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

Catalogue Number	CS-T-43334
Product Name	Terbuthylazine
CAS No.	5915-41-3
Category	Pesticide Standards
Synonyms	N2-(tert-butyl)-6-chloro-N4-ethyl-1,3,5-triazine-2,4-diamine
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:

Acute toxicity (Category 4)

2.2 Label Elements

Signal Word: Warning

Hazard Statement(s)

Code	Statement
H302	Harmful if swallowed.
H373	Not available
H400	Not available
H410	Not available

H332	Harmful if inhaled.

Precautionary Statement(s)

Code	Statement
P260	Not available
P264	Wash hands thoroughly after handling.
P270	Not available
P273	Not available
P301+P317	Not available
P319	Get medical help if you feel unwell.
P330	Not available
P391	Not available
P501	Dispose of contents/container in accordance with local/regional/national/international regulatio
P261	Avoid breathing dust/fume/gas/mist/vapours/spray.
P271	Use only outdoors or in a well-ventilated area.
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P317	Not available

SECTION 3: Composition / information on ingredients

3.1 Substance

Component : Terbuthylazine
CAS Number : 5915-41-3
Molecular Formula : C9H16ClN5
Molecular Weight : 229.71
Parent Chemical : -
Synonyms : N2-(tert-butyl)-6-chloro-N4-ethyl-1,3,5-triazine-2,4-diamine
Concentration : Not available

SECTION 4: First aid measures

Not available

SECTION 5: Firefighting measures

Not available

SECTION 6: Accidental release measures

Not available

SECTION-7: Handling and storage

Not available

SECTION 8: Exposure controls / personal protection

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

Property	Value
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

Not available

SECTION 11: Toxicological information

11.1 Information on toxicological effects
- Acute toxicity: LC50 (rat) > 3,510 mg/m3/4h /GENOTOXICITY/ Terbuthylazine and carbofuran are suspected to cause non-Hodgkin's lymphoma and lung cancer. /The researchers/ evaluated the effects of prolonged exposure to low concentrations on primary DNA damage by comet assay, and on the structural integrity of c-Myc and TP 53 genes by FISH-comet. Another novelty in studying these pesticides' genotoxicity is the use of 14-day extended-term human lymphocyte cultures. Concentrations corresponded to values of ADI and OEL: for terbuthylazine 0.58 ng/mL and 8 ng/mL; for carbofuran 8 ng/mL and 21.6 ng/mL, respectively. A possible effect of metabolic activation (S9) was also considered. Carbofuran treatment induced a significant migration of DNA into the tail in a concentration-dependent manner, while for terbuthylazine the effect was significant only at the higher concentration. Terbuthylazine caused migration of both c-Myc signals into the comet tail. A significant occurrence of TP 53 signals in the tail was observed at 8 ng/ml. Prolonged carbofuran treatment significantly elevated the migration of a single c-Myc signal into the tail in a concentration-dependent manner. With S9, distribution of signals shifted toward increased presence of both signals in tail. Our results showed impaired structural integrity of c-Myc and TP 53 due to prolonged exposure to terbuthylazine and carbofuran.
- Skin corrosion/irritation: /LABORATORY ANIMALS: Subchronic or Prechronic Exposure/ In a subchronic dermal toxicity study, male and female New Zealand White rabbits were dermally exposed to terbuthylazine (technical, 99.8% a.i.) at 0, 5, 50 or 500 mg/kg/day (10 animals/sex at 500 mg/kg/day; (5 animals/sex at all other dose levels). Doses were administered in an aqueous vehicle of 0.1% polysorbate/0.5% carboxymethylcellulose. Animals were exposed for 6 hrs/day, 5 days/week. Five high dose animals/sex were sacrificed at 29 days and 5 after a 2-week recovery period. At 5.0 mg/kg/day, several clinical signs classified as minimal were observed among males and females. During the first 7 days of the study, clinical signs were observed only in 1 male (dyspnea, piloerection, sedation) and 1 female (curved body position). Thereafter, all animals developed dyspnea, piloerection, sedation and curved body posture, a few developed tremors (1 male, 2 females), and 1 female had ataxia. Dermal irritation was also observed in treated animals. At 50 and 500 mg/kg/day, clinical signs occurred earlier and with greater severity (classified as moderate). At 500 mg/kg/day, body weight gain was decreased compared to controls (-87% for males and -73% for females) and food consumption was decreased compared to controls during weeks 1 and 2 (-2% to -71% for males; 23% -37% for females).

- Serious eye damage/eye irritation: /LABORATORY ANIMALS: Acute Exposure/ No skin or eye irritation. Not a skin sensitiser.
- Respiratory or skin sensitization: /LABORATORY ANIMALS: Acute Exposure/ No skin or eye irritation. Not a skin sensitiser.
- Germ cell mutagenicity: /GENOTOXICITY/ Terbuthylazine and carbofuran are suspected to cause non-Hodgkin's lymphoma and lung cancer. /The researchers/ evaluated the effects of prolonged exposure to low concentrations on primary DNA damage by comet assay, and on the structural integrity of c-Myc and TP 53 genes by FISH-comet. Another novelty in studying these pesticides' genotoxicity is the use of 14-day extended-term human lymphocyte cultures. Concentrations corresponded to values of ADI and OEL: for terbuthylazine 0.58 ng/mL and 8 ng/mL; for carbofuran 8 ng/mL and 21.6 ng/mL, respectively. A possible effect of metabolic activation (S9) was also considered. Carbofuran treatment induced a significant migration of DNA into the tail in a concentration-dependent manner, while for terbuthylazine the effect was significant only at the higher concentration. Terbuthylazine caused migration of both c-Myc signals into the comet tail. A significant occurrence of TP 53 signals in the tail was observed at 8 ng/ml. Prolonged carbofuran treatment significantly elevated the migration of a single c-Myc signal into the tail in a concentration-dependent manner. With S9, distribution of signals shifted toward increased presence of both signals in tail. Our results showed impaired structural integrity of c-Myc and TP 53 due to prolonged exposure to terbuthylazine and carbofuran.
- Carcinogenicity: Cancer Classification: Group D Not Classifiable as to Human Carcinogenicity /GENOTOXICITY/ Terbuthylazine and carbofuran are suspected to cause non-Hodgkin's lymphoma and lung cancer. /The researchers/ evaluated the effects of prolonged exposure to low concentrations on primary DNA damage by comet assay, and on the structural integrity of c-Myc and TP 53 genes by FISH-comet. Another novelty in studying these pesticides' genotoxicity is the use of 14-day extended-term human lymphocyte cultures. Concentrations corresponded to values of ADI and OEL: for terbuthylazine 0.58 ng/mL and 8 ng/mL; for carbofuran 8 ng/mL and 21.6 ng/mL, respectively. A possible effect of metabolic activation (S9) was also considered. Carbofuran treatment induced a significant migration of DNA into the tail in a concentration-dependent manner, while for terbuthylazine the effect was significant only at the higher concentration. Terbuthylazine caused migration of both c-Myc signals into the comet tail. A significant occurrence of TP 53 signals in the tail was observed at 8 ng/ml. Prolonged carbofuran treatment significantly elevated the migration of a single c-Myc signal into the tail in a concentration-dependent manner. With S9, distribution of signals shifted toward increased presence of both signals in tail. Our results showed impaired structural integrity of c-Myc and TP 53 due to prolonged exposure to terbuthylazine and carbofuran.
- Reproductive toxicity: /AQUATIC SPECIES/ Subchronic toxic effects on embryos and larvae of common carp (Cyprinus carpio) were investigated during a 30-day toxicity test. The exposure to terbuthylazin showed no effect on mortality, but significant differences ($P<0.0001$) were revealed on weight and growth parameters at concentrations of 520 and 820 ug/L. The inhibition of specific growth rate at concentrations of 520 and 820 ug/L was 14% compared to the control group. No significant negative effects on total body length and body weight were observed at lower concentrations (0.9 and 160 ug/L). The concentrations 520 and 820 ug/L were associated with a delay in development compared to other experimental groups and controls. On the basis of weight and growth rate evaluation and determination of developmental stages, the No Observed Effect Concentration (NOEC) of terbuthylazine was estimated at 160 ug/L and the Lowest Observed Effect Concentration (LOEC) was 520 ug/L. According to these results, the reported environmental concentration of terbuthylazine in Czech rivers does not impact growth, development, morphology, or histology of carp embryos and larvae.
- STOT-single exposure: No data available.
- STOT-repeated exposure: /LABORATORY ANIMALS: Subchronic or Prechronic Exposure/ In a subchronic dermal toxicity study, male and female New Zealand White rabbits were dermally exposed to terbuthylazine (technical, 99.8% a.i.) at 0, 5, 50 or 500 mg/kg/day (10 animals/sex at 500 mg/kg/day; (5 animals/sex at all other dose levels). Doses were administered in an aqueous vehicle of 0.1% polysorbate/0.5% carboxymethylcellulose. Animals were

exposed for 6 hrs/day, 5 days/week. Five high dose animals/sex were sacrificed at 29 days and 5 after a 2-week recovery period. At 5.0 mg/kg/day, several clinical signs classified as minimal were observed among males and females. During the first 7 days of the study, clinical signs were observed only in 1 male (dyspnea, piloerection, sedation) and 1 female (curved body position). Thereafter, all animals developed dyspnea, piloerection, sedation and curved body posture, a few developed tremors (1 male, 2 females), and 1 female had ataxia. Dermal irritation was also observed in treated animals. At 50 and 500 mg/kg/day, clinical signs occurred earlier and with greater severity (classified as moderate). At 500 mg/kg/day, body weight gain was decreased compared to controls (-87% for males and -73% for females) and food consumption was decreased compared to controls during weeks 1 and 2 (-2% to -71% for males; 23% -37% for females). /LABORATORY ANIMALS: Subchronic or Prechronic Exposure/ In a 28-day oral toxicity study, terbuthylazine (technical, 99.8% a.i.) was administered to male and female RAI (SPF) rats in the diet at concentrations of 0, 25, 75, 250 or 750 ppm (corresponding to doses of 0, 2.4, 7.7, 26.6 or 68.7 mg/kg/day in males and 0, 2.3, 8.1, 27.9 or 63.4 mg/kg/day in females). At 25 ppm (2.4 mg/kg/day) and higher, dose-related, statistically significant decreases in mean body weight gain compared to controls were observed in males (at termination body weight gain was 12, 18, 22 and 35% less than controls, low to high dose, respectively). Relative thymic weight was reduced (-17%, decreasing to -36% at 750 ppm) and slight decrease in absolute 1 week kidney weight was also observed (-4%, decreasing to -25% at 750 ppm). In females, both absolute liver weights and liver:brain weights were decreased at 25 ppm (2.3 mg/kg/day) and higher (reductions ranged from about -20% to about -30% at 750 ppm). At 250 and 750 ppm, mean body weights of females were statistically significantly reduced in females (-25 and -41%, respectively). The LEL /lowest effect level/ is 25 ppm (2.3 mg/kg/day) based on decreased body weight gain, relative thymic weight and absolute kidney weight in males and possibly decreased liver weight in females.
- Aspiration hazard: No data available.

Likely routes of exposure
- LC50 Rat inhalation >5.3 mg/L air/4 hr

Symptoms related to the physical, chemical and toxicological characteristics
- /GENOTOXICITY/ Terbuthylazine and carbofuran are suspected to cause non-Hodgkin's lymphoma and lung cancer. /The researchers/ evaluated the effects of prolonged exposure to low concentrations on primary DNA damage by comet assay, and on the structural integrity of c-Myc and TP 53 genes by FISH-comet. Another novelty in studying these pesticides' genotoxicity is the use of 14-day extended-term human lymphocyte cultures. Concentrations corresponded to values of ADI and OEL: for terbuthylazine 0.58 ng/mL and 8 ng/mL; for carbofuran 8 ng/mL and 21.6 ng/mL, respectively. A possible effect of metabolic activation (S9) was also considered. Carbofuran treatment induced a significant migration of DNA into the tail in a concentration-dependent manner, while for terbuthylazine the effect was significant only at the higher concentration. Terbuthylazine caused migration of both c-Myc signals into the comet tail. A significant occurrence of TP 53 signals in the tail was observed at 8 ng/ml. Prolonged carbofuran treatment significantly elevated the migration of a single c-Myc signal into the tail in a concentration-dependent manner. With S9, distribution of signals shifted toward increased presence of both signals in tail. Our results showed impaired structural integrity of c-Myc and TP 53 due to prolonged exposure to terbuthylazine and carbofuran.

SECTION 12: Ecological information

Not available

SECTION 13: Disposal considerations

Not available

SECTION 14: Transport information

Not available

SECTION 15: Regulatory information

Not available

SECTION 16: Other information

Not available

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