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COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS

Sub-Committee of Experts on the Transport of Dangerous Goods
(Sixteenth session,
Geneva, 5-16 July l999,
agenda item 5 (a))

MISCELLANEOUS DRAFT AMENDMENTS TO THE MODEL REGULATIONS ON THE TRANSPORT OF DANGEROUS GOODS

Listing and classification

Proposal to revise the classification for silicon tetrachloride and propyltrichlorosilane and to add new generic chlorosilane entries

Transmitted by the Expert from the United States of America

1. The Expert from the United States is proposing to revise two entries, Silicon tetrachloride and Propyltrichlorosilane on the basis of new toxicity data resulting from testing recently performed in the United States. Additionally, two new generic chlorosilane n.o.s. entries are proposed to provide entries for chlorosilane mixtures with a primary hazard of Division 6.1. Data sheets are provided as an Annex to this paper to support the proposals.

2. Based on the new data it has been determined that Silicon tetrachloride, UN 1818, meets the criteria for Division 6.1, Packing Group II (based on the criteria for inhalation toxicity of vapors in 2.6.2.2.4.3) in addition to the criteria for Class 8, Packing Group II. The attached data sheet supports this position. On this basis, it is proposed that the entry, Silicon tetrachloride, UN 1818, be amended to indicate a primary hazard of Division 6.1, Packing Group II with a subsidiary risk of Class 8.

3. It has also been determined that Propyltrichlorosilane, UN 1816, meets the criteria for Division 6.1, Packing Group II (based on the criteria for inhalation toxicity of vapors in 2.6.2.2.4.3) in addition to the criteria for Class 8 and Class 3, Packing Group II. The attached data sheet supports this position. On this basis, it is proposed that the entry, Propyltrichlorosilane, UN 1816, be amended to indicate a primary hazard of Division 6.1, Packing Group II with Subsidiary Risks of Class 8 and Class 3.

4. The Expert from the United States has determined that additional Chlorosilanes may meet the criteria for Division 6.1 as the primary hazard class in addition to other criteria such as the criteria for Class 8 and Class 3. The attached data sheets for two substances not specifically listed by name in the Dangerous Goods List support this position. On this basis, it is proposed that the following two new n.o.s. entries be added to the Dangerous Goods List:

a) Chlorosilanes, Toxic, Corrosive, n.o.s..
b) Chlorosilanes, Toxic, Corrosive, Flammable n.o.s.

Proposal

5. Amend the Dangerous Goods List to revise the entries UN 1818 and 1816 and to add two new entries as follows:

UN No	Description	Class or Division	Subsi-diary risk	PG	Special Provis-ions	LQ	Packagings and IBCs		Portable Tanks	
1818	Silicon Tetrachloride	6.1	8	II		None	P001, IBC01		T11	TP2 TP7 TP13
1816	Propyltrichlorosilane	6.1	3, 8	II		None	P001, IBC01		T11	TP2 TP13
3xxx	Chlorosilanes, Toxic, Corrosive, n.o.s.	6.1	8	II	109	None	P001, IBC01		T11	TP2 TP13
3xxx	Chlorosilanes, Toxic, Corrosive, Flammable, n.o.s.	6.1	3, 8	II	109	None	P001, IBC01		T11	TP2 TP13

6. Revise the alphabetical index of substances and articles as follows:

Silicon tetrachloride	6	UN 1818
Propyltrichlorosilane	6	UN 1816
Chlorosilanes, Toxic, Corrosive, n.o.s.	6	[UN (to be added)]
Chlorosilanes, Toxic, Corrosive, Flammable, n.o.s.	6	[UN (to be added)]

Annex 1

DATA SHEET TO BE SUBMITTED TO THE UNITED NATIONS FOR NEW OR AMENDED CLASSIFICATION OF SUBSTANCES

Submitted By _____ Date _____

Supply all relevant information including sources of basic classification data. Data should relate to the product in the form to be transported. State test methods. Answer all questions - if necessary state "not known" or "not applicable" - If data is not available in the form requested, provide what is available with details. Delete inappropriate words.

SECTION 1. SUBSTANCE IDENTITY

1.1 Chemical name 2-Methylbutyltrichlorosilane *Note: This compound is being used as an example for the proposed generic material name.*

1.2 Chemical formula $CH_3C_4H_8SiCl_3$

1.3 Other names/synonyms Not Known

1.4.1 UN number _____ Not Known 1.4.2 CAS number ___ Not Known

1.5 Proposed classification for the Recommendations

1.5.1 proper shipping name (3.1.2*/) Chlorosilanes, Toxic, Corrosive, n.o.s.

1.5.2 class/division 6.1 subsidiary risk(s) 8
packing group II

1.5.3 proposed special provisions, if any 109

1.5.4 proposed packing method Not Applicable

SECTION 2. PHYSICAL PROPERTIES

2.1 Melting point or range. Not Known °C

2.2 Boiling point or range. 165 ± 3 °C

2.3 Relative density at:

2.3.1 15°C ___ Not Known _____

2.3.2 20°C ___ Not Known _____

2.2.2 50°C ___ Not Known _____

2.4 Vapour pressure at:

2.4.1 50°C _____1.6950_____ kPa

2.4.2 65°C _____3.5144_____ kPa

2.5 Viscosity at 20°C**/ ____ Not Known _____ m^2/s

2.6. Solubility in water at 20°C _Reacts_____ g/100 ml

_____

*/ *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

**/ *See definition of "liquid" in 1.2.1 of the Model Regulations on the Transport of Dangerous Goods.*

2.7 Physical state at 20°C (2.2.1.2*/) Liquid solid/liquid/gas**/

2.8 Appearance at normal carriage temperatures, including colour and odour Colorless to pale yellow, Hydrochloric Acid odour

2.9 Other relevant physical properties Not Applicable

SECTION 3. FLAMMABILITY

3.1 Flammable vapour

3.1.1 Flash point (2.3.3*/) >60 °C oc/cc

3.1.2 Is combustion sustained? (2.3.1.2*/) Not Known yes/no

3.2 Autoignition temperature __ Not Known _____ °C

3.3 Flammability range (LEL/UEL) __ Not Known _____ %

3.4 Is the substance a flammable solid? No (2.4.2*/)

3.4.1 If yes, give details ___ Not Applicable _____

_____

_____

SECTION 4. CHEMICAL PROPERTIES

4.1. Does the substance require inhibition/stabilization or other treatment such as nitrogen blanket to prevent hazardous reactivity? Yes yes/no

If yes, state

4.1.1 Inhibitor/stabilizer used ____ Not Applicable _____

4.1.2 Alternative method __Nitrogen blanket required to prevent reaction with moisture.

4.1.3 Time effective at 55°C _____ Not Applicable _____

4.1.4 Conditions rendering ineffective __ Not Applicable _____

4.2 Is the substance an explosive according to paragraph 2.1.1.1? (2.1*/) No yes/no

4.2.1 If yes, give details _____ Not Applicable _____

4.3 Is the substance a desensitized explosive? (2.4.2.4*/) No yes/no

4.3.1 If yes, give details _____ Not Applicable _____

_____

_____

*/ *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

**/ *See definition of "liquid" in 1.2.1 of the Model Regulations on the Transport of Dangerous Goods.*

4.4 Is the substance a self-reactive substance? (2.4.1*/) No yes/no

If yes, state

4.4.1 exit box of flow chart Not Applicable

What is the self accelerating decomposition temperature (SADT) for a 50 kg package? Not Applicable °C
Is the temperature control required? (2.4.2.3.5*/) No yes/no

4.4.2 proposed control temperature for a 50 kg package Not Applicable °C

4.4.3 proposed emergency temperature for a 50 kg package Not Applicable °C

4.5 Is the substance pyrophoric? (2.4.3*/) No yes/no

4.5.1 If yes, give details _____ Not Applicable _____
_____
_____

4.6 Is the substance liable to self-heating? (2.4.3*/) No yes/no

4.6.1 If yes, give details ____ Not Applicable _____

4.7 Is the substance an organic peroxide (2.5.1*/) No yes/no

If yes, state

4.7.1 exit box of flow chart Not Applicable

What is the self accelerating decomposition temperature (SADT) for a 50 kg package? Not Applicable °C
Is the temperature control required? (2.5.3.5.1*/) No yes/no

4.7.2 proposed control temperature for a 50 kg package Not Applicable °C

4.7.3 proposed emergency temperature for a 50 kg package Not Applicable °C

4.8 Does the substance in contact with water emit flammable gases?(2.4.4*) No yes/no

4.8.1 If yes, give details ___ Not Applicable _____

4.9 Does the substance have oxidizing properties (2.5.1*/) No yes/no

4.9.1 If yes, give details ____ Not Applicable _____

4.10 Corrosivity (2.8*/) to:

4.10.1 mild steel __ Not Applicable ___ mm/yr at _____ °C

4.10.2 aluminum __ Not Allowed_____ mm/yr at _____ °C

4.10.3 other packaging materials

(specify) __ Not Known_____ _____ mm/yr at _____ °C

_____ _____ mm/yr at _____ °C

4.11 Other relevant chemical properties __ Reacts rapidly with water to release Hydrogen Chloride. Burns skin upon short periods of contact._____

_____

*/ *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

SECTION 5. HARMFUL BIOLOGICAL EFFECTS

5.1 LD 50, oral (2.6.2.1.1*/) _ Not Known _ mg/kg Animal species ___ Not Applicable___

5.2 LD 50, dermal (2.6.2.1.2*/) _ Not Known mg/kg Animal species ___ Not Applicable ___

5.3 LC 50, inhalation (2.6.2.1.3*/) _____ mg/litre Exposure time _____1_____ hours
or _1453___ ml/m^3 Animal species __Rat_____
(estimate)

5.4 Saturated vapour concentration at 20 °C (2.6.2.2.4.3*/) 2931 ppm

5.5 Skin exposure (2.8*/) results Not Known Exposure time ____ Not Applicable____ hours/minutes
Animal species _ Not Applicable _____

5.6 Other data ___Not Known_____

5.7 Human experience ___Not Known_____

SECTION 6. SUPPLEMENTARY INFORMATION

6.1 Recommended emergency action See North American Emergency Response Guide 156

6.1.1 Fire (include suitable and unsuitable extinguishing agents) Do Not use water. Use AFFF alcohol-resistant medium expansion foam.
6.1.2 Spillage Do Not get water on spill or in containers. Use AFFF alcohol-resistant medium expansion foam to reduce vapours.

6.2 Is it proposed to transport the substance in:

6.2.1 Intermediate Bulk Containers (7.5*/)? Yes

6.2.2 Multimodal tanks (7.5*/)? Yes

If yes, give details in Section 7 and/or 8.

SECTION 7. INTERMEDIATE BULK CONTAINERS (IBCs) (only complete if yes in 6.2.1)

7.1 Proposed type(s) Metal IBCs (31A, 31B or 31N) – IBC01

SECTION 8. MULTIMODAL TANK TRANSPORT (only complete if yes in 6.2.2)

8.1 Description of proposed tank (including IMO tank type if known) ___ T11 (4.2.4.2.6*/), IMO-1

8.2 Minimum test pressure 6 bar, (4.2.4.2.6*/)

8.3 Minimum shell thickness 5/6 mm (6.6.2.4.2*/)

8.4 Details of bottom openings, if any 3 effective means of closure (6.6.2.6.3*/)

8.5 Pressure relief arrangements -Normal (6.6.2.8*/)

8.6 Degree of filling - TP2 (4.2.4.3*/)

8.7 Unsuitable construction materials - Aluminum, Brass -

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*/ *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

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Annex 2

DATA SHEET TO BE SUBMITTED TO THE UNITED NATIONS FOR NEW OR AMENDED CLASSIFICATION OF SUBSTANCES

Submitted By _____ Date _____

Supply all relevant information including sources of basic classification data. Data should relate to the product in the form to be transported. State test methods. Answer all questions - if necessary state "not known" or "not applicable" - If data is not available in the form requested, provide what is available with details. Delete inappropriate words.

SECTION 1. SUBSTANCE IDENTITY

1.1 Chemical name Isobutylmethyldichlorosilane *Note: This compound is being used as an example for the proposed generic material name.*

1.2 Chemical formula $C_4H_9CH_3SiCl_2$

1.3 Other names/synonyms Not Known

1.4.1 UN number _____ Not Known __ 1.4.2 CAS number ___018028961_____

1.5 Proposed classification for the Recommendations

1.5.1 proper shipping name (3.1.2*/) Chlorosilanes, Toxic, Corrosive, Flammable, n.o.s.

1.5.2 class/division 6.1 subsidiary risk(s) 8,3
packing group II

1.5.3 proposed special provisions, if any 109

1.5.4 proposed packing method Not Applicable

SECTION 2. PHYSICAL PROPERTIES

2.1 Melting point or range. Not Known °C

2.2 Boiling point or range. 141 ± 2.0 °C

2.3 Relative density at:

2.3.1 15°C ___ Not Known _____

2.3.2 20°C ___ Not Known _____

2.2.2 50°C ___ Not Known _____

2.4 Vapour pressure at:

2.4.1 50°C _____3.6091_____ kPa

2.4.2 65°C _____7.2215_____ kPa

2.5 Viscosity at 20°C**/ ____ Not Known_____ m^2/s

2.6. Solubility in water at 20°C _Reacts_____ g/100 ml

_____

*/ *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

**/ *See definition of "liquid" in 1.2.1 of the Model Regulations on the Transport of Dangerous Goods.*

2.7 Physical state at 20°C (2.2.1.2*/) Liquid solid/liquid/gas**/

2.8 Appearance at normal carriage temperatures, including colour and odour Colorless to pale yellow, Hydrochloric Acid odour

2.9 Other relevant physical properties Not Applicable

SECTION 3. FLAMMABILITY

3.1 Flammable vapour

3.1.1 Flash point (2.3.3*/) ≥ 23°C, ≤ 60°C oc/cc

3.1.2 Is combustion sustained? (2.3.1.2*/) Not Known yes/no

3.2 Autoignition temperature __ Not Known _____ °C

3.3 Flammability range (LEL/UEL) __ Not Known _____ %

3.4 Is the substance a flammable solid? No (2.4.2*/)

3.4.1 If yes, give details ___ Not Applicable _____
_____
_____

SECTION 4. CHEMICAL PROPERTIES

4.1. Does the substance require inhibition/stabilization or other treatment such as nitrogen blanket to prevent hazardous reactivity? Yes yes/no

If yes, state

4.1.1 Inhibitor/stabilizer used ____ Not Applicable _____

4.1.2 Alternative method __Nitrogen blanket required to prevent reaction with moisture.

4.1.3 Time effective at 55°C _____ Not Applicable _____

4.1.4 Conditions rendering ineffective __ Not Applicable _____

4.2 Is the substance an explosive according to paragraph 2.1.1.1? (2.1*/) No yes/no

4.2.1 If yes, give details _____ Not Applicable _____

4.3 Is the substance a desensitized explosive? (2.4.2.4*/) No yes/no

4.3.1 If yes, give details _____ Not Applicable _____
_____
_____

*/ *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

**/ *See definition of "liquid" in 1.2.1 of the Model Regulations on the Transport of Dangerous Goods.*

4.4 Is the substance a self-reactive substance? (2.4.1*/) No yes/no

If yes, state

4.4.1 exit box of flow chart Not Applicable

What is the self accelerating decomposition temperature (SADT) for a 50 kg package? Not Applicable °C
Is the temperature control required? (2.4.2.3.5*/) No yes/no

4.4.2 proposed control temperature for a 50 kg package Not Applicable °C

4.4.3 proposed emergency temperature for a 50 kg package Not Applicable °C

4.5 Is the substance pyrophoric? (2.4.3*/) No yes/no

4.5.1 If yes, give details _____ Not Applicable _____
_____
_____

4.6 Is the substance liable to self-heating? (2.4.3*/) No yes/no

4.6.1 If yes, give details ____ Not Applicable _____

4.7 Is the substance an organic peroxide (2.5.1*/) No yes/no

If yes, state

4.7.1 exit box of flow chart Not Applicable

What is the self accelerating decomposition temperature (SADT) for a 50 kg package? Not Applicable °C
Is the temperature control required? (2.5.3.5.1*/) No yes/no

4.7.2 proposed control temperature for a 50 kg package Not Applicable °C

4.7.3 proposed emergency temperature for a 50 kg package Not Applicable °C

4.8 Does the substance in contact with water emit flammable gases?(2.4.4*) No yes/no

4.8.1 If yes, give details ___ Not Applicable _____

4.9 Does the substance have oxidizing properties (2.5.1*/) No yes/no

4.9.1 If yes, give details ____ Not Applicable _____

4.10 Corrosivity (2.8*/) to:

4.10.1 mild steel __ Not Applicable ___ mm/yr at _____ °C

4.10.2 aluminum __ Not Allowed_____ mm/yr at _____ °C

4.10.3 other packaging materials

(specify) __ Not Known_____ _____ mm/yr at _____ °C

_____ _____ mm/yr at _____ °C

4.11 Other relevant chemical properties __ Reacts rapidly with water to release Hydrogen Chloride. Burns skin upon short periods of contact._____

_____

*/ *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

SECTION 5. HARMFUL BIOLOGICAL EFFECTS

5.1 LD 50, oral (2.6.2.1.1*/) _ Not Known _ mg/kg Animal species ___ Not Applicable___

5.2 LD 50, dermal (2.6.2.1.2*/) _ Not Known mg/kg Animal species ___ Not Applicable ___

5.3 LC 50, inhalation (2.6.2.1.3*/) _____ mg/litre Exposure time _____1_____ hours
or _2180___ ml/m^3 Animal species __Rat_____
(estimate)

5.4 Saturated vapour concentration at 20 °C (2.6.2.2.4.3*/) 21,312 ppm

5.5 Skin exposure (2.8*/) results Not Known Exposure time ____ Not Applicable____ hours/minutes
Animal species _ Not Applicable _____

5.6 Other data ___Not Known_____

5.7 Human experience ___Not Known_____

SECTION 6. SUPPLEMENTARY INFORMATION

6.1 Recommended emergency action See North American Emergency Response Guide 155

6.1.1 Fire (include suitable and unsuitable extinguishing agents) Do Not use water. Use AFFF alcohol-resistant medium expansion foam.
6.1.2 Spillage Do Not get water on spill or in containers. Use AFFF alcohol-resistant medium expansion foam to reduce vapours.

6.2 Is it proposed to transport the substance in:

6.2.1 Intermediate Bulk Containers (7.5*/)? -Yes

6.2.2 Multimodal tanks (7.5*/)? Yes

If yes, give details in Section 7 and/or 8.

SECTION 7. INTERMEDIATE BULK CONTAINERS (IBCs) (only complete if yes in 6.2.1)

7.1 Proposed type(s) –Metal IBCs (31A, 31B or 31N) – IBC01

SECTION 8. MULTIMODAL TANK TRANSPORT (only complete if yes in 6.2.2)

8.1 Description of proposed tank (including IMO tank type if known) ___ T11 (4.2.4.2.6*/), IMO-1___

8.2 Minimum test pressure 6 bar

8.3 Minimum shell thickness 6 mm

8.4 Details of bottom openings, if any -3 effective means of closure 6.6.2.6.3*/

8.5 Pressure relief arrangements - Normal

8.6 Degree of filling TP2 (4.2.4.3*/)

8.7 Unsuitable construction materials - Aluminum, Brass

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*/ *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

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Annex 3

DATA SHEET TO BE SUBMITTED TO THE UNITED NATIONS FOR NEW OR AMENDED CLASSIFICATION OF SUBSTANCES

Submitted By _____ Date _____

Supply all relevant information including sources of basic classification data. Data should relate to the product in the form to be transported. State test methods. Answer all questions - if necessary state "not known" or "not applicable" - If data is not available in the form requested, provide what is available with details. Delete inappropriate words.

SECTION 1. SUBSTANCE IDENTITY

1.1 Chemical name Propyltrichorosilane

1.2 Chemical formula $C_3H_7SiCl_3$

1.3 Other names/synonyms n- Propyltrichorosilane

1.4.1 UN number _____1816_____ 1.4.2 CAS number ___000141571_____

1.5 Proposed classification for the Recommendations

1.5.1 proper shipping name (3.1.2*/) Propyltrichorosilane

1.5.2 class/division 6.1 subsidiary risk(s) 8,3
packing group II

1.5.3 proposed special provisions, if any None

1.5.4 proposed packing method Not Applicable

SECTION 2. PHYSICAL PROPERTIES

2.1 Melting point or range. Not Known °C

2.2 Boiling point or range. 124.5 ± 0.2 °C

2.3 Relative density at:

2.3.1 15°C ___1.2031_____

2.3.2 20°C ___1.1999_____

2.2.2 50°C ___1.1803_____

2.4 Vapour pressure at:

2.4.1 50°C _____7.29_____ kPa

2.4.2 65°C _____13.877_____ kPa

2.5 Viscosity at 20°C**/ ____0.70162 (mPa/s)_____ ~~m^2/s~~

2.6. Solubility in water at 20°C _Reacts_____ g/100 ml

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*/ *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

**/ *See definition of "liquid" in 1.2.1 of the Model Regulations on the Transport of Dangerous Goods.*

2.7 Physical state at 20°C (2.2.1.2*/) Liquid solid/liquid/gas**/

2.8 Appearance at normal carriage temperatures, including colour and odour Colorless to pale yellow, Hydrochloric Acid odour

2.9 Other relevant physical properties Not Applicable

SECTION 3. FLAMMABILITY

3.1 Flammable vapour

3.1.1 Flash point (2.3.3*/) 40.5 °C ~~oc~~/cc

3.1.2 Is combustion sustained? (2.3.1.2*/) Yes yes/no

3.2 Autoignition temperature __ Not Known _____ °C

3.3 Flammability range (LEL/UEL) __ Not Known _____ %

3.4 Is the substance a flammable solid? No (2.4.2*/)

3.4.1 If yes, give details ___ Not Applicable _____
_____
_____

SECTION 4. CHEMICAL PROPERTIES

4.1. Does the substance require inhibition/stabilization or other treatment such as nitrogen blanket to prevent hazardous reactivity? Yes yes/no

If yes, state

4.1.1 Inhibitor/stabilizer used ____ Not Applicable _____

4.1.2 Alternative method __Nitrogen blanket required to prevent reaction with moisture.

4.1.3 Time effective at 55°C _____ Not Applicable _____

4.1.4 Conditions rendering ineffective __ Not Applicable _____

4.2 Is the substance an explosive according to paragraph 2.1.1.1? (2.1*/) No yes/no

4.2.1 If yes, give details _____ Not Applicable _____

4.3 Is the substance a desensitized explosive? (2.4.2.4*/) No yes/no

4.3.1 If yes, give details _____ Not Applicable _____
_____
_____

_____

*/ *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

**/ *See definition of "liquid" in 1.2.1 of the Model Regulations on the Transport of Dangerous Goods.*

4.4 Is the substance a self-reactive substance? (2.4.1*/) No yes/no

If yes, state

4.4.1 exit box of flow chart Not Applicable

What is the self accelerating decomposition temperature (SADT) for a 50 kg package? Not Applicable °C
Is the temperature control required? (2.4.2.3.5*/) No yes/no

4.4.2 proposed control temperature for a 50 kg package Not Applicable °C

4.4.3 proposed emergency temperature for a 50 kg package Not Applicable °C

4.5 Is the substance pyrophoric? (2.4.3*/) No yes/no

4.5.1 If yes, give details _____ Not Applicable _____
_____
_____

4.6 Is the substance liable to self-heating? (2.4.3*/) No yes/no

4.6.1 If yes, give details ____ Not Applicable _____

4.7 Is the substance an organic peroxide (2.5.1*/) No yes/no

If yes, state

4.7.1 exit box of flow chart Not Applicable

What is the self accelerating decomposition temperature (SADT) for a 50 kg package? Not Applicable °C
Is the temperature control required? (2.5.3.5.1*/) No yes/no

4.7.2 proposed control temperature for a 50 kg package Not Applicable °C

4.7.3 proposed emergency temperature for a 50 kg package Not Applicable °C

4.8 Does the substance in contact with water emit flammable gases?(2.4.4*) No yes/no

4.8.1 If yes, give details ___ Not Applicable _____

4.9 Does the substance have oxidizing properties (2.5.1*/) No yes/no

4.9.1 If yes, give details ____ Not Applicable _____

4.10 Corrosivity (2.8*/) to:

4.10.1 mild steel __ Not Applicable ___ mm/yr at _____ °C

4.10.2 aluminum __ Not Allowed_____ mm/yr at _____ °C

4.10.3 other packaging materials

(specify) __ Not Known_____ _____ mm/yr at _____ °C

_____ _____ mm/yr at _____ °C

4.11 Other relevant chemical properties __ Reacts rapidly with water to release Hydrogen Chloride. Burns skin upon short periods of contact._____

_____

*/ *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

SECTION 5. HARMFUL BIOLOGICAL EFFECTS

5.1 LD 50, oral (2.6.2.1.1*/) _ Not Known _ mg/kg Animal species ___ Not Applicable___

5.2 LD 50, dermal (2.6.2.1.2*/) _ Not Known mg/kg Animal species ___ Not Applicable ___

5.3 LC 50, inhalation (2.6.2.1.3*/) _____ mg/litre Exposure time _____1_____ hours
or _1352___ ml/m^3 Animal species __Rat_____

5.4 Saturated vapour concentration at 20 °C (2.6.2.2.4.3*/) 15,789 ppm

5.5 Skin exposure (2.8*/) results Not Known Exposure time ____ Not Applicable____ hours/minutes
Animal species _ Not Applicable _____

5.6 Other data ___Not Known_____

5.7 Human experience ___Not Known_____

SECTION 6. SUPPLEMENTARY INFORMATION

6.1 Recommended emergency action See North American Emergency Response Guide 155

6.1.1 Fire (include suitable and unsuitable extinguishing agents) Do Not use water. Use AFFF alcohol-resistant medium expansion foam.
6.1.2 Spillage Do Not get water on spill or in containers. Use AFFF alcohol-resistant medium expansion foam to reduce vapours.

6.2 Is it proposed to transport the substance in:

6.2.1 Intermediate Bulk Containers (7.5*/)? yes

6.2.2 Multimodal tanks (7.5*/)? yes

If yes, give details in Section 7 and/or 8.

SECTION 7. INTERMEDIATE BULK CONTAINERS (IBCs) (only complete if yes in 6.2.1)

7.1 Proposed type(s) Metal IBCs (31A, 31B or 31N) – IBC01

SECTION 8. MULTIMODAL TANK TRANSPORT (only complete if yes in 6.2.2)

8.1 Description of proposed tank (including IMO tank type if known) –T11(4.2.4.2.6*/), IMO-1

8.2 Minimum test pressure 6 bar, (4.2.4.2.6*/)

8.3 Minimum shell thickness 5/6 mm (4.2.4.2.6*/)

8.4 Details of bottom openings, if any 3 effective means of closure 6.6.2.6.3*/

8.5 Pressure relief arrangements ____ Normal

8.6 Degree of filling ___ TP2 (4.2.4.3*/)

8.7 Unsuitable construction materials -Aluminum, Brass

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*/ *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

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Annexe 4

DATA SHEET TO BE SUBMITTED TO THE UNITED NATIONS FOR NEW OR AMENDED CLASSIFICATION OF SUBSTANCES

Submitted By _____ Date _____

Supply all relevant information including sources of basic classification data. Data should relate to the product in the form to be transported. State test methods. Answer all questions - if necessary state "not known" or "not applicable" - If data is not available in the form requested, provide what is available with details. Delete inappropriate words.

SECTION 1. SUBSTANCE IDENTITY

1.1 Chemical name Silicon tetrachloride

1.2 Chemical formula $SiCl_4$

1.3 Other names/synonyms Tetrachlorosilane

1.4.1 UN number _____1818_____ 1.4.2 CAS number ___010026047_____

1.5 Proposed classification for the Recommendations

1.5.1 proper shipping name (3.1.2*/) Silicon tetrachloride

1.5.2 class/division 6.1 subsidiary risk(s) 8
packing group II

1.5.3 proposed special provisions, if any None

1.5.4 proposed packing method Not Applicable

SECTION 2. PHYSICAL PROPERTIES

2.1 Melting point or range. -68.4 ± 0.2 °C

2.2 Boiling point or range. 57.1 ± 0.1 °C

2.3 Relative density at:

2.3.1 15°C ___1.4942_____

2.3.2 20°C ___1.4875_____

2.2.2 50°C ___1.4460_____

2.4 Vapour pressure at:

2.4.1 50°C _____79.9_____ kPa

2.4.2 65°C _____129.8_____ kPa

2.5 Viscosity at 20°C**/ ____0.473 (mPa/s)_____ ~~m^2/s~~

2.6. Solubility in water at 20°C _Reacts_____ g/100 ml

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*/ *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

**/ *See definition of "liquid" in 1.2.1 of the Model Regulations on the Transport of Dangerous Goods.*

2.7 Physical state at 20°C (2.2.1.2*/) Liquid solid/liquid/gas**/

2.8 Appearance at normal carriage temperatures, including colour and odour Colorless to pale yellow, Hydrochloric Acid odour

2.9 Other relevant physical properties Not Applicable

SECTION 3. FLAMMABILITY

3.1 Flammable vapour

3.1.1 Flash point (2.3.3*/) None °C oc/cc

3.1.2 Is combustion sustained? (2.3.1.2*/) No yes/no

3.2 Autoignition temperature __ Not Applicable _____ °C

3.3 Flammability range (LEL/UEL) __ Not Applicable _____ %

3.4 Is the substance a flammable solid? No (2.4.2*/)

3.4.1 If yes, give details ___ Not Applicable _____

_____

_____

SECTION 4. CHEMICAL PROPERTIES

4.1. Does the substance require inhibition/stabilization or other treatment such as nitrogen blanket to prevent hazardous reactivity? Yes yes/no

If yes, state

4.1.1 Inhibitor/stabilizer used ____ Not Applicable _____

4.1.2 Alternative method __Nitrogen blanket required to prevent reaction with moisture.

4.1.3 Time effective at 55°C _____ Not Applicable _____

4.1.4 Conditions rendering ineffective __ Not Applicable _____

4.2 Is the substance an explosive according to paragraph 2.1.1.1? (2.1*/) No yes/no

4.2.1 If yes, give details _____ Not Applicable _____

4.3 Is the substance a desensitized explosive? (2.4.2.4*/) No yes/no

4.3.1 If yes, give details _____ Not Applicable _____

_____

_____

_____

*/ *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

**/ *See definition of "liquid" in 1.2.1 of the Model Regulations on the Transport of Dangerous Goods.*

4.4 Is the substance a self-reactive substance? (2.4.1*/) No yes/no

If yes, state

4.4.1 exit box of flow chart Not Applicable

What is the self accelerating decomposition temperature (SADT) for a 50 kg package? Not Applicable °C
Is the temperature control required? (2.4.2.3.5*/) No yes/no

4.4.2 proposed control temperature for a 50 kg package Not Applicable °C

4.4.3 proposed emergency temperature for a 50 kg package Not Applicable °C

4.5 Is the substance pyrophoric? (2.4.3*/) No yes/no

4.5.1 If yes, give details _____ Not Applicable _____
_____
_____

4.6 Is the substance liable to self-heating? (2.4.3*/) No yes/no

4.6.1 If yes, give details ____ Not Applicable _____

4.7 Is the substance an organic peroxide (2.5.1*/) No yes/no

If yes, state

4.7.1 exit box of flow chart Not Applicable

What is the self accelerating decomposition temperature (SADT) for a 50 kg package? Not Applicable °C
Is the temperature control required? (2.5.3.5.1*/) No yes/no

4.7.2 proposed control temperature for a 50 kg package Not Applicable °C

4.7.3 proposed emergency temperature for a 50 kg package Not Applicable °C

4.8 Does the substance in contact with water emit flammable gases?(2.4.4*) No yes/no

4.8.1 If yes, give details ___ Not Applicable _____

4.9 Does the substance have oxidizing properties (2.5.1*/) No yes/no

4.9.1 If yes, give details ____ Not Applicable _____

4.10 Corrosivity (2.8*/) to:

4.10.1 mild steel __ Not Applicable ___ mm/yr at _____ °C

4.10.2 aluminum __ Not Allowed_____ mm/yr at _____ °C

4.10.3 other packaging materials

(specify) __ Not Known_____ _____ mm/yr at _____ °C

_____ _____ mm/yr at _____ °C

4.11 Other relevant chemical properties __ Reacts rapidly with water to release Hydrogen Chloride. Burns skin upon short periods of contact._____

*/ *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

SECTION 5. HARMFUL BIOLOGICAL EFFECTS

5.1 LD 50, oral (2.6.2.1.1*/) _ Not Known _ mg/kg Animal species ___ Not Applicable___

5.2 LD 50, dermal (2.6.2.1.2*/) _ Not Known mg/kg Animal species ___ Not Applicable ___

5.3 LC 50, inhalation (2.6.2.1.3*/) _____ mg/litre Exposure time _____1_____ hours
or _1312___ ml/m^3 Animal species __Rat_____

5.4 Saturated vapour concentration at 20 °C (2.6.2.2.4.3*/) 251,316 ppm

5.5 Skin exposure (2.8*/) results Not Known Exposure time ____ Not Applicable____ hours/minutes
Animal species _ Not Applicable _____

5.6 Other data ___Not Known_____

5.7 Human experience ___Not Known_____

SECTION 6. SUPPLEMENTARY INFORMATION

6.1 Recommended emergency action See North American Emergency Response Guide 156

6.1.1 Fire (include suitable and unsuitable extinguishing agents) Do Not use water. Use AFFF alcohol-resistant medium expansion foam.
6.1.2 Spillage Do Not get water on spill or in containers. Use AFFF alcohol-resistant medium expansion foam to reduce vapours.

6.2 Is it proposed to transport the substance in:

6.2.1 Intermediate Bulk Containers (7.5*/)? Yes

6.2.2 Multimodal tanks (7.5*/)? Yes

If yes, give details in Section 7 and/or 8.

SECTION 7. INTERMEDIATE BULK CONTAINERS (IBCs) (only complete if yes in 6.2.1)

7.1 Proposed type(s) Metal IBS (31A, 31B or 31N) – IBC01

SECTION 8. MULTIMODAL TANK TRANSPORT (only complete if yes in 6.2.2)

8.1 Description of proposed tank (including IMO tank type if known) ___ T20 (4.2.4.2.6*/), IMO-1

8.2 Minimum test pressure - 6 bar, (4.2.4.2.6*/)

8.3 Minimum shell thickness - 5/6 mm (4.2.4.2.6*/)

8.4 Details of bottom openings, if any - Allowed (4.2.4.2.6*/)

8.5 Pressure relief arrangements Normal

8.6 Degree of filling - TP2 (4.2.4.3*/)

8.7 Unsuitable construction materials - Aluminum, Brass

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*/ *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*