

BV2 Flying Insect Killer

Safety Data Sheet

1. Identification of Substance & Company

Product

Product name	BV2 Flying Insect Killer
Product code	NA
HSNO approval	HSR000260
Approval description	Aerosol containing 0.5 - 1.0 g/kg d-phenothrin, 3.19 - 10 g/litre piperonyl butoxide and 3 - 4.54 g/kg tetramethrin
UN number	1950
Proper Shipping Name	Aerosols
DG class	2.1
Packaging group	NA
Hazchem code	2YE
Uses	Household insecticide aerosol for flying and crawling insects.

Company Details

Company	Integra Industries Ltd
Address	21A Grosvenor St , South Dunedin
Telephone	0800 667 843
Website	www.integraindustries.co.nz

Emergency Telephone Number: 0800 764 766

2. Hazard Identification

GHS classification of substance/mixture

Product is classified as hazardous according to the Hazardous Substance (Minimum Degrees of Hazard) Regulations 2001.

GHS Classes

Hazard Statements

Aerosols, Hazard Category 1,	H222+H299 Extremely flammable aerosol. Pressurized container: may burst if heated.
Sensitisation (Skin) Category 1,	H317 - May cause an allergic skin reaction.
Serious Eye Damage/Eye Irritation Category 2,	H319 - Causes eye irritation.
Sensitisation (Respiratory) Category 1,	H334- May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Hazardous to the Aquatic Environment Acute Hazard Category 1	H400 - Very toxic to aquatic life.
Hazardous to the Aquatic Environment Long-Term Hazard Category 2	H411 - Toxic to aquatic life with long lasting effects.

SYMBOLS

DANGER



Other Classifications

There are no other classifications that are known to apply

Precautionary Statements

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Prevention	P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P211 - Do not spray on an open flame or other ignition source. P251 - Do not pierce or burn, even after use. P261 - Avoid breathing gas. P280 - Wear protective gloves, protective clothing, eye protection and face protection. P284 - In case of inadequate ventilation] wear respiratory protection. P273 - Avoid release to the environment. P264 - Wash all exposed external body areas thoroughly after handling. P272 - Contaminated work clothing should not be allowed out of the workplace.
Response	P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing. P342+P311 If experiencing respiratory symptoms: Call a POISON CENTER/doctor/physician/first aider. P302+P352 IF ON SKIN: Wash with plenty of water and soap. P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P333+P313 If skin irritation or rash occurs: Get medical advice/attention. P337+P313 If eye irritation persists: Get medical advice/attention. P362+P364 Take off contaminated clothing and wash it before reuse. P391 Collect spillage.
Storage	P410+P412 Protect from sunlight. Do not expose to temperatures exceeding 50 °C/122 °F.
Disposal	P501 - Dispose of contents/container in accordance with local/regional/national/international regulation.

3. Composition / Information on Ingredients

Substances

See section below for composition of Mixtures

Component	CAS/ Identification	Concentration
Naphtha (Petroleum), Hydrotreated	64742-48-9	< 20
Tetramethrin	7696-12-0	< 1
D-Phenothrin	51186-88-0	< 1
Permethrin	52645-53-1	< 1
Butane	106-97-8	< 35
Propane	74-98-6	< 35

4. First Aid

General Information

If medical advice is needed, have product container or label at hand. You should call the National Poisons Centre if you feel that you may have been harmed or irritated by this product. The number is 0800 764 766 (0800 POISON) (24 hr emergency service).

Recommended first aid facilities Ready access to running water is recommended. Accessible eyewash is recommended.

Exposure

Eye contact	If aerosols come in contact with the eyes: <ul style="list-style-type: none">• Immediately hold the eyelids apart and flush the eye continuously for at least 15 minutes with fresh running water.• Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.• Transport to hospital or doctor without delay.• Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	In case of cold burns (frost-bite): <ul style="list-style-type: none">• Move casualty into warmth before thawing the affected part; if feet are affected carry if possible• Bathe the affected area immediately in luke-warm water (not more than 35 deg C) for 10 to 15 minutes, immersing if possible and without rubbing• DO NOT apply hot water or radiant heat.• Apply a clean, dry, light dressing of "fluffed-up" dry gauze bandage• If a limb is involved, raise and support this to reduce swelling

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- If an adult is involved and where intense pain occurs provide pain killers such as paracetamol
- Transport to hospital, or doctor
- Subsequent blackening of the exposed tissue indicates potential of necrosis, which may require amputation.

If solids or aerosol mists are deposited upon the skin:

- Flush skin and hair with running water (and soap if available).
- Remove any adhering solids with industrial skin cleansing cream.
- **DO NOT use solvents.**
- Seek medical attention in the event of irritation.

Inhalation

If aerosols, fumes or combustion products are inhaled:

- Remove to fresh air.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- If breathing is shallow or has stopped, ensure clear airway and apply resuscitation, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor.

Ingestion

- Not considered a normal route of entry.

Indication of any immediate medical attention and special treatment needed

For petroleum distillates

- In case of ingestion, gastric lavage with activated charcoal can be used promptly to prevent absorption - decontamination (induced emesis or lavage) is controversial and should be considered on the merits of each individual case; of course, the usual precautions of an endotracheal tube should be considered prior to lavage, to prevent aspiration.
- Individuals intoxicated by petroleum distillates should be hospitalized immediately, with acute and continuing attention to neurologic and cardiopulmonary function.
- Positive pressure ventilation may be necessary.
- Acute central nervous system signs and symptoms may result from large ingestions of aspiration-induced hypoxia.
- After the initial episode, individuals should be followed for changes in blood variables and the delayed appearance of pulmonary oedema and chemical pneumonitis. Such patients should be followed for several days or weeks for delayed effects, including bone marrow toxicity, hepatic and renal impairment. Individuals with chronic pulmonary disease will be more seriously impaired, and recovery from inhalation exposure may be complicated.
- Gastrointestinal symptoms are usually minor and pathological changes of the liver and kidneys are reported to be uncommon in acute intoxications.
- Chlorinated and non-chlorinated hydrocarbons may sensitize the heart to epinephrine and other circulating catecholamines so that arrhythmias may occur. Careful consideration of this potential adverse effect should precede administration of epinephrine or other cardiac stimulants and the selection of bronchodilators.

Advice to Doctor

Treat symptomatically.

For chronic or short term repeated exposures to pyrethrum and synthetic pyrethroids:

- Mammalian toxicity of pyrethrum and synthetic pyrethroids is low, in part because of poor bioavailability and a large first pass extraction by the liver.
- The most common adverse reaction results from the potent sensitising effects of pyrethrins.
- Clinical manifestations of exposure include contact dermatitis (erythema, vesiculation, bullae); anaphylactoid reactions (pallor, tachycardia, diaphoresis) and asthma. [Ellenhorn Barceloux]
- In cases of skin contact, it has been reported that topical application of Vitamin E Acetate (alpha-tocopherol acetate) has been found to have high therapeutic value, eliminating almost all skin pain associated with exposure to synthetic pyrethroids. [Incitec]

5. Firefighting Measures

Specific hazards (Fire Incompatibility):

Suitable Extinguishing Media:

Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result.

SMALL FIRE:

Water spray, dry chemical or CO₂

LARGE FIRE:

Water spray or fog.

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Advice for firefighters:

FOR FIRES INVOLVING MANY GAS CYLINDERS:

- To stop the flow of gas, specifically trained personnel may inert the atmosphere to reduce oxygen levels thus allowing the
- capping of leaking container(s).
- Reduce the rate of flow and inject an inert gas, if possible, before completely stopping the flow to prevent flashback.
- DO NOT extinguish the fire until the supply is shut off otherwise an explosive re-ignition may occur.
- If the fire is extinguished and the flow of gas continues, used increased ventilation to prevent build-up, of explosive
- atmosphere.
- Use non-sparking tools to close container valves.
- Be CAUTIOUS of a Boiling Liquid Evaporating Vapour Explosion, BLEVE, if fire is impinging on surrounding containers.
- Direct 2500 litre/min (500 gpm) water stream onto containers above liquid level with the assistance remote monitors.
- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- If safe, switch off electrical equipment until vapour fire hazard removed.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

Fire Fighting (General)

- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Consider evacuation
- Fight fire from a safe distance, with adequate cover.
- If safe, switch off electrical equipment until vapour fire hazard removed.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- **DO NOT approach cylinders suspected to be hot.**
- Cool fire-exposed cylinders with water spray from a protected location.
- If safe to do so, remove containers from path of fire.

Fire Fighting Procedures

- The only safe way to extinguish a flammable gas fire is to stop the flow of gas.
- If the flow cannot be stopped, allow the entire contents of the cylinder to burn while cooling the cylinder and surroundings with water from a suitable distance.
- Extinguishing the fire without stopping the gas flow may the formation of ignitable or explosive mixtures with air. These mixtures may propagate to a source of ignition.

Special Hazards

- Excessive pressures may develop in a gas cylinder exposed in a fire; this may result in explosion.
- Cylinders with pressure relief devices may release their contents as a result of fire and the released gas may constitute a further source of hazard for the fire-fighter.
- Cylinders without pressure-relief valves have no provision for controlled release and are therefore more likely to explode if exposed to fire.

Fire Fighting Requirements

- The need for proximity, entry and flash-over protection and special protective clothing should be determined for each incident, by a competent fire-fighting safety professional. Prevent by any means spillage from entering drains or water-courses.

Fire/ Explosion Hazard

- Severe fire hazard when exposed to heat or flame.
- Vapour forms an explosive mixture with air.
- Severe explosion hazard, in the form of vapour, when exposed to flame or

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- spark.
- Vapour may travel a considerable distance to source of ignition.
- Heating may cause expansion or decomposition with violent container rupture.
- Aerosol cans may explode on exposure to naked flames.
- Rupturing containers may rocket and scatter burning materials.
- Hazards may not be restricted to pressure effects.
- May emit acrid, poisonous or corrosive fumes.
- On combustion, may emit toxic fumes of carbon monoxide (CO).

Combustion products include:

carbon monoxide (CO)

Brännbar. Kommer att brinna om den antänds.

carbon dioxide (CO₂)

other pyrolysis products typical of burning organic material.

Contains low boiling substance: Closed containers may rupture due to pressure buildup under fire conditions.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and materials for containment and cleaning up

Minor spills:

- Clean up all spills immediately.
- Avoid breathing vapours and contact with skin and eyes.
- Wear protective clothing, impervious gloves and safety glasses.
- Shut off all possible sources of ignition and increase ventilation.
- Wipe up.
- If safe, damaged cans should be placed in a container outdoors, away from all ignition sources, until pressure has dissipated.
- Undamaged cans should be gathered and stowed safely.

Major spills:

- Clear area of all unprotected personnel and move upwind.
- Alert Emergency Authority and advise them of the location and nature of hazard.
- May be violently or explosively reactive.
- Wear full body clothing with breathing apparatus.
- Prevent by any means available, spillage from entering drains and water-courses.
- Consider evacuation.
- Shut off all possible sources of ignition and increase ventilation.
- No smoking or naked lights within area.
- Use extreme caution to prevent violent reaction.
- Stop leak only if safe to do so.
- Water spray or fog may be used to disperse vapour.
- DO NOT enter confined space where gas may have collected.
- Keep area clear until gas has dispersed.
- Remove leaking cylinders to a safe place.
- Fit vent pipes. Release pressure under safe, controlled conditions
- Burn issuing gas at vent pipes.
- DO NOT exert excessive pressure on valve; DO NOT attempt to operate damaged valve.
- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water courses
- No smoking, naked lights or ignition sources.
- Increase ventilation.
- Stop leak if safe to do so.
- Water spray or fog may be used to disperse / absorb vapour.

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- Absorb or cover spill with sand, earth, inert materials or vermiculite.
- If safe, damaged cans should be placed in a container outdoors, away from ignition sources, until pressure has dissipated.
- Undamaged cans should be gathered and stowed safely.
- Collect residues and seal in labelled drums for disposal.

7. Storage and Handling

PRECAUTIONS FOR SAFE HANDLING

Safe Handling

The conductivity of this material may make it a static accumulator. A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive if its conductivity is below 10 000 pS/m. Whether a liquid is nonconductive or semi-conductive, the precautions are the same. A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid.

Natural gases contain a contaminant, radon-222, a naturally occurring radioactive gas. During subsequent processing, radon tends to concentrate in liquefied petroleum streams and in product streams having similar boiling points. Industry experience indicates that the commercial product may contain small amounts of radon-222 and its radioactive decay products (radon daughters). The actual concentration of radon-222 and radioactive daughters in process equipment (IE lines, filters, pumps and reactor units) may reach significant levels and produce potentially damaging levels of gamma radiation. A potential external radiation hazard exists at or near any pipe, valve or vessel containing a radon enriched stream or containing internal deposits of radioactive material. Field studies, however, have not shown that conditions exist that expose the worker to cumulative exposures in excess of general population limits. Equipment containing gamma-emitting decay products should be presumed to be internally contaminated with alpha-emitting decay products which may be hazardous if inhaled or ingested. During maintenance operations that require the opening of contaminated process equipment, the flow of gas should be stopped and a four hour delay enforced to allow gamma-radiation to drop to background levels. Protective equipment (including high efficiency particulate respirators (P3) suitable for radionucleotides or supplied air) should be worn by personnel entering a vessel or working on contaminated process equipment to prevent skin contamination or inhalation of any residue containing alpha-radiation. Airborne contamination may be minimised by handling scale and/or contaminated materials in a wet state. [TEXACO]

- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- **DO NOT enter confined spaces until atmosphere has been checked.**
- Avoid smoking, naked lights or ignition sources.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- **DO NOT incinerate or puncture aerosol cans.**
- **DO NOT spray directly on humans, exposed food or food utensils.**
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Use good occupational work practice.
- Observe manufacturer's storage and handling recommendations contained within this SDS.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Other information

- Keep dry to avoid corrosion of cans. Corrosion may result in container perforation and internal pressure may eject contents of can
- Store in original containers in approved flammable liquid storage area.
- DO NOT store in pits, depressions, basements or areas where vapours may be trapped.
- No smoking, naked lights, heat or ignition sources.

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- Keep containers securely sealed. Contents under pressure.
- Store away from incompatible materials.
- Store in a cool, dry, well ventilated area.
- Avoid storage at temperatures higher than 40 deg C.
- Store in an upright position.
- Protect containers against physical damage.
- Check regularly for spills and leaks.
- Observe manufacturer's storage and handling recommendations contained within this SDS.

CONDITIONS OF SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES

Suitable Container

- Aerosol dispenser.
- Check that containers are clearly labelled.

Storage Compatibility

- Low molecular weight alkanes:
- May react violently with strong oxidisers, chlorine, chlorine dioxide, dioxygenyl tetrafluoroborate.
- May react with oxidising materials, nickel carbonyl in the presence of oxygen, heat.
- Are incompatible with nitronium tetrafluoroborate(1-), halogens and interhalogens may generate electrostatic charges, due to low conductivity, on flow or agitation.
- Avoid flame and ignition sources

Redox reactions of alkanes, in particular with oxygen and the halogens, are possible as the carbon atoms are in a strongly reduced condition. Reaction with oxygen (if present in sufficient quantity to satisfy the reaction stoichiometry) leads to combustion without any smoke, producing carbon dioxide and water. Free radical halogenation reactions occur with halogens, leading to the production of haloalkanes. In addition, alkanes have been shown to interact with, and bind to, certain transition metal complexes. Interaction between chlorine and ethane over activated carbon at 350 deg C has caused explosions, but added carbon dioxide reduces the risk. The violent interaction of liquid chlorine injected into ethane at 80 deg C/10 bar becomes very violent if ethylene is also present. A mixture prepared at -196 deg C with either methane or ethane exploded when the temp was raised to -78 deg C. Addition of nickel carbonyl to an n-butane-oxygen mixture causes an explosion at 20-40 deg C. Alkanes will react with steam in the presence of a nickel catalyst to give hydrogen.

Butane/ isobutane:

- reacts violently with strong oxidisers
- reacts with acetylene, halogens and nitrous oxides
- is incompatible with chlorine dioxide, conc. nitric acid and some plastics
- may generate electrostatic charges, due to low conductivity, in flow or when agitated - these may ignite the vapour.

Segregate from nickel carbonyl in the presence of oxygen, heat (20-40 C)

Pyrethrins and permethrins:

- are unstable in the presence of light, heat, moisture and air
- are hydrolysed by oxygen and/ or sunlight
- may react with strong oxidisers to produce fire and explosions
- are incompatible with alkalis

Propane:

- reacts violently with strong oxidisers, barium peroxide, chlorine dioxide, dichlorine oxide, fluorine etc.
- liquid attacks some plastics, rubber and coatings
- may accumulate static charges which may ignite its vapours
- Avoid reaction with oxidising agents
- Compressed gases may contain a large amount of kinetic energy over and above that potentially available from the energy of reaction produced by the gas in chemical reaction with other substances

8. Exposure Controls / Personal Protective Equipment

Workplace Exposure Standards

A workplace exposure standard (WES) has not been established by WorkSafe NZ for this product. There is a general limit of 3mg/m³ for respirable particulates and 10mg/m³ for inhalable particulates when limits have not otherwise been established.

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NZ Workplace Exposure Standards	Ingredient	WES-TWA	WES-STEL
	naphtha petroleum, isoparaffin, hydrotreated	5 mg/m3	10 mg/m3
	tetramethrin	10 mg/m3	Not available
	tetramethrin	3 mg/m3	Not available
	butane	800ppm/ 1900 mg/m3	Not available
	propane	Not available	Not available

Material Data

Exposed individuals are NOT reasonably expected to be warned, by smell, that the Exposure Standard is being exceeded.

Odour Safety Factor (OSF) is determined to fall into either Class C, D or E.

The Odour Safety Factor (OSF) is defined as:

OSF= Exposure Standard (TWA) ppm/ Odour Threshold Value (OTV) ppm

Classification into classes follows:

ClassOSF Description

A 550 Over 90% of exposed individuals are aware by smell that the Exposure Standard (TLV-TWA for example) is being reached, even when distracted by working activities

B 26-550 As "A" for 50-90% of persons being distracted

C 1-26 As "A" for less than 50% of persons being distracted

D 0.18-1 10-50% of persons aware of being tested perceive by smell that the Exposure Standard is being reached

E <0.18 As "D" for less than 10% of persons aware of being tested

as octane CAS 111-65-9

The TLV-TWA is thought to be protective against narcotic effects produced at higher concentrations

For butane:

Odour Threshold Value: 2591 ppm (recognition)

Butane in common with other homologues in the straight chain saturated aliphatic hydrocarbon series is not characterised by its toxicity but by its narcosisinducing

effects at high concentrations. The TLV is based on analogy with pentane by comparing their lower explosive limits in air.

It is concluded that this limit will

protect workers against the significant risk of drowsiness and other narcotic effects.

Odour Safety Factor(OSF)

OSF=0.22 (n-BUTANE)

For pyrethrum and its active components:

IDLH Level: 5000 mg/m3

Pyrethrum and/or its active components, the pyrethrins, cause dermatitis and sensitisation. Ingestion of massive doses can induce convulsions, vomiting and bradycardia. Animals exhibit liver damage and death through respiratory failure.

The recommended TLV-TWA is equivalent to an occupational dose of 0.7mg/kg/day and is thought to minimise the potential for systemic effects. The TLV may NOT prevent the development of hypersensitisation, particularly among those with pre-existing allergies to pollen and related agents.

Synthetic pyrethrins (pyrethroids) often produce a range of toxic effects resembling pyrethrum; in the absence of a regulated exposure limit prudence dictates that the value for pyrethrum serves as a reference.

For propane:

Odour Safety Factor (OSF)

OSF=0.16 (PROPANE)

Engineering Controls

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.

The basic types of engineering controls are:

Process controls which involve changing the way a job activity or process is done to reduce the risk.

Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.

Employers may need to use multiple types of controls to prevent employee overexposure.

General exhaust is adequate under normal conditions. If risk of overexposure exists, wear SAA approved respirator. Correct fit is essential to obtain adequate protection.

Provide adequate ventilation in warehouse or closed storage areas.

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Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Speed:
aerosols, (released at low velocity into zone of active generation)	0.5-1 m/s
direct spray, spray painting in shallow booths, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min.) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Individual Protection



Eye and face protection

- Safety glasses with side shields.
- Chemical goggles. [AS/NZS 1337.1, EN166 or national equivalent]
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience.
- Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].
- Chemical goggles.
- Full face shield may be required for supplementary but never for primary protection of eyes.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience.
- Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]
- Close fitting gas tight goggles

Skin protection

See Other protection below.

Hands/feet protection

- No special equipment needed when handling small quantities.

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- OTHERWISE:
- For potentially moderate exposures:
- Wear general protective gloves, eg. light weight rubber gloves.
- For potentially heavy exposures:
- Wear chemical protective gloves, eg. PVC. and safety footwear.
- Insulated gloves:
- NOTE: Insulated gloves should be loose fitting so that may be removed quickly if liquid is spilled upon them. Insulated gloves are not made to permit hands to be placed in the liquid; they provide only short-term protection from accidental contact with the liquid.

Body protection

See Other protection below.

Other protection

- The clothing worn by process operators insulated from earth may develop static charges far higher (up to 100 times) than the minimum ignition energies for various flammable gas-air mixtures. This holds true for a wide range of clothing materials including cotton.
- Avoid dangerous levels of charge by ensuring a low resistivity of the surface material worn outermost. BREThERICK: Handbook of Reactive Chemical Hazards.
- No special equipment needed when handling small quantities.
- OTHERWISE:
- Overalls.
- Skin cleansing cream. Eyewash unit.
- Do not spray on hot surfaces

Respiratory Protection

Type AX Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Where the concentration of gas/particulates in the breathing zone, approaches or exceeds the "Exposure Standard" (or ES), respiratory protection is required. Degree of protection varies with both face-piece and Class of filter; the nature of protection varies with Type of filter.

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	AX-AUS	-	AX-PAPR-AUS / Class 1
up to 50 x ES	-	AX-AUS / Class 1	-
up to 100 x ES	-	AX-2	AX-PAPR-2 ^

^ - Full-face

A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO₂), G = Agricultural chemicals, K = Ammonia(NH₃), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

- Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content.
- The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of cartridge respirators is considered appropriate.
- Cartridge performance is affected by humidity. Cartridges should be changed after 2 hr of continuous use unless it is determined that the humidity is less than 75%, in which case, cartridges can be used for 4 hr. Used cartridges should be discarded daily, regardless of the length of time used
- Generally not applicable.

Aerosols, in common with most vapours/ mists, should never be used in confined spaces without adequate ventilation. Aerosols, containing agents designed to enhance or mask smell, have triggered allergic reactions in predisposed individuals.

9. Physical & Chemical Properties

Appearance	Not available
Physical State	Liquified Gas
Odour	Not available
Odour Threshold	Not available
pH	Not applicable
Freezing/Melting Point	No data
Flammability	Highly Flammable

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Flashpoint	<0
Upper Explosive limit (%)	9.5
Lower Explosive limit (%)	1.2
Vapour pressure (kPa)	300-600
Vapour density	>1
Specific gravity/density	No applicable
Solubility	Immiscible
Partition coefficient	No data
Auto-ignition temperature	No data
Decomposition temperature	No data
Viscosity	No data
Particle Characteristics	No data

10. Stability & Reactivity

Chemical Stability	<ul style="list-style-type: none"> • Elevated temperatures. • Presence of open flame. • Product is considered stable. • Hazardous polymerisation will not occur. • Presence of heat source • Presence of an ignition source
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

11. Toxicological Information

Summary

Information given is based on product testing, and/or similar products, and/or components.

Supporting Data

Acute	Oral	Based on available data, the classification criteria are not met.
	Dermal	Based on available data, the classification criteria are not met.
	Inhaled	High concentrations of vapour may cause central nervous system depression resulting in headaches, dizziness and nausea.
	Eye	There is sufficient evidence to classify this material as eye damaging or irritating.
Chronic	Sensitisation	There is sufficient evidence to classify this material as sensitising to skin or the respiratory system
	Mutagenicity	Based on available data, the classification criteria are not met.
	Carcinogenicity	Based on available data, the classification criteria are not met.
	Reproductive / Developmental	Based on available data, the classification criteria are not met.
	STOT – Single Exposure	Based on available data, the classification criteria are not met.
	STOT – Repeated Exposure	Based on available data, the classification criteria are not met.
	Aspiration Hazard	Based on available data, the classification criteria are not met.

INHALED The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting. Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo. Inhalation of pyrethrins may produce nausea, vomiting, sneezing, serious nasal discharge, nasal stuffiness and

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asthma. High concentrations may produce hyperexcitability, incoordination, tremors, muscular paralysis and death (due to respiratory failure). There have been some reports of transient facial tingling (paraesthesia) which lasts a few hours after exposure.

No health effects were seen in humans exposed at 1,000 ppm isobutane for up to 8 hours or 500 ppm for 8 hours/day for 10 days. Isobutane can have anaesthetic and asphyxiant effects at high concentrations, well above the lower explosion limit of 1.8% (18,000 ppm).

Butane is a simple asphyxiant and is mildly anaesthetic at high concentrations (20-25%). 10000 ppm for 10 minutes causes drowsiness.

Narcotic effects may be accompanied by exhilaration, dizziness, headache, nausea, confusion, incoordination and unconsciousness in severe cases

The paraffin gases C1-4 are practically nontoxic below the lower flammability limit, 18,000 to 50,000 ppm; above this, low to moderate incidental effects such as CNS depression and irritation occur, but are completely reversible upon cessation of the exposure.

The vapour is discomforting

WARNING: Intentional misuse by concentrating/inhaling contents may be lethal.

In common with natural pyrethrins, the material may produce central nervous system stimulation with nausea, vomiting, gastroenteritis, diarrhoea, hypersensitivity, incoordination, tremors, muscle paralysis, convulsion, coma, and respiratory failure. Synthetic pyrethroids are neuropoisons acting on the axons in the peripheral and central nervous systems by interacting with sodium channels in mammals and/or insects. A single dose produces toxic signs in mammals, such as tremors, hyperexcitability, salivation, choreoathetosis (a condition characterised by aimless muscle movements and involuntary motions), and paralysis.

The signs disappear fairly rapidly, and the animals recover, generally within a week. At near-lethal dose levels, synthetic pyrethroids cause transient changes in the nervous system, such as axonal swelling and/or breaks and myelin degeneration in the sciatic nerves. They are not considered to cause delayed neurotoxicity of the kind induced by some organophosphorus compounds. Pyrethroids have at least two distinct actions- a short-term pharmacological effect at near-lethal dose levels and a more long-term neurotoxic effect that results in sparse axonal nerve damage.

This synthetic pyrethroid produces Type I poisoning syndrome (or "T" syndrome which is characteristic of those esters lacking an alpha-cyano substituent) and, in rats, causes such signs as sparring and aggressive behaviour, enhanced startle response, whole body tremor and prostration. Evidence indicates that Type I syndrome involves peripheral nerves in the mammal. Although this insecticide cannot be considered highly toxic in mammals its use indoors, in enclosed and poorly ventilated spaces may result in toxic effects in humans. Although natural pyrethroid produces allergic responses (rather than direct neurotoxicity) there is little evidence of allergic-type responses amongst humans exposed to the synthetic pyrethroid esters.

[Cassaret & Doull's Toxicology: The Basic Science of Poisoning, 4th Ed.]

High inhaled concentrations of mixed hydrocarbons may produce narcosis characterised by nausea, vomiting and lightheadedness. Inhalation of aerosols may produce severe pulmonary oedema, pneumonitis and pulmonary haemorrhage. Inhalation of petroleum hydrocarbons consisting substantially of low molecular weight species (typically C2-C12) may produce irritation of mucous membranes, incoordination, giddiness, nausea, vertigo, confusion, headache, appetite loss, drowsiness, tremors and anaesthetic stupor. Massive exposures may produce central nervous system depression with sudden collapse and deep coma; fatalities have been recorded. Irritation of the brain and/or apnoeic anoxia may produce convulsions. Although recovery following overexposure is generally complete, cerebral micro-haemorrhage of focal post-inflammatory scarring may produce epileptiform seizures some months after the exposure. Pulmonary episodes may include chemical pneumonitis with oedema and haemorrhage. The lighter hydrocarbons may produce kidney and neurotoxic effects. Pulmonary irritancy increases with carbon chain length for paraffins and olefins. Alkenes produce pulmonary oedema at high concentrations. Liquid paraffins may produce anaesthesia and depressant actions leading to weakness, dizziness, slow and shallow respiration, unconsciousness, convulsions and death. C5-7 paraffins may also produce polyneuropathy. Aromatic hydrocarbons accumulate in lipid rich tissues (typically the brain, spinal cord and peripheral nerves) and may produce functional impairment manifested by nonspecific symptoms such as nausea, weakness, fatigue and vertigo; severe exposures may produce inebriation or unconsciousness. Many of the petroleum hydrocarbons are cardiac sensitisers and may cause ventricular fibrillations.

Central nervous system (CNS) depression may include nonspecific discomfort, symptoms of giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal.

Some aliphatic hydrocarbons produce axonal neuropathies. Isoparaffinic hydrocarbons produce injury to the kidneys of male rats. When albino rats were exposed to isoparaffins at 21.4 mg/l for 4 hours, all animals experienced weakness, tremors, salivation, mild to moderate convulsions, chromodacryorrhoea and ataxia within the first 24 hours. Symptoms disappeared after 24 hours.

Several studies have evaluated sensory irritation in laboratory animals or odor or sensory response in humans. When evaluated by a standard procedure to assess upper airway irritation, isoparaffins did not produce sensory irritation in mice exposed to up to 400 ppm isoparaffin in air. Human volunteers were exposed for six hours to 100 ppm isoparaffin. The subjects were given a self-administered questionnaire to evaluate symptoms, which

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included dryness of the mucous membranes, loss of appetite, nausea, vomiting, diarrhea, fatigue, headache, dizziness, feeling of inebriation, visual disturbances, tremor, muscular weakness, impairment of coordination or paresthesia. No symptoms associated with solvent exposure were observed. With a human expert panel, odour from liquid imaging copier emissions became weakly discernible at approximately 50 ppm.

Numerous long-term exposures have been conducted in animals with only one major finding observed. Renal tubular damage has been found in kidneys of male rats upon repeated exposures to isoparaffins. It does not occur in mice or in female rats. This male rat nephropathy has been observed with a number of hydrocarbons, including wholly vaporized unleaded gasoline. The phenomenon has been attributed to reversible binding of hydrocarbon to alpha2-globulin. Since humans do not synthesize alpha2-globulin or a similar protein, the finding is not considered to be of biological significance to man. No clinically significant renal abnormalities have been found in refinery workers exposed to hydrocarbons.

When evaluated for developmental toxicity in rats, isoparaffins were neither embryotoxic nor teratogenic. Isoparaffins were consistently negative on standard bacterial genotoxicity assays. They were also non-genotoxic in *in vivo* mammalian testing for somatic or germ cell mutations (mouse micronucleus test and rat dominant lethal assay, respectively).

Mullin et al: *Jnl Applied Toxicology* 10, pp 136-142, 2006

Acute effects from inhalation of high concentrations of vapour are pulmonary irritation, including coughing, with nausea; central nervous system depression - characterised by headache and dizziness, increased reaction time, fatigue and loss of co-ordination. Material is highly volatile and may quickly form a concentrated atmosphere in confined or unventilated areas. The vapour may displace and replace air in breathing zone, acting as a simple asphyxiant. This may happen with little warning of overexposure.

Symptoms of asphyxia (suffocation) may include headache, dizziness, shortness of breath, muscular weakness, drowsiness and ringing in the ears. If the asphyxia is allowed to progress, there may be nausea and vomiting, further physical weakness and unconsciousness and, finally, convulsions, coma and death. Significant concentrations of the non-toxic gas reduce the oxygen level in the air. As the amount of oxygen is reduced from 21 to 14 volume %, the pulse rate accelerates and the rate and volume of breathing increase. The ability to maintain attention and think clearly is diminished and muscular coordination is somewhat disturbed. As oxygen decreases from 14-10% judgement becomes faulty; severe injuries may cause no pain. Muscular exertion leads to rapid fatigue. Further reduction to 6% may produce nausea and vomiting and the ability to move may be lost. Permanent brain damage may result even after resuscitation at exposures to this lower oxygen level. Below 6% breathing is in gasps and convulsions may occur. Inhalation of a mixture containing no oxygen may result in unconsciousness from the first breath and death will follow in a few minutes.

INGESTION

Ingestion of pyrethrins may produce nausea, vomiting, headache and other central nervous system disturbances. Excitation, muscular tremors and a period of shock may be followed by death. Dogs fed 5000 ppm of pyrethrum, for 90 days, developed dyspnoea, tremors, ataxia and excessive salivation. An estimated fatal human dose is thought to be 100 gms. for a typical 70 kg man (1430 mg/kg).

Not normally a hazard due to physical form of product.

Considered an unlikely route of entry in commercial/industrial environments

Many aliphatic hydrocarbons create a burning sensation because they are irritating to the GI mucosa. Vomiting has been reported in up to one third of all hydrocarbon exposures. While most aliphatic hydrocarbons have little GI absorption, aspiration frequently occurs, either initially or in a semi-delayed fashion as the patient coughs or vomits, thereby resulting in pulmonary effects. Once aspirated, the hydrocarbons can create a severe pneumonitis.

Rats given isoparaffinic hydrocarbons - isoalkanes- (after 18-24 hours fasting) showed lethargy and/or general weakness, ataxia and diarrhoea. Symptoms disappeared within 24-28 hours.

SKIN CONTACT

The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

Repeated exposure may cause skin cracking, flaking or drying following normal handling and use.

Dermally, isoparaffins have produced slight to moderate irritation in animals and humans under occluded patch conditions where evaporation cannot freely occur. However, they are not irritating in non-occluded tests, which are a more realistic simulation of human exposure. They have not been found to be sensitizers in guinea pig or human patch testing. However, occasional rare idiosyncratic sensitisation reactions in humans have been reported.

Skin contact with natural pyrethrins may result in severe dermatitis and may also be associated with allergic rhinitis and asthma. Absorption through the skin may result in a toxic syndrome similar to that produced by inhalation. Systemic effects, following skin absorption, may include liver and kidney damage. Prolonged or repeated exposure may cause central nervous system effects and allergic skin reaction.

Open cuts, abraded or irritated skin should not be exposed to this material

Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

Spray mist may produce discomfort

Vapourising liquid causes rapid cooling and contact may cause cold burns, frostbite, even through normal gloves. Frozen skin tissues are painless and appear waxy and yellow. Signs and symptoms of frost-bite may include "pins and needles", paleness followed by numbness, a hardening or stiffening of the skin, a progression of colour

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changes in the affected area, (first white, then mottled and blue and eventually black; on recovery, red, hot, painful and blistered).

EYE Evidence exists, or practical experience predicts, that the material may cause eye irritation in a substantial number of individuals and/or may produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals.
Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur.
Instillation of isoparaffins into rabbit eyes produces only slight irritation.
Direct contact with the eye may not cause irritation because of the extreme volatility of the gas; however concentrated atmospheres may produce irritation after brief exposures.

CHRONIC Exposure to the material may cause concerns for human fertility, generally on the basis that results in animal studies provide sufficient evidence to cause a strong suspicion of impaired fertility in the absence of toxic effects, or evidence of impaired fertility occurring at around the same dose levels as other toxic effects, but which are not a secondary non-specific consequence of other toxic effects.
Prolonged or repeated skin contact may cause drying with cracking, irritation and possible dermatitis following. Chronic poisoning by natural pyrethrins may result in convulsion, tetanic paralysis, rapid and uneven heart beat, liver and kidney damage, or death.
The natural pyrethrins may produce hypersensitivity, especially following previous sensitising exposure. In general, repeated exposures over 2 or 3 years are required to elicit a response and involve exposure to pyrethrum rather than its individual components (including pyrethrins). The sesquiterpene lactone (pyrethrosin) and the pyrethrum glycoproteins account for the immediate and delayed hypersensitivity seen in guinea pigs following a single injection of ground chrysanthemum in Freud's adjuvant. Mild erythematic vesicular dermatitis (with papules), pruritus, localized oedema (particularly of the face, lips and eyelids), rhinitis, tachycardia, pallor and sweating are the most common syndromes. An initial skin sensitisation can progress to marked dermal oedema and skin cracking. Pyrethrum dermatitis appears to increase in hot weather or under conditions where heavy perspiration is produced. The active ingredients of pyrethrum (except pyrethrin II) are inactive in patch tests. Those patients allergic to ragweed pollen are particularly sensitive to pyrethrin.
Rats fed on a diet of pyrethrins for 5000 ppm for 2 years showed some signs of tissue damage including liver lesions, bile duct proliferation and focal necrosis of the liver cells. A no-effect level of 1000 ppm found in animal experiments correspond to a daily dose of 3600 mg/man.
Repeated or prolonged exposure to mixed hydrocarbons may produce narcosis with dizziness, weakness, irritability, concentration and/or memory loss, tremor in the fingers and tongue, vertigo, olfactory disorders, constriction of visual field, paraesthesias of the extremities, weight loss and anaemia and degenerative changes in the liver and kidney. Chronic exposure by petroleum workers, to the lighter hydrocarbons, has been associated with visual disturbances, damage to the central nervous system, peripheral neuropathies (including numbness and paraesthesias), psychological and neurophysiological deficits, bone marrow toxicities (including hypoplasia possibly due to benzene) and hepatic and renal involvement. Chronic dermal exposure to petroleum hydrocarbons may result in defatting which produces localised dermatoses. Surface cracking and erosion may also increase susceptibility to infection by microorganisms. One epidemiological study of petroleum refinery workers has reported elevations in standard mortality ratios for skin cancer along with a dose-response relationship indicating an association between routine workplace exposure to petroleum or one of its constituents and skin cancer, particularly melanoma. Other studies have been unable to confirm this finding.
Hydrocarbon solvents are liquid hydrocarbon fractions derived from petroleum processing streams, containing only carbon and hydrogen atoms, with carbon numbers ranging from approximately C5-C20 and boiling between approximately 35-370 deg C. Many of the hydrocarbon solvents have complex and variable compositions with constituents of 4 types, alkanes (normal paraffins, isoparaffins, and cycloparaffins) and aromatics (primarily alkylated one- and two-ring species). Despite the compositional complexity, most hydrocarbon solvent constituents have similar toxicological properties, and the overall toxicological hazards can be characterized in generic terms. Hydrocarbon solvents can cause chemical pneumonitis if aspirated into the lung, and those that are volatile can cause acute CNS effects and/or ocular and respiratory irritation at exposure levels exceeding occupational recommendations. Otherwise, there are few toxicologically important effects. The exceptions, n-hexane and naphthalene, have unique toxicological properties

Animal studies:

No deaths or treatment related signs of toxicity were observed in rats exposed to light alkylate naphtha (paraffinic hydrocarbons) at concentrations of 668, 2220 and 6646 ppm for 6 hrs/day, 5 days/wk for 13 weeks. Increased liver weights and kidney toxicity (male rats) was observed in high dose animals. Exposure to pregnant rats at concentrations of 137, 3425 and 6850 ppm did not adversely affect reproduction or cause maternal or foetal toxicity. Lifetime skin painting studies in mice with similar naphthas have shown weak or no carcinogenic activity following prolonged and repeated exposure. Similar naphthas/distillates, when tested at nonirritating dose levels, did not show any significant carcinogenic activity indicating that this tumorigenic response is likely related to chronic irritation and not to dose. The mutagenic potential of naphthas has been reported to be largely negative in a variety of mutagenicity tests. The exact relationship between these results and human health is not known. Some components of this product have been shown to produce a species specific, sex hormonal dependent kidney lesion in male rats from repeated oral or inhalation exposure. Subsequent research has shown that the

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kidney damage develops via the formation of a alpha-2u-globulin, a mechanism unique to the male rat. Humans do not form alpha-2u-globulin, therefore, the kidney effects resulting from this mechanism are not relevant in human.

Principal route of occupational exposure to the gas is by inhalation.

BV2 BORER INJECTOR SPRAY AEROSOL

TOXICITY	IRRITATION
Not Available	Not Available

Naptha Petroleum, Isoparaffin, hydrotreated

TOXICITY	IRRITATION
Dermal (rabbit) LD50: >1900 mg/kg ^[1]	Not Available
Inhalation (Rat) LC50: >4.42 mg/L4h ^[1]	
Oral (Rat) LD50: >4500 mg/kg ^[1]	

Tetramethrin

TOXICITY	IRRITATION
dermal (rat) LD50: >5000 mg/kg ^[2]	Eye (Rodent - rabbit): 100mg/1H - Mild
Oral (Rat) LD50: 4640 mg/kg ^[2]	Skin: adverse effect observed (irritating) ^[1]
	Skin: no adverse effect observed (not irritating) ^[1]

D-Phenothrin

TOXICITY	IRRITATION
dermal (rat) LD50: 1750 mg/kg ^[2]	Skin (Rodent - rabbit): 500mg/24H - Mild
	Skin: adverse effect observed (irritating) ^[1]

Permethrin

TOXICITY	IRRITATION
dermal (rat) LD50: 1750 mg/kg ^[2]	Skin (Rodent - rabbit): 500mg/24H - Mild
Oral (Rat) LD50: 383 mg/kg ^[2]	Skin: adverse effect observed (irritating) ^[1]
	Skin: no adverse effect observed (not irritating) ^[1]

Butane

TOXICITY	IRRITATION
Inhalation (Rat) LC50: 658 mg/l4h ^[2]	Not Available

Propane

TOXICITY	IRRITATION
Inhalation (Rat) LC50: 364726.819 ppm4h ^[2]	Not Available

NAPHTHA PETROLEUM, ISOPARAFFIN, HYDROTREATED

For petroleum: This product contains benzene, which can cause acute myeloid leukaemia, and n-hexane, which can be metabolized to compounds which are toxic to the nervous system. This product contains toluene, and animal studies suggest high concentrations of toluene lead to hearing loss. This product contains ethyl benzene and naphthalene, from which animal testing shows evidence of tumour formation. Cancer-causing potential: Animal testing shows inhaling petroleum causes tumours of the liver and kidney; these are however not considered to be relevant in humans. Mutation-causing potential: Most studies involving gasoline have returned negative results regarding the potential to cause mutations, including all recent studies in living human subjects (such as in petrol service station attendants). Reproductive toxicity: Animal studies show that high concentrations of toluene (>0.1%) can cause developmental effects such as lower birth weight and developmental toxicity to the nervous system of the foetus. Other studies show no adverse effects on the foetus. Human effects: Prolonged or repeated contact may cause defatting of the skin which can lead to skin inflammation and may make the skin more susceptible to irritation and

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penetration by other materials.

Animal testing shows that exposure to gasoline over a lifetime can cause kidney cancer, but the relevance in humans is questionable.

TETRAMETHRIN

Bacterial mutagen NOEL: 2 mg/kg/day

The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

D-PHENOTHRIN

- In a six month feeding trial NOEL was 2500 mg/kg diet [ICI] NOEL: 2.5 mg/kg/day for d-phenothrin:

The acute toxicity of d-phenothrin is extremely low, the LD50 being >5000 mg/kg body weight in the rat and mouse (via the oral, subcutaneous, dermal, and intraperitoneal routes) and the inhalation LC50 >3760 mg/m³ in the rat. d-Phenothrin causes a poisoning syndrome of hyperexcitability, prostration, tremor, ataxia, and paralysis. From these symptoms and the results of electrophysiological studies of cockroach cercal sensory nerves, it is classified as a Type I pyrethroid.

Repeat dose toxicity: When rats were exposed to d-phenothrin by inhalation at concentrations of up to 210 mg/m³ for 4 h per day for 4 weeks or orally for 5 consecutive days at a dose level of 5000 mg/kg body weight, no adverse toxicological effects were observed. Several feeding studies of phenothrin (racemic or d-phenothrin from 200 to 10 000 mg/kg diet) in rats and mice, with exposure periods of 6 months to 2 years, have been performed. The no- observed-effect levels (NOEL) obtained in these studies were 300- 1000 mg/kg diet, which correspond to approximately 40-160 mg/kg body weight per day. In two studies on dogs in which d-phenothrin was given at doses of 100-3000 mg/kg diet, with exposure periods of 26-52 weeks, the NOEL was 300 mg/kg diet, corresponding to 7-8 mg/kg body weight per day.

Rats exposed by inhalation to very high doses of d-phenothrin (up to 3760 mg/m³) for 4 h or orally to a dose of 5000 mg/kg body weight per day for 5 days showed no myelin degeneration or axon disruption in the sciatic nerve

Genotoxicity: d-Phenothrin is not mutagenic in a variety of in vivo and in vitro systems that test for gene mutations, DNA damage, DNA repair, and chromosomal effects. In 2-year studies, d-phenothrin was not oncogenic to rats and mice at dietary levels of up to 3000 mg/kg diet.

Developmental toxicity: Neither teratogenicity nor embryotoxicity was observed in fetuses of rabbits and mice orally administered d-phenothrin at up to 1000 and 3000 mg/kg body weight, respectively.

Reproductive toxicity: In a 2- generation rat reproduction study, the NOEL was 1000 mg/kg diet.

PERMETHRIN

Oral (rat) LD50: 430-4000 mg/kg * Oral (mouse) LD50: 540-2960 mg/kg * cis/trans ratio: 40:60 cis/trans ratio: 20:80 ADI: 0.05 mg/kg for nominal cis-trans 40:60 and 25:75 isomers only

The following information refers to contact allergens as a group and may not be specific to this product.

Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitisation potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitising substance which is widely distributed can be a more important allergen than one with stronger sensitising potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested.

The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis.

The substance is classified by IARC as Group 3:

NOT classifiable as to its carcinogenicity to humans

Evidence of carcinogenicity may be inadequate or limited in animal testing.

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[* The Pesticides Manual, Incorporating The Agrochemicals Handbook, 10th Edition, Editor Clive Tomlin, 1994, British Crop Protection Council]

BV2 Borer Injector Spray Aerosol & NAPHTHA PETROLEUM, ISOPARAFFIN, HYDROTREATED

Studies indicate that normal, branched and cyclic paraffins are absorbed from the mammalian gastrointestinal tract and that the absorption of n-paraffins is inversely proportional to the carbon chain length, with little absorption above C30. With respect to the carbon chain lengths likely to be present in mineral oil, n-paraffins may be absorbed to a greater extent than iso- or cyclo- paraffins.

The major classes of hydrocarbons have been shown to be well absorbed by the gastrointestinal tract in various species. In many cases, the hydrophobic hydrocarbons are ingested in association with dietary lipids. The dependence of hydrocarbon absorption on concomitant triglyceride digestion and absorption, is known as the "hydrocarbon continuum hypothesis", and asserts that a series of solubilising phases in the intestinal lumen, created by dietary triglycerides and their digestion products, afford hydrocarbons a route to the lipid phase of the intestinal absorptive cell (enterocyte) membrane. While some hydrocarbons may traverse the mucosal epithelium unmetabolised and appear as solutes in lipoprotein particles in intestinal lymph, there is evidence that most hydrocarbons partially separate from nutrient lipids and undergo metabolic transformation in the enterocyte. The enterocyte may play a major role in determining the proportion of an absorbed hydrocarbon that, by escaping initial biotransformation, becomes available for deposition in its unchanged form in peripheral tissues such as adipose tissue, or in the liver.

NAPHTHA PETROLEUM, ISOPARAFFIN, HYDROTREATED & PROPANE TETRAMETHRIN & D- PHENOTHRIN

No significant acute toxicological data identified in literature search.

ADI: 0.02 mg/kg/day

12. Ecological Data

Summary

This mixture is not considered ecotoxic however in all cases prevent run-off to drains, sewers and waterways.

Supporting Data

Toxicity

BV2 Flying Insect Killer Aerosol

Endpoint	Test Duration (hr)	Species	Value	Source
Not Available	Not Available	Not Available	Not Available	Not Available

Naphta, Petroleum, Isoparaffin, Hydrotreated

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	96h	Algae or other aquatic plants	64mg/l	2

Tetramethrin

Endpoint	Test Duration (hr)	Species	Value	Source
EC50(ECx)	48h	Crustacea	0.046-0.058mg/L	4
EC50	48h	Crustacea	0.046-0.058mg/L	4
LC50	96h	Fish	0.003-0.007mg/L	4

D-Phenothrin

Endpoint	Test Duration (hr)	Species	Value	Source
EC50(ECx)	48h	Fish	<0.001mg/L	4

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LC50	96h	Fish	<0.001mg/L	4
NOEC(ECx)	504h	Crustacea	<0.001mg/L	4
EC50	48h	Crustacea	0.004-0.005mg/L	4
LC50	96h	Fish	0.001mg/L	4

Permethrin

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	96h	Algae or other aquatic plants	0.068mg/L	4
EC50	48h	Crustacea	<0.001mg/L	4
NOEC(ECx)	72h	Fish	<0.001mg/L	4
LC50	96h	Fish	<0.001mg/L	4

Butane

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	96h	Algae or other aquatic plants	7.71mg/l	2
EC50(ECx)	96h	Algae or other aquatic plants	7.71mg/l	2
LC50	96h	Fish	24.11mg/l	2

Propane

Endpoint	Test Duration (hr)	Species	Value	Source
Not Available	Not Available	Not Available	Not Available	Not Available

When released in the environment, alkanes don't undergo rapid biodegradation, because they have no functional groups (like hydroxyl or carbonyl) that are needed by most organisms in order to metabolize the compound.

However, some bacteria can metabolise some alkanes (especially those linear and short), by oxidizing the terminal carbon atom. The product is an alcohol, that could be next oxidised to an aldehyde, and finally to a carboxylic acid. The resulting fatty acid could be metabolised through the fatty acid degradation pathway. For petroleum distillates:

Environmental fate:

When petroleum substances are released into the environment, four major fate processes will take place: dissolution in water, volatilization, biodegradation and adsorption. These processes will cause changes in the composition of these UVCB substances. In the case of spills on land or water surfaces, photodegradation- another fate process-can also be significant.

As noted previously, the solubility and vapour pressure of components within a mixture will differ from those of the component alone. These interactions are complex for complex UVCBs such as petroleum hydrocarbons.

Each of the fate processes affects hydrocarbon families differently. Aromatics tend to be more water-soluble than aliphatics of the same carbon number, whereas aliphatics tend to be more volatile. Thus, when a petroleum mixture is released into the environment, the principal water contaminants are likely to be aromatics, whereas aliphatics will be the principal air contaminants. The trend in volatility by component class is as follows: alkenes = alkanes > aromatics = cycloalkanes. The most soluble and volatile components have the lowest molecular weight; thus there is a general shift to higher molecular weight components in residual materials.

Biodegradation:

Biodegradation is almost always operative when petroleum mixtures are released into the environment. It has been widely demonstrated that nearly all soils and sediments have populations of bacteria and other organisms capable of degrading petroleum hydrocarbons. Degradation occurs both in the presence and absence of oxygen. Two key factors that determine degradation rates are oxygen supply and molecular structure. In general, degradation is more rapid under aerobic conditions. Decreasing trends in degradation rates according to structure are as follows:

- (1) n-alkanes, especially in the C10–C25 range, which are degraded readily;
- (2) isoalkanes;
- (3) alkenes;
- (4) benzene, toluene, ethylbenzene, xylenes (BTEX) (when present in concentrations that are not toxic to microorganisms);
- (5) monoaromatics;
- (6) polynuclear (polycyclic) aromatic hydrocarbons (PAHs); and
- (7) higher molecular weight cycloalkanes (which may degrade very slowly).

Three weathering processes-dissolution in water, volatilization and biodegradation-typically result in the depletion of the more readily soluble, volatile and degradable compounds and the accumulation of those most resistant to these processes in residues.

When large quantities of a hydrocarbon mixture enter the soil compartment, soil organic matter and other sorption sites in soil are fully saturated and the hydrocarbons will begin to form a separate phase (a non-aqueous phase liquid, or NAPL) in the soil. At concentrations below the retention capacity for the hydrocarbon in the soil, the NAPL will be immobile this is referred to as residual NAPL. Above the retention capacity, the NAPL becomes mobile and will move within the soil.

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Bioaccumulation:

Bioaccumulation potential was characterized based on empirical and/or modelled data for a suite of petroleum hydrocarbons expected to occur in petroleum substances. Bioaccumulation factors (BAFs) are the preferred metric for assessing the bioaccumulation potential of substances, as the bioconcentration factor (BCF) may not adequately account for the bioaccumulation potential of substances via the diet, which predominates for substances with $\log K_{ow} > -4.5$.

In addition to fish BCF and BAF data, bioaccumulation data for aquatic invertebrate species were also considered. Biotas-sediment/soil accumulation factors (BSAFs), trophic magnification factors and biomagnification factors were also considered in characterizing bioaccumulation potential.

Overall, there is consistent empirical and predicted evidence to suggest that the following components have the potential for high bioaccumulation, with BAF/BCF values greater than 5000: C13–C15 isoalkanes, C12 alkenes, C12–C15 one-ring cycloalkanes, C12 and C15 two-ring cycloalkanes, C14 polycycloalkanes, C15 one-ring aromatics, C15 and C20 cycloalkane monoaromatics, C12–C13 diaromatics, C20 cycloalkane diaromatics, and C14 and C20 three-ring PAHs.

These components are associated with a slow rate of metabolism and are highly lipophilic. Exposures from water and diet, when combined, suggest that the rate of uptake would exceed that of the total elimination rate. Most of these components are not expected to biomagnify in aquatic or terrestrial foodwebs, largely because a combination of metabolism, low dietary assimilation efficiency and growth dilution allows the elimination rate to exceed the uptake rate from the diet; however, one study suggests that some alkyl-PAHs may biomagnify. While only BSAFs were found for some PAHs, it is possible that BSAFs will be > 1 for invertebrates, given that they do not have the same metabolic competency as fish.

In general, fish can efficiently metabolize aromatic compounds. There is some evidence that alkylation increases bioaccumulation of naphthalene but it is not known if this can be generalized to larger PAHs or if any potential increase in bioaccumulation due to alkylation will be sufficient to exceed a BAF/BCF of 5000. Some lower trophic level organisms (i.e., invertebrates) appear to lack the capacity to efficiently metabolize aromatic compounds, resulting in high bioaccumulation potential for some aromatic components as compared to fish.

This is the case for the C14 three-ring PAH, which was bioconcentrated to a high level (BCF > 5000) by invertebrates but not by fish. There is potential for such bioaccumulative components to reach toxic levels in organisms if exposure is continuous and of sufficient magnitude, though this is unlikely in the water column following a spill scenario due to relatively rapid dispersal.

Bioaccumulation of aromatic compounds might be lower in natural environments than what is observed in the laboratory. PAHs may sorb to organic material suspended in the water column (dissolved humic material), which decreases their overall bioavailability primarily due to an increase in size. This has been observed with fish.

Ecotoxicity:

Diesel fuel studies in salt water are available. The values varied greatly for aquatic species such as rainbow trout and *Daphnia magna*, demonstrating the inherent variability of diesel fuel compositions and its effects on toxicity. Most experimental acute toxicity values are above 1 mg/L. The lowest 48-hour LC50 for salmonids was 2.4 mg/L. *Daphnia magna* had a 24-hour LC50 of 1.8 mg/L. The values varied greatly for aquatic species such as rainbow trout and *Daphnia magna*, demonstrating the inherent variability of diesel fuel compositions and its effects on toxicity. Most experimental acute toxicity values are above 1 mg/L. The lowest 48-hour LC50 for salmonids was 2.4 mg/L. *Daphnia magna* had a 24-hour LC50 of 1.8 mg/L.

The tropical mysid *Metamysidopsis insularis* was shown to be very sensitive to diesel fuel, with a 96-hour LC50 value of 0.22 mg/L. This species has been shown to be as sensitive as temperate mysids to toxicants. However, this study used nominal concentrations, and therefore was not considered acceptable. In another study involving diesel fuel, the effect on brown or common shrimp (*Crangon crangon*) a 96-hour LC50 of 22 mg/L was determined. A "gas oil" was also tested and a 96-hour LC50 of 12 mg/L was determined.

The steady state cell density of marine phytoplankton decreased with increasing concentrations of diesel fuel, with different sensitivities between species. The diatom *Phaeodactylum tricornutum* showed a 20% decrease in cell density in 24 hours following a 3 mg/L exposure with a 24-hour no-observed effect concentration (NOEC) of 2.5 mg/L. The microalga *Isochrysis galbana* was more tolerant to diesel fuel, with a 24-hour lowest-observed-effect concentration (LOEC) of 26 mg/L (14% decrease in cell density), and a NOEC of 25 mg/L.

Finally, the green algae *Chlorella salina* was relatively insensitive to diesel fuel contamination, with a 24-hour LOEC of 170 mg/L (27% decrease in cell density), and a NOEC of 160 mg/L. All populations of phytoplankton returned to a steady state within 5 days of exposure.

In sandy soils, earthworm (*Eisenia fetida*) mortality only occurred at diesel fuel concentrations greater than 10 000 mg/kg, which was also the concentration at which sub-lethal weight loss was recorded.

Nephrotoxic effects of diesel fuel have been documented in several animal and human studies. Some species of birds (mallard ducks in particular) are generally resistant to the toxic effects of petrochemical ingestion, and large amounts of petrochemicals are needed in order to cause direct mortality.

For synthetic pyrethroids:

Environmental fate:

Synthetic pyrethroids are examples of optimised insecticidal activity, selectivity and tailored environmental persistence. Through modifications of both acid and alcohol portions of the ester, compounds of desired residual activity have been synthesised whilst maintaining a biodegradable ester linkage. These compounds are generally very toxic to crustaceans and fish in laboratory bioassays. Under field conditions, however, the residues are tightly bound in sediment, and ingested residues are readily metabolised. Their toxicity in natural systems are generally less than laboratory test data might indicate. They are generally non-persistent in the environment.

In pond waters and in laboratory degradation studies, pyrethroid concentrations decrease rapidly due to sorption to sediment, suspended particles and plants. Microbial and photodegradation also occur.

Pyrethrins are generally unstable in the presence of light, are hydrolysed rapidly under alkaline conditions and oxidise rapidly in air. Vapour phase pyrethrins may combine chemically with ozone to produce hydroxy radicals. Pyrethroids where the isobutenyl group attached to the cyclopropane moiety has been altered are more stable to sunlight than the early pyrethroids like allethrin or

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resmethrin. For this reason, pyrethroids such as permethrin, deltamethrin, cyhalothrin, cyfluthrin, and cypermethrin are more frequently applied outdoors to crops in comparison to the rapidly degraded pyrethroids like resmethrin and allethrin. Because agricultural dose rates are low and biological degradation is generally rapid, residues are unlikely to attain significant levels. Permethrin disappears from ponds and streams within 6-24 hours, pond sediments within 7 days and foliage and forest soil within 58 days. Since pyrethrins and pyrethroids undergo photolysis in the atmosphere, they are also degraded by this mechanism in sunlit surface waters. Photosensitising agents found in natural waters such as fulvic and humic acids increase the rate of photolysis. Pyrethroids and pyrethrins also undergo hydrolysis in the environment at varying rates depending upon pH and temperature. Generally, hydrolysis is only an important environmental fate process under alkaline conditions and at temperatures of 20 deg. C or greater.

Based on the vapor pressure of the pyrethrins and pyrethroids, these compounds are expected to exist in both vapor and particulate phases in the ambient atmosphere. Vapor phase pyrethrins and pyrethroids are rapidly degraded in the atmosphere by direct photolysis and reaction with oxidants found in air such as photochemically-produced hydroxyl radicals, ozone, and nitrate radicals. Particulate phase compounds are slower to degrade, however, and can travel long distances before being removed from the air by wet and dry deposition.

Pyrethrins and pyrethroids are strongly adsorbed to soil surfaces and are not considered very mobile. A wide range of Koc values has been reported by different authors, but most of these values indicate a high degree of adsorption and little leaching potential. Since light is attenuated as a function of depth from the soil surface, photolysis of pyrethrins and pyrethroids is only an important environmental fate process at the surface of the soil. The potential for significant toxicity is not reached in fields. Under aerobic conditions in soil, permethrin degrades in a relatively short time (half-life 28 days).

Volatilisation from water and soil is expected to occur slowly for many of the pyrethroids since these compounds generally have low vapor pressures and Henry's law constants. When released to water, partitioning to suspended solids and sediment occurs rapidly. These compounds adsorb strongly to suspended solids and sediment in the water column, and this process significantly attenuates volatilisation. Volatilisation losses from foliage may be considerably greater than volatilisation from soils because pyrethrins and pyrethroids do not adsorb as strongly to the leafy component of vegetation as to soils. Pyrethrins and pyrethroids are often used indoors in sprays or aerosol bombs, and the volatilisation rates from glass or floor surfaces may be significantly faster than from soils since these compounds are not likely to adsorb as strongly to these surfaces.

Little data exist regarding the uptake and transport of pyrethrins and pyrethroids by plant material. Since many of these compounds are rapidly degraded in the environment, this transport mechanism may not be an important environmental fate process other than the initial settling of these compounds on the canopy following deposition. The aerial surface of a plant, including foliage, is covered by a cuticle, which serves as a barrier to water loss and to prevent penetration of applied chemicals or environmental pollutants. Once deposited on the surface, a chemical may be degraded, bind to the cuticle, or diffuse into the plant through the stomata. Since pyrethrins and pyrethroids adsorb strongly to soils, their uptake from roots and transport within plants is expected to be limited.

The general population is exposed to pyrethrins and pyrethroids primarily from food sources, especially fruits and vegetables. The tendency of young children to ingest soil, either intentionally through pica or unintentionally through hand-to-mouth activity, is well documented. These behavioral traits can result in ingestion of pyrethrins and pyrethroids present in soil and dust. Since these compounds are adsorbed strongly to soils, they may not be in a highly bioavailable form. Young children often play on the ground or on carpets and this will increase the likelihood of dermal exposure and inhalation of contaminated particles from soil, household dust and treated surfaces.

Drinking Water Standards:

pesticide 0.1 ug/l (UK max.)

Ecotoxicity:

Synthetic pyrethroids are extremely effective against insects, but are relatively safe to mammals and birds. One potential problem of pyrethroids is their extreme toxicity to aquatic organisms, where often <1 ug/L will produce toxic effects.

The half-lives for elimination of several pyrethroids by trout are all greater than 48 hours, while elimination half-lives in birds and mammals range from 6 to 12 hours

Pyrethroids are highly toxic to fish; with 96-hour LC50 values generally below 10 ug/l. Corresponding LD50 values in mammals and birds are in the range of several hundred to several thousand mg/kg. Fish sensitivity to the pyrethroids may be explained by their relatively slow metabolism and elimination of these compounds. The half-lives for elimination of several pyrethroids by trout are all greater than 48 hours, while elimination half-lives for birds and mammals range from 6 to 12 hours. Generally, the lethality of pyrethroids to fish increases with increasing octanol/water partition coefficients. The bioaccumulation factor of cypermethrin in fish is approximately 1000 when measured experimentally.

Substances containing unsaturated carbons are ubiquitous in indoor environments. They result from many sources (see below). Most are reactive with environmental ozone and many produce stable products which are thought to adversely affect human health. The potential for surfaces in an enclosed space to facilitate reactions should be considered.

Source of unsaturated substances

Occupants (exhaled breath, ski oils, personal care products)

Soft woods, wood flooring, including cypress, cedar and silver fir boards, houseplants

Unsaturated substances (Reactive Emissions)

Isoprene, nitric oxide, squalene, unsaturated sterols, oleic acid and other unsaturated fatty acids, unsaturated oxidation products

Isoprene, limonene, alpha-pinene, other terpenes and sesquiterpenes

Major Stable Products following reaction with Ozone

Methacrolein, methyl vinyl ketone, nitrogen dioxide, acetone, 6MHQ, geranyl acetone, 4OPA, formaldehyde, nonanol, decanal, 9-oxo-nonanoic acid, azelaic acid, nonanoic acid, Formaldehyde, 4-AMC, pinonaldehyde, pinic acid, pinonic acid, formic acid, methacrolein, methyl vinyl ketone, SOAs including ultrafine particles

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Carpets and carpet backing	4-Phenylcyclohexene, 4-vinylcyclohexene, styrene, 2-ethylhexyl acrylate, unsaturated fatty acids and esters	Formaldehyde, acetaldehyde, benzaldehyde, hexanal, nonanal, 2-nonenal
Linoleum and paints/polishes containing linseed oil	Linoleic acid, linolenic acid	Propanal, hexanal, nonanal, 2-heptenal, 2-nonenal, 2-decenal, 1-pentene-3-one, propionic acid, n-butyric acid
Latex paint	Residual monomers	Formaldehyde
Certain cleaning products, polishes, waxes, air fresheners	Limonene, alpha-pinene, terpinolene, alpha-terpineol, linalool, linalyl acetate and other terpenoids, longifolene and other sesquiterpenes	hydrogen and organic peroxides, acetone, benzaldehyde, 4-hydroxy-4-methyl-5-hexen-1-ol, 5-ethenyl-dihydro-5-methyl-2(3H)-furanone, 4-AMC, SOAs including ultrafine particles
Natural rubber adhesive	Isoprene, terpenes	Formaldehyde, methacrolein, methyl vinyl ketone
Photocopier toner, printed paper, styrene polymers	Styrene	Formaldehyde, benzaldehyde
Environmental tobacco smoke	Styrene, acrolein, nicotine	Formaldehyde, benzaldehyde, hexanal, glyoxal, N-methylformamide, nicotinaldehyde, cotinine
Soiled clothing, fabrics, bedding	Squalene, unsaturated sterols, oleic acid and other saturated fatty acids	Acetone, geranyl acetone, 6MHO, 4OPA, formaldehyde, nonanal, decanal, 9-oxo-nonanoic acid, azelaic acid, nonanoic acid
Soiled particle filters	Unsaturated fatty acids from plant waxes, leaf litter, and other vegetative debris; soot; diesel particles	Formaldehyde, nonanal, and other aldehydes; azelaic acid; nonanoic acid; 9-oxo-nonanoic acid and other oxo-acids; compounds with mixed functional groups (=O, -OH, and -COOH)
Ventilation ducts and duct liners	Unsaturated fatty acids and esters, unsaturated oils, neoprene	C5 to C10 aldehydes
"Urban grime"	Polycyclic aromatic hydrocarbons	Oxidized polycyclic aromatic hydrocarbons
Perfumes, colognes, essential oils (e.g. lavender, eucalyptus, tea tree)	Limonene, alpha-pinene, linalool, linalyl acetate, terpinene-4-ol, gamma-terpinene	Formaldehyde, 4-AMC, acetone, 4-hydroxy-4-methyl-5-hexen-1-ol, 5-ethenyl-dihydro-5-methyl-2(3H)-furanone, SOAs including ultrafine particles
Overall home emissions	Limonene, alpha-pinene, styrene	Formaldehyde, 4-AMC, pinonaldehyde, acetone, pinic acid, pinonic acid, formic acid, benzaldehyde, SOAs including ultrafine particles

Abbreviations: 4-AMC, 4-acetyl-1-methylcyclohexene; 6MHQ, 6-methyl-5-heptene-2-one, 4OPA, 4-oxopentanal, SOA, Secondary Organic Aerosols Reference: Charles J Weschler; Environmental Health Perspectives, Vol 114, October 2006

For butane:
log Kow: 2.89
Koc: 450-900
BCF: 1.9

Environmental Fate

Terrestrial Fate: An estimated Koc value of 900, determined from a log Kow of 2.89 indicates that n-butane is expected to have low mobility in soil. Volatilisation of n-butane from moist soil surfaces is expected to be an important fate process given an estimated Henry's Law constant of 0.95 atm-cu m/mole, derived from its vapor pressure, 1820 mm Hg and water solubility, 61.2 mg/l. The potential for volatilisation of n-butane from dry soil surfaces may exist based upon its vapor pressure. While volatilisation from soil surfaces is expected to be the predominant fate process of n-butane released to soil, this compound is also susceptible to biodegradation. In one soil, a biodegradation rate of 1.8 mgC/day/kg dry soil was reported.

Aquatic fate: The estimated Koc value indicates that n-butane may adsorb to suspended solids and sediment. Volatilisation from water surfaces is expected based upon an estimated Henry's Law constant. Using this Henry's Law constant volatilisation half-lives for a model river and model lake are estimated to be 2.2 hours and 3 days, respectively. An estimated BCF of 33 derived from the log Kow suggests the potential for bioconcentration in aquatic organisms is moderate. While volatilisation from water surfaces is expected to be the major fate process for n-butane released to water, biodegradation of this compound is also expected to occur. In a screening study, complete biodegradation was reported in 34 days. In a second study using a defined microbial culture, it was reported that n-butane was degraded to 2-butanone and 2-butanol. Photolysis or hydrolysis of n-butane in aquatic systems is not expected to be important.

Atmospheric fate: According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere and the vapour pressure, n-butane, is expected to exist solely as a gas in the ambient atmosphere. Gas-phase n-butane is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 6.3

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days, calculated from its rate constant of 2.54×10^{-12} cu cm/molecule-sec at 25 deg.

Based on data for iso-octane and n-hexane, n-butane is not expected to absorb UV light in the environmentally significant range, >290 nm and probably will not undergo direct photolysis in the atmosphere. Experimental data showed that 7.7% of the n-butane fraction in a dark chamber reacted with nitrogen oxide to form the corresponding alkyl nitrate, suggesting nighttime reactions with radical species and nitrogen oxides may contribute to the atmospheric transformation of n-butane.

For Propane: Koc 460. log Kow 2.36.

Henry's Law constant of 7.07×10^{-1} atm-cu m/mole, derived from its vapour pressure, 7150 mm Hg, and water solubility, 62.4 mg/L. Estimated BCF: 13.1. Terrestrial Fate: Propane is expected to have moderate mobility in soil. Volatilization from moist soil surfaces is expected to be an important fate process. Volatilization from dry soil surfaces is based vapor pressure. Biodegradation may be an important fate process in soil and sediment.

Aquatic Fate: Propane is expected to adsorb to suspended solids and sediment. Volatilization from water surfaces is expected and half-lives for a model river and model lake are estimated to be 41 minutes and 2.6 days, respectively. Biodegradation may not be an important fate process in water.

Ecotoxicity: The potential for bioconcentration in aquatic organisms is low.

Atmospheric Fate: Propane is expected to exist solely as a gas in the ambient atmosphere. Gas-phase propane is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 14 days and is not expected to be susceptible to direct photolysis by sunlight.

DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
tetramethrin	HIGH	HIGH
d-phenothrin	HIGH	HIGH
permethrin	HIGH	HIGH
butane	LOW	LOW
propane	LOW	LOW

Bioaccumulation potential

Ingredient	Bioaccumulation
tetramethrin	HIGH (LogKOW = 4.73)
d-phenothrin	LOW (LogKOW = 7.5367)
permethrin	LOW (LogKOW = 7.4267)
butane	LOW (LogKOW = 2.89)
propane	LOW (LogKOW = 2.36)

Mobility in Soil

Ingredient	Mobility
tetramethrin	LOW (Log KOC = 3533)
d-phenothrin	LOW (Log KOC = 178400)
permethrin	LOW (Log KOC = 178400)
butane	LOW (Log KOC = 43.79)
propane	LOW (Log KOC = 23.74)

13. Disposal Considerations

Waste treatment methods

Product / Packaging disposal

- Consult State Land Waste Management Authority for disposal.
- Discharge contents of damaged aerosol cans at an approved site.
- Allow small quantities to evaporate.
- DO NOT incinerate or puncture aerosol cans.
- Bury residues and emptied aerosol cans at an approved site.

Ensure that the hazardous substance is disposed in accordance with the Hazardous Substances (Disposal) Notice 2017

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Disposal Requirements

Packages that have been in direct contact with the hazardous substance must be only disposed if the hazardous substance was appropriately removed and cleaned out from the package. The package must be disposed according to the manufacturer's directions taking into account the material it is made of. Packages which hazardous content have been appropriately treated and removed may be recycled.

The hazardous substance must only be disposed if it has been treated by a method that changed the characteristics or composition of the substance and it is no longer hazardous.

DO NOT deposit the hazardous substance into or onto a landfill or a sewage facility. Burning the hazardous substance must happen under controlled conditions with no person or place exposed to

(1) a blast overpressure of more than 9 kPa; or

(2) an unsafe level of heat radiation.

The disposed hazardous substance must not come into contact with class 1 or 5 substances.

14. Transport Information

Classified as a dangerous goods according to the NZ Land Transport Rule for road and rail, IMDG for sea, IATA for air. Class 2.1 should not be loaded on the same vehicle as Classes 1, 3 (where both are in bulk), 4, 5, and 7. They may be loaded with Classes 3, 6, 8, 9, foodstuffs and foodstuff empties.

UN number: 1950
Class(es) 2.1
Precautions: 1L

Proper shipping name: Aerosols
Packing group: NA
Hazchem code: NA

IMDG

UN number: 1950
Class(es) 2.1
Precautions: 1L

Proper shipping name: AEROSOLS
Packing group: NA
EmS: F-D, S-U

IATA

UN number: 1950
Class(es) 2.1
Precautions: 150kg

Proper shipping name: AEROSOLS
Packing group: NA
ERG Guide 10L

15. Regulatory Information

Safety, health and environmental regulations / legislation specific for the substance or mixture

This substance is to be managed using the conditions specified in an applicable Group Standard

HSR Number	Group Standard
000264	Flammable aerosol containing 0.5g/l d-phenothrin , 1.0 g/l permethrin and 2.9g/l tetramethrin

Please refer to Section 8 of the SDS for any applicable tolerable exposure limit or Section 12 for environmental exposure limit.

naphtha petroleum, isoparaffin, hydrotreated is found on the following regulatory lists

Chemical Footprint Project - Chemicals of High Concern List

New Zealand Approved Hazardous Substances with controls

New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals

New Zealand Inventory of Chemicals (NZIoC)

New Zealand Land Transport Rule; Dangerous Goods 2005 - Schedule 2 Dangerous Goods in Limited Quantities and Consumer Commodities

New Zealand Workplace Exposure Standards (WES)

tetramethrin is found on the following regulatory lists

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs - Not Classified as Carcinogenic

New Zealand Approved Hazardous Substances with controls

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New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals - Classification Data

New Zealand Inventory of Chemicals (NZIoC)

New Zealand Land Transport Rule: Dangerous Goods 2005 - Schedule 1 Quantity limits for dangerous goods

New Zealand Land Transport Rule: Dangerous Goods 2005 - Schedule 1 Quantity limits for dangerous

New Zealand Workplace Exposure Standards (WES)

d-phenothrin is found on the following regulatory lists

New Zealand Approved Hazardous Substances with controls

New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals

New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals - Classification Data

New Zealand Inventory of Chemicals (NZIoC)

New Zealand Land Transport Rule: Dangerous Goods 2005 - Schedule 1 Quantity limits for dangerous goods

butane is found on the following regulatory lists

Chemical Footprint Project - Chemicals of High Concern List

New Zealand Approved Hazardous Substances with controls

New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals

New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals - Classification Data

New Zealand Inventory of Chemicals (NZIoC)

New Zealand Workplace Exposure Standards (WES)

propane is found on the following regulatory lists

New Zealand Approved Hazardous Substances with controls

New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals

New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals - Classification Data

New Zealand Inventory of Chemicals (NZIoC)

New Zealand Workplace Exposure Standards (WES)

Hazardous Substance Location

Subject to the Health and Safety at Work (Hazardous Substances) Regulations 2017.

Hazard Class	Quantity (Closed Containers)	Quantity (Open Containers)
2.1.2A	3 000 L (aggregate water capacity)	3 000 L (aggregate water capacity)

Maximum quantities of certain hazardous substances permitted on passenger service vehicles

Subject to Regulation 13.14 of the Health and Safety at Work (Hazardous Substances) Regulations 2017.

Hazard Class	Gas (aggregate water capacity in mL)	Liquid (L)	Solid (kg)	Maximum quantity per package for each classification
6.5A or 6.5B	120	1	3	
2.1.2A				1L (aggregate water capacity)

National Inventory Status

National Inventory	Status
Australia - AIIC / Australia Non-Industrial Use	Yes
Canada – DSL	No (tetramethrin; d-phenothrin; permethrin)

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China - IECSC	No (naphtha petroleum, isoparaffin, hydrotreated; tetramethrin; d-phenothrin; permethrin; butane; propane)
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	Yes
Korea - KECI	No (d-phenothrin)
New Zealand - NZIoC	Yes
Philippines - PICCS	No (d-phenothrin)
USA - TSCA	TSCA Inventory 'Active' substance(s) (naphtha petroleum, isoparaffin, hydrotreated; butane; propane); No (permethrin)
Taiwan - TCSI	Yes
Mexico - INSQ	Yes
Vietnam - NCI	Yes
Russia - FBEPH	Yes
Legend:	<i>Yes = All CAS declared ingredients are on the inventory No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.</i>

16. Other Information

Ingredients with multiple cas numbers

Name	CAS No
naphtha petroleum, isoparaffin, hydrotreated	64742-48-9., 101795-02-2., 64771-72-8.
d-phenothrin	51186-88-0, 188023-86-1, 26046-85-5, 51134-87-3, 26002-80-2
permethrin	52645-53-1, 54774-45-7, 57608-04-5, 93388-66-0, 63364-00-1, 60018-94-2, 75497-64-2

Classification of the preparation and its individual components has drawn on official and authoritative sources using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average

PC—STEL: Permissible Concentration-Short Term Exposure Limit

IARC: International Agency for Research on Cancer

ACGIH: American Conference of Governmental Industrial Hygienists STEL: Short Term Exposure Limit

TEEL: Temporary Emergency Exposure Limit.

IDLH: Immediately Dangerous to Life or Health Concentrations ES: Exposure Standard

OSF: Odour Safety Factor

NOAEL: No Observed Adverse Effect Level

LOAEL: Lowest Observed Adverse Effect Level TLV: Threshold Limit Value

LOD: Limit Of Detection

OTV: Odour Threshold Value

BCF: BioConcentration Factors BEI: Biological Exposure Index DNEL: Derived No-Effect Level

PNEC: Predicted no-effect concentration

MARPOL: International Convention for the Prevention of Pollution from Ships IMSBC: International Maritime Solid Bulk Cargoes Code

IGC: International Gas Carrier Code

IBC: International Bulk Chemical Code

AIIC: Australian Inventory of Industrial Chemicals DSL: Domestic Substances List

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NDSL: Non-Domestic Substances List
IECSC: Inventory of Existing Chemical Substance in China
EINECS: European INventory of Existing Commercial chemical Substances
ELINCS: European List of Notified Chemical Substances NLP: No-Longer Polymers
ENCS: Existing and New Chemical Substances Inventory KECl: Korea Existing Chemicals Inventory
NZIoC: New Zealand Inventory of Chemicals
PICCS: Philippine Inventory of Chemicals and Chemical Substances TSCA: Toxic Substances Control Act
TCSI: Taiwan Chemical Substance Inventory
INSQ: Inventario Nacional de Sustancias Químicas NCI: National Chemical Inventory
FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

Review

Date	Reason for review
1 April 2025	Phone number updated

Disclaimer

This SDS was prepared by INTEGRA INDUSTRIES LTD and is based on our current state of knowledge, including information obtained from suppliers. The SDS is given in good faith and constitutes a guideline (not a guarantee of safety). The level of risk each substance poses is relevant to its properties (as summarised in the SDS) AND HOW THE SUBSTANCE IS USED. While guidelines are given for personal protective equipment, such precautions must be relevant to the use. The likely GHS 7 classifications for this SDS have been estimated based on general information from the supplier (e.g., hazard, toxicological). This SDS is copyright INTEGRA INDUSTRIES LTD and must not be copied, edited or used for other than intended purpose. To contact the SDS author, email sales@integraindustries.co.nz or phone: +64 3 455 6805.