Civil Engineering・Architecture

Quality improvement, Reforming, Long-life of Concrete and Mortar

Concrete and Mortar　Water stop material of cracks

Concrete and Mortar　Reduction material of cracks

Concrete and Mortar　Permeable water-proof material

Japan MLIT NETIS Registration No. CB - 180026 - A

※MLIT is Japanese Ministry of Land, Infrastructure, Transport and Tourism

Significant reduction of work period　Only once paint

Silikali

After paint, there is no need to sprinkle water, to wash, and it is difficult to turn white

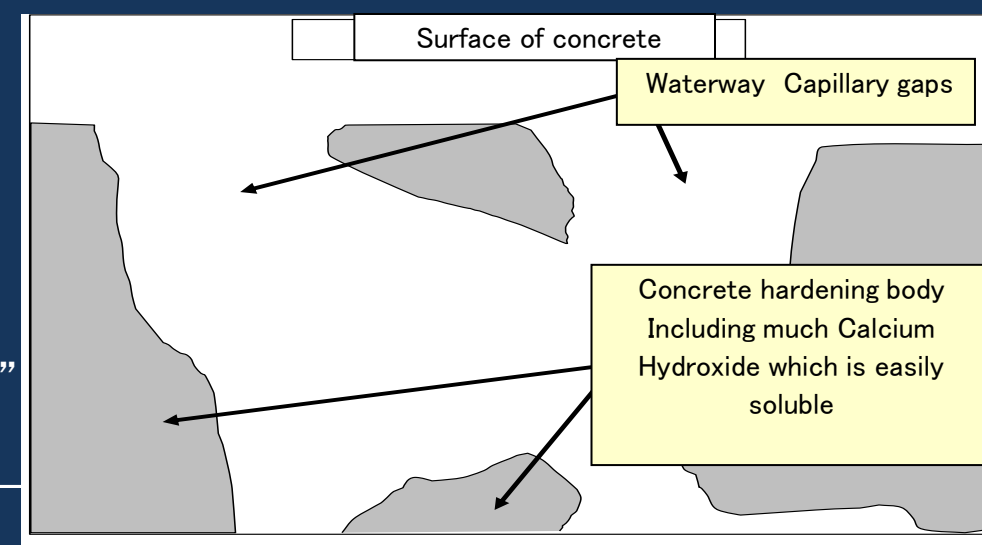
Jyukankyosoken Co., Ltd.

General incorporated association Concrete Reforming Association (CRA)

Infiltrate, stop the leaks = Long lasting

Gaps of Ready-mixed concrete amount to 18% at minimum. (4.5% at mixing, 4.5% by contamination of bubbles caused by AE water reducing agent, 9% by water evaporation caused by heat of hydration after placing) If we assume 150mm thickness of concrete, convert minimum gaps per square meter of area into water, it is 27 liters.

【Reference】 ”Properties of Concrete Fourth Edition”
Author : A.M. Neville



Calcium Hydroxide in concrete chemically changes into Calcium Carbonate while drying after dissolving in rainwater. This is neutralization of concrete. Potassium Sillicate turns Calcium Hydroxide in surface and cracks into slightly soluble Calcium Silicate and fills. Calcium Silicate is 17 times as insoluble as Calcium Hydroxide in water, anti-carbonization, inorganic hardened body. This blocks approach route of rainwater shortening the life of concrete, and stop water.

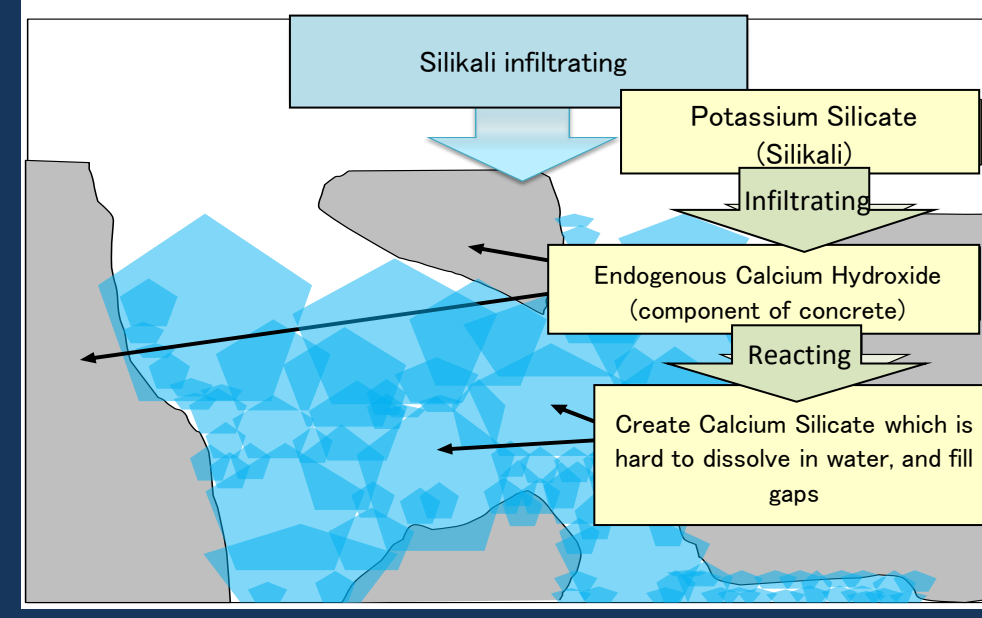
Silikali infiltrating concrete

turns Calcium Hydroxide(dissolution rate:0.17%)

into Calcium Silicate(dissolution rate:0.01%),

namely, slightly soluble of calcium in concrete improves 17 times.

Concrete refined by slightly soluble solidified body prevents infiltration of water including deterioration factor.
Potassium Hydroxide absorbs Carbonic acid gas and helps with initial reaction.



Even if cracks are wide, first of all throw Silikali, after that throw filling material.
Please contact. It is said that if reinforcing steel gets rusty, it will expand 2.5 times.

In LOG definition, when we spread impregnant material of strongly alkaline silicate system on 1㎡/0.2ℓ, pH 10 concrete changes into pH12 concrete. But pH 12 concrete will turn back to pH 10 before spreading if it keep raining 2hours by 10mm/h. Surface impregnant material of silicate system is not intending long life by providing alkali.

We clog surface part and minute cracks. While we make inhomogeneity of moisture loss in concrete homogeneity, we restrain moisture loss rate and keep moisture. Hereby, we stop growth of cracks caused by volume reduction from overdrying. We block minute waterway. We interrupt to absorb into inside of building rainwater barely containing chloride and carbon dioxide gas, and interrupt to get reinforcing steel rusty. This promotes long-life.Because Potassium Silicate has big power to water stop, we have many achievements since 2005, for example stop bleeding water leaks with easy work. Silikali enables us to stop water on site. On site, please test effect of water stop. Silikali includes rust proofing (Lithium Nitrite).

In the land where there is a rainy season or which is struck by typhoons, cracks grow and neutralization proceeds. On existing water sealing material of resin systems, we have no choice but to carry out water leaks by guess when we can't find admission ports of water. Resin differ from concrete in expansion coefficient and tensile rate.We have only to sprinkle around admission ports of rain Silikali of viscosity which is nearly equivalent to water. Silikali traces waterway, infiltrates into deepest part of cracks. Silikali reacts to component of concrete【sol→gel→Calcium Silicate fill】, and can stop the leaks. The feature of Silikali made from Potassium Silicate is permeability which can stop water even if we can't clearly detect the location of water leakages. By simple work former concrete is reborn into high quality concrete which can prevent elution carbonization of Calcium Hydroxide by rainwater.

The inside of concrete which is thickness of 1cm/1㎡ has minimum 1.8 liter quantities of cavities. From surface Silikali infiltrates deepest part of waterway which rainwater enters, and stuffs Calcium Silicate. We recommend sprinkling much in addition porous part absorbing it significantly.

The feature of Silikali is continuing to stop water leakages for a long period of time after sprinkling it. Hardly soluble solidification material makes concrete long-life. In Silicate-based impregnated materials, Natrium, Potassium, and Lithium which carbonize and end role cause being able to stop water or not. From the last 14 years result on site, we have verified that waterproof property and durability of concrete buildings keep over 10 years.

Only new technology in Japan

Component is Potassium Silicate Completion of stopping water is long lasting

■ Infiltration Stopping water

Calcium Silicate made of Potassium Silicate by infiltrating concrete fills waterways and cavities, and reforms concrete itself into waterproof layer. This waterway blockades easily stop bleeding water leaks by minute cracks. Potassium Silicate has more ionization tendency than Sodium Silicate. A feature of Silikali is a strong water stop function with adding high solubility and dispersibility to Potassium Silicate.

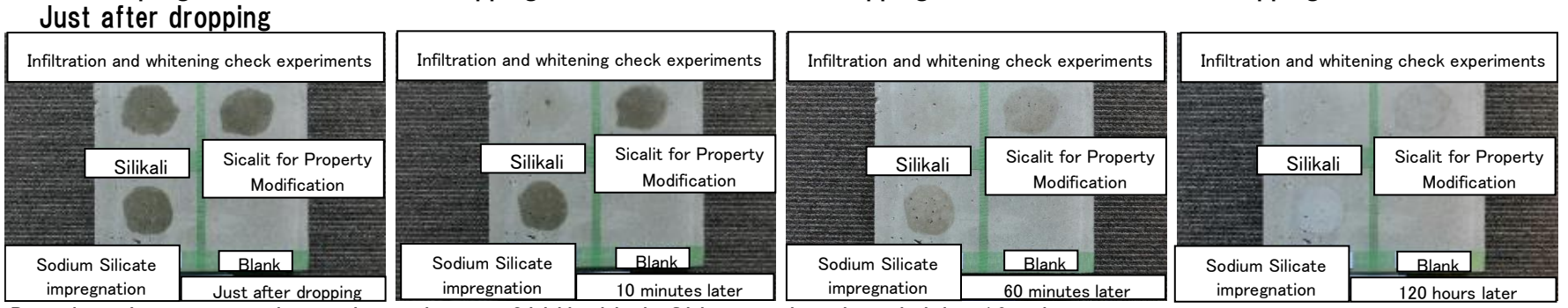
【Slope face completion picture】

Order ： Shimane-ken Matsue Kendo Seibi Office
Title ： Matsue Shimane Sen Owashi Kaka construction area the third period construction
Area ： 1300㎡
Purpose ： Cracks water stop / Cracks inhibition
Construction ： Without water sprinkling and washing
Result : Without particular whitening of silicate,
completely stops rainwater oozing ectally from cracks.

■Infiltration comparison, after a time whitening check experiments

Silikali (instantly infiltrate) / Sicalit for Property Modification / Sodium Silicate impregnation material

1. Each impregnation materials Just after dropping
2. Dropping 10 minutes later
3. Dropping 60 minutes later
4. Dropping 120 hours later



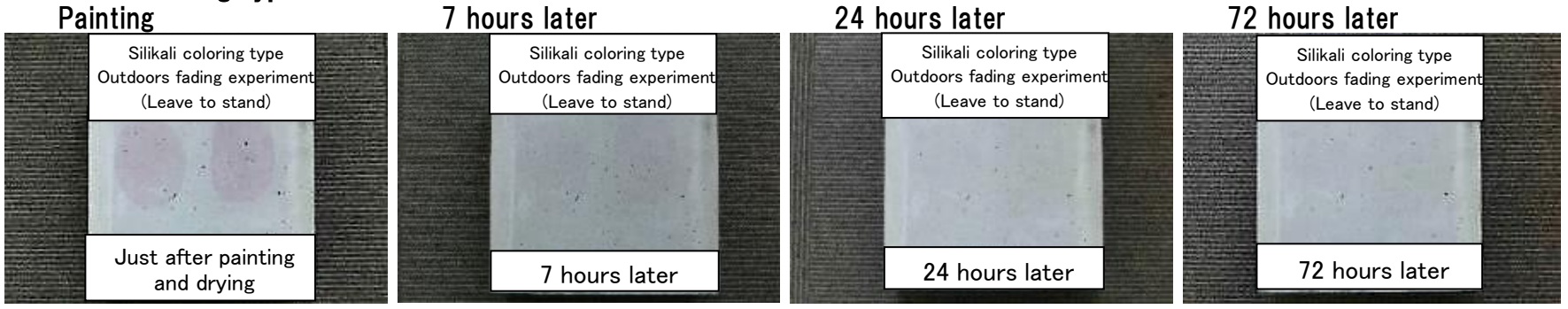
Result : As compared to the others, Silikali infiltrated only within 10 minutes, furthermore we didn't find whitening after a time.

■Fading coloring technology

《Colorant of Silikali》 not phenolphthalein suspected of carcinogen and bad influence for fetus.

【Outdoors fading experiment】

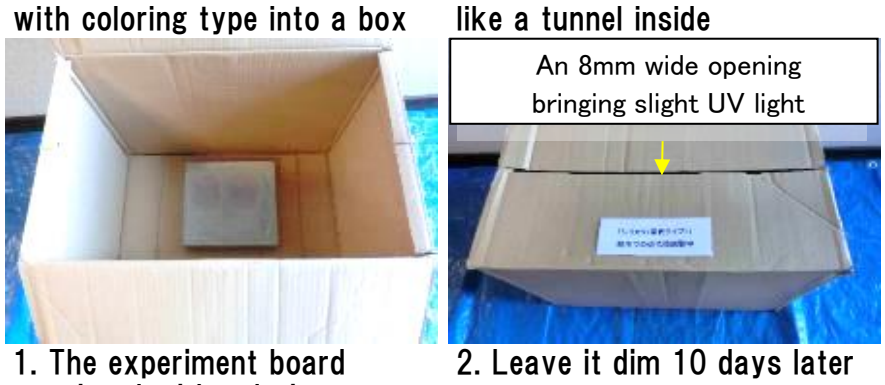
1. Silikali coloring type Painting
2. Outdoors leave to stand 7 hours later
3. Outdoors leave to stand 24 hours later
4. Outdoors leave to stand 72 hours later



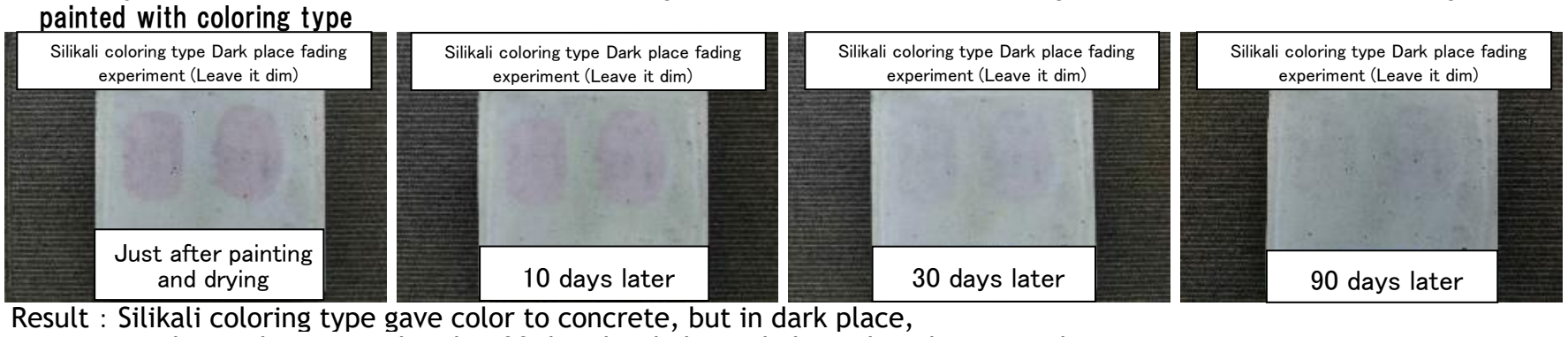
Result : Silikali coloring type gave color to concrete, but outdoors, it disappeared within 72 hours by UV light.

【Dark place fading experiment】

Put the board painted with coloring type into a box
Leave it dim like a tunnel inside



1. The experiment board painted with coloring type
2. Leave it dim 10 days later
3. Leave it dim 30 days later
4. Leave it dim 90 days later

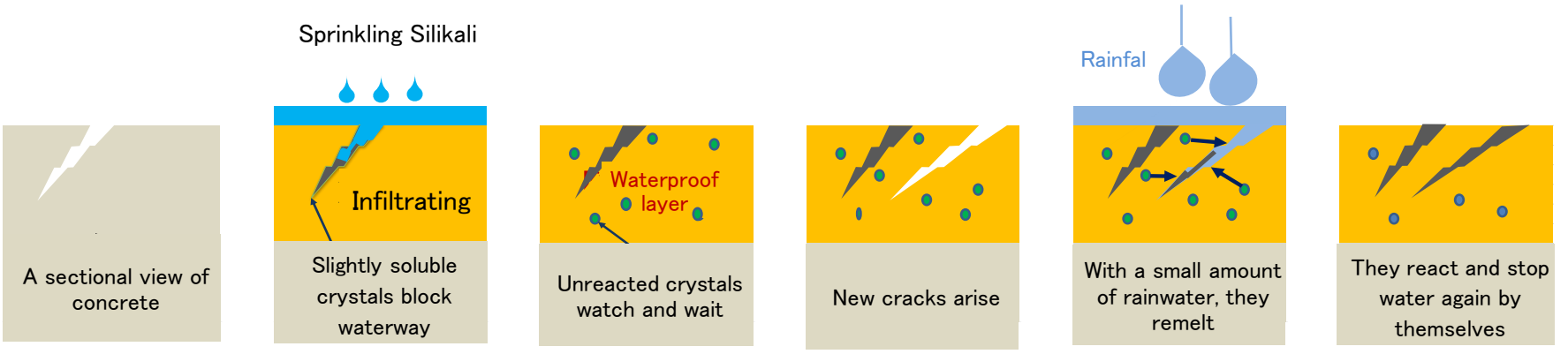


Result : Silikali coloring type gave color to concrete, but in dark place, it almost disappeared within 90 days by slight UV light and oxidation tendency.

■Water stop again reaction

After we finish work of Silikali, not all active components react because painting faces gradually dry.

After aging of work, if new cracks occur, it will resume chemical reaction by infiltration of slight rainwater, and can generate C-S-H gel.

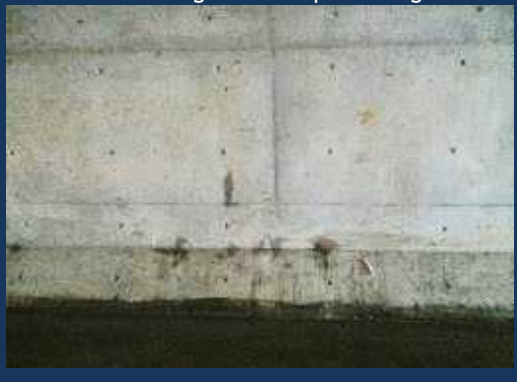


Water stop construction of underground box culvert　Takaishi City

1　Underground about 8m　Water leakage state

2　Throwing above water leakage

3　After throwing water stop reacting



4　Drying　A month later finishing water stop

Packing style：16 liters oil tins / 10 liters plastic containers

※Upon arrival, be sure to inspect a leakage from containers with delivery person.

Even if containers are damaged, you can't return them until material liquid leak out. Please note that.

※Colorant is not phenolphthalein suspected of carcinogen and bad influence for fetus.

【Development Cooperation】 General incorporated association Concrete Reforming Association **CRA**

TEL:052-883-9752 2-15-30 Tsurumai, Showa-ku, Nagoya-shi, Aichi-ken, Japan

inquiry@cra-j.com

【Manufacturer】 Jyukankyosoken Co., Ltd. 534-15 Tomitsuka-chou, Naka-ku, Hamamatsu-shi, Shizuoka-ken, Japan

Factory / Shibukawa, Shimizu-ku, Shizuoka-shi

【Inquiry】 TEL：053-412-5513 / FAX：053-412-5514

info @ tokaikutai .co.jp

Attached document－3
(Silikali Safety Data Sheet SDS)

Material Safety Data Sheet

Revised on May 1, 2018

1. Chemical Product and Company Identification

[Product Name]

Cement-based Property Modification Material "Silikali" of Colorless Type

[Company Identification]

Name: Jyukankyosoken Co., Ltd.
Address: 534-15 Tomitsuka-chou, Naka-ku, Hamamatsu-shi, Shizuoka-ken, Japan
Phone: 053-412-5513
Factory Shibukawa, Shimizu-ku, Shizuoka-shi

2. Summary of Hazards Identification

GHS classification and label elements of product

GHS classification

Physical hazards

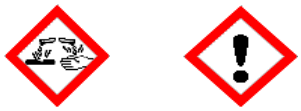
Flammable liquids: Not classified

Health hazards

Skin corrosion / irritation: Category 1
Eye damages / eye irritation: Category 1
Acute toxicity: Not classified

＊All items that are not described fall under "Not applicable", "Classification not possible" or "Not classified".

GHS label elements



Signal word: Danger

Hazard statement:

May cause serious skin burns/ eye damages
May cause serious eye damages

Precautionary statements:

【Measures for safety】

Wear protective gloves / protective clothing / eye protection / face protection.
Avoid breathing mist.
Wash hands thoroughly after handling.

【Emergent measures】

If on skin (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash the affected skin with running water/ shower. Wash the contaminated clothing before reuse.
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Contact a doctor immediately. Continue rinsing.
If swallowed: Rinse mouth with water. Do not induce vomiting.
If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical advice/attention if you feel unwell.

【Storage】

Keep a container tightly closed in the locked place.

【Disposal】
Dispose of contents / a container to waste in accordance with local / regional / national / international regulations (to be specified).

3. Composition/ Information on Ingredients

Substance/ Mixture: Mixture

Ingredient and content

Ingredient (Chemical name)	Chemical formula	Content wt%	CAS №	CSCL №	PRTR №
Potassium Silicate	K2O・SiO2	12～20	1312-76-1	1-459	Out of scope
Silicon Dioxide	SiO2	1.0>	763186-9	1-548	Out of scope
Penetrant(negative ion surfactant	—	1.0>	Not available	Out of scope	Out of scope
Pure Water	H2O	Balance	7732-18-5	—	Out of scope

4. First-Aid Measures

If inhaled
Stop work immediately, remove victim to fresh air and keep at rest in a position comfortable for breathing.
Get medical advice/attention immediately when signs/ symptoms continue.

If on skin
Wash the contacted site (skin) immediately with plenty of water and soap.
Take off contaminated clothing and wash before reuse.
Get medical advice/attention immediately when signs/ symptoms continue.

If in eyes
Gently rinse the eyes with water for at least 15 minutes immediately and get medical advice/attention.
Remove contact lenses, if present and easy to do. Continue rinsing.

If swallowed
After rinse mouth immediately with water, give water or milk.
Don't give anything by mouth to the victim when not conscious.
Get medical advice/attention immediately.

5. Fire-Fighting Measures

Extinction method
Not flammable. Extinguish a fire appropriate for surrounding fire.

Suitable extinguishing media
Use extinguishing media appropriate for surrounding fire such as water, dry chemical powder and foam.

Unsuitable extinguishing media
There is no unsuitable extinguishing media under normal condition.

Specific extinction method
Move a container to a safe area, if possible, in case of surrounding fire.
Keep unauthorized personnel removed from and upwind of fire.
Make sure accidental substances or extinguishing media are not emitted to river etc.

Protection of fire-fighters
Carry out fire fighting upwind and avoid inhalation of harmful gas.
Wear respiratory protection depending on the situation.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures
Wear appropriate protective equipment during work. (See section 8. "Exposure Controls/ Personal Protection".)

Environmental precautions
Make sure spilled substance or washing water is not emitted to river etc.
and not to cause an effect on environment.

Methods for containment and cleaning up
Collect a small amount of generated dust/ waste/ sand in an empty container.
Neutralize uncollectible balance with dilute hydrochloric acid or dilute sulfuric acid.

7. Handling and storage

Handling

Technical measure: Make sure not to contact skin, mucous membrane and clothing and not to contact eyes.
Wash hands and face thoroughly after handling.

Local-ventilation/ whole-ventilation: Provide adequate ventilation in the work area.

Safety treatment notes: Wear appropriate protective equipment for handling.
Wash hands and face thoroughly after work.

Storage

Appropriate safekeeping condition: Keep a container tightly closed in a cool location away from direct sunlight.

Incompatible substances: Strong acid

Safe packaging materials: Use a plastics container that has sufficient strength.

8. Exposure Controls/ Personal Protection

Control limit

Potassium Silicate: Not described in announcement by Health, Labour and Welfare Ministry

Other Ingredient: No information

Occupational exposure limits

Potassium Silicate: Not described by JSOH (Japan Society of Occupational Health)
Value of TLV-TWA is not described by ACGIH

Other Ingredient: No information

Facility and equipment measures

Provide adequate ventilation in the work area.

Make available emergency safety shower and eye wash in the work area.

Personal protective equipment

Respiratory protection: Wear protective mask.

Hand protection: Wear protective gloves.

Eye protection: Wear protective goggles.

Skin and body protection: Wear appropriate protective clothing as necessary.

Hygiene measures: Wash hands thoroughly after handling.

9. Physical and Chemical Properties

Appearance: Colorless to pale white liquid

Specific gravity: 1.115(20℃)

PH: 10~12

Solubility: Soluble in water arbitrarily

Flash point: Not having flash point

10. Stability and Reactivity

Stability: In a usual handling condition, chemically stable.

Reactivity: React with acid forming gel of SiO2.

Conditions to avoid: Don't contact amphoteric metal. Don't add thick acid. Avoid contact with air.

Materials to avoid: Amphoteric metal such as aluminum, zinc, tin and lead

Hazardous decomposition products: Not available

11. Toxicological Information

＊There is no finding as a product. Information on composition is as follows:

Acute toxicity : No literature described (Potassium Silicate)
Oral LD50 5700mg/kg rat (as Amorphous Silica)

Skin corrosion/ irritation: Corrode skin and mucous membrane.

Serious eye damages/eye irritation: Corrode mucous membrane of eyes.

12. Ecological Information

＊There is no finding as a product. Information on composition is as follows:

Water environment acute noxiousness: Not available

Persistence/ degradability: Considered to be readily decomposed in soil

Bioaccumulation potential: Not available

Ecological toxicity: Not available

13. Disposal Considerations

Waste Disposal

Before disposal, reduce hazard level by rendering the product harmless, stabilizing it, or neutralizing it as possible to the extent possible.
Dispose of contents/ a container appropriately in conformance with applicable laws and regulations such as Wastes Disposal and Public Cleansing Act and "Water Quality Pollution Control Act" during disposal.

Pollution container and packing

Dispose of contents/ a container appropriately by recycling it (them) after washing or following applicable laws and regulations or standards specified by local government.

14. Transport Information

Make sure to check for leaks in a container during transportation and to prevent loading and collapsing load so as not to cause falling, drop and damage.
Follow applicable laws and regulations.

UN Number, UN Classification

UN Number	:3266
Substance name (proper shipping name)	: Other corrosive substance (inorganic, liquid, and alkaline substance)
UN Classification	: Class 8
Container class	:Ⅲ
Marine pollutant	: Not available

15. Regulatory Information

Law concerning Pollutant Release and Transfer Register (PRTR Law): Not available
Poisonous and Deleterious Substances Control Act: Not available
Fire Service Act : Not available
Industrial Safety and Health Act: Not available
Civil Aeronautics Act : Other corrosive substance (corrosive substance: Class 9)

16. Other Information

Main references:

Raw material/ MSDS by product manufacturer
15308 Chemical Products (The Chemical Daily Co., Ltd.)
Merck Index 14th

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It is the user's responsibility to use this information as reference. Please use it after understanding the necessity of taking an appropriate action according to the actual condition such as the individual handling.

Attached document－3
（Silikali Safety Data Sheet SDS）

Material Safety Data Sheet

Revised on May 1, 2018

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[Company Identification]

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Phone: 053-412-5513
Factory Shibukawa, Shimizu-ku, Shizuoka-shi

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GHS classification and label elements of product

GHS classification

Physical hazards

Flammable liquids: Not classified

Health hazards

Skin corrosion / irritation: Category 1
Eye damages / eye irritation: Category 1
Acute toxicity: Not classified

＊All items that are not described fall under "Not applicable", "Classification not possible" or "Not classified".

GHS label elements


Signal word: Danger

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May cause serious skin burns/ eye damages
May cause serious eye damages

Precautionary statements:

【Measures for safety】

Wear protective gloves / protective clothing / eye protection / face protection.
Avoid breathing mist.
Wash hands thoroughly after handling.

【Emergent measures】

If on skin (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/shower.
Wash the affected skin with running water/ shower. Wash the contaminated clothing before reuse.
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Contact a doctor immediately. Continue rinsing.
If swallowed: Rinse mouth with water. Do not induce vomiting.
If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Get medical advice/attention if you feel unwell.

【Storage】

Keep a container tightly closed in the locked place.

【Disposal】
Dispose of contents / a container to waste in accordance with local / regional / national / international regulations (to be specified).

3. Composition/ Information on Ingredients

Substance/ Mixture: Mixture

Ingredient and content

Ingredient (Chemical name)	Chemical formula	Content wt%	CAS №	CSCL №	PRTR №
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Silicon Dioxide	SiO2	1.0>	763186-9	1-548	Out of scope
Penetrant(negative ion surfactant	—	1.0>	Not available	Out of scope	Out of scope
Stabilizer (organic nitrogen compound)	—	0.1>	Not available	Out of scope	Out of scope
Pure Water	H2O	Balance	7732-18-5	—	Out of scope

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If inhaled
Stop work immediately, remove victim to fresh air and keep at rest in a position comfortable for breathing.
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Don't give anything by mouth to the victim when not conscious.
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5. Fire-Fighting Measures

Extinction method
Not flammable. Extinguish a fire appropriate for surrounding fire.

Suitable extinguishing media
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Wear respiratory protection depending on the situation.

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Personal precautions, protective equipment and emergency procedures
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Environmental precautions
Make sure spilled substance or washing water is not emitted to river etc.
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Methods for containment and cleaning up
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Neutralize uncollectible balance with dilute hydrochloric acid or dilute sulfuric acid.

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Incompatible substances: Strong acid

Safe packaging materials: Use a plastics container that has sufficient strength.

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Eye protection: Wear protective goggles.

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Hygiene measures: Wash hands thoroughly after handling.

9. Physical and Chemical Properties

Appearance: Red liquid

Specific gravity: 1.115(20℃)

PH: 10~12

Solubility: Soluble in water arbitrarily

Flash point: Not having flash point

10. Stability and Reactivity

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Fire Service Act : Not available
Industrial Safety and Health Act: Not available
Civil Aeronautics Act : Other corrosive substance (corrosive substance: Class 9)

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