



MATERIAL SAFETY DATA SHEET

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SDS No.: SP805-13 Version:1.2 Effective Date: 2022-5-16

1 PRODUCT AND COMPANY IDENTIFICATION

Manufacturer: Matrix (Guangzhou) Metamaterials Co., Ltd.

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Product Name ATO-W20
Product Synonym (S) See miscellaneous section for all applicable grades
Covered by this MSDS.
Chemical Family Inorganic silicate salt
Chemical Formula $ZrSiO_4 / nSiO_2.mAl_2O_3$.
Chemical Name Zirconium Silicate/Aluminum Silicate
EPA Reg Num
Product Use Tiles body whitener

2 COMPOSITION/INFORMATION ON INGREDIENTS

<u>Ingredient Name</u>	<u>CAS Registry Number</u>	<u>Typical Wt.%</u>	<u>OSHA</u>
Zirconium Silicate	10101-52-7	15-65%	Y
Aluminum Silicate	1302-76-7	35-85%	Y

The substance(s) marked with a "Y" in the OSHA column, are identified as hazardous chemicals according to the criteria of the OSHA Communication Standard (29 CFR 1910.1200)

This material is classified as hazardous under Federal OSHA regulation
The components of this product are all on the TSCA inventory list.

3 HAZARDS IDENTIFICATION

Emergency Overview

White granules or powder with no characteristic odor.

CAUTION!



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MAY CAUSE EYE IRRITATION.

CANCER HAZARD. CONTAINS CRYSTALLINE SILICA WHICH CAN CAUSE CANCER.

Repeated and prolonged inhalation of respirable particles can cause lung cancer and delayed lung damage (Silicosis).

Potential Health Effects

Skin contact and inhalation are expected to be the primary route of occupational exposure to this material. Overexposure to dust of zirconium metal or insoluble zirconium compounds may cause slight irritation to the eyes, skin and respiratory tract. Repeated or prolonged contact with insoluble zirconium compounds may cause a rough and grainy inflammation of the skin. This material contains trace amounts of naturally occurring uranium, thorium and radium. Inhalation and skin contact are expected to be the irritating to the respiratory system and may cause mechanical irritation to the eyes. Chronic inhalation of the dusts of this material may cause shortness of breath, cough and adverse lung effects including fibrosis and emphysema. Due to the potential for this material to produce respiratory tract irritation and adverse lung effects, workers with lung disease or limited respiratory capacity should have limited exposure to this material. Skin contact and inhalation are expected to be the primary routes of occupational exposure to this material. Repeated and prolonged inhalation of this material may cause a form of disabling lung disease (commonly known as silicosis). Clinical signs and symptoms of silicosis include cough, shortness of breath, wheezing and impairment of lung function. Impairment of lung function may be progressive. In the usual case of silicosis, there is a slow deterioration of capacity for physical effort, decreased chest expansion, and an increased susceptibility to tuberculosis and other respiratory infections. This material inhaled in the form of quartz is classified as "carcinogenic to humans" by the International Agency for Research on Cancer (IARC) and respirable forms of this material are listed as substances that "may reasonably be anticipated to be carcinogens" by the National Toxicology Program.

Short term, extremely heavy exposure to dust of this material (particularly small-sized particles) can result in acute silicosis. This disease is rapidly progressive with diffuse pulmonary involvement, which may develop within months of initial exposure. Individuals with acute silicosis may suffer an abrupt onset of violent coughing, labored breathing, and weight loss; death has been known to occur within one to two years.



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4 FIRST AID MEASURE

IF IN EYES, immediately flush with plenty of water. Get medical attention if irritation persists.

IF ON SKIN, flush the area with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Get medical attention if irritation develops and persists.

IF SWALLOWED, induce vomiting immediately as directed by medical personnel. Give water to drink. Get medical attention immediately.

NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

IF INHALED, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

5 FIRE FIGHTING MEASURES

Fire and Explosive Properties

Auto-Ignition Temperature	None	
Flash Point	None	Flash Point Method
Flammable Limits-Upper	NA	
Lower	NA	

Extinguishing Media

Product does not burn. Use extinguishing media appropriate to surrounding fire conditions.

Fire Fighting Instructions

Fire fighters and others who may be exposed to products of combustion should wear full fire fighting turn out gear (full Bunker Gear) and self-contained breathing apparatus (pressure demand NIOSH approved or equivalent). Fire fighting equipment should be thoroughly decontaminated after use.

Fire and Explosion Hazards

None known.



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6 ACCIDENTAL RELEASE MEASURES

In case of Spill or Leak

Stop the leak, if possible. Ventilate the space involved. Absorb, sweep up, place in container for disposal. Reduce dust spreading with a water spray. Shut off or remove all ignition sources. Prevent waterway contamination. Construct a dike to prevent spreading. Protect workers with water spray. Collect run-off water and transfer to drums or tanks for later disposal. Avoid creating a dusty atmosphere. Consult a regulatory specialist to determine appropriate state or local reporting requirements, for assistance in waste characterization and/or hazardous waste disposal and other requirements listed in pertinent environmental permits.

Clean up procedures: transfer to containers, preparatory for later disposal. Avoid generation of dust. Place in non-sparking containers for recovery or disposal. Remove from spill location. Flush area with water spray , collect rinsate.

7 HANDLING AND STORAGE

Handling

Avoid contact with eyes. Avoid creating dust in handling, transfer or clean-up. Avoid breathing dust. Use only with adequate ventilation. Wash thoroughly after handling.

Storage

This material is not hazardous under normal storage conditions; however, material should be stored in closed containers, in a secure area to prevent container damage and subsequent spillage.

8 EXPOSURE CONTROLS? PERSONAL PROTECTION

Engineering Controls

Investigate engineering techniques to reduce exposures below airborne exposure limits. Provide ventilation if necessary to control exposure levels below airborne exposure limits (see below). If practical, use local mechanical exhaust ventilation at sources of air contamination such as open process equipment.

Eye/Face protection

Where there is potential for eye contact, wear chemical goggles and have eye-flushing equipment immediately available.



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Skin protection

Wear appropriate chemical resistant protective clothing and chemical resistant gloves to prevent skin contact. Consult glove manufacturer to determine appropriated type glove material for given application. Rinse contaminated skin promptly. Wash contaminated clothing and clean protective equipment before reuse. Wash skin thoroughly after handling.

Respiratory protection

Avoid breathing dust. When airborne exposure limits are exceeded (see below), use NIOSH approved respiratory protection equipment appropriate to the material and/or its components. Consult respirator manufacturer to determine appropriate type equipment for given application. Observe respirator use limitations specified by NIOSH or the manufacturer. For emergency and other conditions where exposure limit may be significantly exceeded, use an approved full-face positive-pressure, self-contained breathing apparatus or positive-pressure airline with auxiliary self-contained air supply. Respiratory protection programs must comply with 29 CFR §1910.134.

Airborne Exposure Guidelines for Ingredients

Exposure Limit		Value
Zirconium Silicate		
ACGIH STEL	-Zirconium compound, as Zr	10mg/m3
ACGIH TWA	-Zirconium compounds, as Zr	5mg/m3
OSHA TWA PEL	- Zirconium compounds, as Zr	5mg/m3

-Only those components with exposure limits are printed in this section.

-Skin contact limits designated with a “Y” above have skin contact effect. Air sampling alone is insufficient to accurately quantitate exposure. Measure to prevent significant cutaneous absorption may be required.

-ACGIH Sensitizer designator with a value of “Y” above means that exposure to this material may cause allergic reactions.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance/Odor	White granules or powder with no characteristic odor
PH	NE
Specific Gravity	4.28
Vapor pressure	NA
Vapor Density	NA
Melting Point	NE
Freezing Point	NA



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Boiling Point

NA

Solubility In Water

Insoluble

10 STABILITY AND REACTIVITY

Stability

This material is chemically stable under normal and anticipated storage and handling conditions.

Incompatibility

None known

Hazardous Decomposition Products

Zirconium Silicate will disassociate to Zirconium oxide(ZrO₂) and silicon dioxide(SiO₂) when heated above 1540 deg C.

11 TOXICOLOGICAL INFORMATION

Toxicological information

Data on this material and/or its components are summarized below.

Zirconium Silicate

Following single or repeated intraperitoneal doses, this material was considered to be physiologically inert. Following repeated inhalation exposure to dust of this material, radiographic lung shadows were reported in rats; however, histological examination of the lung tissues showed no changes. Following implantation of a disc of this material into the muscle tissue of rabbits, histological examination of the surrounding tissues did not show any effects that were different from other materials used in medical implants.

This material contains trace quantities of naturally occurring radioactive uranium, thorium and radium(106-120 picocuries/gram). Overexposure to respirable dusts containing radioactive uranium, thorium and radium may cause lung cancer. (Zircon is exempt from NRC regulations for source material per 10 CFR 40, since it falls under the definition of material containing less than 0.05% uranium or thorium. However, calculations show that observance of 2.2-2.8 mg/m³ of respirable dust will, under voluntary guidelines, ensure that intake is less than 10% of the annual limits on intake(ALI) specified in 10 CFR 20.1502(B) and NRC standards for protection against radiation for uranium, thorium, radium and radioactive daughter decay products.)



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Zirconium and Zirconium Compounds

Single exposure(Acute) studies indicate that zirconium and zirconium compounds are slightly toxic to mice, rats and guinea pigs if swallowed [LD50 990 to 2290 mg/kg (insoluble zirconium salts)] and practically non-toxic to rats ,guinea pigs, rabbits, cats and dogs if inhaled(LC 50>6 mg/l). Aluminum silicate Workers exposed to a hydrated clay of this material, have been reported to have experienced lung effects ranging from mild pneumoconiosis, a non-disabling lung change, to progressive pulmonary fibrosis and emphysema. Exposure to the anhydrous form of this material used for refractory and porcelain manufacture, has been reported to cause interstitial pulmonary fibrosis in workers and in experimental animals; these finding are complicated by the presence of cristobalite. Another report has indicated that occupational exposure to this material in kitty litter dust caused pulmonary fibrosis; however, further evaluation of these workers and lack of pulmonary toxicity in animals from instillation of this material in the lungs suggests that smoking behavior may have been the most significant causative factor.

Oral administration of aluminum silicate to dogs and rats showed no evidence of toxicity to kidneys or other organs. In vitro studies and long-term inhalation studies with this material have shown aluminum silicate to be less cytotoxic and carcinogenic than other inorganic fiber dusts.

Other studies have suggested an association between aluminum and neurological degenerative diseases, including Alzheimer's disease, dialysis dementia and reduced neural-motor functions. In aluminum sensitive animal species such as cats and rabbits, a pathological change noted in neurons is an accumulation of neurofibrillary tangles. Neurofibrillary tangles and increased brain levels of aluminum are also observed in patients with Alzheimer's disease and dialysis dementia; however, these tangles are associated with a variety of neurologic disorders. Because there are scientific questions regarding these studies, the causative association between aluminum and these diseases has not been demonstrated. In a study of occupationally exposed workers to aluminum dusts, no increased mortality from Alzheimer's disease or other neurological diseases was noted.

Quartz

Chronic inhalation of crystalline silica may cause a progressive pneumoconiosis (silicosis), a form of disabling lung disease (pulmonary fibrosis). Data from animal studies on crystalline forms of silica confirm the capacity of free crystalline silica to induce a fibrinogenic response in lungs. Studies on a variety of laboratory animals (rats, guinea pigs, rabbits, and monkeys)using inhalation as well as intratracheal routes of exposure indicate the ability of crystalline silica to produce silicosis similar to that seen in man. In addition, experiments in animals have confirmed human experience that the presence of crystalline silica in the lung increased susceptibility to tuberculosis and other lung infections. Crystalline silica inhaled in the form of quartz is classified as "carcinogenic to humans" by the International Agency for Research on



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Cancer(IARC), and respirable forms of crystalline silica are listed as substance that “may reasonably be anticipated to be carcinogens” by the National Toxicology Program. The IARC listing is based on the determination that there is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica in the form of quartz from occupational exposures. Epidemiology studies cited by IARC give indications of increased risk for lung cancer from inhaled crystalline silica (quartz) resulting from occupational exposure. Studies involving heavy industrial exposure to silica in granite and foundry workers, brick factories and sandblasting produced increased levels of protein and enzymes in urine, which is indicative of kidney damage.

12 ECOLOGICAL INFORMATION

Ecotoxicological Information

Data on this material and/or its components are summarized below.

Zirconium and zirconium Compounds

Zirconium is moderately toxic to green algae (96-hr EC 50 2.6 mg/l), no more than slightly toxic to rainbow trout(96-hr LC 50 >20mg/l), slightly to moderately toxic to bluegill sunfish (96-hr LC50 15-240 mg/l) and slightly toxic to practically non-toxic to fathead minnow (96-hr LC50 14-115 mg/l).

Chemical Fate Information

Data on this material and/or its components are summarized below.

Zirconium and zirconium compounds

Zirconium is an element and will not degrade. It occurs in the environment in insoluble forms which remain unavailable to living organisms. In a bioconcentration assay in bluegill sunfish, zirconium showed a low potential bioaccumulate factor of 3.3.

13 DISPOSAL CONSIDERATIONS

Waste Disposal

Recover, reclaim or recycle when practical. Dispose of in accordance with federal, state and local regulations. Note: chemical additions to, process of, or otherwise altering this material may make this waste management information incomplete, inaccurate, or otherwise inappropriate. Furthermore, state and local waste disposal requirements may be more restrictive or otherwise different from federal laws and regulations.



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14 TRANSPORT INFORMATION

DOT Name NOT REGULATED
 DOT Technical Name
 DOT Hazard Class
 UN Number
 DOT Packing Group PG
 RQ

15 REGULATORY INFORMATION

Hazard Categories Under Criteria of SARA Title III Rules(40 CFR Part 370)

Immediate (Acute) Health	Y	Fire	N
Delayed (Chronic) Health	Y	Reactive	N
Sudden Release of Pressure	N		

The components of this product are all on the TSCA inventory list.

Ingredient Related Regulatory Information:

SARA Reportable Quantities	<u>CERCLA RQ</u>	<u>SARA TPQ</u>
Zirconium Silicate	NE	
Aluminum Silicate	NE	

SARS Title III, Section 313

This product does contain chemical(s) which are defined as toxic chemicals under and subject to the reporting requirements of, section 313 of Title III of the superfund Ammendments and Reauthorization Act of 986 and 40 CFR Part 372. See Section 2 Aluminum silicate

California Prop 65-Carcinogen

This product does contain the following chemical(s), as indicated below, currently on the California list of known Carcinogens.

Massachusetts Right to know

This product does contain the following chemical(s),as indicated below, currently on the Massachusetts Right to know Substance list.

Aluminum Silicate
 Zirconium Silicate



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New Jersey Right to Know

This product does contain the following chemical(s),as indicate below, currently on the New Jersey Right-to –Know Substances list.

Aluminum Silicate

Zirconium Silicate

Pennsylvania Right to Know

This product does contain the following chemical(s), as indicated below, currently on the Pennsylvania Hazardous Substance List.

Aluminum Silicate

Zirconium Silicate

16 OTHER INFORMATION

Key words

NE=Not Established NA= Not Applicable ®=Registered Trademark

Miscellaneous

This MSDS covers the following grades of ATO-W20 tiles body whiteners.

Matrix (Guangzhou) Metamaterials Company Limited believes that the information and recommendations contained herein (including data and statements) are accurate as of the date hereof.NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY, OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, IS MADE CONCERNING THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be valid where such product is used in combination with any other materials or in any process. Further, since the conditions and methods of use are beyond the control of Matrix (Guangzhou) Metamaterials, Matrix (Guangzhou) Metamaterials expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information.