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

Catalogue Number	CS-T-17419
Product Name	1,4-Dichlorobenzene
CAS No.	106-46-7
Category	Intermediate
Synonyms	-
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:

Serious eye damage/eye irritation (Category 2)

2.2 Label Elements

Signal Word: Warning

Hazard Statement(s)

Code	Statement
H319	Causes serious eye irritation.
H351	Not available
H400	Not available
H410	Not available

H317	May cause an allergic skin reaction.
H335	Not available
H361	Not available
H370	Not available
H372	Not available
H373	Not available
H360	Not available
H303	Not available
H316	Not available
H320	Not available
H341	Not available

Precautionary Statement(s)

Code	Statement
P203	Not available
P264+P265	Not available
P273	Not available
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if presen
P318	Not available
P337+P317	If eye irritation persists: Get medical help.
P391	Not available
P405	Store locked up.
P501	Dispose of contents/container in accordance with local/regional/national/international regulatio
P260	Not available
P261	Avoid breathing dust/fume/gas/mist/vapours/spray.
P264	Wash hands thoroughly after handling.
P270	Not available
P271	Use only outdoors or in a well-ventilated area.
P272	Not available

P302+P352	IF ON SKIN: Wash with plenty of water and soap.
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P308+P316	Not available
P319	Get medical help if you feel unwell.
P321	Specific treatment (see … on this label).
P333+P317	Not available
P362+P364	Take off contaminated clothing and wash it before reuse.
P403+P233	Store in a well-ventilated place. Keep container tightly closed.
P301+P317	Not available
P332+P317	If skin irritation occurs: Get medical help.

SECTION 3: Composition / information on ingredients

3.1 Substance

Component : 1,4-Dichlorobenzene
CAS Number : 106-46-7
Molecular Formula : C■H■Cl■
Molecular Weight : 147.00
Parent Chemical : -
Synonyms : -
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	White crystalline solid
IR spectrum	No data available
pH	No data available
Solubility	In chloroform

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

Not available

SECTION 11: Toxicological information

11.1 Information on toxicological effects
- Acute toxicity: IDENTIFICATION AND USE: 1,4-Dichlorobenzene (p-DCB) is a solid. It is used as moth repellent, general insecticide, germicide, space odorant, in manufacture of 2,5-dichloroaniline, dyes, intermediates, pharmacy, agriculture (fumigating soil). HUMAN STUDIES: Fumes from the surface of hot p-DCB may irritate skin slightly when contact is repeated or prolonged. Leukoencephalopathy has been described following ingestion of p-DCB mothballs. Hemolytic anemia and methemoglobinemia is more rarely reported in such cases. p-DCB increased the frequency of sister chromatid exchange in human peripheral blood lymphocytes in the absence of metabolic activation. ANIMAL STUDIES: p-DCB induces renal tumors specifically in male rats through an alpha2u-globulin-associated response. p-DCB failed to exhibit genotoxic effects in vivo, exhibiting negative responses in unscheduled DNA synthesis, in the chromosome aberration assay, in the dominant lethal assay, and in the in vivo micronucleus assay. It was reported as positive in one DNA strand breakage assay and in one in vivo micronucleus assay. p-DCB bound to DNA in the liver, lung, and kidney of mice but not in that of male rats. It also induced DNA damage in the liver and spleen but not in the kidney, lung, or bone marrow of mice. p-DCB was not mutagenic in Salmonella typhimurium strains TA 98, TA 100, TA 1535, or TA 1537 with or without metabolic activation. Acute and subchronic neurotoxicity studies have been performed with p-DCB. In rats, acute exposure to p-DCB at the rate of 50, 200 or 600 ppm caused decreased forelimb and hindlimb grip strengths and motor activity in males but not females at the high-dose. p-DCB was not teratogenic in rabbits. ECOTOXICITY STUDIES: Acute and chronic toxicity to freshwater aquatic life occur at concentrations as low as 1,120 and 763 ug/L. Acute toxicity to saltwater aquatic life occurs at concentrations as low as 1,970 ug/L. p-DCB was toxic to cell cultures of the tomato, soybean, and carrot. Concentrations of 0.5 mM caused 50% growth inhibition in carrot and soybean cultures. The tomato cultures were more sensitive, with 0.05 mM causing 50% growth inhibition. The hepatotoxicity and nephrotoxicity observed in laboratory animals are likely due to the formation of toxic intermediates formed while converting 1,4-DCB to 2,5-dichlorophenol by cytochrome P-450, or by depletion of GSH at higher doses of 1,4-DCB, or both. (L395)
- Skin corrosion/irritation: No data available.
- Serious eye damage/eye irritation: Eye irritation, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; In Animals: liver, kidney injury; [potential occupational carcinogen]
- Respiratory or skin sensitization: No data available.
- Germ cell mutagenicity: IDENTIFICATION AND USE: 1,4-Dichlorobenzene (p-DCB) is a solid. It is used as moth repellent, general insecticide, germicide, space odorant, in manufacture of 2,5-dichloroaniline, dyes, intermediates, pharmacy, agriculture (fumigating soil). HUMAN STUDIES: Fumes from the surface of hot p-DCB may irritate skin slightly when contact is repeated or prolonged. Leukoencephalopathy has been described following ingestion of p-DCB mothballs. Hemolytic anemia and methemoglobinemia is more rarely reported in such cases. p-DCB increased the frequency of sister chromatid exchange in human peripheral blood lymphocytes in the absence of metabolic activation. ANIMAL STUDIES: p-DCB induces renal tumors specifically in male rats through an alpha2u-globulin-associated response. p-DCB failed to exhibit genotoxic effects in vivo, exhibiting negative responses in unscheduled DNA synthesis, in the chromosome aberration assay, in the dominant lethal assay, and in the in vivo micronucleus assay. It was reported as positive in one DNA strand breakage assay and in one in vivo micronucleus assay. p-DCB bound to DNA in the liver, lung, and kidney of mice but not in that of male rats. It also induced DNA damage in the liver and spleen but not in the kidney, lung, or bone marrow of mice. p-DCB was not

mutagenic in Salmonella typhimurium strains TA 98, TA 100, TA 1535, or TA 1537 with or without metabolic activation. Acute and subchronic neurotoxicity studies have been performed with p-DCB. In rats, acute exposure to p-DCB at the rate of 50, 200 or 600 ppm caused decreased forelimb and hindlimb grip strengths and motor activity in males but not females at the high-dose. p-DCB was not teratogenic in rabbits. ECOTOXICITY STUDIES: Acute and chronic toxicity to freshwater aquatic life occur at concentrations as low as 1,120 and 763 ug/L. Acute toxicity to saltwater aquatic life occurs at concentrations as low as 1,970 ug/L. p-DCB was toxic to cell cultures of the tomato, soybean, and carrot. Concentrations of 0.5 mM caused 50% growth inhibition in carrot and soybean cultures. The tomato cultures were more sensitive, with 0.05 mM causing 50% growth inhibition.
- Carcinogenicity: IDENTIFICATION AND USE: 1,4-Dichlorobenzene (p-DCB) is a solid. It is used as moth repellent, general insecticide, germicide, space odorant, in manufacture of 2,5-dichloroaniline, dyes, intermediates, pharmacy, agriculture (fumigating soil). HUMAN STUDIES: Fumes from the surface of hot p-DCB may irritate skin slightly when contact is repeated or prolonged. Leukoencephalopathy has been described following ingestion of p-DCB mothballs. Hemolytic anemia and methemoglobinemia is more rarely reported in such cases. p-DCB increased the frequency of sister chromatid exchange in human peripheral blood lymphocytes in the absence of metabolic activation. ANIMAL STUDIES: p-DCB induces renal tumors specifically in male rats through an alpha2u-globulin-associated response. p-DCB failed to exhibit genotoxic effects in vivo, exhibiting negative responses in unscheduled DNA synthesis, in the chromosome aberration assay, in the dominant lethal assay, and in the in vivo micronucleus assay. It was reported as positive in one DNA strand breakage assay and in one in vivo micronucleus assay. p-DCB bound to DNA in the liver, lung, and kidney of mice but not in that of male rats. It also induced DNA damage in the liver and spleen but not in the kidney, lung, or bone marrow of mice. p-DCB was not mutagenic in Salmonella typhimurium strains TA 98, TA 100, TA 1535, or TA 1537 with or without metabolic activation. Acute and subchronic neurotoxicity studies have been performed with p-DCB. In rats, acute exposure to p-DCB at the rate of 50, 200 or 600 ppm caused decreased forelimb and hindlimb grip strengths and motor activity in males but not females at the high-dose. p-DCB was not teratogenic in rabbits. ECOTOXICITY STUDIES: Acute and chronic toxicity to freshwater aquatic life occur at concentrations as low as 1,120 and 763 ug/L. Acute toxicity to saltwater aquatic life occurs at concentrations as low as 1,970 ug/L. p-DCB was toxic to cell cultures of the tomato, soybean, and carrot. Concentrations of 0.5 mM caused 50% growth inhibition in carrot and soybean cultures. The tomato cultures were more sensitive, with 0.05 mM causing 50% growth inhibition. Cancer Classification: Group C Possible Human Carcinogen
- Reproductive toxicity: IDENTIFICATION AND USE: 1,4-Dichlorobenzene (p-DCB) is a solid. It is used as moth repellent, general insecticide, germicide, space odorant, in manufacture of 2,5-dichloroaniline, dyes, intermediates, pharmacy, agriculture (fumigating soil). HUMAN STUDIES: Fumes from the surface of hot p-DCB may irritate skin slightly when contact is repeated or prolonged. Leukoencephalopathy has been described following ingestion of p-DCB mothballs. Hemolytic anemia and methemoglobinemia is more rarely reported in such cases. p-DCB increased the frequency of sister chromatid exchange in human peripheral blood lymphocytes in the absence of metabolic activation. ANIMAL STUDIES: p-DCB induces renal tumors specifically in male rats through an alpha2u-globulin-associated response. p-DCB failed to exhibit genotoxic effects in vivo, exhibiting negative responses in unscheduled DNA synthesis, in the chromosome aberration assay, in the dominant lethal assay, and in the in vivo micronucleus assay. It was reported as positive in one DNA strand breakage assay and in one in vivo micronucleus assay. p-DCB bound to DNA in the liver, lung, and kidney of mice but not in that of male rats. It also induced DNA damage in the liver and spleen but not in the kidney, lung, or bone marrow of mice. p-DCB was not mutagenic in Salmonella typhimurium strains TA 98, TA 100, TA 1535, or TA 1537 with or without metabolic activation. Acute and subchronic neurotoxicity studies have been performed with p-DCB. In rats, acute exposure to p-DCB at the rate of 50, 200 or 600 ppm caused decreased forelimb and hindlimb grip strengths and motor activity in males but not females at the high-dose. p-DCB was not teratogenic in rabbits. ECOTOXICITY STUDIES: Acute and chronic toxicity to freshwater aquatic life occur at concentrations as low as 1,120 and 763 ug/L. Acute toxicity to saltwater aquatic life occurs at concentrations as low as 1,970 ug/L. p-DCB was toxic to cell cultures of the tomato,

soybean, and carrot. Concentrations of 0.5 mM caused 50% growth inhibition in carrot and soybean cultures. The tomato cultures were more sensitive, with 0.05 mM causing 50% growth inhibition. /AQUATIC SPECIES/ Developmental, genetic, and reproductive toxicities of benzene, chlorobenzene, and o-, m-, and p-dichlorobenzenes were investigated in sea urchin, Paracentrotus lividus. Toxicity order depended on whether the target organ was embryo or sperm. Benzene was active in sea urchin sperm causing developmental and mitotic abnormalities in offspring. Benzene also showed a significant increase in developmental defects following embryo exposure. For chlorobenzene, developmental defects were seen when the concn was increased to 10(-4) M-Dichlorobenzene caused a strong increase in developmental defects and also in mitotic abnormalities.
- STOT-single exposure: /AQUATIC SPECIES/ Developmental, genetic, and reproductive toxicities of benzene, chlorobenzene, and o-, m-, and p-dichlorobenzenes were investigated in sea urchin, Paracentrotus lividus. Toxicity order depended on whether the target organ was embryo or sperm. Benzene was active in sea urchin sperm causing developmental and mitotic abnormalities in offspring. Benzene also showed a significant increase in developmental defects following embryo exposure. For chlorobenzene, developmental defects were seen when the concn was increased to 10(-4) M-Dichlorobenzene caused a strong increase in developmental defects and also in mitotic abnormalities.
- STOT-repeated exposure: IDENTIFICATION AND USE: 1,4-Dichlorobenzene (p-DCB) is a solid. It is used as moth repellent, general insecticide, germicide, space odorant, in manufacture of 2,5-dichloroaniline, dyes, intermediates, pharmacy, agriculture (fumigating soil). HUMAN STUDIES: Fumes from the surface of hot p-DCB may irritate skin slightly when contact is repeated or prolonged. Leukoencephalopathy has been described following ingestion of p-DCB mothballs. Hemolytic anemia and methemoglobinemia is more rarely reported in such cases. p-DCB increased the frequency of sister chromatid exchange in human peripheral blood lymphocytes in the absence of metabolic activation. ANIMAL STUDIES: p-DCB induces renal tumors specifically in male rats through an alpha2u-globulin-associated response. p-DCB failed to exhibit genotoxic effects in vivo, exhibiting negative responses in unscheduled DNA synthesis, in the chromosome aberration assay, in the dominant lethal assay, and in the in vivo micronucleus assay. It was reported as positive in one DNA strand breakage assay and in one in vivo micronucleus assay. p-DCB bound to DNA in the liver, lung, and kidney of mice but not in that of male rats. It also induced DNA damage in the liver and spleen but not in the kidney, lung, or bone marrow of mice. p-DCB was not mutagenic in Salmonella typhimurium strains TA 98, TA 100, TA 1535, or TA 1537 with or without metabolic activation. Acute and subchronic neurotoxicity studies have been performed with p-DCB. In rats, acute exposure to p-DCB at the rate of 50, 200 or 600 ppm caused decreased forelimb and hindlimb grip strengths and motor activity in males but not females at the high-dose. p-DCB was not teratogenic in rabbits. ECOTOXICITY STUDIES: Acute and chronic toxicity to freshwater aquatic life occur at concentrations as low as 1,120 and 763 ug/L. Acute toxicity to saltwater aquatic life occurs at concentrations as low as 1,970 ug/L. p-DCB was toxic to cell cultures of the tomato, soybean, and carrot. Concentrations of 0.5 mM caused 50% growth inhibition in carrot and soybean cultures. The tomato cultures were more sensitive, with 0.05 mM causing 50% growth inhibition. Prolonged exposure to high concentration of 1,4-DCB may cause weakness, dizziness, loss of weight, liver injury. Chronic (months to years) ingestion of 1,4-DCB products can provoque skin blotches and problems with red blood cells, such as anemia. There is an indication that 1,4-DCB can affect the development of the nervous system after birth. 1,4-DCB is possibly a human carcinogen. (L395, T63)
- Aspiration hazard: No data available.

Likely routes of exposure
- IDENTIFICATION AND USE: 1,4-Dichlorobenzene (p-DCB) is a solid. It is used as moth repellent, general insecticide, germicide, space odorant, in manufacture of 2,5-dichloroaniline, dyes, intermediates, pharmacy, agriculture (fumigating soil). HUMAN STUDIES: Fumes from the surface of hot p-DCB may irritate skin slightly when contact is repeated or prolonged. Leukoencephalopathy has been described following ingestion of p-DCB mothballs. Hemolytic anemia and methemoglobinemia is more rarely reported in such cases. p-DCB increased the frequency of

sister chromatid exchange in human peripheral blood lymphocytes in the absence of metabolic activation. ANIMAL STUDIES: p-DCB induces renal tumors specifically in male rats through an alpha2u-globulin-associated response. p-DCB failed to exhibit genotoxic effects in vivo, exhibiting negative responses in unscheduled DNA synthesis, in the chromosome aberration assay, in the dominant lethal assay, and in the in vivo micronucleus assay. It was reported as positive in one DNA strand breakage assay and in one in vivo micronucleus assay. p-DCB bound to DNA in the liver, lung, and kidney of mice but not in that of male rats. It also induced DNA damage in the liver and spleen but not in the kidney, lung, or bone marrow of mice. p-DCB was not mutagenic in Salmonella typhimurium strains TA 98, TA 100, TA 1535, or TA 1537 with or without metabolic activation. Acute and subchronic neurotoxicity studies have been performed with p-DCB. In rats, acute exposure to p-DCB at the rate of 50, 200 or 600 ppm caused decreased forelimb and hindlimb grip strengths and motor activity in males but not females at the high-dose. p-DCB was not teratogenic in rabbits. ECOTOXICITY STUDIES: Acute and chronic toxicity to freshwater aquatic life occur at concentrations as low as 1,120 and 763 ug/L. Acute toxicity to saltwater aquatic life occurs at concentrations as low as 1,970 ug/L. p-DCB was toxic to cell cultures of the tomato, soybean, and carrot. Concentrations of 0.5 mM caused 50% growth inhibition in carrot and soybean cultures. The tomato cultures were more sensitive, with 0.05 mM causing 50% growth inhibition.

Symptoms related to the physical, chemical and toxicological characteristics
- A study (OECD method, duration of exposure 24 hours, 90 mg solid mixed to a paste with oil paraffin) on three rabbits revealed that 1,4-dichlorobenzene is slightly irritating to the eye (1/3 rabbits) with isolated damage to the conjunctiva (scores at 1 for erythema and edema), reversible after 72 hours; no irritating effects to the iris, nor to the cornea were noted.

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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