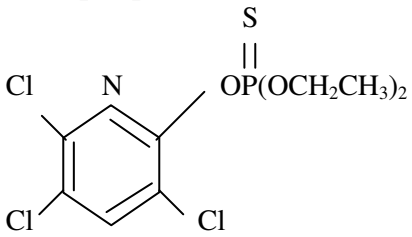
MSDS of RUSBAN:Chlorpyriphos 20% EC.

1. Name and address of the manufacturer/ Formulator : M/s Jai Shree Rasayan Udyog Ltd.; M-4, Aradhana Bhawan, Commercial Complex, Azadpur, Delhi (INDIA)

2. Common name / Descriptive name :CHLORPYRIPHOS 20% w/w. Emulsifiable Concentrate

3. Chemical name (IUPAC nomenclature) : O, O-diethyl O-3,5,6-trichloro -2-pyridylphosphorothioate

4. Structural formula : **Chlorpyriphos**



5. Empirical formula and molecular weight : Empirical formula:
Chlorpyriphos : $C_9H_{11}CI_3NO_3PS$
Mol. Weight
Chlorpyriphos : 350.6

(1) Identity / Appearance (colour) : Homogenous stable liquid with negligible sediment and/or suspended matter. On dilution with water, it shall readily form an emulsion suitable for spray.

(2) Odour : Odorless

(3) Type of formulation : Emulsifiable Concentrate (EC)

(4) Content of active ingredient(s) : Chlorpyriphos 20% w/w.

6. Composition of active "RUSBAN": (Chlorpyriphos 20% EC w/w.)

S. No.	Ingredients	%age	CAS No.
1	Chlorpyriphos Technical (a.i.)	20.00 % w/w	2921-88-2

2	Emulsifiers A and B (Mixture of Ethylene oxide condensate of Alkyl-phenol and Sulphonated alkyl benzene)	10.00 % w/w	68412-54-4 and 26264-06-2
3	Solvent (Xylene)	70.00 % w/w	1330-20-7
	Total:	100.00 % w/w	

7. Water content / Moisture (above relevant).	:	Negligible
8. Specific gravity	:	1.07
9. Viscosity	:	The product is a free flowing liquid.
10. Low & High Temp. storage stability (in respect to composition and physical properties related to use).	:	The product is stable for 24 months from the date of manufacture under normal storage conditions.
11. Impurities	:	Not applicable
12. Flammability	:	Flash point : >24.5 ^{o}C
13. Acidity	:	0.15% w/w (max.) as H_2SO_4
14. Alkalinity	:	Not applicable
15. pH value	:	6 - 8
16. Other properties may in certain cases need evaluation.	:	None
17. Carrier materials	:	Petroleum Solvent
18. Persistent foam (for formulation applied in water).	:	Negligible
19. Emulsion stability (for emulsifiable concentrates).	:	Any separation including creaming at the Top and sedimentation at the bottom of 100 ml of emulsion prepared in standard hard water with 2.0 ml of EC for agricultural use, shall not exceed 2.0 ml.

20. Corrosiveness (when necessary)	:	Product is non-corrosive
21. Known incompatibilities with other products, e.g., pesticides, fertilizers.	:	The product is compatible with commonly used insecticides and Fungicides.
22. Toxicology data :		
a) Acute Oral		
Rate	:	**Chlorpyriphos**: 101 mg/kg (rats)
Mice	:	
b) Acute Dermal		
Rate	:	**Chlorpyriphos**: >4000 mg/kg (rats)
c) Acute Inhalation		
Rate	:	**Chlorpyriphos:** >0.2 mg/l (rats) [a.i.]
d) Acute		
Other routes, e.g., intraperitoneal	:	No Data applicable
e) Skin irritation	:	**Chlorpyriphos:** Non irritant (rabbits)
f) Eye irritation	:	**Chlorpyriphos:** Mildly irritant (rabbits)
g) Short term Oral administration	:	**CHLORPYRIPHOS** **Rats:** Cholinesterase inhibition in plasma and erythrocytes was evident of dietary levels of 100 ppm and above. No symptoms of toxicity were evident at 100 ppm. **Dogs:** Gross cholinergic effect was evident in dogs fed 600 and 200 ppm for 16 and 45 days respectively. At 60 and 20 ppm for 88 and 77 days respectively, retardation in growth and reduction of cholinesterase activity was the only abnormality.
h) Short term Sensitizing effects	:	**Chlorpyrifos** Guinea Pig : Weak sensitizer
i) Toxic effects of metabolies, breakdown products or impurities.	:	Metabolites, break down products or impurities does not produce any toxic effects of Chlorpyriphos when used as per the recommendation.

j) Metabolic-studies :

CHLORPYRIPHOS:

In Animals: The metabolic rate of Chlorpyriphos in animals is oxidative dealkylation or hydrolysis to diethyl phosphorothioate and 3,5,6-trichloro-2-pyridinol being the major route of detoxification. The latter metabolite is conjugated as the glycosides or glucuronides in plants and animals. 90% of the applied dose in rats was excreted in the urine within 48 hours. The major metabolite in the urine was identified as the glucuronide of 3,5,6-trichloro-2-pyridinol. The parent pyridinol and its glycoside were found in lesser amounts.

In Plants: Most studies have shown that the chlorpyriphos, which is taken up by the foliage of plants, is rapidly metabolized to 3,5,6-trichloro-2-pyridinol, which is then sequestered by the plant as glycoside conjugates. Also other metabolite tentatively identified as desethyl chlorpyriphos, di-desethylated compound 3,5,6-trichloro-2-pyridyl phosphate. It is taken up by the foliage of plants & rapidly metabolized to 3,5,6-trichloro-2-pyridinol, which is then sequestered by the plant as glycoside conjugates. Degradation of the major soil metabolites was quite variable among different soils and rapid degradation (half-life <30 d) occurred in 8 of the 15 soils.

In Soil/Environment: It is fairly stable to degradation in soils with half-lives reported over a wide range of 7-120 days (several studies) and with the rate of decomposition being very dependent upon the soil type, degradation was faster in aerobic conditions than anaerobic by a factor of about two (several studies). Leaching studies have shown chlorpyriphos to have little mobility in soil. Field studies have confirmed this lack of mobility, with chlorpyriphos residues being confined to the upper 12 inches of soils in several trials.

k)Long-term toxicity, including carcinogenicity. :

CHLORPYRIPHOS

Rats: Groups of rats were fed dietary levels of Chlorpyriphos of 0, 0.01, 0.03, 0.1, 1.0 & 3.0 mg/kg/day for two years. Chlorpyriphos at all dosage levels had no significant effect on behavior, appearance, growth, mortality, hematology, urinalysis, clinical biochemistry, gross or histo-pathology of tissues and organs or the incidence of new plasma.

Dogs: Groups of dogs were fed chlorpyriphos in the diet for up to two years at dose levels of 0, 0.01, 0.03, 0.1, 1.0 & 3.0 mg/kg/day. Inhibition of erythrocyte cholinesterase in males and females were evident at 1.0 and 3.0 mg/kg. Marginal reduction in brain cholinesterase activity was shown at the highest level of feeding. Inhibition of cholinesterase activity was shown at the highest level of feeding. Inhibition of cholinesterase activity was the only abnormality detected.

l) Neurotoxicity :

CHLORPYRIPHOS:

A maximum dose of 150 mg/kg of chlorpyriphos has been administered orally to hens, which were protected by pralidoxime. Surviving birds did not display delayed ataxia or paralysis.

m) Reproduction studies : **CHLORPYRIPHOS**

Current evidence indicates that Chlorpyriphos dose not adversely affect reproduction. In two studies, no effects were seen in animals tested at dose levels up to 1.2 mg/kg/day. No effects on reproduction occurred in a three-generation study with rats fed dietary doses as high as 1 mg/kg/day. In another study in which rats were fed 1.0 mg/kg/day for two generations, the only effect

n) Embryotoxicity, including :

CHLORPYRIPHOS

Rabbits: Oral teratology study was done in New Zealand White rabbits with doses of 0, 25, 100 or 250 mg/kg/day. Maternal NOAEL was found to be 100 mg/kg/day and developmental NOAEL is 25 mg/kg/day.

o) Mutagenicity :

CHLORPYRIPHOS:

It showed no mutagenic activity in the histamine reverse mutation system in five strains of Salmonella typhimurum, the tryptophan mutation system in E. Coli EP2, the mitotic recombination assay in Saccharomyces cereviside D3 and the relative toxicity in E. Coli, Bacillus subtills.

p) Health records, both from :The product has not industry and agriculture. Produced any single case of poisoning both from industry and agriculture since its first use 4-5 years back.

q)Treatment of poisoning : 1. Atropinise the patient immediately and maintain full atropinisation by repeated doses of 2 to 4 mg at 5 minutes interval for hours together. The need for further atropine administration is indicated by the continuance of symptoms.

2. Dissolve 1-2 gm of 2 PAM in 10 ml distilled water and intravenously very slowly for 10-15 minutes.

r) First aid measure : 1. Gastric lavage with 5% sodium bicarbonate may be used if swallowed.

2. Wash contaminated skin and irrigate eyes with normal saline.

s) Supplementary treatment : Treat symptomatically.

t) Data on further disappearance on storage, and transportation. : **CHLORPYRIPHOS**

Information on the frozen storage stability of chlorpyriphos and 3,5,6-trichloro-2-pyridinol residues in an extensive range of raw agricultural and processed commodities shows that residues were generally stable (>70% remaining) under the test conditions (-18C for 3 months and longer, sample for 4 years).

u) Prediction of potential consumer intake, actual intake studies. :

Chlorpyriphos: ADI-0.01 mg/kg (JMPR 1999)

v)Assessment of actual consumer intake : **Chlorpyriphos:** ADI-0.01 mg/kg (JMPR 1999)

w)Persistence of the product. : As the product is non-systemic in plants, It is not adsorbed from soil via the roots.

24. Prediction of environment effects :

Soil and Ground water :

a) Fate and mobility studies of toxicant :

CHLORPYRIPHOS

In soil, chlorpyriphos is degraded at a moderate rate : DT50 (lab) 10-120 d (25 C); field DT50 for soil incorporated applications 33-56 d. for soil surface application 7-15 d. Primary route of degradation is transformation to 3,5,6-trichloropyridin-2-ol, which is subsequently degraded to organochlorine compounds and CO2.

b) Water solubility : **Chlorpyriphos :** c.1.4 mg/l at 25 C

c) Octanol water partition coefficient : **Chlorpyriphos :** Kow logP = 4.7

d) Degradation : **CHLORPYRIPHOS**

It is fairly stable to degradation in soils with half-lives reported over a wide range of 7-120 days (several studies) and with the rate of decomposition being very dependent upon the soil type. Degradation was faster in aerobic conditions than anaerobic by a factor of about two (several studies).

e) Effects on birds : Non toxic to Birds.

f) Effects on fish : **Chlorpyriphos a.i. :** LC50 (96 h)
Rainbow trout : 0.007-0.051 mg/l
Roach : 0.25 mg/l
Bluegill sunfish : 0.002-0.10 mg/l
Fathead minnows : 0.12-0.54 mg/l

g) Effects on fish food species : Not effect on fish food species when used as per recommendation.

h) Effects on honeybees : **Chlorpyriphos a.i.:**
LD50 Oral : 360 ng/bee
LD50 Contact : 70 ng/bee

i) Degradation product in soil	:	**Chlorpyrifos :** Main degradation product is 3,5,6-trichloropyridin –2- ol, which is subsequently degraded to organo-chlorin compounds and CO_2.
j) Disposal of used, condemned and	:	Packages or surplus materials and washing surplus pesticides and pesticides containers. from machines and containers shall be disposed off in a safe manner so as to prevent environmental or water pollution.
k) Classification during transport.	:	UW 6.1
UN No.		2761,2762, 2995, 2996
IMCO Class		6.1
IMDG PG		6219
Packing Group		II
Proper Shipping Name		Organophosphorothioate pesticide, liquid, toxic,
Environmental risk		Marine pollutant

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For JAI SHREE RASAYAN UDYOG LTD.

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