SECTION-1: Identification of the substance / mixture and the company / undertaking

Catalogue Number	CS-O-49722
Product Name	Nitrogen trichloride
CAS No.	10025-85-1
Category	Reagents
Synonyms	Trichloroamine
Brand	Clearsynth Labs Ltd.
Identified uses	Laboratory Chemicals
Uses advised against	Not available
Company	Clearsynth Labs Ltd. Mumbai, India
Emergency Phone #	+91-22-245045900
REACH No.	Not available

SECTION 2: Hazards identification

Disclaimer: This is sample MSDS. Please email **sales@clearsynth.com** for more details.

2.1 Classification of the substance or mixture-Regulation (EC) No 1272/2008:

Not available

2.2 Label Elements

Signal Word: Not available

Not available

Hazard Statement(s)

Code	Statement
Not available	Not available

Precautionary Statement(s)

Code	Statement
Not available	Not available

SECTION 3: Composition / information on ingredients

3.1 Substance

Component : Nitrogen trichloride
CAS Number : 10025-85-1
Molecular Formula : Cl3N
Molecular Weight : 120.37
Parent Chemical : -
Synonyms : Trichloroamine
Concentration : Not available

SECTION 4: First aid measures

SECTION 4: First-aid measures

4.1 Description of first aid measures
- General advice: Remove from exposure. Keep at rest. Seek immediate medical attention.
- Inhalation: Move person to fresh air. If breathing is difficult, provide oxygen by trained personnel. If not breathing, give artificial respiration by trained personnel. Get medical attention immediately.
- Skin contact: Remove contaminated clothing and shoes. Rinse skin immediately with plenty of water for at least 15 minutes. Obtain medical attention.
- Eye contact: Rinse cautiously with water for at least 15 minutes, lifting upper and lower eyelids. Remove contact lenses if present and easy to do. Get immediate medical attention.
- Ingestion: Rinse mouth with water if conscious. Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Get immediate medical attention.

4.2 Most important symptoms and effects, both acute and delayed
- Not available.

4.3 Indication of any immediate medical attention and special treatment needed
- Treat symptomatically. Not available.

SECTION 5: Firefighting measures

SECTION 5: Fire-fighting measures

5.1 Extinguishing media
- Suitable extinguishing media: Use extinguishing media appropriate for surrounding fire.
- Unsuitable extinguishing media: Not available.

5.2 Special hazards arising from the substance or mixture
- May release hazardous decomposition products under fire conditions. Not available.

5.3 Advice for firefighters
- Wear self-contained breathing apparatus (SCBA) and full protective gear.
- Cool containers with water spray from a safe distance.
- Fight fire from a safe location due to potential for violent reaction/explosion. Not available.

SECTION 6: Accidental release measures

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

- Evacuate area. Keep upwind.
- Avoid breathing vapors/mists. Avoid contact with skin and eyes.
- Use appropriate personal protective equipment (see Section 8).

6.2 Environmental precautions
- Prevent release to the environment. Prevent entry into drains, surface waters, or soil.

6.3 Methods and material for containment and cleaning up
- Ventilate area.
- Absorb spill with inert, non-combustible absorbent material and place in a suitable, closed container for disposal.
- Do not allow material to contact incompatible materials. Not available.

6.4 Reference to other sections
- See Section 8 for exposure controls/personal protection and Section 13 for disposal considerations.

SECTION-7: Handling and storage

SECTION 7: Handling and storage

7.1 Precautions for safe handling
- Handle in a fume hood or well-ventilated area.
- Avoid breathing vapors/mists. Avoid contact with skin, eyes, and clothing.
- Keep away from heat, sparks, open flames, and other ignition sources.
- Use non-sparking tools and explosion-proof equipment where applicable.
- Do not mix with incompatible materials. Not available.

7.2 Conditions for safe storage, including any incompatibilities
- Store tightly closed in a cool, dry, well-ventilated place.
- Protect from heat and direct sunlight.
- Store away from incompatible materials. Not available.

7.3 Specific end use(s)
- Reagent. Not available.

SECTION 8: Exposure controls / personal protection

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
- Occupational exposure limits: Not available.
- Biological limit values: Not available.

8.2 Exposure controls
- Engineering controls: Use local exhaust ventilation or fume hood. Provide eyewash station and safety shower.
- Personal protective equipment (PPE):
- Eye/face protection: Safety goggles or face shield.
- Skin protection: Chemical-resistant gloves; protective clothing.
- Respiratory protection: Use appropriate respirator if ventilation is inadequate. Selection should be based on hazard and workplace conditions.
- Hygiene measures: Wash hands after handling. Remove contaminated clothing and wash before reuse.
- Environmental exposure controls: Avoid release to the environment. Not available.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Test	Result
Appearance	No data available
IR spectrum	No data available
pH	No data available
Solubility	No data available

Property	Value
a) Physical State	No data available
b) Color	No data available
c) Odor	No data available
d) pH	No data available
e) Vapour Pressure	No data available
f) Viscosity	No data available
g) Initial Boiling Point and boiling range	No data available
h) Melting Point / Freezing Point	No data available
i) Auto Ignition Temperature	No data available
j) Flash Point	No data available
k) Explosion Limit, Lower	No data available
l) Explosion Limit, Upper	No data available
m) Decomposition Temperature	No data available
n) Loss on Drying	No data available
o) Relative Density	No data available
p) Solubility (in DMSO)	No data available
q) Oxidizing Properties	No data available

SECTION 10: Stability and reactivity

SECTION 10: Stability and reactivity

10.1 Reactivity
- Not available.

10.2 Chemical stability
- Not available.

10.3 Possibility of hazardous reactions
- Not available.

10.4 Conditions to avoid
- Heat, flames, sparks, and other ignition sources. Not available.

10.5 Incompatible materials
- Not available.

10.6 Hazardous decomposition products
- Not available.

SECTION 11: Toxicological information

11.1 Information on toxicological effects
- Acute toxicity: IDENTIFICATION AND USE: Nitrogen chloride is a yellow, oily liquid, which explodes easily. It was used as a flour bleach (no longer permitted in US). It is a volatile chlorination by-product and a potent respiratory irritant present in swimming pools. HUMAN STUDIES: The most commonly reported symptoms consisted of cough, dyspnea, tearing eyes and blocked or runny nose. Airway hyperreactivity to histamine was also detected in exposed subjects. Cases of workers who developed occupational asthma following exposure to airborne nitrogen chloride in indoor chlorinated swimming pools are reported. Epidemiology studies show that lifeguards and trainers experience ocular and respiratory irritative symptoms from nitrogen chloride more frequently than employees not exposed. Cleaning and disinfecting workers in the food industry are at risk of developing eye, nasal, and throat irritation symptoms. Although nitrogen chloride exposure does not seem to carry a risk of developing permanent bronchial hyperresponsiveness (BHR), the possibility of transient BHR cannot be ruled out. Altered levels of innate immunity proteins in the upper airways of exposed individuals may pose as potential biomarkers. ANIMAL STUDIES: The expiratory bradypnea indicative of upper airway irritation in mice was evaluated during a 60-min oronasal exposure to increasing concentrations of nitrogen trichloride. The maximal response of nitrogen trichloride was reached in 10 min. In rats pulmonary edema appears to contribute significantly to mortality produced by inhalation of nitrogen chloride. The subchronic toxicity of 0.2-90 ppm nitrogen chloride in the drinking water of rats was investigated using biochemical, hematological, and histopathological parameters. Nitrogen chloride at level of >2 ppm induced adaptive histopathological changes in thyroids and kidneys of animals of both sexes. LC50 (rat) = 112 ppm/1H
- Skin corrosion/irritation: No data available.
- Serious eye damage/eye irritation: IDENTIFICATION AND USE: Nitrogen chloride is a yellow, oily liquid, which explodes easily. It was used as a flour bleach (no longer permitted in US). It is a volatile chlorination by-product and a potent respiratory irritant present in swimming pools. HUMAN STUDIES: The most commonly reported symptoms consisted of cough, dyspnea, tearing eyes and blocked or runny nose. Airway hyperreactivity to histamine was also detected in exposed subjects. Cases of workers who developed occupational asthma following exposure to airborne nitrogen chloride in indoor chlorinated swimming pools are reported. Epidemiology studies show that lifeguards and trainers experience ocular and respiratory irritative symptoms from nitrogen chloride more frequently than employees not exposed. Cleaning and disinfecting workers in the food industry are at risk of developing eye, nasal, and throat irritation symptoms. Although nitrogen chloride exposure does not seem to carry a risk of developing

permanent bronchial hyperresponsiveness (BHR), the possibility of transient BHR cannot be ruled out. Altered levels of innate immunity proteins in the upper airways of exposed individuals may pose as potential biomarkers. ANIMAL STUDIES: The expiratory bradypnea indicative of upper airway irritation in mice was evaluated during a 60-min oronasal exposure to increasing concentrations of nitrogen trichloride. The maximal response of nitrogen trichloride was reached in 10 min. In rats pulmonary edema appears to contribute significantly to mortality produced by inhalation of nitrogen chloride. The subchronic toxicity of 0.2-90 ppm nitrogen chloride in the drinking water of rats was investigated using biochemical, hematological, and histopathological parameters. Nitrogen chloride at level of >2 ppm induced adaptive histopathological changes in thyroids and kidneys of animals of both sexes. /EPIDEMIOLOGY STUDIES/ The hypothesis that attendance at indoor chlorinated swimming pool is a risk factor for irritative ocular and respiratory symptoms and bronchial asthma is well known in literature, although epidemiological evidence is still inconclusive. The aim of this study was to evaluate the association between airborne trichloramine (NCl(3)) levels and irritative symptoms in swimming pool employees in order to obtain detailed data regarding dose-response relationships and to identify the airborne NCl(3) exposure level, if any, without health effects. A total of 20 indoor swimming pools in the Emilia Romagna region of Italy were included in the study. Information about the health status of 128 employees was collected using a self-administered questionnaire. Exposure to airborne NCl(3) was evaluated in indoor swimming pools by a modified DPD/KI method. The results of the study evidenced a mean value of airborne NCl(3) of 0.65 +/- 0.20 mg/cu m (ranging from 0.20 to 1.02 mg/cu m). Both ocular and upper respiratory symptoms, in particular red eyes, runny nose, voice loss and cold symptoms, were declared more frequently by lifeguards and trainers when compared with employees working in other areas of the facility (office, cafe, and so on). Pool attendants exposed to airborne NCl(3) levels of >0.5 mg/cu m experienced higher risks for runny nose (OR: 2.91; 95% CI: 1.22-6.93) red eyes (OR: 3.16; 95% CI: 1.46-6.82), voice loss (OR: 3.56; 95% CI: 1.60-7.95) and itchy eyes (OR: 2.23; 95% CI: 1.04-4.78) than other employees. Moreover, red eyes, itchy eyes, runny nose and voice loss are related to airborne NCl(3) levels, with strong dose-response relationships. In conclusion, this study shows that lifeguards and trainers experience ocular and respiratory irritative symptoms more frequently than employees not exposed. Irritative symptoms become significant starting from airborne NCl(3) levels of >0.5 mg/cu m ... .

- Respiratory or skin sensitization: /EPIDEMIOLOGY STUDIES/ OBJECTIVES: To describe associations among swimming, respiratory health, allergen sensitization and Clara cell protein 16 (CC16) levels in Dutch schoolchildren. Trichloramine levels in swimming pool air were determined to assess potential exposure levels. METHODS: Respiratory health and pool attendance information was collected from 2359 children, aged 6-13 years. Serum from 419 children was tested for allergen sensitization and CC16 levels. Trichloramine levels were assessed in nine swimming facilities. RESULTS: Trichloramine levels ranged from 0.03 to 0.78 mg/cu m (average 0.21 mg/cu m). Reported swimming pool attendance and trichloramine exposure were both not associated with asthma, wheezing, rhinitis or CC16 levels. Birch and house dust mite sensitization were associated with recent indoor swimming (OR>1.86), but not after considering recent swimming frequency multiplied by trichloramine levels. Sensitization to house dust mites was associated with frequent baby swimming (ORs=1.75; 95% CI 1.09 to 2.79). Furthermore, sensitization was associated with lower serum CC16 levels. CC16 levels were associated with average trichloramine concentrations in pools; however, not after considering swimming frequency multiplied by trichloramine levels. CONCLUSIONS: Measured trichloramine levels were comparable with other studies but lower than in an earlier Dutch study. Swimming pool attendance was not associated with respiratory symptoms. The association between sensitization and swimming during the first 2 years of life suggests that early-life exposures might be important, although this needs further study. The interpretation of transient and chronic changes of CC16 and other inflammatory markers in relation to the pool environment and health impacts warrants further investigation. Detailed comparisons with other studies are limited as few studies have measured trichloramine levels.
- Germ cell mutagenicity: No data available.
- Carcinogenicity: No data available.

- Reproductive toxicity: No data available.
- STOT-single exposure: No data available.
- STOT-repeated exposure: IDENTIFICATION AND USE: Nitrogen chloride is a yellow, oily liquid, which explodes easily. It was used as a flour bleach (no longer permitted in US). It is a volatile chlorination by-product and a potent respiratory irritant present in swimming pools. HUMAN STUDIES: The most commonly reported symptoms consisted of cough, dyspnea, tearing eyes and blocked or runny nose. Airway hyperreactivity to histamine was also detected in exposed subjects. Cases of workers who developed occupational asthma following exposure to airborne nitrogen chloride in indoor chlorinated swimming pools are reported. Epidemiology studies show that lifeguards and trainers experience ocular and respiratory irritative symptoms from nitrogen chloride more frequently than employees not exposed. Cleaning and disinfecting workers in the food industry are at risk of developing eye, nasal, and throat irritation symptoms. Although nitrogen chloride exposure does not seem to carry a risk of developing permanent bronchial hyperresponsiveness (BHR), the possibility of transient BHR cannot be ruled out. Altered levels of innate immunity proteins in the upper airways of exposed individuals may pose as potential biomarkers. ANIMAL STUDIES: The expiratory bradypnea indicative of upper airway irritation in mice was evaluated during a 60-min oronasal exposure to increasing concentrations of nitrogen trichloride. The maximal response of nitrogen trichloride was reached in 10 min. In rats pulmonary edema appears to contribute significantly to mortality produced by inhalation of nitrogen chloride. The subchronic toxicity of 0.2-90 ppm nitrogen chloride in the drinking water of rats was investigated using biochemical, hematological, and histopathological parameters. Nitrogen chloride at level of >2 ppm induced adaptive histopathological changes in thyroids and kidneys of animals of both sexes. /EPIDEMIOLOGY STUDIES/ OBJECTIVES: To describe associations among swimming, respiratory health, allergen sensitization and Clara cell protein 16 (CC16) levels in Dutch schoolchildren. Trichloramine levels in swimming pool air were determined to assess potential exposure levels. METHODS: Respiratory health and pool attendance information was collected from 2359 children, aged 6-13 years. Serum from 419 children was tested for allergen sensitization and CC16 levels. Trichloramine levels were assessed in nine swimming facilities. RESULTS: Trichloramine levels ranged from 0.03 to 0.78 mg/cu m (average 0.21 mg/cu m). Reported swimming pool attendance and trichloramine exposure were both not associated with asthma, wheezing, rhinitis or CC16 levels. Birch and house dust mite sensitization were associated with recent indoor swimming (OR>1.86), but not after considering recent swimming frequency multiplied by trichloramine levels. Sensitization to house dust mites was associated with frequent baby swimming (ORs=1.75; 95% CI 1.09 to 2.79). Furthermore, sensitization was associated with lower serum CC16 levels. CC16 levels were associated with average trichloramine concentrations in pools; however, not after considering swimming frequency multiplied by trichloramine levels. CONCLUSIONS: Measured trichloramine levels were comparable with other studies but lower than in an earlier Dutch study. Swimming pool attendance was not associated with respiratory symptoms. The association between sensitization and swimming during the first 2 years of life suggests that early-life exposures might be important, although this needs further study. The interpretation of transient and chronic changes of CC16 and other inflammatory markers in relation to the pool environment and health impacts warrants further investigation. Detailed comparisons with other studies are limited as few studies have measured trichloramine levels.
- Aspiration hazard: No data available.

Likely routes of exposure
- IDENTIFICATION AND USE: Nitrogen chloride is a yellow, oily liquid, which explodes easily. It was used as a flour bleach (no longer permitted in US). It is a volatile chlorination by-product and a potent respiratory irritant present in swimming pools. HUMAN STUDIES: The most commonly reported symptoms consisted of cough, dyspnea, tearing eyes and blocked or runny nose. Airway hyperreactivity to histamine was also detected in exposed subjects. Cases of workers who developed occupational asthma following exposure to airborne nitrogen chloride in indoor chlorinated swimming pools are reported. Epidemiology studies show that lifeguards and trainers experience ocular and respiratory irritative symptoms from nitrogen chloride more frequently than employees not exposed. Cleaning

and disinfecting workers in the food industry are at risk of developing eye, nasal, and throat irritation symptoms. Although nitrogen chloride exposure does not seem to carry a risk of developing permanent bronchial hyperresponsiveness (BHR), the possibility of transient BHR cannot be ruled out. Altered levels of innate immunity proteins in the upper airways of exposed individuals may pose as potential biomarkers. ANIMAL STUDIES: The expiratory bradypnea indicative of upper airway irritation in mice was evaluated during a 60-min oronasal exposure to increasing concentrations of nitrogen trichloride. The maximal response of nitrogen trichloride was reached in 10 min. In rats pulmonary edema appears to contribute significantly to mortality produced by inhalation of nitrogen chloride. The subchronic toxicity of 0.2-90 ppm nitrogen chloride in the drinking water of rats was investigated using biochemical, hematological, and histopathological parameters. Nitrogen chloride at level of >2 ppm induced adaptive histopathological changes in thyroids and kidneys of animals of both sexes.

Symptoms related to the physical, chemical and toxicological characteristics
- IDENTIFICATION AND USE: Nitrogen chloride is a yellow, oily liquid, which explodes easily. It was used as a flour bleach (no longer permitted in US). It is a volatile chlorination by-product and a potent respiratory irritant present in swimming pools. HUMAN STUDIES: The most commonly reported symptoms consisted of cough, dyspnea, tearing eyes and blocked or runny nose. Airway hyperreactivity to histamine was also detected in exposed subjects. Cases of workers who developed occupational asthma following exposure to airborne nitrogen chloride in indoor chlorinated swimming pools are reported. Epidemiology studies show that lifeguards and trainers experience ocular and respiratory irritative symptoms from nitrogen chloride more frequently than employees not exposed. Cleaning and disinfecting workers in the food industry are at risk of developing eye, nasal, and throat irritation symptoms. Although nitrogen chloride exposure does not seem to carry a risk of developing permanent bronchial hyperresponsiveness (BHR), the possibility of transient BHR cannot be ruled out. Altered levels of innate immunity proteins in the upper airways of exposed individuals may pose as potential biomarkers. ANIMAL STUDIES: The expiratory bradypnea indicative of upper airway irritation in mice was evaluated during a 60-min oronasal exposure to increasing concentrations of nitrogen trichloride. The maximal response of nitrogen trichloride was reached in 10 min. In rats pulmonary edema appears to contribute significantly to mortality produced by inhalation of nitrogen chloride. The subchronic toxicity of 0.2-90 ppm nitrogen chloride in the drinking water of rats was investigated using biochemical, hematological, and histopathological parameters. Nitrogen chloride at level of >2 ppm induced adaptive histopathological changes in thyroids and kidneys of animals of both sexes.

SECTION 12: Ecological information

SECTION 12: Ecological information

12.1 Toxicity
- Not available.

12.2 Persistence and degradability
- Not available.

12.3 Bioaccumulative potential
- Not available.

12.4 Mobility in soil
- Not available.

12.5 Results of PBT and vPvB assessment
- Not available.

12.6 Endocrine disrupting properties

- Not available.

12.7 Other adverse effects
- Not available.

SECTION 13: Disposal considerations

SECTION 13: Disposal considerations

13.1 Waste treatment methods
- Dispose of contents/container in accordance with local/regional/national/international regulations.
- Do not discharge to drains.
- Contaminated packaging: Dispose of as hazardous waste unless cleaned according to applicable regulations.
- Waste code: Not available.

SECTION 14: Transport information

SECTION 14: Transport information

- UN number: Not available.
- UN proper shipping name: Not available.
- Transport hazard class(es): Not available.
- Packing group: Not available.
- Environmental hazards: Not available.
- Special precautions for user: Not available.
- Transport in bulk according to IMO instruments: Not available.

SECTION 15: Regulatory information

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
- Not available.

15.2 Chemical safety assessment
- Not available.

SECTION 16: Other information

SECTION 16: Other information

- Product name: Nitrogen trichloride
- CAS No.: 10025-85-1
- Synonyms: Trichloroamine
- Catalog No.: CS-O-49722
- Supplier: Clearsynth Labs Ltd., Mumbai, India
- Emergency phone: +91-22-245045900

Disclaimer

- The information provided is believed to be accurate based on available data; however, no warranty is expressed or implied. Users are responsible for determining suitability and for compliance with applicable laws and regulations.

Revision information
- Revision date: Not available.
- Version: Not available.

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