POSCO
포스코강판

MSDS (Material Safety Data Sheet)

[This data was prepared in consideration of Article 41 of Occupational Safety and Health Act.]

Product	ALZASTA

1. Chemical Product and Company Identification

a. Product Name: ALZASTA

b. Recommended use of the chemical and restrictions on use

Recommended use	Steel manufacturing
Limit on using product	Do not use except for purpose

c. Information on manufacturer/importer/distributor

Company	POSCO Coated & Color Steel Co.,Ltd
Address	173 Cheolgang-ro, Nam-gu, Pohang-si, Gyeongsangbuk-do
Emergency numbers	82-54-280-6114

2. Hazard Identification

a. Classification of hazards

Water reactive materials and mixtures : Section1
Pyrophoric solid : Section1
Reproductive toxicity : Section 1B
Chronic aqatic environment hazard : Section2

b. Signal word, hazard statement(s), symbols and precautionary statement

Pictogram

Signal word: Dangerous

Health hazard statement

H250 Self ignited when exposed to air
H260 Generates self-igniting flammable gas when in contact with water
H360 May damage fertility or the unborn child
H411 toxic to aquatic organisms due to long term effects

Precautionary statements

Prevention

P201 Obtain special instructions before use..
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P222 Do not contact it with the air
P231+P232 Handle under inert gas. Protect from moisture.
P280 Wear protective gloves/protective clothing/eye protection/face protection.

Response

P308+P313 If exposed or concerned, get medical advice/attention.
P335+P334 Shak off any substance on the skin, soak in cold water or wrap it with a wet bandage.
P391 collect spills.

Storage

P402+P404 Take off contaminated clothing and wash it before reuse.
P407 Maintain air gap between stacks/pallets.

Disposal

P501 Dispose of contents/container to related regulation.

c. Hazards not otherwise classified(NEPA)

Aluminum

Health	0
Fire	No data
Reactivity	1

Manganese

	0
Fire	No data
Reactivity	1

Iron

Health	2
Fire	No data
Reactivity	No data

Zinc

Health	0
Fire	No data
Reactivity	1

3. Composition/Information on Ingredients

Chemical name	Other name	CAS No	Content(%)
Aluminum		7429-90-5	0.7% Max.
Manganese	Colloidal manganese	7439-96-6	0.6% Max.
Iron	FERRIUM	7439-89-6	98.1% or more.
Zinc	Zinc, elemental	7440-66-6	0.6 Max.

※ Other ingredients may be contained in small volumes (such as cooper, chromium, nickel or silicon, etc.)
※ In case of general chromium treatment, the product contains Cr6 as follows. - max. 30mg/㎡
※ This is the solidified finished products. But, if it is in a molten state like cutting or fusion, the people may be exposed to a little extent.

4. First-aid Measures

a. Eye contact	If it gets into your eyes, wash carefully with water for a few minutes. If possible. remove contact lenses. Keep washing. If eye irritation persists seek medical action or advice.
b. Skin contact	If skin irritation develops, seek medical action or advice. Remove contaminated clothing and wash before reuse. In the case of hot material, immerse or wash affected areas in lot of cold water to remove heat.
c. Inhalation	Take emergency medical care. If exposure or expoures is feasible seek medical action or advice. Go to a place with fresh air.
d. Ingestion	Wash your mouth. If feel uncomfortable with swallowing, get the medical attention.
e. Other precautions	The doctor must be aware of the substance and protective measures.

5. Fire-fighting Measures

a. Suitable (and unsuitable) Extinguishing Media	Use alcohol foam, carbon dioxide or water spray for extinguishing fire related to this material. Use dry sand for extinguishment by smothering.
b. Specific Hazards arising from the chemical substance	During burning, pyrolysis or combustion may produce irritating and highly toxic gases. Some materials may burn quickly with flash. Some materials may burn but not eaily ignite. Some materials may explode explosively upon fire or heating. Non-flammable substances may not burn but decompose on heating, resulting in corrosive / toxic fumes.
c. Special protective equipment and precautions for fire-fighters	Rescuers should wear appropriate protective equipment. Extinguish the area and keep it at an emergenct distance. Move the container from the fire area if not dangerous. If the fire fighting is not possible, protect the surrounding area and make the fire consume on its own.

6. Accidental Release Measures

a. Actions and protective equipment	Remove all ignition sources as very fine particles may cause fire or explosion.

to protect the human body	Remove all ignition sources. Do not touch the container or leaks without wearing appropriate protective clothing. Do not clean and dispose without supervision of a professional. Avoid dust formation. Note the substances and conditions to avoid.
b. Actions to protect the environment	Do not release the substance to the environment. Do not flow the substance into waterway, sewage, basement or confined area.
c. How to clean or remove	Collect the spillage.

7. Handling and Storage

a. Precautions for safe handling	Do not handle until all safety precautions have been read and understood. Wash thoroughly after handling. Do not expose to cutting, welding, soldering, bonding, punching, grinding or heat exposure, flame, sparks, static electricity or other sources of ignition. Handle/ stores carefully Avoid prolonged or repeated skin contact. Note the substances and conditons to avoid.
b. Conditions for safe storage	Keep away from heat, sparks, flames, and heat. -No smoking. Keep away from food and drink. Store in a dry place. Maintain a clearance between the load.

8. Exposure Controls / Personal Protection

a. Exposure limit and chemical substance and biological exposure limit, etc.

Domestic regulations	
Aluminum	TWA-10mg/m3 aluminum (metal dust)
Manganese	TWA-1mg/m3 STEL-3mg/m3 fume
Iron	TWA-1mg/m3
Zinc	No data available
ACGIH regulations	
Aluminum	(Aluminum metal) TWA 1mg/m3
Magnesium	TWA-0.2mg/m3
Iron/Zinc	No data available
b. Appropriate Engineering Controls	Use local exhaust ventilation when dust and fumes are generated and keep below exposure limits.
c. Personal protective equipment	
Respiratory protection	Wear respiratory protection which has been approved by the Korean Occupational Safety and Health Administration in accordance with physicochemical properies of the pariculate matter to be exposed.
Hand protection	Be sure to wear the protective glove proper for the work..
Body protection	Be sure to wear the work clothing proper for the work.

9. Physical and Chemical Properties

a. Appearance	
Physical state	Solid
Color	Metallic gray
b. Odor	odorless
c. Odor threshold	No data available
d. pH	No data available
e. Melting point/freezing point	No data available
f. Initial boiling point and boiling range	No data available
g. Flash point	No data available
h. Evaporation rate	No data available
i. Flammability (solid. Gas)	No data available

j. Upper/lower flammability or explosoive limit	No data available
k. Vapor pressure	No data available
l. Solubility	No data available
m, Vapor density	No data available
n. Relative density	No data available
o. n-octanol/water	No data available
p. Auto-ignition temperature	No data available
q. Decomposition temperature	No data available
r. Viscosity	No data available
s. Molecular volume	No data available

Aluminum

a. Appearance	
Physical state	Solid(powder)
Color	Silvery white - gray
b. Odor	Odorless
c. Odor threshold	No data available
d. pH	No data available
e.Melting point/freezing point	660℃
f. Initial boiling point and boiling range	2327℃
g. Flash point	No data available
h. Evaporation rate	No data available
i. Flammability (solid. Gas)	No data available
j. Upper/lower flammability or explosive limits	-/-
k. Vapor pressure	1mmHg (at 1284℃)
l. Solubility	Non soluble
m, Vapor density	No data available
n. Relative density	2.7
o. n-octanol/water	No data available
p. Auto-ignition temperature	590℃
q. Decomposition temperature	No data available
r. Viscosity	No data available
s. Molecular volume	26.98

Manganese

a. Appearance	
Physical state	Solid(powder)
Color	Gray
b. Odor	None
c. Odor threshold	No data available
d. pH	(Not applicable)
e.Melting point/freezing point	1244℃
f. Initial boiling point and boiling range	1962℃
g. Flash point	No data available
h. Evaporation rate	No data available
i. Flammability (solid. Gas)	Inflammable
j. Upper/lower flammability or explosive limits	-/-
k. Vapor pressure	1Pa (955℃)
l. Solubility	(Non-soluble)
m, Vapor density	(Not applicable)
n. Relative density	7.47
o. n-octanol/water	No data available
p. Auto-ignition temperature	No data available
q. Decomposition temperature	No data available
r. Viscosity	No data available
s. Molecular volume	54.94

Iron

a. Appearance	
Physical state	Solid
Color	White or gray
b. Odor	Odorless
c. Odor threshold	No data available
d. pH	(Not applicable)
e.Melting point/freezing point	1535℃
f. Initial boiling point and boiling range	2750℃
g. Flash point	No data available
h. Evaporation rate	No data available
i. Flammability (solid. Gas)	No data available
j. Upper/lower flammability or explosive limits	-/-
k. Vapor pressure	1mmHg (at 1787℃)
l. Solubility	(Water solubility: non-soluble, solvent solubility: soluble, acid, solubility: alkali, alcohol, ether)
m, Vapor density	No data available
n. Relative density	7.86 ((water =1))
o. n-octanol/water	(None)
p. Auto-ignition temperature	No data available
q. Decomposition temperature	No data available
r. Viscosity	No data available
s. Molecular volume	55.85

Zinc

a. Appearance	
Physical state	Solid (powder)
Color	Gray ~ blue
b. Odor	odorless
c. Odor threshold	(Not applicable)
d. pH	No data available
e.Melting point/freezing point	419℃
f. Initial boiling point and boiling range	907~℃
g. Flash point	No data available
h. Evaporation rate	No data available
i. Flammability (solid. Gas)	Inflammable
j. Upper/lower flammability or explosive limits	-/-
k. Vapor pressure	0.1kPa (487℃)
l. Solubility	(reactive)
m, Vapor density	No data available
n. Relative density	7.14 (water=1)
o. n-octanol/water	-0.47 (estimate)
p. Auto-ignition temperature	460℃ (applied to the minute powder.)
q. Decomposition temperature	No data available
r. Viscosity	No data available
s. Molecular volume	65.38

10. Stability and Reactivity

a. Chemical stability and hazardous reactivity	
Aluminum,Manganese,Iron,Zinc	No data available
b. Conditions to avoid	
Aluminum,Manganese,Iron	Heat, Moisture, Spark, Flame, Friction
Zinc	Keep it away from heat, spark, flame or high temperature - No smoking. It can make the self-igmition if it is exposed to the air having the temperature higher than room temperature. Therefore, be sure to store it under the proper temperature. Humidity
c. Incompatible materials	

Aluminum,Manganese,Iron	Water
Zinc	Do not make it contact the air.

d. Hazardous decomposition products

Aluminum,Manganese,Iron,Zinc	Irritant, Corrosive, Toxic Gas

11. Toxicological Information

a. Information on highly possible exposure route

Aluminum,Manganese,Iron,Zinc	No data available

b. Information on hazard to health

Acute toxicity

Oral

Aluminum	LD50>15900mg/kg Rat (OECD TG 401)
Manganese	LD50 > 2000 ㎎/kg Rat (OECD TG 420, GLP)
Iron	LD50 98600 ㎎/kg Rat (OECD TG 401)
Zinc	LD50 > 2000 ㎎/kg Rat (OECD TG 401, GLP)

Percutaneous

Aluminum,Manganese,Zinc	No data available
Iron	LD50 20000 ㎎/kg Guinea pig

Inhalation

Aluminum,Manganese,Iron,Zinc	No data available

Skin corrosiveness or stimulating

Aluminum,Iron	The skin corrosiveness/stimulating test by using the rabbit shows that it is not stimulating
Manganese	Irritation test results in rabbits, no irritation
Zinc	Human body/ non-stimulating

Serious eye damage or stimulating

Aluminum,Manganese,Iron	The eye damage/stimulation test by using the rabbit shows that it is not stimulating
Zinc	The eye damage/stimulation test by using the rabbit shows that there was very small stimulation which was not classified.

Oversensitivity of respiratory organ

Aluminum	The respiratory orgnan sensitization test by using the male mouse shows that is not oversensitivity
Manganese,Iron,Zinc	No data available

Oversensitivity of skin

Aluminum,Manganese,Iron,Zinc	There is no oversensitivity

Carcinogenicity

Occupational safety and health Act

Aluminum,Manganese,Iron,Zinc	No data available

Publication of Ministry of Employment and Labor

Aluminum,Manganese,Iron,Zinc	No data available

IARC/OSHA/ACGIH/NTP/EU CLP

Aluminum,Manganese,Iron,Zinc	No data available

Reproductive cell mutagenicity

Aluminum	In vitro DNA damage assay results were negative in the absence of metabolic activation.
Manganese	Chromosomal aberration test using in vitro cultured mammalian cells does not cause chromosomal abnormalities.
Iron	The in-vitro genetic mutation test by using the cultured cell of mammal shows that there were no carbonyl iron and electrolytic iron.
Zinc	The in-vitro genetic mutation test from the recombination of similar division shows that its effect is negative.

Reproductive toxicity

Aluminum	Test result on rats NOAEL=266mg/kg bw/day
Manganese	Teratogenicity test by using the mouse shows the death or deformation of fetus and the dislocation of brain from the fetus.

Iron	Teratogenicity test by using the mouse shows the death or deformation of fetus and the dislocation of brain from the fetus.
Zinc	Rabbits were tested for developmental / teratogenicity toxicity tests, and had no effect on adult and fetal rabbits.

Specific target organ toxicity (Exposed once)

Aluminum	Inhalation of material may result in bubbly emphysema, bronchopneumonia and bleeding
Manganese	It causes the pneumonia.
Iron, Zinc	No data available

Specific target organ toxicity(Exposed repeatedly)

Aluminum	Repeated, exposure during long-term effects on the lungs. Affect the nervous system
Manganese	Affect the respiratory and nervous system
Iron	Oral taget toxicity test results in rats : Affected by liver
Zinc	No data available

Inhalation hazard

Aluminum,Manganese,Iron,Zinc	No data available

12. Ecological information

a. Biological toxicity

Fish

Aluminum	No data available
Manganese	LC50>50mg/L 96hr
Iron	LC50 13.6mg/L 96hr
Zinc	LC50 0.24mg/L 96hr Oncorhynchus mykiss

Crustacean

Aluminum,Iron	EC50 > 100 mg/L 48 hr Daphnia magna
Manganese	EC50 > 1.6 ㎎/ℓ 48 hr Daphnia magna
Zinc	EC50 0.416 ㎎/ℓ 48 hr Ceriodaphnia dubia

Bird

Aluminum	NOEC ≥ 0.052mg/L 72hr Selenastrum capricornutum
Manganese	EC50 4.5 ㎎/ℓ 72 hr Desmodesmus subspicatus
Iron	No data available
Zinc	NOEC 0.05 ㎎/ℓ 72 hr Selenastrum capricornutum

b. Persistence and degradability

Persistence/Degradability

Aluminum,Manganese,Iron,Zinc	No data available

c. Bioaccumulatoin

Accumulation

Aluminum,Iron	No data available
Manganese	BCF ≤ 81
Zinc	BCF 600 (fish)

Biodegradability

Aluminum,Manganese,Iron	No data available
Zinc	(The biodegradbility test cannot be applied.)

d. Mobility in soil

Aluminum,Manganese,Iron,Zinc	No data available

e. Other hazards

Aluminum	Crustacean : NOEC(Daphnia magna)>100mg/L48hr
Manganese,Iron,Zinc	No data availble

13. Disposal consideration

a. Disposal method

Aluminum,Manganese,Iron,Zinc	Dispose of contents and container in accordance with local regulation.

b. Cautions in disposal

Aluminum,Manganese,Iron,Zinc	Dispose of the container according to the related laws and regulations.

14. Transport information

a. UN No.

Aluminum	1396
Manganese	3089
Iron	1383
Zinc	1436

b. Proper ship name

Aluminum	Aluminum powder, uncoater(that which has no autoingition and which has no coating on the surface)
Manganese	Metal powder (inflammable) (except otherwise specified)
Iron	Other pyrophoric metals or pyrophoric alloys
Zinc	ZINC POWDER or ZINC DUST

c. Danger class in transport

Aluminum,Zinc	4.3
Manganese	4.1
Iron	4.2

d. Container class

Aluminum,Manganese	Ⅰ
Iron, Zinc	Ⅱ

e. Marine contaminants

Aluminum,Zinc	Applicable (MP)
Manganese	Non-applicable
Iron	No data availble

f. Special safety plan to be known by the user with respect to transport or transportation means

Emergency action in fire

Aluminum,Manganese,Iron,Zinc	F-G

Emergency actions in spill

Aluminum,Zinc	S-O
Manganese	S-G
Iron	S-M

15. Regulatory information

a. Regulation by Korea's Occupational Safety and Health Act

Aluminum,Manganese	Controlled hazardous substance Subastance subject to the work enviromental measuring(period of measuring : 6months) Subastance subject to the special health diagnosis(period of measuring : 12months) Substance subject to the setting of exposure standard
Iron,Zinc	Controlled hazardous substance

b. Regulation by Toxic Chemicals Control Act

Aluminum,Manganese,Iron,Zinc	No data available

c. Regulation by Act on the Safety Control of Hazardous Substances

Aluminum,Manganese,Zinc	Class 2 metal powder 500kg
Iron	Class 2, iron powder 500kg

d. Regulation by Wastes Control Act

Aluminum,Iron	Designated waste
Manganese,Zinc	No data available

e. Regulation by other domestic and foreign laws or regulation

Domestic regulations

PERSISTENT ORGANIC POLLUTANTS CONTROL ACT

Aluminum,Manganese,Iron,Zinc	Not applicable

Overseas regulations

US control information(OSHA regulation)

Aluminum,Manganese,Iron,Zinc	Not applicable
US control information(CERCLA regulation)	
Aluminum,Manganese,Iron	Not applicable
Zinc	2267.9995kg 5000lb
US control information(EPCRA 302 regulation)	
Aluminum,Manganese,Iron,Zinc	Not applicable
US control information(EPCRA 304 regulation)	
Aluminum,Manganese,Iron,Zinc	Not applicable
US control information(EPCRA 313 regulation)	
Aluminum,Manganese,Iron,Zinc	Not applicable
US control information(Rotterdam convention substance)	
Aluminum,Manganese,Iron,Zinc	Not applicable
US control information(Stockholm convention substance)	
Aluminum,Manganese,Iron,Zinc	Not applicable
US control information(Monteal Protocol substance)	
Aluminum,Manganese,Iron,Zinc	Not applicable
EU Classification information (confirmed classification results)	
Aluminum	Pyr.Sol.1 / Water-react.2
Iron, Manganes	Not applicable
Zinc	Pyr. Sol. 1Water-react. 1Aquatic Acute 1Aquatic Chronic 1
EU Classification information (danger statements)	
Aluminum	H250,H261
Manganese,Iron	Not applicable
Zinc	H250,H260,H400,H410
EU Classification information (safety statements)	
Aluminum,Manganese,Iron,Zinc	Not applicable

16. Other information

a. Source of data

This MSDS was prepared based on KOSHA, NITE, ESIS, NLM, SIDS, IPCS, etc.

b. Date of first edition	30/07/2014
c. Revision no. and date of final revision	
Revision no.	1
Date of final revision	10/01/2020

d. Others

○ The prepared MSDS is prepared by referencing, editing and partially amending the MSDS provided by the Korea Occupational Safety & Health Agency