA	3 mg/m3	Respirable fraction.
Zirconium dioxide (CAS 1314-23-4)	STEL	10 mg/m3	
	TWA	5 mg/m3	

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
Antimony sulfide (CAS 1345-04-6)	PEL	0.5 mg/m3	
Barium sulphate (CAS 7727-43-7)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
Calcium carbonate (CAS 471-34-1)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
Calcium hydroxide (CAS 1305-62-0)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
Copper (CAS 7440-50-8)	PEL	1 mg/m3	Dust and mist.
		0.1 mg/m3	Fume.
Graphite (CAS 7782-42-5)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
Zirconium dioxide (CAS 1314-23-4)	PEL	5 mg/m3	

US. OSHA Table Z-3 (29 CFR 1910.1000)

Components	Type	Value
Graphite (CAS 7782-42-5)	TWA	15 millions of particle
Mica (CAS 12001-26-2)	TWA	20 mppcf

Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2)

Components	Type	Value	Form
Antimony sulfide (CAS 1345-04-6)	TWA	0.5 mg/m3	
Barium sulphate (CAS 7727-43-7)	TWA	10 mg/m3	

Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2)

Components	Type	Value	Form
Calcium carbonate (CAS 471-34-1)	TWA	10 mg/m3	
Calcium hydroxide (CAS 1305-62-0)	TWA	5 mg/m3	
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Graphite (CAS 7782-42-5)	TWA	2 mg/m3	Respirable.
Mica (CAS 12001-26-2)	TWA	3 mg/m3	Respirable.
Zirconium dioxide (CAS 1314-23-4)	STEL	10 mg/m3	
	TWA	5 mg/m3	

Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)

Components	Type	Value	Form
Antimony sulfide (CAS 1345-04-6)	TWA	0.5 mg/m3	
Barium sulphate (CAS 7727-43-7)	TWA	3 mg/m3	Respirable fraction.
		10 mg/m3	Total dust.
Calcium carbonate (CAS 471-34-1)	STEL	20 mg/m3	Total dust.
	TWA	3 mg/m3	Respirable fraction.
		10 mg/m3	Total dust.
Calcium hydroxide (CAS 1305-62-0)	TWA	5 mg/m3	
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Graphite (CAS 7782-42-5)	TWA	2 mg/m3	Respirable.
Mica (CAS 12001-26-2)	TWA	3 mg/m3	Respirable.
Zirconium dioxide (CAS 1314-23-4)	STEL	10 mg/m3	
	TWA	5 mg/m3	

Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act)

Components	Type	Value	Form
Antimony sulfide (CAS 1345-04-6)	TWA	0.5 mg/m3	
Barium sulphate (CAS 7727-43-7)	TWA	10 mg/m3	
Calcium hydroxide (CAS 1305-62-0)	TWA	5 mg/m3	
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Graphite (CAS 7782-42-5)	TWA	2 mg/m3	Respirable fraction.
Mica (CAS 12001-26-2)	TWA	3 mg/m3	Respirable fraction.
Zirconium dioxide (CAS 1314-23-4)	STEL	10 mg/m3	
	TWA	5 mg/m3	

Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)

Components	Type	Value	Form
Antimony sulfide (CAS 1345-04-6)	TWA	0.5 mg/m3	
Barium sulphate (CAS 7727-43-7)	TWA	10 mg/m3	
Calcium hydroxide (CAS 1305-62-0)	TWA	5 mg/m3	
Copper (CAS 7440-50-8)	TWA	0.2 mg/m3	Fume.
Graphite (CAS 7782-42-5)	TWA	2 mg/m3	Respirable fraction.

Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)

Components	Type	Value	Form
Mica (CAS 12001-26-2)	TWA	3 mg/m3	Respirable fraction.
Zirconium dioxide (CAS 1314-23-4)	STEL	10 mg/m3	
	TWA	5 mg/m3	

Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment)

Components	Type	Value	Form
Antimony sulfide (CAS 1345-04-6)	TWA	0.5 mg/m3	
Barium sulphate (CAS 7727-43-7)	TWA	5 mg/m3	Respirable dust.
		10 mg/m3	Total dust.
Calcium carbonate (CAS 471-34-1)	TWA	10 mg/m3	Total dust.
Calcium hydroxide (CAS 1305-62-0)	TWA	5 mg/m3	
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Graphite (CAS 7782-42-5)	TWA	2 mg/m3	Respirable dust.
Mica (CAS 12001-26-2)	TWA	3 mg/m3	Respirable dust.
Wollastonite (CAS 13983-17-0)	TWA	10 mg/m3	Fiber.
Zirconium dioxide (CAS 1314-23-4)	STEL	10 mg/m3	
	TWA	5 mg/m3	

Mexico. Occupational Exposure Limit Values

Components	Type	Value	Form
Antimony sulfide (CAS 1345-04-6)	TWA	0.5 mg/m3	
Calcium carbonate (CAS 471-34-1)	STEL	20 mg/m3	
	TWA	10 mg/m3	
Calcium hydroxide (CAS 1305-62-0)	TWA	5 mg/m3	
Copper (CAS 7440-50-8)	STEL	2 mg/m3	Fume.
		2 mg/m3	Dust and mist.
	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Graphite (CAS 7782-42-5)	TWA	10 mg/m3	
Mica (CAS 12001-26-2)	TWA	3 mg/m3	
Zirconium dioxide (CAS 1314-23-4)	STEL	10 mg/m3	
	TWA	5 mg/m3	

Engineering controls Use explosion-proof electrical equipment if airborne dust levels are high. Provide adequate ventilation. Observe Occupational Exposure Limits and minimize the risk of inhalation of dust.

Personal protective equipment

Eye / face protection Wear approved safety goggles.

Skin protection Wear protective gloves (i.e. latex, nitrile). Wear suitable protective clothing. Suitable gloves can be recommended by the glove supplier.

Respiratory protection If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. During dust-raising work: In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA Standard 1910.134. Respirator type: Any powered, air-purifying respirator with a high-efficiency particulate filter.

General hygiene considerations 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 & Chemical Properties

Appearance	Solid (article).
Physical state	Solid.
Form	Solid (Disc pad).
Color	Gray.
Odor	None.
Odor threshold	Not applicable.
pH	Not applicable.
Vapor pressure	Not applicable.
Vapor density	Not applicable.
Boiling point	Not applicable.
Melting point/Freezing point	Not applicable.
Solubility (water)	Not available.
Specific gravity	2 - 3 (20 °C)
Flash point	Not applicable.
Flammability limits in air, upper, % by volume	Not applicable.
Flammability limits in air, lower, % by volume	Not applicable.
Auto-ignition temperature	Not applicable.

10. Chemical Stability & Reactivity Information

Chemical stability	Material is stable under normal conditions.
Conditions to avoid	None known.
Incompatible materials	None.
Hazardous decomposition products	Carbon dioxide. Carbon monoxide. Metallic fumes.
Possibility of hazardous reactions	Will not occur.

11. Toxicological Information

Toxicological data

Components	Species	Test Results
Calcium carbonate (CAS 471-34-1)		
Acute		
Oral		
LD50	Rat	6450 mg/kg
Calcium hydroxide (CAS 1305-62-0)		
Acute		
Oral		
LD50	Rat	7340 mg/kg

Sensitization	Not a skin sensitizer.
Acute effects	The ingredients may be released as general dust from the product by operations such as overheating, burning, machining, abrading, or riveting. Dust may cause eye, skin and respiratory tract irritation. Inhalation may lead to deposition in lung and in sufficient quantities produce baritosis. Inhalation of powder or fumes may cause metal fume fever.
Chronic effects	The ingredients may be released as general dust from the product by operations such as overheating, burning, machining, abrading, or riveting. May cause lung damage. May cause damage to the liver and kidneys.
Carcinogenicity	Not classified.

ACGIH Carcinogens

Zirconium dioxide (CAS 1314-23-4)	A4 Not classifiable as a human carcinogen.

IARC Monographs. Overall Evaluation of Carcinogenicity

Antimony sulfide (CAS 1345-04-6)	3 Not classifiable as to carcinogenicity to humans.
Aramid fiber (CAS 26125-61-1)	3 Not classifiable as to carcinogenicity to humans.
Wollastonite (CAS 13983-17-0)	3 Not classifiable as to carcinogenicity to humans.

Mutagenicity No data available.

Reproductive effects No data available.

Symptoms and target organs Exposed individuals may experience eye tearing, redness, and discomfort.

12. Ecological Information

Ecotoxicological data

Components		Species	Test Results
Barium sulphate (CAS 7727-43-7)			
Aquatic			
Crustacea	EC50	Tubificid worm (Tubifex tubifex)	28.61 - 38.03 mg/l, 48 hours
Calcium hydroxide (CAS 1305-62-0)			
Aquatic			
Fish	LC50	Zambezi barbel (Clarias gariepinus)	33.8844 mg/l, 96 hours
Copper (CAS 7440-50-8)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	0.0318 mg/l, 48 hours
	LC50	Water flea (Daphnia magna)	0.04 - 0.05 mg/l, 48 hours
Fish	LC50	Chinook salmon (Oncorhynchus tshawytscha)	0.02 mg/l, 96 hours
		Oncorhynchus mykiss	200 µg/l, 96 hours

Ecotoxicity Not relevant, due to the form of the product in its manufactured and shipped state.

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

Bioaccumulation / Accumulation No data available.

Mobility in environmental media The product is insoluble in water and will sediment in water systems.

13. Disposal Considerations

Disposal instructions Disposal recommendations are based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

Waste from residues / unused products Dispose of waste and residues in accordance with local authority requirements.

Contaminated packaging Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport Information

DOT

Not regulated as a hazardous material by DOT.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

TDG

Not regulated as dangerous goods.

15. Regulatory Information

US federal regulations Under some use conditions, this material may be considered to be hazardous in accordance with OSHA 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Antimony sulfide (CAS 1345-04-6)

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration

Antimony sulfide (CAS 1345-04-6)	1.0 % N010
Copper (CAS 7440-50-8)	1.0 %

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance

Antimony sulfide (CAS 1345-04-6)	N010 Listed.
Copper (CAS 7440-50-8)	Listed.

CERCLA (Superfund) reportable quantity (lbs) (40 CFR 302.4)

Barium sulphate: 1000
Copper: 5000

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - No
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical No

Drug Enforcement Administration (DEA) (21 CFR 1308.11-15) Not controlled

Canadian regulations This product has been classified according to the hazard criteria of the Canadian Controlled Products Regulations, Section 33, and the MSDS contains all required information.

WHMIS status Non-controlled

Inventory status

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

*A "Yes" indicates this product complies 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).

State regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - California Hazardous Substances (Director's): Listed substance

Antimony sulfide (CAS 1345-04-6)	Listed.
Calcium hydroxide (CAS 1305-62-0)	Listed.
Copper (CAS 7440-50-8)	Listed.
Graphite (CAS 7782-42-5)	Listed.
Mica (CAS 12001-26-2)	Listed.
Wollastonite (CAS 13983-17-0)	Listed.
Zirconium dioxide (CAS 1314-23-4)	Listed.

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Not listed.

US. Massachusetts RTK - Substance List

Barium sulphate (CAS 7727-43-7)	Listed.
Calcium carbonate (CAS 471-34-1)	Listed.
Calcium hydroxide (CAS 1305-62-0)	Listed.
Copper (CAS 7440-50-8)	Listed.
Graphite (CAS 7782-42-5)	Listed.
Mica (CAS 12001-26-2)	Listed.
Zirconium dioxide (CAS 1314-23-4)	Listed.

US. New Jersey Worker and Community Right-to-Know Act

Antimony sulfide (CAS 1345-04-6)
Barium sulphate (CAS 7727-43-7)
Calcium carbonate (CAS 471-34-1)
Calcium hydroxide (CAS 1305-62-0)
Copper (CAS 7440-50-8)
Graphite (CAS 7782-42-5)

Mica (CAS 12001-26-2)

US. Pennsylvania Worker and Community Right-to-Know Law

Barium sulphate (CAS 7727-43-7)
Calcium carbonate (CAS 471-34-1)
Calcium hydroxide (CAS 1305-62-0)
Copper (CAS 7440-50-8)
Graphite (CAS 7782-42-5)
Mica (CAS 12001-26-2)

16. Other Information

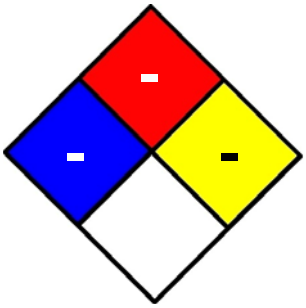
Further information

HMIS® is a registered trade and service mark of the NPCA.
Dash "-"next to each of the entries for the HMIS and NFPA ratings indicates Not Applicable.

HMIS® ratings

Health: -
Flammability: -
Physical hazard: -

NFPA Ratings



Disclaimer

The information provided on this data sheet was abstracted from supplier material safety data sheets and standard references in occupational health and toxicology. Federal-Mogul makes no representation or warranty with respect to the information obtained from such references. The information is however, as of the date provided, true and accurate to the best of Federal-Mogul's knowledge, and should be used to make an independent determination of the methods to safeguard workers and the environment.