KAPI LIMITED

MANUFACTURERS & REFINERS

MATERIAL SAFETY AND TECHNICAL DATA SHEET

FLOWER DS 4% W/V100% Natural

EMULSIFIABLE CONCENTRATE

CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: FLOWER DS Emulsifiable Concentrate.

COMMON NAME: Pyrethrins 4% w/v100% Natural

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1. INTRODUCTION.

Pyrethrum is derived from the dried flowers of the plant chrysanthemum cinerariaefolium and chrysanthemum cineum. Pyrethrins are a combination of six natural chemicals with insecticidal properties extracted from the commercial powdered pyrethrum flowers.

The popularity of the pyrethrins lies from their effective paralysis action, naval arrest and eventual death of a wide range of insect and arachnid pests. These pests include mosquitoes, sawfly larvae. Caterpillars, leafhoppers, aphids, spidermites, diamond black moth (DBM), mealy bugs, thrips, boll worms, house flies, cockroaches among many others.

The six Pyrethrins are divided into two groups i.e. Group I and Group II pyrethrins and pyrethrum grown in the Kenyan highlands is very peculiar specifically from the characteristic stability ratio of 3:2 of the Group I to Group II pyrethrins. This gives the pyrethrins a great efficacy rate against the pests by the fact that Group I pyrethrins are responsible for the immobilization, hyper excitation and flushing out of the insects from their harbourages which in the long run affects the function of their nervous system, stimulates repetitive nerve discharges leading to paralysis and hence the technical knockdown while Group II pyrethrins are responsible for the binding of the sodium channels prolonging their opening and thereby causing death.

This formulation is enriched with natural vegetable oil synergists to inhibit knockdown resistance (k.dr) which is the detoxication of pyrethrins to less active metabolites by natural product enzymes secreted by the insects

The outstanding Properties of Flower DS 4% w/v Pyrethrins, Natural enriched with Vegetable oil Synergists Emulsifiable Concentrate are:-

i. Rapid Action.

This product is in all a contact, respiratory and stomach insecticide attacking the nervous system of target pests almost immediately and causing knockdown followed by kill.

ii. Low Mammalian Toxicity.

Pyrethrum has a long record of proven safety towards humans and animals. It is one of the least toxic of domestic insecticides available.

iii. Lack of insect Immunity.

Insect resistance to pyrethrum is not a practical problem though minor isolated examples of immunity have been recorded.

iv. Broad Spectrum of activity.

Because of it consists of a group of related compounds, pyrethrum has a wider spectrum of activity against insect species than many single insecticides.

v. Lack of Persistence.

Flower DS 4% w/v Pyrethrins, Natural enriched with Vegetable oil Synergists Emulsifiable Concentrate is 100% biodegraded by combination of sunlight, water and other atmospheric conditions such as temperature and therefore presents little of the hazards which are usually associated with certain other classes of persistent insecticides

vi. Repellency.

Pyrethrum is a powerful insect repellent which in combination with its low mammalian toxicity favors it in many applications.

2. HAZARDOUS IDENTIFICATION

POTENTIAL HEALTH EFFECTS: EMERGENCY OVERVIEW

CAUTION.

Harmful if swallowed or absorbed through the skin. Risk of serious damage to eyes. Very toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

CLASSIFICATION: III CAUTION!

SIGNS AND SYMPTOMS OF SYSTEMIC EFFECTS:

May cause gastro intestinal effects such as nausea, vomiting and diarrhea. Inhalation of vapors or mist concentrations or ingestion of large quantities can result to nervous system effects such as dizziness, headache, loss of coordination, tremors, loss of consciousness and coma. Symptoms usually regress with no long term effects.

ACUTE HEALTH EFFECTS:

EYES:

May cause stinging, temporary irritation, tearing and blurred vision and possible eye damage depending on the duration of exposure.

SKIN:

Can cause skin irritation, burning or prickling sensation on more sensitive areas (Face, eyes, and mouth).

SKIN ABSORPTION:
Harmful if absorbed through the skin. Indications include redness, itchiness and possible dermatitis.

INGESTION:
Harmful if swallowed. May cause irritation to mouth, throat and stomach with effects including mucous build up, irritation to the tongue and lips and pain in the stomach. Can cause nausea and vomiting.

ACUTE HEALTH EFFECTS cont'd:

INHALATION:
Excessive inhalation may cause nasal, throat and respiratory irritation with effects including dizziness headache and possible confusion.

CHRONIC EFFECTS:
Prolonged or repeated skin contact may lead to dermatitis.

CARCINOGENICITY:
This product is not listed as a carcinogen by the international Agency for research on cancer (IARC), National Toxicology Program (NTP), Occupational Safety and Health Administration (OSHA) OR ACGIH. Independent and industry toxicological experts who have reviewed the data agree that the findings of the study do not indicate a health risk to human beings.
The vegetable oils used are edible cold pressed oils and Pyrethrum amounts used in this formulation are highly unlikely to cause carcinogenic effects as they are exponentially minimum and incomparable to the dosages of anticipated human dietary intakes which cause benign liver tumors.

MUTAGENICITY:
Pyrethrum was not found to be genotoxic and did not damage DNA in any study conducted (Ames) Mutagenicity assay, chromosome aberration in Chinese hamster ovary (CHO) cells, CHO/HGPRT assay with S9 activation, and in the unscheduled DNA synthesis (UDS) assay in cultured human liver cells).

3. COMPOSITION / INFORMATION ON INGREDIENTS.

This product is to be considered as an Emulsifiable Concentrate preparation, according to the E.U legistration/regulation.

Chemical Name	% Weight/Weight (w/w)	ACGIH Exposure Limits	OSHA Exposure Limits	CAS NUMBER
Pyrethrins	4	5 mg/m3 TWA	5 mg/m3 TWA	008003-34-7
Fatty Alcohol Ethoxylate blend with Edible Soya - Lecithin.	<3	None None	None None	000112-34-5 ----------

NOTE: Unspecified ingredients are proprietary, posses no toxicological properties and are non-hazardous. These are not full product specifications

Flower DS 4% w/v Pyrethrins, 100% Natural Emulsifiable Concentrate is to be considered as an Emulsifiable Concentrate preparation, according to the E.U legistration/regulation. This formulation is purely 100% Organic and Natural.

This product evenly disperses throughout water which is the diluent material for its application in spraying and misting. The formulation is stable and does not form any alkaline solutions with water. The emulsifiers used have got no residual properties and are rapidly degraded and deposited as cholines in the plant material.

The emulsifiers have a unique lipid molecular structure which is non-ionic and stable with a high Hydrophile Lipophyle Balance (HLB) which assists to buffer the pH of the emulsion mixture with water leading to a homogeneous oil in water system with excellent wetting properties, coupled with low Phytotoxicity (conducive for horticultural applications) with great affinity to water without generation of hydroxyl ions which would cause hydrolytic degradation to the Pyrethrins.

The carrier solvents are biodegradable, food grade alcohols which provide stable free flowing formulation miscible with all co-formulants.

4. FIRST-AID MEASURES.

Eye Contact:
Hold eye open and rinse slowly and gently with water for 20-30 minutes. Remove contact lenses if present after the first 5 minutes, and then continue rinsing eye. Call a poison control centre or doctor for treatment advice.

Skin Contact:
Take of contaminated clothing. Rinse skin immediately with soap and water for 30 minutes. Call a poison control centre or doctor for treatment advice.

Ingestion:
Immediately call a poison control centre or doctor. Induce vomiting by gastric lavage only if the victim is conscious.

Do not give any liquid to the person. Do not give anything by mouth to an unconscious person.

Inhalation:
Move the person to fresh air at once. If difficulty in breathing is experienced give artificial respiration preferably by mouth-to-mouth, if possible. Call a poison control centre or doctor for treatment advice.

NOTES TO PHYSICIAN:
This product contains natural Pyrethrins pesticide. If a small amount is ingested (or if treatment is delayed) oral administration of fine powder of activated carbon/charcoal and a cathartic is probably sufficient therapy. If large amounts are ingested and vomiting has not occurred emesis should be induced with supervision. Keep patients head below hips to prevent aspiration. If symptoms such as loss of gag reflex, convulsions or unconsciousness occur before emesis, gastric lavage using cuffed endotracheal tube should be considered.

DO NOT administer milk, cream or other substance containing vegetable or animal fats, which enhance the absorption of lipophillic substances. If localized paresthesia develops, the site should be thoroughly washed with soap and water cold cream can be applied to help diminish the effect. Ingestion of this product or subsequent vomiting can result in aspiration of light hydrocarbon liquid, which can cause pneumonitis.

5. FIRE FIGHTING MEASURES.

FLASH POINT:	>60°C, (>140°F)
FLAME EXTENSION:	NOT Volatile.
SUITABLE EXTINGUISHING MEDIA:	Foam, Extinguishing powder, Carbon Dioxide, Sand or Earth.
FLAMMABLE LIMITS IN AIR:	Unlikely to catch fire.

This product is NOT classified as a combustible or flammable liquid by OSHA.

LOWER FLAMMABLE LIMITS:	Not Established.
UPPER FLAMMABLE LIMITS:	Not Established.

AUTO IGNITION: Not applicable / NO Data available.

HAZARDOUS COMBUSTION PRODUCTS: Unlikely to catch fire.

Under fire conditions this product may support combustion and may decompose to give off toxic gases such as carbon monoxide, carbon dioxide, various hydrocarbons and nitrogen oxides.

FIRE FIGHTING INSTRUCTIONS:

Products of combustion from fires involving this material may be toxic. Avoid breathing smoke and mists. Avoid personnel and equipment contact with fallout and runoff. Minimize the amount of water used for fire fighting. Do not enter any enclosed area without full protective equipment, including self-contained breathing equipment. Contain and isolate runoff and debris for proper disposal. Decontaminate personal protective equipment and firefighting equipment before reuse. Read the entire document.

6. ACCIDENTAL RELEASE MEASURES.

OBSERVE PRECAUTIONS IN SECTION 8: PERSONAL PROTECTION.

Where possible:

- Evacuate non-essential personnel from the area to prevent human exposure.
- Remove all sources of ignition.
- Ventilate area.
- Stop the source of the spill.
- Contain the spill to prevent further contamination of the soil, surface water or ground water.
- May produce slippery conditions

SMALL SPILL:

Stop release, if possible without risk. Dike or contain release, if possible, and if immediate response can prevent further damage or danger. Isolate and control access to the release area. Take actions to reduce vapors. Absorb with inert absorbent material such as granular clay, sawdust, or pet litter.

LARGE SPILL:

Eliminate all ignition sources, if possible without risk. Dike or contain release, if possible without coming into contact with spilled material, and if immediate response can prevent further damage or danger. Isolate and control access to the release area. Take actions to reduce vapors. Absorb with inert absorbent material such as granular clay, sawdust, or pet litter and if uncontrollable, Collect product into drums, etc. via drains, pumps, etc. Absorb with appropriate absorbent such as granular clay, sawdust, or pet litter.

CLEAN UP:
Rinse spill area of residues and absorbent to prevent entry into waterways, sewers, basements or confined areas. Contain and absorb the rinsate with inert adsorbents and place into an approved chemical waste container for disposal. Area can be washed with water to remove the last trace residue. Do not allow water to contaminate water supplies or sewers.

7. HANDLING AND STORAGE.

HANDLING: Read and observe all precautions and instructions on the label.

STORAGE: Store containers upright and closed. Store in areas that are cool (room temperature), dry and well-ventilated. KEEP OUT OF REACH OF CHILDREN.

WORK/HYGIENIC PRACTICES:
DO NOT smoke, eat, drink or apply Cosmetics in work area. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet. Remove contaminated clothing and wash clothing before reuse.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION.

END USER MUST READ AND OBSERVE ALL PRECAUTIONS ON THE PRODUCT LABEL.

EYES:
Do not get this material in your eyes. Eye contact can be avoided by wearing protective eyewear.

RESPIRATORY PROTECTION:
Use this material only in well ventilated areas. Unless ventilation is adequate to keep airborne concentrations below recommended exposure standards, approved respiratory protection should be worn.

SKIN PROTECTION:
Avoid contact with skin or clothing. Skin contact should be minimized by wearing protective clothing including long pants, long-sleeved shirt and shoes plus socks and chemical-resistant gloves. Remove contaminated clothing.

ENGINEERING CONTROLS:
Local exhaust ventilation as necessary to maintain exposures to within applicable limits.

OTHER/GENERAL PROTECTION:

The usual precautions for handling chemicals should be observed. Wash hands, arms and face with soap and water after handling and before eating, drinking, chewing gum or using tobacco. Wash contaminated clothing with soap and water before reuse. Avoid contamination of feed and foodstuffs.

9. PHYSICAL AND CHEMICAL PROPERTIES.

APPEARANCE:	Pale Yellow.	**SPECIFIC GRAVITY:**	0.97-0.98
ODOUR:	Faint Alcoholic.	**SOLUBILITY:**	Soluble in organic solvents. Emulsifies in water
PHYSICAL STATE:	Liquid.	**VISCOSITY:**	Free flowing liquid
VAPOR PESSURE:	NOT Available	**HYDROLYSIS:**	In presence of hydroxyl ions
VAPOR DENSITY:	Heavier than air.	**BOILING POINT:**	73°C- 76°C.
pH CONC. SOLUTION:	6.6	**pH DILUTE (1:4):**	7.4

10. APPLICATIONS USAGES AND DOSAGES.

Applications:

Flower DS 4% w/v Pyrethrins, 100% Natural Emulsifiable Concentrate is a broad spectrum 100% natural and Organic insecticide made from stabilized Kenyan Pyrethrum Extract with no applied Synergists and effectively controls larvae, nymph, pupae and adult forms of both chewing and sucking insects and disease causing pests.

Flower DS 4% w/v Pyrethrins, 100% Natural Emulsifiable Concentrate is best recommended for application on crops with moderately short growing cycles and which are prone to infestation by both the hard and soft pests. This product may effectively be applied in all stages of the plant cycle as well as during transportation and storage of the Horticultural (Fruits and Vegetables) crops and a Post Harvest Interval (PHI) of Zero Days is recommended.

Uses:

This product is ideal for:-

- Horticulture and floriculture.
- Food crops such as coffee and cocoa.
- Fruits.

Controls:

Flower DS 4% w/v Pyrethrins Synergized 100% Natural Emulsifiable Concentrate effectively controls Mealy bugs, caterpillars, Cutworms, White flies, Spider mites, Aphids, Wire flies, Thrips, Leaf miners, Worm Scales, Diamond Black Moth (DBM), Bollworms, Ants, Mosquitoes, Bugs and Fleas etc. Spray all sides of the crop to drip every 7 days or as necessary.

Dosages:

AREAS OF USE	TEARGET PESTS	RATE OF DILUTION	RATES OF USE
Horticultural (Fruits, and Vegetables) and Floriculture.	Mealy bugs, Aphids, Wire flies, Stink beetles, Thrips, Leaf miners Worm Scales, Boll worms.	6 ml/Litre (Misting and Knap Sack Spray).	1.575 L/ha (Misting). 63 g/ha Pyrethrins Every 7 Days
	White flies, Caterpillars, Cut worms, Ants, House flies, bugs, Fleas.	4 ml/Litre (Misting and Knap Sack Spray).	1.05 L/ha (Misting). 42 g/ha Pyrethrins Every 7 Days
Food (Perennial) crops such as Coffee, Cocoa, Macadamia etc	Mealy bugs, Aphids, Wire flies, Stink beetles, Thrips, Leaf miners Worm Scales, Boll worms.	8 ml/Litre (Misting and Knap Sack Spray).	2.1 L/ha (Misting). 84 g/ha Pyrethrins Every 7 Days
	White flies, Caterpillars, Cut worms, Ants, House flies, bugs, Fleas.	4 ml/Litre (Misting and Knap Sack Spray).	1.05 L/ha (Misting). 42 g/ha Pyrethrins Every 7 Days

Effects on IPM's and Microbial Communities:
Some microbial communities are well tolerant with this product especially when this product is applied together with glucose. In cases where there are good generators of humic acids and nitrogen, with minimal changes in nutrient levels, the microbial communities will continue to multiply uniformly and steadily without any effect from the application of this product.

Only major drops in nutrient levels, which happens on rare occasions in organic environments, will the microbial communities' populations decline; not as a result of persistence but due to susceptibility to degradative products of pyrethrins.

11. STABILITY AND REACTIVITY.

STABILITY: Chemically stable under recommended use, under normal atmospheric conditions of Temperature, Humidity and Pressure.

STORAGE STABILITY: Stable at 25°C in original sealed container for 2 years

STABILITY IN WATER: Stable emulsion at pH 7

EFFECTS OF U.V LIGHT: Gradual initiation of photolytic degradation.

THERMAL DEGRADATION: Above 70°C.

STABILITY IN AIR: Stable.

REACTIVITY:

OXIDATION/REDUCTION PROPERTIES: Non-oxidizing with air at ambient temperature.

HYDROLYSIS: In presence of free hydroxyl ions.

CORROSSIVENESS: None corrosive.

REACTIVITY TOWARDS CONTAINER MATERIAL: Not reactive if container material is free from rust.

INCOMPARTIBILITY: Strong oxidizing agents.

EXPLODABILITY: Not expected to be explosive.

HAZARDOUS POLYMERIZATION: Highly unlikely to occur.

HAZARDOUS DECOMPOSITION PRODUCTS: May form toxic materials such as Carbon Dioxide, Carbon Monoxide, various hydrocarbons, and Nitrogen Oxides.

(This data is typical for the product and not a specification).

12. PACKAGING.

This product is to be packaged in White opaque 1 Litre, 5 Litre and 20 Litre capacities High Density Poly Ethylene (HDPE) pesticide bottles with inner safety seal and cover.

13. PRODUCT EFFICACY.

Flower DS 4% w/v Pyrethrins 100% Natural Emulsifiable Concentrate effectively controls Mealy bugs, caterpillars, Cutworms, White flies, Spider mites, Aphids, Wire flies, Thrips, Leaf miners, Worm Scales, Diamond Black Moth (DBM), Bollworms, Ants, Mosquitoes, Bugs and Fleas etc.

Crops/Cultivars:
Sugar Snaps, Leeks, Salad Onions, Brassicas, Runner Beans, Fine Beans, Mange Tout, Peas, Green Vegetables, Fruits and Flowers.

Application:
Insect control in horticulture and agriculture. The following trials were conducted for both the hard insects and soft insects represented by the black, red and green aphids and white flies respectively.

Crop	Pest	Rate	Result % Knockdown 24 hours
Sugar Snaps	Black bean aphid	5ml/L	99-100%
Runner Beans	Red aphid	5ml/L	99-100%
Green Peas	Green pea aphid	5ml/L	97-99%
French beans	White fly	3ml/L	99-100%

The trials were conducted using a hand sprayer and there was recorded an immediate pest knockdown in all the trials over three growing seasons in two diverse testing fields.

This product exhibited zero (0%) Phytotoxicity/Scorching on host plants and in all the trials only a maximum of 3% aphids were seen climbing back of the plants in 36 hours.

14. ANALYSIS.

Pyrethrum extracts ,concentrates and formulations all over the world are analyzed using the "Official method of Analysis of the Association of Agricultural Chemists, 8th Edition, 1955" pp. 68-67; i.e. A.O.A.C. 8th.

METHOD OF ASSAY

Reagents:

Denige's reagent.—Mix 5g yellow HgO with 40 ml distilled water H 2O, and, while stirring, slowly add 20 ml H 2SO4; then add additional 40 ml distilled water H 2O and stir until completely dissolved. Test for the absence of mercurous Hg by adding few drops of (b) to 10ml and titrating with (c) as will be described later on the pyrethrins I with addition of 30ml HCl.

Iodine monochloride solution.—Dissolve 10g. KI and 6.44g. KIO3 in 75ml H 2O in glass-stoppered bottle; add 75ml. HCl and 5ml. CHCl3, and adjust to faint iodine colour (in CHCl3) by adding dilute KI or KIO3 solution. If much iodine is liberated, use stronger solution of KIO3 than 0.01M solution. Keep in dark and readjust when necessary.

Standard Potassium Iodate solution.—0.01M. Dissolve 2.14g pure KIO3, previously dried at 105°C, in H 2O and dilute to 1 litre. 1ml of this solution =0.0057g. 'Pyrethrin' I and needs no further standardization.

Petroleum ether is a fraction boiling between 40°C and 60°C from which the aromatic the hydrocarbons have been removed.

Hydrochloric acid is concentrated acid of the British Pharmacopoeia containing not less than 35% w/w of HCl.

Solution of Sodium Chloride (British Pharmacopoeia, 1953) is a saturated solution of sodium chloride in water.

Other reagents should comply with the requirements of the British Pharmacopoeia and British ***Pharmaceutical*** Codex. These are identical to "Analytical Reagent" standards.

Phenolphthalein—1g phenolphthalein in 100ml alcohol.

Preliminary Treatment

Transfer the emulsifiable concentrate (100-150 mg. pyrethrins) to a separating funnel (500 ml. capacity) with water (200 ml.). Saturate the aqueous layer with sodium chloride. Extract with aromatic-free petroleum ether, boiling range 40°C-60°C.; 4 x 50ml., each extraction being allowed at least one hour for separation. The combined petroleum ether extracts are then shaken with a saturated solution of sodium chloride (10ml) and allowed separate overnight, the aqueous layer being discarded. The petroleum ether layer is evaporated carefully on a water bath to c. 50ml. and filter –Cel (1.0g.) is added and mixed thoroughly. The whole is allowed to stand at room temperature (20°C) for two hours.

With samples containing much perfume or other saponifiable ingredients, it may be necessary to use as much as 50ml normal alcoholic NaOH.

Pyrethrins I Assay:

Transfer to 600ml beaker and add sufficient H 2O to make aqueous layer 200ml. If more than 20ml alcoholic NaOH solution has been used, add sufficient H 2O so that all alcohol will be removed when volume has been reduced to 150ml.
Add few glass beads, or preferably use boiling tube, and boil aqueous layer down to 150ml. Transfer contents of the beaker to 500ml separator and drain aqueous layer into 250ml volume flask. Wash oil layer once with H 2O and add wash H 2O to aqueous portion. If slight emulsion still persists after draining aqueous layer and washings, add 2—3 ml 10%N BaCl2 Solution but do not shake vigorously after adding the BaCl2, because reversed emulsion difficult to separate may be formed. To aqueous solution in 250ml flask add 1g Filter-Cel and 10ml or more of the BaCl2 Solution. Do not shake before diluting to volume. Dilute to volume, mix thoroughly and filter off 200ml. Test filtrate with BaCl2 to see if sufficient has been added to obtain clear solution. Neutralize with H 2SO4; (1+4), using 1 drop phenolphthalein and add 1 ml in excess. Filter through 7cm paper, coated lightly with suspension of Filter-Cel in H 2O on Buchner, and wash several times with H 2O. Transfer to 500ml separator and extract with two 50mlportions petroleum ether. Wash extractions with two or three 10ml portions H 2O and filter petroleum ether extractions through cotton plug into clean 250ml separator. Wash cotton with 5ml petroleum ether. Extract petroleum ether with 5ml 0.1N NaOH, shaking vigorously.

Pyrethrins I Assay cont'd:

Drain aqueous layer into 100ml beaker, wash petroleum ether with 5ml 0.1N NaOH, and add this to beaker. Add 10mls of the Denige's reagent and let stand 1 hour in the dark at 25+ 2°C. Add 20ml alcohol and precipitate HgCl with 3ml saturated NaCl solution. Warm to ca. 60°C and filter through small paper, transferring all precipitate to paper, and wash with 10ml or more hot alcohol. Wash with two or more 10ml portions hot CHCl3, and place paper and contents in 250ml glass-stoppered Erlenmeyer. Add 30ml HCl and 20ml H 2O and cool: add 6ml CHCl3, or CCl4, and 1ml of the ICl solution and titrate with the KIO3 solution, shaking vigorously after each addition, until no iodine colour remains in CHCl3, or CCl4, layer. Take as end point when red colour disappears from CHCl3, or CCl4, layer. From ml of the standard KIO3 solution used in titration calculate % 'Pyrethrins I)'

(KIO3 reacts with mercurous Hg to form mercuric Hg and iodine; further addition of KIO3 in presence of HCl oxidizes iodine to ICl:

2 Hg2Cl2 + 4 ICl = 4 HgCl2 + 2 I2 (iodine)

2 I2 + KIO3 + 6 HCl = KCl + 5 ICl + 3 H 2O

Addition of ICl does not change volume relationship between mercurous Hg and KIO3 solution and aids in determining end point in titration of small quantities of Hg).

NOTE: *Chrysanthemum monocarboxylic acid reacts with Denige's reagent to form a series of colours beginning with phenolphthalein red, which gradually changes to purple, then to blue and finally to bluish green. Colour reaction is very distinct with 5mg monocarboxylic acid and quantities as low as 1 mg can usually be detected. Therefore no Pyrethrin I should be reported if colour reaction is negligible. When lethanes are present, after washing HgCl precipitate with alcohol and CHCl3, wash once more with alcohol and then several times with hot water.*

Pyrethrins II Assay:

If necessary, filter aqueous residue from petroleum ether extraction from Pyrethrin I determination through gooch. Concentrate filtrate to ca. 50ml and transfer to 500ml separator. Acidify with 10ml HCl and saturate with NaCl. (Acidified aqueous layer must be saturated with NaCl throughout following extractions). Extract with 50ml ether, drain aqueous layer into second separator and extract again with 50ml ether. Continue extracting and draining aqueous layer, using 35ml for third and fourth extractions. Combine four ether extractions, drain and wash with three 10ml portions saturated NaCl solution. Filter ether extractions through cotton plug into 500ml Erlenmeyer and wash cotton with additional 10ml ether. Evaporate ether on H 2O bath and remove any fumes of HCl with current of air and continued heating. Dry 10 minutes at 100°C. Add 2ml neutral alcohol and 20ml H 2O and heat to dissolve acid. Cool, filter through gooch if necessary, add 1 or 2 drops phenolphthalein, and titrate with 0.02 N NaOH of which 1 ml = 0.00374 g Pyrethrin II.

15. TOXICOLOGICAL INFORMATION.

Oral Toxicity LD50 (rat) :	> 2000 mg / Kg
Dermal Toxicity LD50 (rat) :	> 2000 mg / Kg
Inhalation Toxicity LC50 (rat):	5 mg / L
Eye Irritation (rabbit):	Non-irritating / Irritates on direct contact.
Skin Irritation (rabbit):	Non-irritating.
Skin Sensitization (rabbit):	Non-sensitizing.

DEVELOPMENTAL TOXICITY:

There were no birth defects or adverse effects on reproduction parameters in tests with rats and rabbits for either with pyrethrum. Pyrethrum is not considered to be teratogenic.

(This data is typical for the product and not a specification).

16. ECOLOGICAL INFORMATION.

ECOTOXICOLOGICAL INFORMATION:

ACUTE AND LONG-TERM TOXICITY TO FISH AND INVERTEBRATES: This product is toxic to fish. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or public waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and permitting authority has been notified in writing prior to discharge.

Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA.

17. METABOLIC PATHWAYS AND ENVIRONMENTAL FATE.

AIR:

This product is to be administered by spraying thus the spray drift following its application should be considered. This product would volatilize in water and moist soils but this would be gradual due to the low vapor pressures of the active ingredients. It would therefore exist as both particulate and vapor phases in the atmosphere.

Vapor phases are susceptible to rapid degradation by direct photolysis (photolytic degradation) and by reaction of the hydroxyl radicals, ozone and nitrate radicals to less active metabolites.

Particulate phases will degrade more slowly as the rates of volatilization are quite slower than the vapor phases.

SOIL AND MICROBIAL INTERRACTIONS:

High concentrations of humic acid in compost, high organic matter content and high rates of microbial communities in the soil would cause microbial degradation of pyrethrins via oxidative mechanism occurring at the un-saturated side chains, reactive methylene groups and at the secondary alcohol groups . Degradation of the cyclic rings is slower than at the un-saturated side chains.

WATER:

Pyrethrins would greatly undergo hydrolytic degradation in water due to the presence of free hydroxyl groups. Pyrethrins I have got considerably higher lipophillic characteristics than Pyrethrins II.

PHOTO CHEMISTRY:

Pyrethrins degrade rapidly when exposed to natural sunlight and do not persist for more than 14 days. Photo-degradation of pyrethrins is rapid when directly exposed to oxygen and sunlight while temperature is the critical factor in increasing the rate of photolytic degradation.

METABOLIC PATHWAYS:

Bio-transformation in mammals is mainly by cleavage of the ester bona. Other pathways

include the oxidation of the acid or alcohol moieties of the esters followed by conjugation prior to excretion from the body.

18. DISPOSAL CONSIDERATIONS.

ANY UNUSED PRODUCT MUST BE DISPOSED AS PER THE RECOMMENDATIONS ON THE LABEL.

PRODUCT DISPOSAL:
Never place unused product down any indoor or outdoor drain. Pesticide, spray mixture or rinse water that cannot be used according to label instructions must be disposed of at or by an approved waste disposal facility.

CONTAINER DISPOSAL:
Rinse severally with soapy water (or equivalent). Then offer for recycling or reconditioning or puncture and dispose of in a sanitary landfill, or by other procedures approved by local authorities.

DISPOSAL METHODS:
Check government regulations and local authorities for approved disposal of this material. Dispose in accordance with applicable laws and regulations.

19. TRANSPORT INFORMATION.

This product needs no special attention. UN/IATA/ICAO specifications on transportation of pyrethrins apply.

DOT (ground) SHIPPING NAME:	Environmentally hazardous substance, liquid, n.o.s. (Chrysanthemum Concentrate).
UN/NA NUMBER:	UN 3082
HAZARD CLASS:	9
PACKING GROUP:	III
REMARKS:	Marine pollutant when shipped in bulk or non-bulk by water.

20. REGULATORY INFORMATION.

This product is not classified as dangerous according to EU dangerous preparation directive.

21. DISCLAIMER.

This information only concerns the above mentioned product (s) as supplied and may not be valid if used with other product (s) or in any process. It remains the user's responsibility to make sure that the information is appropriate and complete for this special use of this product. KAPI LIMITED makes no warranties expressed or implied in respect of the adequacy of this document for any particular purpose. The buyer/user accepts all the risks there from.