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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

ISOBUTYLTRIETHOXYSILANE

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

ISOBUTYLTRIETHOXYSILANE

1. APPLICANT

Dow Corning Australia Pty. Ltd., 21 Tattersall Rd., Blacktown, NSW 2148 has submitted a standard notification application for isobutyltriethoxysilane, a high purity alkylsilane.

2. IDENTITY OF THE CHEMICAL

Chemical name: Isobutyltriethoxysilane

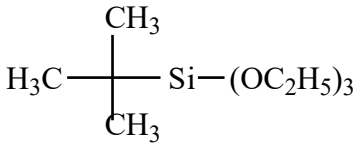
Chemical Abstracts Service (CAS) Registry No.: 17980-47-1

Other name: Alkoxysilane

Trade name: DOW CORNING 1-6403 Alkoxysilane

Molecular formula: $C_{10}\ H_{24}\ O_3\ Si$

Structural formula:



Molecular weight: 220

Method of detection and determination: Infrared spectrophotometry and gas chromatography.

Spectral data:

IR: Major characteristic peaks were observed at: 450-550, 850, 1150-1350 and 2800 - 3000 cm^{-1}.

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa: Colourless liquid

Melting Point/Boiling Point: -140°C/186°C

Specific Gravity: 0.88 at 25°C

Vapour Pressure: 0.9 mm Hg at 20°C
1.3 mm Hg at 25°C

Water Solubility: Not determined (hydrolyses in water)

Partition Co-efficient (n-octanol/water) log P_{ow}:	Not applicable as the Si-OC bond will hydrolyse in aqueous solution
Hydrolysis as a function of pH:	Catalyzed by both low and high pH
Adsorption/Desorption:	Not performed
Dissociation Constant pKa:	No dissociation in water
Flash Point:	60°C
Flammability Limits:	Not determined - combustible
Autoignition Temperature:	255°C, Calculated by extrapolation from methoxytriethoxysilane = 225°C and ethyltriethoxysilane = 235°C
Explosive Properties:	None from the notified product; however ethanol vapours produced during use can form explosive mixtures in air and the notified product may be explosive in confined spaces because of its low flash point.
Reactivity/Stability:	Can react with strong oxidising agents, and hydrolyses in water to ethanol and silanol.
Particle size distribution:	Not applicable

Comments on physico-chemical properties:

Although results for hydrolysis of isobutyltriethoxysilane were not provided, information on similar chemicals were. Hydrolysis is expected to be stoichometric at neutral pH, while in the presence of acid or base, hydrolysis will proceed even in the presence of a small amount of water. The partition co-efficient is not applicable as the silane is hydrolytically unstable.
No information was submitted for adsorption/desorption and flammability limits. The notifier claimed that the new chemical was similar to one already on the market, except for its hydrolytic by-product (ethyl alcohol) instead of methyl alcohol.

4. PURITY OF THE CHEMICAL

Degree of purity :	97%
Toxic or hazardous impurities:	3%

Unidentified isomers and dimers of isobutylethoxysilane

Non-hazardous impurities (> 1% by weight):	None
Additives/Adjuvants:	None

5. INDUSTRIAL USE

The notified chemical will be used as a water-proofing agent for existing and new concrete and masonry.

Up to 100 tonnes/year will be imported.

6. OCCUPATIONAL EXPOSURE

Workers involved in the transportation, storage and application of the chemical will be exposed to the chemical. The number of workers in each category varies between 20 and 100.

The notified chemical is imported into the country in 20 and 200 litre sealed metal drums, which are moisture resistant. During storage, the drums will be stored in well ventilated areas.

Typically, the spraying equipment is attached directly to the drum so that spillage and consequent dermal or inhalational exposure is expected to be low during these operations.

Workers involved in application will be using the notified chemical as a low pressure spray (50 kPA nominal), in outdoor areas, spraying onto horizontal and vertical surfaces. The maximum possible exposure would be 8 hours/day for 5 days/week to the aerosol spray. The notified chemical would be used anywhere where there is masonry/concrete, including buildings, bridges, pathways and driveways. Spraying on wetted surfaces results in binding of the notified chemical to silica based surfaces with evaporation of the solvent occurring during binding.

All workers will wear protective clothing, which will be washed before re-use. The spraying will be carried out in the open area environment which would avoid build-up of the by-product ethanol.

7. PUBLIC EXPOSURE

The notified chemical will be imported to Australia in moisture resistant, sealed metal drums (20 or 100 litre) and stored before transportation to application sites. Public exposure during storage and transportation in sealed metal drums is not expected to occur unless in the case of accidental spillage.

The notified chemical is proposed to be used as a water-proofing agent on silica-based surfaces including buildings, bridges, pathways and driveways. It will be sold to trained contractors and is not available to the general public. Isobutyltriethoxysilane is applied by low pressure spray onto the horizontal or vertical surfaces without or with minimal run-off. People in areas adjacent to the application sites being treated may be exposed to the notified chemical, especially under adverse (windy) weather conditions; however, the exposure period would be short and the extent of exposure is expected to be low considering the application rate of 0.4-1.0 L/m^2 and assuming good work practices.

The notified chemical will not leach from the substrate to which it attaches and significant evaporation of the chemical is unlikely. Public exposure to the notified chemical after treatment is negligible.

Container residues will be kept to a minimum by emptying residues from spent containers into the next one to be used with the final container being capped for later use. Any residues, not recovered in the containers, are sent to licensed disposal contractors and will be disposed in accordance with local government requirements, most likely incinerated.

8. ENVIRONMENTAL EXPOSURE

Release

Isobutyltriethoxysilane will replace the closely related existing product isobutyltrimethoxysilane (which has three methoxy groups rather than ethoxy groups) with similar use patterns and, as such, there will be no increase in the environmental exposure of polyisobutylsiloxane.

It is projected that isobutyltriethoxysilane will be used throughout Australia for the sole purpose of weatherproofing silica-based surfaces, which include buildings, bridges, pathways and driveways.

Horizontal application is by low pressure gravity spraying to wetted surfaces where the substance is allowed to bind while the solvent evaporates. No runoff is expected as the product will be sold to trained licensed contractors and it is claimed, due to product costs, would be uneconomical to allow poor application and subsequent waste.

Application to vertical surfaces of buildings and bridges requires closer scrutiny due to the greater likelihood of runoff, particularly to the aquatic compartment in the case of bridges. Application of Isobutyltriethoxysilane is by low pressure sprayer sufficient to deliver the product from the nozzle to the substrate (wall). The application commences at the base of the wall with the lowest volume to obtain a zero curtain length and moves up the vertical surface with increasing volume and correspondingly longer curtain length to a maximum of 50 cm. The technique was developed in Europe and USA to obtain 100% surface application, whilst avoiding runoff to non-target areas, eliminating environmental exposure, particularly to the aquatic compartment, and keeping costs to a minimum.

Once applied to a substrate, the non-polar isobutyl group of the substance provides its hydrophobic properties, whilst the three hydrophilic ethoxy groups hydrolyse, releasing ethanol and form a reactive isobutyl silanol which undergoes polymerisation and reacts with the inorganic surface of the building material.

Significant evaporation of the substance is unlikely given the high level of adsorption to silica-based substrates.

The quantity of Isobutyltriethoxysilane to be applied depends on the absorbency of the substrate to be treated and on the desired depth of penetration but is likely to be in the range 0.4 to 1 $L.m^{-2}$ for surfaces from concrete through to hard-baked brickwork.

It is envisaged that containers residues will be kept to a minimum by emptying residues from spent containers into the next to be used with the final container being capped, at the completion of an application contract, for later use. Container residues, not recovered, are sent to licensed disposal contractors for disposal in accordance with local requirements, incineration being the preferred option.

Fate

No results were submitted on biodegradation of Isobutylethoxysilane. The notifier claims that literature provides evidence that polysiloxanes are not biodegradable in general. The EPA agrees with this claim, although EPA notes that under certain conditions polysiloxanes can be degraded to low molecular weight species (1). These low molecular weight species were found to be either volatilised from the soil, incorporated into humus, or to a lesser extent, evolved as CO_2 (2).

No results were provided for the bioaccumulation of Isobutylethoxysilane. However, literature supports that polysiloxanes are biologically innocuous to, and poorly accumulated by, fish (3). Further, the chemical is likely to be rapidly hydrolysed and polymerise to polyisobutyl siloxane. It will bind to sediment and mineral surfaces and therefore be unavailable for bioaccumulation.

9. EVALUATION OF TOXICOLOGICAL DATA

The toxicological data submitted primarily relates to the similar chemical isobutyltrimethoxysilane which is expected to have similar properties to the notified chemical. The skin sensitisation and *in vivo* micronucleus test in the mouse were performed using the notified chemical.

9.1 Acute Toxicity

Table 1 Summary of the acute toxicity

Test	Species	Chemical	Outcome	Reference
Oral toxicity	Rat	Isobutyltrimethoxysilane	LD_{50} > 5000 mg/kg	(4)
Inhalational toxicity	Rat	Isobutyltrimethoxysilane	LD_{50} > 13750 mg/m^3	(5)
Skin irritation	Rabbit	Isobutyltrimethoxysilane	moderate irritant	(4)
Eye irritation	Rabbit	Isobutyltrimethoxysilane	severe irritant	(4)
Skin sensitisation	Guinea-pig	Isobutyltriethoxysilane	Non-sensitiser	(6)

9.1.1 Oral Toxicity (4)

Sprague Dawley rats (5/sex) were given a single 5000 mg/kg oral dose by gavage of isobutyltrimethoxysilane and observed over a period of 2 weeks.

No mortalities were noted. No clinical signs of toxicity were noted. At necropsy, gross pathology of animals did not reveal any treatment-related effects.

Therefore, the LD_{50} of isobutyltrimethoxysilane is > 5000 mg/kg.

9.1.2 Inhalation Toxicity (5)

This study was performed in accordance with OECD Guideline No. 403 (7).

Sprague-Dawley rats (5/sex/group) were placed in 450 L exposure chambers and exposed to either 0 or an average of 13750 mg/m^3 (nominal concentration) isobutyltrimethoxysilane in a vapour for 4 hours. Animals were observed for 14 days after exposure.

No deaths occurred during the study. No effects on body weight gain were observed.

Clinical signs observed included lethargy and unresponsiveness during the exposure period, but no effects were observed during the subsequent 14 day observation period. No reference was made to effects of the isobutyltrimethoxysilane on eyes and respiratory passages. Gross pathology appeared unremarkable.

Based on the findings of this study, the nominal inhalational LD_{50} of isobutyltrimethoxysilane was > 13750 mg/m^3.

9.1.3 Skin Irritation (4)

Three young male albino New Zealand White rabbits were used in this study. 24 hours prior to initiation of the study, the hair from the entire abdomen of the rabbits was removed. Isobutyltrimethoxysilane was applied as follows:

a) 2-5 applications of 0.1 mL to the ear over 14 days,
b) 0.5 mL was applied to the intact abdomen under a gauze pad, kept in place by a cloth bandage; 2-5 applications were made over 14 days, and
c) 0.5 mL was applied to abraded abdomen under a gauze pad, kept in place by a cloth bandage; 2-5 applications were made over 14 days.

A single 24 hour semi-occlusive contact with isobutyltrimethoxysilane produced slight to moderate redness and slight oedema. Longer and repeated contact resulted in superficial necrosis of the tissue.

Based on the results of this study, isobutyltrimethoxysilane is a moderate skin irritant in rabbits.

9.1.4 Eye Irritation (4)

Three young male albino New Zealand White rabbits were used in this study. Both eyes were treated with 0.1 mL of undiluted isobutyltrimethoxysilane. The left eye was flushed after 30 seconds with water, while the right eye remained unwashed. Observations were performed at 1, 24, 48 hours and 7 days after treatment.

Direct eye contact with isobutyltrimethoxysilane produced moderate pain, moderate to severe redness with swelling of the conjunctiva, slight to moderate iritis and slight damage to the cornea. Results were more severe in the unwashed eye. No ocular irritation was present at the end of 7 days.

Based on the results of this study, isobutyltrimethoxysilane may be a severe eye irritant in rabbits.

9.1.5 Skin Sensitisation (6)

This study was performed with the notified chemical, isobutyltriethoxysilane.

The potential of isobutyltriethoxysilane to provoke skin sensitisation was investigated using the maximisation method of Magnusson and Kligman (8). This study was performed in accordance with OECD Guideline No. 406 (9).

Dunkin Hartley guinea-pigs were used in the study. DNCB was the positive control used in this study.

The study was conducted as follows:

Induction:

On day 1, two intradermal injections of 5% isobutyltriethoxysilane in sesame oil and 1:1:1 mix of saline:FCA and 30% w/w isobutyltriethoxysilane in sesame oil were made on the shaved cervical area (5 x 5 cm) of each animal. On day 8, 2 mL of test substance was applied epicutaneously to the same site on a patch and occluded for 48 hours. The control group was treated in the same way without the application of the notified compound.

Challenge:

3 weeks after the last induction, test and control groups were challenged on one flank with a 30% w/w solution of isobutyltriethoxysilane in sesame oil. A volume of 0.5 mL of solution was applied on a patch to the shaved flank and occluded for 24 hours with Micropore Tape. The skin reactions were tested according to the method of Draize et al. (10).

Results:

No mortalities were noted and clinical signs of toxicity were observed during the study.
No evidence of erythema or oedema was observed in either the control or test animals.

The positive compound produced the expected responses.

In conclusion, isobutyltriethoxysilane was not demonstrated to be a sensitiser to the skin of the guinea-pig.

9.2 Repeated Dose Toxicity

No repeat toxicity study was submitted.

9.3 Genotoxicity

9.3.1 *Salmonella typhimurium* and *Escherichia coli* Reverse Mutation Assays (11)

This study was performed in accordance with OECD Guidelines No. 471 and 472 (12, 13).

The assay was performed in one experiment, with and without metabolic activation (using rat liver S9). Each concentration, including the controls, was tested in triplicate. Isobutyltrimethoxysilane, in dimethylsulphoxide, was tested at concentrations of 312.5, 625, 1250, 2500 and 5000.0 µg/plate. The strains used were as follows: *Salmonella typhimurium*: TA 1535, TA 98, TA 1537 and TA 100, and *Escherichia coli*: WP2. The positive controls used were as follows: in the presence of activation: sodium azide (10 µg/plate), 9-aminoacridine (50 µg/plate), 2-nitrofluorene (10 µg/plate) and N-methyl-N-nitrosoquanidine (10 µg/plate); and in the absence of activation: 2-anthramine (10 µg/plate), all assays were done in triplicate. The data was presented as the number of revertants colonies per plate.

No evidence of mutagenic potential was observed. At the highest concentration tested, slight toxicity was noted to strains TA 1535, TA 1537 and TA 98.

The positive controls produced the expected responses.

Therefore under the conditions of this assay, isobutyltrimethoxysilane was not mutagenic in the *Salmonella typhimurium* and *Escherichia coli* reverse mutation assays.

9.3.2 Micronucleus Assay in the Bone Marrow Cells of the Mouse (14)

This study was performed in accordance with OECD Guideline No. 474 (15).

Based on a preliminary study, two groups of NMRI mice (5/sex/group) were given a single dose of 1391 mg/kg isobutyltriethoxysilane (5 mL/kg in corn oil) and sacrificed 24 and 48 hours after treatment, respectively. Two groups were administered the reference mutagen 7,12-dimethylbenz[a]anthracene (DMBA) as a positive control. Bone marrow cells were collected from these groups at either 24 or 48 hours after treatment. Control animals (5/sex) were given the vehicle alone and sacrificed 24 hours later.

One thousand polychromatic erythrocytes (PCEs) per animal were scored for micronuclei. Cytotoxic effects were described by the ratio of PCE/normochromatic erythrocytes (NCE) as an indicator of cytotoxicity.

At the dose used, the animals showed no clinical signs of toxicity. The mean number of NCEs was not increased after treatment with isobutyltriethoxysilane compared to control. No necropsies were performed.

There was no enhancement in the frequency of the detected micronuclei at any preparation interval after treatment with isobutyltriethoxysilane, compared to the solvent control. The positive control, DMBA, produced the expected results.

In conclusion, isobutyltriethoxysilane does not cause chromosomal damage in bone marrow cells of the mouse *in vivo*.

9.4 Overall Assessment of Toxicological Data

Most of the studies submitted were performed with the closely related compound isobutyltrimethoxysilane.

On the basis of the studies submitted, isobutyltriethoxysilane is expected to have low acute oral and inhalational toxicity in rats. However, it may cause skin and eye irritation, and is predicted to cause irritation to the respiratory tract. According to the MSDS inhalation of mist may affect the blood, liver and kidneys but this refers to the hydrolysis product ethanol. Isobutyltriethoxysilane was not found to be a skin sensitiser in guinea-pigs.

Genetic toxicity was tested in the *Salmonella typhimurium* and *Escherichia coli* reverse mutation assays with isobutyltrimethoxysilane. No evidence of mutagenic potential was found. Isobutyltriethoxysilane was not genotoxic in the mouse *in vivo* micronucleus test. Therefore, isobutyltriethoxysilane likely to be non-genotoxic.

Based on the toxicity studies submitted it is expected that isobutyltriethoxysilane will produce irritation upon contact with skin and mucous membranes and also on oral ingestion.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No results were provided for the ecotoxicity of Isobutyltriethoxysilane. However, the notifier did provide results for similar chemicals (see the following Table):

Species (Name)	Chemical	Result
Rainbow trout (*Oncorhyncus mykiss)*	$MeSi(OEt)_3$	LC_{50} = 400 mg/L
Bluegill (*Lepomis macrochirus)*	$MeSi(OEt)_3$	LC_{50} >1000 mg/L
Mummichog (*Fundulus heteroclitus)*	$MeSi(OEt)_3$	LC_{50} >1000 mg/L
Grass shrimp (*Palaemonetes vulgaris)*	$MeSi(OEt)_3$	LC_{50} = 58 mg/L[a]
Shore crabs (*Pachygrapsus crassipes)*	$MeSi(OEt)_3$	LC_{50} = 421 mg/L[a]
Water flea (*Daphnia magna)*	$MeSi(OEt)_3$	LC_{50} >1000 mg/L
Green alga (*Selenastrum capricornutum)*	$MeSi(OH)_3$ derived from $MeSi(OEt)_3$	LC_{50} >1000 mg/L[b]
Blue-green alga (*Anabaena flos-aquae)*	$MeSi(OH)_3$ derived from $MeSi(OEt)_3$	LC_{50} >1000 mg/L[b]

[a] Low dissolved oxygen levels were noted which might contribute to mortality of the organism.

[b] Some effects on growth were noted but these appeared to be associated with ethanol, present from the hydrolysis of $MeSi(OEt)_3$. This was not confirmed by testing $MeSi(OH)_3$ alone.

Isobutyltriethoxysilane is expected to be very unstable in water with a very short half-life. Therefore, two of the above tests used the hydroxy analogue, while the others were probably testing the hydroxy analogue for most of the test period. The above results indicate that isobutyltriethoxysilane is slightly toxic to aquatic fauna.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The main route of environmental exposure for the notified substance may occur as a result of runoff or "washoff", from concrete surfaces during application, directly to the ground or aquatic compartment in the case of bridge pylon application.

The "worst case" environmental hazard scenario will be from application to existing bridge structures where the base of the pylons are submerged in rivers or harbours. The hazard may be greatest where application is close to the water line, although it is envisaged that most use will be to new structures (pylons) before they are lowered into the water or where watercourses are diverted during construction.

The case for application to existing sea harbour bridge pylon structures in areas close to the water line requires closer scrutiny. As mentioned above, substance runoff during application is minimised given the precise techniques utilised. However, "washoff" caused by wave motion may remove some Isobutyltriethoxysilane from the concrete surfaces before strong bonding can occur.

Assuming an application rate of 0.4 L/m, a 1 metre swell and a pylon circumference of 10 metres, a maximum of 4 L of substance may be washed into the sea. The instantaneous dilution, in the event of "washoff", will be approximately 4L in 200 m^3 of seawater. Subsequent wave motions and eddy effects around the bridge pylons will cause further substance dilution. Rapid polymerisation to polyisobutylsiloxane will limit its release from surfaces.

Therefore, in the unlikely event of 100% "washoff", the immediate aquatic concentration of Isobutyltriethoxysilane will be approximately 64 ppm which will be further swiftly diminished (within minutes) by a number of factors described above to concentrations which provide an adequate safety margin in light of ecotoxicity data provided.

The aquatic concentrations are expected to be at least 3 orders of magnitude less than the ecotoxicity results presented above and indicate Isobutyltriethoxysilane is unlikely to present either an acute or chronic hazard to aquatic invertebrates, freshwater fish and micro-organisms at likely environmental levels.

If the notified substance and/or its condensate (polymer) does bind to sediment, it is unlikely that significant toxic levels of the notified substance or polymer will occur due to application methods minimising run-off, and the expected lack of bioaccumulation potential. Recent reviews of the environmental fate and effects of polysiloxanes suggest that any isobutyltriethoxysilane released to the aquatic compartment will become a permanent but biocompatible resident of sediments (3).

Conclusions and Recommendations

Isobutyltriethoxysilane will replace a closely related trimethoxy analogue. Any substance that reaches the environment, in the event of "washoff" to the aquatic compartment, is likely to be swiftly diluted to concentrations in the order of ppb and, further, polymerise to levels that are unlikely to present a hazard to the environment, based on the ecotoxicity data submitted.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Occupational use of isobutyltriethoxysilane will be extensive both in terms of numbers using the notified chemical, with workers being involved in the transportation, storage and application of the chemical numbering between 20 and 100 in each category, and the number of sites at which the chemical is used. The chemical will potentially be used at any site where there is masonry/concrete.

The notified chemical is imported into the country in 20 and 200 litre sealed metal drums, which are moisture resistant. The drums will be stored in well ventilated areas.

Typically, the spraying equipment is attached directly to the drum so that spillage and consequent dermal or inhalational exposure is expected to be low during these operations. Container residues are expected to be emptied into the next to be used with the final container being capped, at the completion of an application contract, for later use. Exposure during this operation should be low if care is taken to avoid spillage.

Workers involved in application will be using the liquid as a low pressure spray (50 kPA nominal), in outdoor areas, spraying onto horizontal and vertical surfaces. The maximum possible exposure to the aerosol spray would be 8 hours/day for 5 days/week so that workers will be spraying the chemical for prolonged periods. Vertical spraying and spraying horizontal surfaces from below are likely to result in workers being covered with the chemical spray, more so in windy conditions. However, the spraying technique used, which was developed in Europe and the USA, minimises the amount of wastage of the notified chemical.

As the spraying will be carried out in the open air environment, this would tend to reduce the exposure to the evaporating solvent, ethanol. The strong binding of the isobutylpolysilane to silica-based surfaces after spraying would reduce any run-off and hence workers would not be exposed to the notified chemical further.

The toxicological data provided for the closely related chemical, isobutyltrimethoxysilane suggest that the notified chemical is likely to be a moderate skin irritant, a severe eye irritant and a respiratory irritant. However, the notified chemical is not likely to exhibit acute toxicity following ingestion or dermal exposure and is not expected to be a skin sensitiser or to be genotoxic based on data for both the notified chemical and the methoxy analogue.

Given the likely toxicological profile of the notified chemical together with the possibility of a high level of exposure for prolonged periods, it can be concluded that the risk of skin, eye and respiratory irritation when spraying is high.

The potential for public exposure to the notified chemical is expected to be low. Public exposure to the notified chemical will occur at areas adjacent to the application sites and possibly by contact with the treated concrete/masonry structures. However, exposure to the public in areas adjacent to the application sites will be short and the extent of exposure is expected to be low if the notified chemical is applied as recommended. Public exposure to the chemical as a result of contact with sprayed structures is expected to be negligible, since the notified chemical will not leach from the substrate to which it attaches.

In the case of accidental spillage during transport, the public may be exposed to the notified chemical. This is minimised by the recommended practices for containment and clean-up of spills as outlined in the MSDS.

13. RECOMMENDATIONS

To minimise occupational exposure to isobutyltriethoxysilane the following guidelines and precautions should be observed:

. when spraying the notified chemical the following protective equipment should be used:

- a full face respirator with dust cartridge or canister conforming to Australian Standards (AS) AS 1715 (16) and AS 1716 (17),
- impervious rubber gloves conforming to AS 2161 (18), and
- long-sleeved work overalls conforming to AS 3765.1 and AS 3765.1 (19, 20)

. good work practices should be implemented to avoid generation of spray into non-work areas. Adequate precautions should be observed when spraying in windy conditions or in areas of poor air circulation.

. good personal hygiene practices should be observed.

. container residues should be carefully emptied into the next to be used with the final container being capped for later use.

. A copy of the Material Safety Data Sheet (MSDS) should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The Material Safety Data Sheet (MSDS) for isobutyltriethoxysilane was provided in Worksafe Australia format (21).

This MSDS was provided by Dow Corning Australia Pty. Ltd as part of their notification statement. The accuracy of this information remains the responsibility of Dow Corning Australia Pty. Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Industrial Chemicals (Notification and Assessment) Act 1989 (the Act), secondary notification of isobutyltriethoxysilane shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

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